coleção Relações Internacionais

The energy statecraft of Brazil

the rise and fall of Brazil's ethanol diplomacy

The *Alexandre de Gusmão Foundation* (Funag) was established in 1971. It is a public foundation linked to the Ministry of Foreign Affairs whose goal is to provide civil society with information concerning the international scenario and aspects of the Brazilian diplomatic agenda. The Foundation's mission is to foster awareness of the domestic public opinion with regard to international relations issues and Brazilian foreign policy.

Klaus Guimarães Dalgaard

The energy statecraft of Brazil

the rise and fall of Brazil's ethanol diplomacy

FUNDAÇÃO ALEXANDRE DE GUSMÃO

Brasília – 2017

Ministry of Foreign Affairs
Esplanada dos Ministérios, Bloco H
Anexo II, Térreo, Sala 1
70170-900 Brasília-DF
Telefones: +55 (61) 2030-6033/6034
Fax: +55 (61) 2030-9125
Website: www.funag.gov.br
E-mail: funag@funag.gov.br

Editorial Staff:
Eliane Miranda Paiva
André Luiz Ventura Ferreira
Fernanda Antunes Siqueira
Gabriela Del Rio de Rezende
Luiz Antônio Gusmão

Graphic Design and cover:
Daniela Barbosa

Printed in Brazil 2017

D142 Dalgaard, Klaus Guimarães.
The energy statecraft of Brazil : the rise and fall of Brazil's ethanol diplomacy / Klaus Guimarães Dalgaard.– Brasília : FUNAG, 2017.

528 p. - (Coleção relações internacionais)
ISBN 978-85-7631-718-0

1. Recursos energéticos - Brasil. 2. Política energética - Brasil. 3. Política externa - Brasil. 4. Segurança energética. 5. Diplomacia energética. 6. Programa Nacional do Álcool (Brasil) (Proalcool). 7. Fonte alternativa de energia - Brasil. I. Título. II. Série.

CDD 333.7

Depósito Legal na Fundação Biblioteca Nacional conforme Lei n° 10.994, de 14/12/2004.
Bibliotecária responsável: Kathryn Cardim Araujo, CRB-1/2952

To Christopher Coker

ACKNOWLEDGEMENTS

Over eleven years have passed since 3 April 2006, the day I had the epiphany that inspired me to do a PhD on energy security in Latin America. The thought came to me in a meeting with Flávio Saraiva at the Royal United Services Institute for Defence and Security Studies (RUSI) in London – where I was employed as an assistant editor – in which we were discussing possible avenues for research collaboration between RUSI and the Brazilian Institute of International Relations (IBRI). The discussion never went any further than that meeting, but as fate would have it, professor Saraiva would be end up being the external examiner at the viva of the very thesis whose existence began that day.

At that point in time, I had already been accepted as a PhD candidate at my old *alma mater*, the London School of Economics and Political Science (LSE), although the research project I had submitted was on EU defence policy. A couple of weeks thereafter, I consulted my former undergraduate tutor and soon-to-be PhD supervisor, Christopher Coker, about the possibility of completely changing my research topic. He did not seem very enthusiastic about the idea, but accepted it on the condition that I submit a new research proposal within a month. Searching and gathering enough sources to write a research proposal from scratch within a month (especially on a subject one knew next to nothing about) might have been too challenging a task… if a certain president had not decided to nationalise Bolivia's hydrocarbon sector and expropriate Brazilian natural gas production facilities on May Day 2006. Suddenly fate provided me with an avalanche of news and analyses on the ramifications of that event, as well as two consecutive special issues of *Foreign Affairs* relevant to my subject matter. Thus began the venture that would culminate with the publication of this book over eleven years later.

It has been a long journey indeed – as fascinating as it was frustrating, as wretched as it was rewarding – and so many people have played a part in it that I could not possibly thank them all. I will nevertheless try my best, and apologise profusely to those I have left out.

First and foremost, I thank my parents, Hebe and Svenning, for their unconditional love and support – in particular for their help in securing countless and invaluable interviews for my field research, as well as for their financial support, of course. I owe an eternal debt of gratitude to my godfather Helder and my aunt Rita, without whose unsolicited generosity in lending me the money to pay for my freshman year's tuition, I would never have been able to attend LSE in the first place. I appreciate all the academic advice given to me by my uncle Hegler, as well as the support of my aunt Denise, my uncle Heber, my cousins Henrique, Homero and Marcelo, and my grandmother Deusita, God rest her soul. I am also grateful to my family in Rotterdam – Alice, Floris and Daniel – for their frequent hospitality and emotional support.

I would like to thank the Danish foundation, Frimodt-Heineke Fonden, for its generosity in awarding me a scholarship during the first year of my PhD. In the academic world, my first acknowledgement goes to the LSE's Department of International Relations – where I studied for three degrees, taught and lectured over the span of ten years – for its institutional and financial support. Specifically, I am grateful to Chris Alden, whose *Foreign Policy Analysis* course I taught at undergraduate, Summer School and even MSc level (a couple of times as a stand-in for Dr Alden), and who was the internal examiner at my viva. I thank professors Michael Cox and James Mayall for their PhD workshops I attended and presented my research's progress. I would also like to thank professor George Phillip, Sean Burges and Maria Cristina Pecequilo for comments and/or guidance on my early research. In particular, I am grateful to professor Flávio Saraiva not only for being part of the conversation that inspired my PhD and being the external examiner at my viva, but also for the numerous conversations on my subject matter, amounting almost to an informal supervision. And though it might be a cliché, I am also grateful to my undergraduate *Foreign Policy Analysis* students, from whom I have learned more than I could ever hope to teach them.

My gratitude goes out to all the incredibly smart and illustrious people who were so kind as to spare their time – sometimes more than once – to give me (or help me secure) an interview, whose insights have enriched the quality and depth of this work and made it truly unique and original: ambassador Antônio de Aguiar Patriota; ambassador Antônio José Ferreira Simões; federal representative Antônio Carlos de Mendes Thame; Antônio Lício; Claudia Santos Vieira; Cristina Maria Monteiro Machado; Emerson Coraiola Kloss; Habib Jorge Fraxe Neto; Helena Claudia Cantizano; Henry Groppe; José Miguez; Paulo César Lima; Renato Domith Godinho; Rodrigo Dolabella; Sílvia Cupertino; Alexis Crow; Enrique Natalino; José Carlos Carvalho; Marco Túlio Scarpelli Cabral; and those interviewees who wished to remain anonymous.

I would like to convey my appreciation and gratitude to Ambassador Sérgio Eduardo Moreira Lima, president of the Alexandre de Gusmão Foundation (FUNAG), for his encouragement in the completion of my research and the publishing of this book. I would also like to thank João Genésio de Almeida Filho, for accepting my invitation to write this book's foreword, as well Paulo Roberto de Almeida, Eliane Miranda Paiva and FUNAG's editorial staff, for their part in the editorial process.

A special recognition is owed to my research assistant, Felipe Mendes Cardoso, whose tireless and invaluable service was indispensable in updating my doctoral thesis and adapting it into the book you hold before you.

And what would such a lonely, lasting and arduous endeavour have been without friends and colleagues to keep me sane and entertained throughout? First and foremost among my friends in London, words cannot describe the sheer debt of gratitude I owe Alex Pyatov, whose unwavering loyalty should never be underestimated, whose outrageous and politically incorrect sense of humour never ceases to amuse, shock and revolt, and whose endless generosity and hospitality I abused beyond reason. My unconditional friendship and thankfulness goes out to: Maria Emília Briso, whom I gave away at her wedding and who is now godmother to my son; Tiago Kieckbusch, with whom I have shared countless crazy adventures and can always count on to take a walk on the wild side when life gets too serious; Marco Vieira, my favourite conference companion, whose friendship strikes the perfect balance of intellectual seriousness and careless fun; Clara Roorda, whose one-year exchange at LSE turned into a life-long friendship; Carolina Pavese, whose friendship and support are as strong during hard times as they are during good ones; Bernardo Almeida and Mónica Salgado, my favourite quirky couple, for their patience, constant hospitality and always ready shoulder to cry on; Terence McNamee, my boss at RUSI, who taught me the importance of leadership in a professional setting; Adriana Vilella Nilsson, the most excellent, wise and entertaining field-research partner one could hope for; and to Walter Dos Santos, Morten Kirk Olesen, Christopher Wilson, Åsa Glöck, Spencer Morley and Laurien Fields, for all the good times, advice and support. I would also like to thank my friends on the continent – Henrique Delgado, Inês Jordão, Michael Ellegaard and Michiel Mussies – for their friendship, hospitality and the great adventures we shared during my constant visits across the Channel. And my friends in Brasília have my thorough appreciation for their friendship and company while I was there doing field research: Daniel Valle de Lima, Amena Yassine and, of course, the other two '*mousquetaires*', Raphael Montejo and François Tournon – '*un pour tous et tous pour un!*'

I want to thank my beautiful wife Fabiana and our adorable son Theo for bringing so much love and joy to my life and for their constant patience, understanding and support throughout the past couple of years. I love them both with all my heart and soul – a love that grows stronger every day. And our love and joy at home would not be complete without our cat, Madalena, who is sleeping on my lap as I write this.

In the spirit of saving the best for last, I owe my greatest gratitude to Christopher Coker – my supervisor, my mentor, my friend, my 'Captain! My Captain!' and elite drinking companion. I have known Christopher for precisely half my life, and I still cannot find the words that would do justice to the utter respect and admiration I have for him, nor to how grateful I am for all that he has done for me over the years, for his unconditional and selfless generosity, for his wisdom and guidance, for his wit and most enjoyable company,

for his steadfastness and patience, for his unwavering faith in me. In want of the right words, I dedicate this book to him.

Belo Horizonte, Brazil, July 2017

FOREWORD[1]

This book comes at a moment when careful reflection on energy is of paramount importance. We look at any direction and energy is there as a topic to be better understood, discussed and decided upon.

Energy-related issues are going through many transformations in Brazil and around the world. Let us mention at least some of these below.

Transformations affecting the energy scenario are often debated, and the expression 'energy transition' appears increasingly in official documents and fora (G20 and BRICS, to name just two). The 'shale revolution' has caused immense changes to the oil and gas markets. Natural gas has been supplying the market in unprecedented quantities. New reserves of oil are announced very frequently. We may reduce our consumption of oil not because of the lack of it, but for climate-related reasons.

Along with hydropower, other clean sources of energy are being used more frequently, like solar and wind energy. Efficiency is another area where we are undergoing many changes – not only those propelled by technological advances, but also those that stem

1 The author of this preface writes in his personal capacity.

from a growing concern about the importance of energy savings due to climate change. Air pollution in big and mega cities can be drastically improved by the widespread use of electric cars and/or a combination of electric batteries and biomass combustion systems in vehicles.

Brazilian law and regulatory statutes have been changed. Law 13.365 issued in November 2016 revoked Petrobras' right as the 'sole operator' in the exploration of the massive Pre-Salt oil reserves, as well as its mandatory participation of 30% in all exploration. In February 2017, the Brazilian National Council of Energy Policy (*Conselho Nacional de Política Energética* – CNPE) reduced the mandatory national-content requirements in the oil sector. The Government renewed the special customs regime until 2040, known as REPETRO, as an additional incentive for oil exploration in Brazil.

Since 2006, Brazil is no longer the number one producer of ethanol, having lost the lead to the United States. Between 2005 and 2014, the United States produced 56% of the global ethanol output, while Brazil responds for less than half of it, 26.6%. During the same period, Brazil became an important player in the field of biodiesel and today accounts for 11.4% of the global market share. In the Brazilian case, Indirect Land Use Change (ILUC) has been understood as a questionable conceptual tool – if not non-applicable at all.

Against this backdrop, the book by Klaus Guimarães Dalgaard emerges as a powerful reference, which helps us to better understand this intricate world. In a solid manner, he leads us through a conceptual 'cascade' – from statecraft, to economic statecraft, to energy statecraft, to ethanol statecraft. These conceptual tools are not only relevant to the academic environment, but are of vital importance for those who work with energy diplomacy or are interested in approaching energy as an instrument of power in international relations. The adaptation of the idea of economic statecraft to that of energy statecraft, as a subcategory with its own specificities, is particularly enlightening.

When ethanol comes into play, the reader realizes the relevance of the conceptual work. Ethanol is a source of energy of a very particular kind. Its use as fuel was for a long time part of a Brazilian policy of energy security, a homegrown reply to the oil crises of the 70s. (In any case, let us not forget that ethanol was part of the history of the first automotive engines). This uniqueness and the recent expansion of ethanol as a fuel make it more difficult to analyze, so it is even more important to have endeavors like the one contained in this book.

The author reminds us that '[w]ithin the relatively limited literature on economic statecraft – for, as Baldwin draws attention to, the "two most salient characteristics of the literature on economic statecraft are scarcity and the nearly universal tendency to denigrate the utility of such tools of foreign policy" – positive economic statecraft (the proverbial "carrot") is significantly under-researched compared to negative forms of economic statecraft (or "sticks").' And ethanol is definitely a carrot.

It suffices to look at the relation between climate change and transportation. According to EUROSTAT, the transport sector was responsible for 15% of carbon dioxide emissions in 1990 and responded to 23% in 2015, nearly a quarter of the world's total emissions. If we are to make an impact on the reduction of emissions and meet the goals of the Paris Agreement – namely, to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius –

the transport sector is to be taken very seriously indeed. In this context, the use of ethanol, which reduces the transport sector's carbon footprint, is essential.

That is the reason why Brazil spearheaded the Biofuture Platform at UNFCCC COP 22 (November 2016). Understanding the potential to limit global greenhouse gas (GHG) emissions in the transport sector, Brazil and 19 other countries (Argentina, Canada, China, Denmark, Egypt, Finland, France, India, Indonesia, Italy, Morocco, Mozambique, Netherlands, Paraguay, Philippines, Sweden, United Kingdom, United States of America, and Uruguay) are joining efforts to accelerate the development and deployment of advanced low-carbon biofuels, in the most diverse sectors, as sustainable alternatives to fossil fuels. Ethanol diplomacy is very much alive.

If the message of the Biofuture Plaform is well understood, we will see that scaling up the use of biofuels can significantly contribute to the reduction of GHG emissions both in the short and long term. The purpose is not a simple one, and Brazil is not promoting a one-size-fits-all solution. Lowering emissions in transportation is a challenging task that requires refinement to be tackled. No isolated solution will change the world of transportation fuels overnight. However, there are means available to move faster toward that goal. Only a combination of policies and strategies can address the question in the most effective way. Biofuels – for its low-emission records, for its ready availability and for the simplicity of its integration into existing transportation infrastructure – is certainly part of the solution.

While studying Brazil's ethanol policy in a specific context, Klaus Dalgaard has opened the door for further analyses. His work is not only about a specific period in Brazil's foreign policy, when ethanol was at the forefront of diplomacy. The solid conceptual structure he built and the case study he presented have made an invaluable contribution to the ongoing debate on the role of energy, and how it functions, in international relations.

João Genésio de Almeida Filho
Director of the Department of Energy
Brazilian Ministry of Foreign Affairs

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ABBREVIATIONS

ABC	Brazilian Cooperation Agency
ANFAVEA	Brazilian Automotive Industry Association
ANP	Brazil's National Petroleum Agency
APEX-Brasil	Brazilian trade and investment promotion agency
BNDES	Brazil's National Development Bank
CEO	Chief Executive Officer
CERA	Cambridge Energy Research Associates
COP	Conference of the Parties
E&P	Exploration and Production
Embrapa	Brazilian Agricultural Research Corporation
EPA	Environmental Protection Agency
EPE	Energy Research Company
EROI	Energy Return On Investment
ETBE	Ethyl Tertiary-Butyl Ether
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FFV	Flex-Fuel Vehicle
FIESP	Federation of Industries of the State of São Paulo
GDP	Gross Domestic Product

GECF	Gas Exporting Countries Forum
GHG	Greenhouse gas
GJ	Gigajoule
ha	hectares
ha/MLge	hectares per Million Litres of gasoline equivalent
IBF	International Biofuels Forum
IEA	International Energy Agency
ILUC	Indirect Land-Use Change
INDC	Intended Nationally Determined Contribution
INMETRO	Brazilian National Institute for Metrology, Normalization and Industrial Quality
IOC	International Oil Company
IPCC	Intergovernmental Panel on Climate Change
IR	International Relations
LNG	Liquefied Natural Gas
MAPA	Agriculture, Livestock and Supply Ministry
mbd	million barrels/day
MEND	Movement for the Emancipation of the Niger Delta
MLge	Million Litres of gasoline equivalent
MOU	Memorandum of Understanding
MTBE	Methyl Tertiary-Butyl Ether
NATO	North Atlantic Treaty Organization
NGO	Non-Governmental Organisation
NIST	National Institute of Norms and Technology
NOC	National Oil Company
OECD	Organization for Economic Cooperation and Development
OPEC	Organization of Petroleum Exporting Countries

PDVSA	Petróleos de Venezuela S.A.
ProÁlcool	Brazil's National Alcohol Program
R&D	Research and Development
RFS	Renewable Fuel Standard
SPR	Strategic Petroleum Reserve
SUV	Sport-Utility Vehicle
TPES	Total Primary Energy Supply
UK	United Kingdom
UN	United Nations
UNICA	Brazilian Sugarcane Industry Association
US	United States
USAID	United States Agency for International Development
USGS	United States Geological Survey

PREFACE

This book was originally a PhD thesis defended at the London School of Economics and Political Science's (LSE) Department of International Relations in 2012, but has since been updated with analysis based on new interviews and further collection of primary and secondary sources, in order to reflect the developments that occurred in Brazil's ethanol diplomacy between 2012 and 2017. The ideas that shaped this work have a long history, fraught with conceptual dead ends, detours and significant changes in both theme and structure.

Before I started my PhD, I was assistant editor at the publications department of the Royal United Services Institute for Defence and Security Studies (RUSI) in London. It was my responsibility to read, edit and sometimes even rewrite the vast majority of articles and manuscripts that RUSI published (as well as many more that we did not publish) – in other words, I had the privilege of being exposed to all the great debates on national and international security, defence and military science of the mid-2000s. I noticed a particular topic that was being increasingly mentioned in both conferences and publications at RUSI, namely energy security. Back then, the barrel of oil had not yet reached $60 in what would later become the gradual ascent to the record price of $147 per barrel, but energy security was already at the top of the international security agenda the world over. Most discussions hovered around the US-led war in Iraq and the 'blood for oil' narrative; Europe's dependence on Russian gas imports and the latter's so-called 'pipeline wars'; China's tireless search for energy to fuel its rapidly growing market and its increasing presence in Africa; as well as NATO's presence in Afghanistan and the growing role of ensuring energy security among its objectives. However, very little was being said about Latin America, despite the huge diversity of energy-related issues happening in that part of the world – from Venezuela's vast oil wealth under Hugo Chávez's regime, to the many 'gas wars' between Bolivia and its neighbours, to Brazil's dilemma between international energy cooperation and domestic energy independence. Being part Latin American myself, and thus having a natural comparative advantage in studying the region, I had found the niche I would explore in my PhD: energy security in South America.

Among the countless specific topics to choose from, the most talked about at the time seemed to be energy integration in South America, given the mutual compatibility of countries with large natural gas reserves surrounded by large energy-consuming countries, as well as a predisposition of the continent's leaders (at least rhetorically) to build closer ties among their countries. Thus, the title of my first PhD proposal was 'Energy Security and Regional Integration in South America'.

Despite earlier (though less glamorous) attempts at regional infrastructure, including energy, integration in South America – such as the Initiative for the Integration of the Regional Infrastructure of South America (IIRSA), launched in 2000 – by the mid- to late-2000s, the most debated issue on the subject of South American regionalism was the competing visions for regional cooperation. On the one hand, Hugo Chávez proposed the

Bolivarian Alternative for the Americas (ALBA), funded essentially by his country's oil windfall. On the other hand, Brazil, under the leadership of Lula, promoted more market-friendly forms of regional cooperation, while also encouraging Latin American countries to produce their own biofuels. Given the pervasiveness of sources on these competing visions of regionalism at the time, my early research started drifting in that direction, comparing and contrasting these two models.

As is almost invariably the case in doctoral research, however, I soon encountered obstacles, initially of a conceptual nature. My first PhD panel was adamant that the inclusion of the word 'security' in my title meant that I necessarily needed to explore theories of Security Studies in my framework, even though I tried to explain that energy security is different than 'traditional' security, and in that sense the French term for it – *sûreté énérgetique*, as opposed to *sécurité* – was much more appropriate, since energy security implies certainty (of supply) much more than it denotes security in the military sense of the word. Moreover, the use of 'traditional' theories of regional integration – developed for the study of European integration – were not appropriate for application in the case of South American integration. Thus, out of purely semantic reasons, I had to go back to the proverbial drawing board and try to rethink my thesis conceptually.

In order to salvage most of what I had done up to that point, I shifted my thesis' focus from regional integration to regional leadership, wanting to compare the leadership styles of Chávez and Lula, both of whom used, to varying degrees, their respective countries' domestic energy resources and expertise in their leadership strategies. The problem with this approach was that my research inevitably turned towards a theoretical inquiry into the nature and motivations of international leadership and hegemony, with energy being at best a mere case study of the many instruments of power used in South America's dispute for regional leadership. However, it had always been my intention to do the opposite: to study the nature and role of energy in international relations, with South American countries serving as case studies thereof. The noticeable disconnect between my original intention, reflected in my empirical work, and the conceptual dead end I was pursuing in my theoretical framework, was raised as a major concern by my second PhD panel a year later. Insofar as I expressed my intention to focus on energy, my panel recommended that I abandon all my theoretical work on leadership/hegemony and use some concept taken from the field of Foreign Policy Analysis instead.

Taking heed to my PhD panel's advice, it was not until I applied to teach the LSE's undergraduate Foreign Policy Analysis course that I finally found the missing piece to the puzzle that was my yet-to-be-defined theoretical framework. When preparing a class on foreign policy instruments, I realised that economic instruments of foreign policy – referred to as economic statecraft in the literature – could include energy resources. After all, these are economic resources, albeit with their own particular characteristics that might differentiate them from other goods used in economic sanctions. It was then a matter of reviewing the economic statecraft literature – some of which explored the use of the 'oil weapon' during OPEC's 1973 embargo – and the emerging literature on energy security in International Relations, in order to construct the theoretical framework for my thesis, before applying it to one or more case studies.

However, I ended up choosing Brazil as a single case study, instead of a comparison with Venezuela, for two reasons. First, Hugo Chávez and the way he was running Venezuela was an intensely polarised subject at the time. It proved extremely difficult to find experts to interview that did not either sanctify or demonise Chávez and his 'bolivarianism'. To a lesser extent, the same was true of academic sources, not to mention that much of Venezuela's official data was highly questionable. In that sense, it proved very difficult to make an objective and balanced assessment of that case study, given the overwhelming bias by both sides on the subject. Fortunately, back then Brazil was not marred by severe polarisation, and one could make an objective analysis based on sources without much bias. Second, and more importantly, energy statecraft using petroleum was nothing new in international relations, even if Chávez's more 'positive' use of it – by selling heavily subsidised oil to Caribbean countries in exchange for political loyalty – is under-researched compared to the punitive use of the oil weapon. For both bribes and coercion constitute the 'hard' end of the power spectrum, whereas energy statecraft used as 'soft power' – through attraction and emulation – had not yet been studied. Not only did Brazil provide a unique case of energy statecraft being employed through soft power, but it was also the only country to use a renewable energy source – namely biofuels – rather than oil or gas.

From that point on, the brainstorming was over and I plunged into the much harder (but simpler) work of researching, collecting data and interviews, analysing all of it and putting it into words. By the time I submitted my thesis, however, several changes – initially at the domestic level but later also in the international context – began to affect my doctorate's subject matter. Some of them I mentioned in my thesis' conclusion, while other subsequent events necessarily needed to be worked into it in order to be published as a book.

On the domestic front, the discovery of enormous oil fields in the so-called 'pre-salt' layer off the coast of Brazil significantly shifted the attention among policy makers, the media and academia in the debate and formulation of the country's energy policy. The euphoria surrounding Brazil's leadership in biofuels switched to its potential role as one of the world's great petroleum exporters – even including talk of joining OPEC – while Brazil's ethanol sector was deprioritised in both domestic and foreign policy. At that point, it seemed like Brazil's ethanol diplomacy was in decline, though my thesis concluded that this had more to do with decisions made in domestic politics, while the international context that gave rise to it was still auspicious.

However, later pivotal developments in the international energy context would affect the prospects of Brazil's ethanol diplomacy even further, with some offering important challenges while others provide new opportunities. The earliest objections to the widespread use of biofuels came from social and environmental movements, respectively accusing biofuels of competing with food production (the infamous 'food *vs.* fuel debate') and claiming that biofuels do not reduce carbon emissions if the effects of land-use change are taken into account. These objections represent a serious challenge to Brazil's ultimate goal of commoditising ethanol because they question two of the fundamental advantages (social and environmental) touted by the Brazilian government in its promotion of biofuels abroad. The third, and perhaps most pressing, advantage of adopting biofuels – namely, the exorbitant price of their main competitor, petroleum – practically collapsed in the face of the continually tumbling oil price resulting from the 'shale revolution' in the United States.

However, the cause of sustainability – and the role that biofuels might play in that cause – made a huge leap forward when the Paris Accord was signed at COP-21 in December 2015. Indeed, the following Conference of the Parties, in Marrakesh, saw the creation of the Biofuture Platform, an initiative led by the Brazilian delegation along with 19 other like-minded countries, to promote new pathways toward a low-carbon future in the transportation sector, including sustainable and advanced biofuels. I interpreted this milestone development as a relaunch of Brazil's ethanol diplomacy, albeit with an adapted strategy under the broader and more flexible concept of 'bioeconomy' – which allows for a myriad of technological pathways to decarbonise transport – rather than the narrower solutions advocated by its previous incarnation. With the Biofuture Platform still in its fledgling state, this seems like the most opportune moment to publish my research, so that the lessons learned during 'The Rise and Fall of Brazil's Ethanol Diplomacy' may be taken into consideration – by policy makers and scholars alike – in the vital mission to decarbonise transport in Brazil and abroad.

Klaus Guimarães Dalgaard, PhD.

CHAPTER 1
INTRODUCTION

Fairly early in his seminal work on the subject of *Economic Statecraft*, David Baldwin cites Harold Lasswell: '*Concepts for the study of influence must be changed or invented when influence is sought by novel means or under changed conditions*.'[2] Baldwin's study was an attempt to theorise, in a comprehensive manner, the increasing use of economic instruments of foreign policy, or what he calls 'economic statecraft', and the proliferation of academic studies on the subject in the late 1970s and early 1980s. The subject of economic instruments of foreign policy became popular not only because of the growing use of economic sanctions, especially when compared to the relatively diminishing use of force (among other reasons, due to its increasing costs) as an instrument of foreign policy, but also as a reaction to the employment of the so-called 'oil weapon' by the Arab members of the Organization of Petroleum Exporting Countries (OPEC) in protest to the Yom Kippur War in 1973, which was a favourite case study in the analysis of economic statecraft. The newfound power of the oil-exporting cartel thus became the subject of much interest among scholars, who at the

2 Lasswell, H., Politics: Who Gets What, When, How, pp. 7-8, cited in Baldwin, D.A., *Economic Statecraft*, (Princeton: Princeton University Press, 1985), p. 29.

time tended to analyse the 'oil weapon' as an economic foreign policy instrument in general, rather than seeing energy resources as unique and intrinsically different from most other economic goods.

In 1986, the year after the publication of Baldwin's book, however, the price of oil collapsed, and interest in the role of energy in International Relations faded quickly, although the theoretical lessons set forth in *Economic Statecraft*, along with Albert Hirschman's *National Power and the Structure of Foreign Trade*, continue to make up the foundation of most subsequent studies on economic instruments of foreign policy. To quote Andreas Goldthau: 'A decade-long period of oversupply on oil and gas markets and resulting low prices calmed public debate on these issues. It is only since the turn of the new millennium, when supply-demand balances both in global oil markets and in regional gas markets tightened again, that energy…has come to receive renewed attention.'[3]

The early twenty-first century witnessed the rise of an international energy context plagued by oil prices rising steadily to historic heights, coupled with fears over the future availability of oil and increasing concerns over environmental degradation, much of it a result of humanity's wanton burning of fossil fuels. Under a tight international oil market, in which producers could not keep up with rising demand from emerging economies, a number of oil and gas exporting countries took advantage of importing countries' scramble for energy resources and used their energy exports politically to manipulate importing states. This sort of behaviour, which the present study terms 'energy statecraft' – be it in the form of the coercive stick, like Russia's natural gas 'pipeline wars'

3 Goldthau, A., Energy Diplomacy in Trade and Investment of Oil and Gas. In: Goldthau, A. & Witte, J.M. (eds.), *Global Energy Governance: The New Rules of the Game*, (Washington, D.C.: Brookings Institution Press, 2010), p. 27.

with Ukraine, or the bribing carrot, like Venezuela's subsidised oil sales to neighbouring countries during Hugo Chávez's regime – rekindled the energy debate in International Relations among scholars, the media and policy makers alike.

Unlike the energy crises of the 1970s and early 1980s, however, the twenty-first century saw the appearance of renewable energy sources as viable alternatives to fossil fuels and also as forms of energy statecraft. While most attention has been given to 'traditional' energy resources such as oil and natural gas, few (if any) studies concerned themselves exclusively with energy statecraft using renewable energy. The problem with the relative scarcity of studies on renewable energy in International Relations is not limited to insufficient research on the matter, but also the fact that discussions of alternative energy resources have often been biased: 'their proponents tend to be over the top in their enthusiasm and their detractors tend to be exaggeratedly negative.'[4] Indeed, Jürgen Maier states that there is 'probably no other energy issue currently being discussed with so much emotion and so little facts as bioenergy.'[5] The present work seeks to remedy this oversight by assessing the use of biofuels as a form of energy statecraft.

The term *biofuels* refers to liquid transportation fuels produced from biological feedstocks like agricultural commodities or other organic materials.[6] Among different kinds of biofuels, ethanol is

4 Howell, D. & Nakhle, C., *Out of the Energy Labyrinth*, (London: I.B. Tauris, 2006), p. 112.

5 Maier, J., Bioenergy: Neither Golden Solution nor Prescription for Disaster. In: Dodds, F., Higham, A. & Sherman, R. (eds), *Climate Change and Energy Insecurity: The Challenge for Peace, Security and Development*, (London: Earthscan Publications, 2009), p. 35.

6 Seelke, C.R. & Yacobucci, B.D., Ethanol and Other Biofuels: Potential for U.S.-Brazil Energy Cooperation, *Congressional Research Service Report for Congress*, 27 September 2007, p. 2. And Zarrilli, S., Development of the Emerging Biofuels Market, In: Andreas Goldthau & Jan Martin Witte (eds.), *Global Energy Governance: The New Rules of the Game*, (Washington, D.C.: Brookings Institute Press, 2010), p.74.

the world's most widely used biofuel for transport, accounting for roughly three quarters of global biofuels production. Ethanol fuel is an alcohol that is mostly produced through a process of fermentation and distillation of starch- or sugar-based crops like corn, beats or sugarcane. Seelke and Yacobucci remind us that ethanol can also be produced from lignocellulose-based feedstocks, like switchgrass and wood chips, although the technology to generate lignocellulosic ethanol is still too expensive to produce on a commercial scale without subsidies. The remaining quarter of biofuels produced include biodiesel made from vegetable oils, like palm oil and soybeans, or animal fats, as well as butanol made from various biological feedstocks. Since ethanol makes up the majority of biofuels produced globally, this study will focus predominantly on ethanol as an instrument of energy statecraft.

Among the world's ethanol producers, Brazil holds a leading position not only as one of the two main producers and exporters – along with the United States, which together are responsible for around 85% of the world's ethanol made for fuel consumption – but unlike other countries Brazil also has over forty years' experience producing ethanol for domestic consumption – a success story that Brazil can share with other countries. Coupled with immense discoveries of oil and natural gas in recent years, Brazil's well-established ethanol industry has positioned the country to be one of the twenty-first century's foremost global energy players.[7] Larry Rother states that Brazil has

> *the abundance of sources of energy, which seem, as the twenty-first century advances, more likely than ever to become one of the main determinants of a nation's power, influence, and prestige on the world stage. Perhaps that is why the government of Luiz Inácio Lula da Silva in 2009*

7 Roett, R., *The New Brazil*, (Washington, D.C.: Brookings Institution Press, 2010), p. 120.

> *adopted the slogan "Brazil, Fifth World Power," implying that Brazil's extraordinary energy foundation is capable of projecting the country into the same category as the United States, the European Union, China, and India.*[8]

According to one observer, 'Brazil really does have a concrete chance of participating in and even leading an important revolution in the world economy' by sharing its knowledge and experience with biofuels with other countries. Indeed, 'the world wants what Brazil has to offer' where biofuels are concerned: 'the country has technology that, if replicated in other countries, has the capacity to significantly reduce the emission of the greenhouse gases'[9] (GHGs) as well as costly petroleum imports, while also creating jobs and promoting rural development. To that end, Brazil's National Development Bank (BNDES) published a comprehensive study advocating the benefits of sugarcane-based ethanol, to be distributed to countries interested in developing their own biofuel programmes (with implied Brazilian assistance):

> *Modern society is facing the worsening of environmental degradation while, at the same time, realizing that its reserves of natural resources, be they energy, water or metals are limited. In this context, energy plays a central role, compelling us to urgently rethink the foundations of an energy-supply model that is showing signs of depletion and seeks new resources which will allow continued socioeconomic development. ... Within this context, bioenergy has proven to be one of the best alternatives to capture and store solar energy, wherever idle land and favorable climate (sunlight, water and*

8 Rother, L. *Brazil on the Rise: The Story of a Country Transformed*, (London: Palgrave Macmillan, 2010), p. 171.

9 Nucci, J.P. Fuel to Change the World, *PIB*, Year 1, Number 2, Dec 07/Jan 08, pp. 32-33.

> *temperature) are matched by sufficient knowledge and an entrepreneurial spirit to apply it.*[10]

By showcasing its successful experience with ethanol, Brazil encourages other countries to adopt biofuel programmes by emulating its own experience. This 'soft power' strategy – getting others to want what you want through imitation, rather than getting others to do what you want through bribes or coercion[11] – has been employed by the Brazilian government in the pursuit of its goal to spread the production, use and international trade of biofuels, with the aim of creating a global market in which ethanol is freely traded as a commodity and Brazil has a natural competitive advantage. However, the world has yet to develop a formal commodity market for major biofuel transactions with globally-recognised prices, similar to the long-established international oil market. For this to happen, not only do more biofuels need to be produced (and, obviously, consumed), but a much larger number of countries need to grow their own biofuels, in order to avoid the reliance on few (potentially unreliable) suppliers that currently plagues the international oil market – a condition without which only a few countries are willing consume biofuels that are not indigenously grown. It is against this backdrop that the Brazilian government formulated its foreign policy goal to 'commoditise' ethanol and increase its exports thereof – a goal that Brazil pursues through energy statecraft by promoting the use of biofuels to other countries as an instrument of its foreign policy – or what has been called Brazil's 'ethanol diplomacy'.

The present study seeks to analyse and evaluate the relative efficacy and potential for success of using biofuels as an instrument

10 Banco Nacional de Desenvolvimento Econômico e Social & Centro de Gestão e Estudos Estratégicos (eds.), *Sugarcane-Based Ethanol: Energy for Sustainable Development*, (Rio de Janeiro: BNDES, 2008), p. 259.

11 Nye, J.S. *Soft Power: The Means to Success in World Politics*, (New York: NY: Public Affairs, 2004).

of foreign policy – or, as this study terms it, 'energy statecraft' – with Brazil's so-called ethanol diplomacy currently being the only major case study on the matter. To inform this analysis, this study draws on the economic statecraft literature to set up a theoretical framework in which to test its main hypothesis against the only case study available. Within the relatively limited literature on economic statecraft – for, as Baldwin draws attention to, the 'two most salient characteristics of the literature on economic statecraft are scarcity and the nearly universal tendency to denigrate the utility of such tools of foreign policy'[12] – positive economic statecraft (the proverbial 'carrot') is significantly under-researched compared to negative forms of economic statecraft (or 'sticks').[13] 'It is not that political scientists have said wrong things about the role of positive [economic] sanctions in power relations', writes Baldwin; 'it is just that they have said little.'[14] The present study therefore seeks to make a contribution not only to the relatively scarce literature on positive economic statecraft, but also to the recently emerging literature on energy statecraft in general, as well as to the literature on energy statecraft using biofuels in particular – which was completely unheard of when the research for this study began.

Three main schools of thought were identified in the economic statecraft literature: realism, liberalism and the conditionalist approach, the last of which includes a domestic and an international subdivision. This study takes a conditionalist approach to economic and energy statecraft – focusing primarily

12 Baldwin, *Op cit.*, p. 51.

13 Mastanduno, M. Economic Statecraft. In: Smith, S., Hadfield, A. & Dunne, T. (eds.), *Foreign Policy: Theories, Actors, Cases*, (Oxford: Oxford University Press, 2008), p. 182.

14 Baldwin, D.A. The Power of Positive Sanctions, *World Politics*, Vol. 24, No. 1 (October 1971), p. 19, cited in Mastanduno, M. Economic Statecraft, Interdependence, and National Security, *Security Studies*, Vol. 9, No. 1, 1999, p. 301.

on international conditions, while also acknowledging domestic ones – which does not strive for definite answers to whether or not such instruments of foreign policy work, but asks under what conditions economic and energy statecraft work best. Four such conditional variables have been identified in the conditionalist literature on economic statecraft: 1) whether the instruments employed are commensurable with the objective(s) pursued; 2) the magnitude and dependence on an economic interaction; 3) the elasticity of demand for a good; and 4) the degree of government control over economic actors. While generally applicable to all forms of economic statecraft, for the purposes of this study these factors have been adjusted to fit the specificities of energy resources *vis-à-vis* most other economic goods. In theory, if all of these four conditional variables are favourable, energy statecraft is more likely to work. This theoretical proposition forms the main hypothesis in this study, which seeks to answer the question of whether Brazil's energy statecraft using biofuels has been successful.

1.1. Chapter summaries

In addition to this introduction and the conclusion, this book is divided into four main chapters. The next chapter provides the theoretical framework for the rest of this study. It begins by defining the term *statecraft*, which essentially refers to the foreign policy 'instruments used by policy makers in their attempts to exercise power, i.e., to get others to do what they would otherwise not do.'[15] Next follows a discussion of Joseph Nye's concept of *soft power*, which, unlike 'traditional' accounts of power, such as the one defined in the term *statecraft*, also considers the possibility that an actor can get others to want what the same things it wants, rather than coercing or bribing them to do what they would otherwise

15 Baldwin, *Economic Statecraft*, p. 9.

not do. This distinction is important because Brazil's entire energy statecraft strategy is based (and depends) on soft power.

The remainder of Chapter 2 is dedicated to explaining *economic statecraft*. The section starts with a definition of the term – 'all of the economic means by which foreign policy actors might try to influence other international actors'[16] – before reviewing the literature on economic statecraft, identifying the three schools of thought mentioned above: realism, liberalism and conditionalist approaches (international and domestic). What follows is a description of the different types of economic statecraft: negative and positive, short and long term. Lastly, the chapter examines the four conditional variables identified in the literature, which determine whether economic statecraft is likely to be effective. First among these are the scope, domain and cost of economic statecraft; in other words, measuring economic foreign policy instruments in terms of the underlying strategic objectives they are meant to achieve. Second is the magnitude of, and dependence on, the economic interaction in question. Third is the 'strategic' quality of a good, defined in terms of its price elasticity. And lastly, the degree to which a government has control over the economic actors that implement its economic statecraft in practice is analysed through the perspective of principal-agent theory. These four conditional factors are of crucial importance to this study, as they form the framework through which the main hypothesis is tested throughout the book.

Chapter 3 constitutes the core of this study, providing a thorough and comprehensive examination of the diverse roles played by energy resources in foreign policy and international relations, with a focus on energy statecraft. The chapter is

16 Hanson, P. *Western Economic Statecraft in East-West Relations: Embargoes, Sanctions, Linkage, Economic Warfare, and Détente*, (London: Routledge & Kegan Paul, 1988), p. 6.

divided into four sections, with the first clarifying and defining three different but interrelated energy concepts that often cause confusion in the emerging literature on the study of energy in International Relations: energy security, energy diplomacy and energy statecraft. In its most fundamental sense, energy *security* means having the 'assurance of the ability to access the energy resources required for the continued development of national power', sustained economic performance and growth.[17] More specifically, energy security involves four basic elements, all of which need to be addressed to ensure the energy security of a state: the *availability* of energy goods and services; *reliability* in terms of being protected from interruption of energy supplies; the economic *affordability* of energy goods and services for consumers, safeguarded against price volatility; and the environmental *sustainability* of energy resources, given the world's increasing concerns over GHG emissions from burning fossil fuels. The role of energy security in foreign policy is then divided into the two remaining concepts – energy diplomacy and energy statecraft – with the former representing energy as a goal and the latter denoting it as an instrument of foreign policy. Thus, energy *diplomacy* refers to the use of political instruments of a state's foreign policy aiming to ensure that state's energy security. Conversely, energy *statecraft* means the use of a state's native energy resources as an instrument of its foreign policy to attain the political objectives of that state – or, more specifically, the manipulation of a target state's energy security in order to get it to do what it would otherwise not do – which is the main subject of this study.

The following section briefly repeats the different types of economic statecraft in general – namely, negative, positive, short

17 Kalicki, J.H. & Goldwyn, D.L. Introduction: The Need to Integrate Energy and Foreign Policy. In: Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press / Woodrow Wilson Center Press, 2005), p. 9.

and long term – and applies them to the specific case of energy resources, with examples for each. The section also examines how different kinds of energy resources (e.g., oil, natural gas, coal, nuclear and renewable energy) vary in their application as instruments of energy statecraft.

The third and most important section in Chapter 3 lists the four conditional variables on which successful economic statecraft depends (analysed in Chapter 2) and adjusts them to the specific nature of energy resources, as opposed to most other economic goods. The first of these sub-sections repeats the proposition that a state's foreign policy goals must be commensurate with the energy instrument employed, illustrating it with the case of OPEC's use of the 'oil weapon' following the Yom Kippur War in 1973. Where energy resources are concerned, the magnitude of the economic interaction translates into the market power (including the control of energy transport routes) of the state employing energy statecraft and the degree to which target states are vulnerable to their dependence on energy imports from the former. Since energy resources are, by almost any definition, 'strategic goods', the third conditional variable focuses on how the low price elasticity for most energy resources are reflected in price volatility under tight international market conditions, which largely favours the energy statecraft of exporters. Interestingly, unlike most other economic goods, energy resources are particularly prone to government control under the auspices of national energy companies, given the tendency toward 'resource nationalism' in energy-rich states. This last conditional variable indicates that energy resources are, in theory, more effective instruments of economic statecraft than most other economic goods.

Finally, the last section in Chapter 3 avoids merely 'showcasing' the efficacy of energy statecraft by discussing the several limits and countermeasures to it. First among these are the so-called 'resource curse' and the export dependence often generated in energy-rich states, which can cripple all other sectors of the economy of an energy-exporting state, failing to translate their short-term wealth from energy sales into long-term economic growth and sustainable development due to poor governance and fiscal mismanagement. Though a potential source of control and increased effectiveness of energy statecraft, the same 'resource nationalism' mentioned in the fourth conditional factor for effective energy statecraft mentioned above can also be a limitation: while the nationalisation of energy resources and the removal of foreign or private energy companies may accrue more power and revenue to energy-rich states in the short term, the long-term ramifications tend to be detrimental. The same is true for the creation of energy cartels like OPEC, whose strength depends on internal cohesion, without which their energy statecraft loses its force. There are also limitations imposed by the demand side, as energy importers can collectively use their monopsony power to form the equivalent of an 'importer's cartel', like the International Energy Agency (IEA) linked to the Organization for Economic Cooperation and Development (OECD), which established that member states should create strategic petroleum reserves to be drawn upon in times of sustained shortfalls or interruptions in energy supply. Importing countries can also counteract exporters' energy statecraft by reducing their dependence on imports from the latter through diversification and conservation of their energy use.

Chapter 4 explores the new international energy security context that has risen in the early twenty-first century. Since the utility of any given instrument of foreign policy is, according to Baldwin, 'a function of the situation and not a quality intrinsic to the particular technique',[18] it is crucial to recognise the context in which energy statecraft takes place. The conditionalist approach adopted in this study also calls for an understanding of the international conditions that have allowed energy statecraft to thrive in the previous decade. As explained in Chapter 3, energy security involves four basic elements: availability, reliability, affordability and sustainability. The risks that fossil fuels in general, and oil in particular, have posed to all four of these elements created a context in which traditional energy resources gained value as an instrument of state power in international relations. On the other hand, because this situation also allowed renewable energy to compete with fossil fuels in general – and biofuels to compete with petroleum in particular – this new international energy security context also paved the way for the possibility of using biofuels as a tool of energy statecraft – the subject of this study.

Chapter 4 therefore assesses the concerns that oil raises to each of these elements – availability, reliability, affordability and sustainability – in the current international energy security context, with secondary consideration paid to other energy sources. The section on *availability* raises the issue of resource scarcity and the finite nature of fossil fuels, tackles the 'Peak Oil' debate, and concludes that there is still much oil underground in physical terms, especially evidenced by the so-called 'shale revolution' in the US. The next section, on *reliability*, focuses on the fact that only a limited number of countries produce the whole world's oil supply, most of which are OPEC members with their own political interests, which are not necessarily convergent with those of importing states wishing for uninterrupted energy supplies that are both abundant and affordable. On the related subject of *affordability* of energy resources, the third section examines the

18 Baldwin, *Economic Statecraft*, p. 123.

diverse factors that led to steadily rising oil prices to a historic peak of $147 per barrel in July 2008, such as the long-term imbalance between supply and demand for oil, and the subsequent reversal of that imbalance leading to the current low oil price scenario. Lastly, the section on *sustainability* raises the relatively recent concern over the effect that human energy use is having on the environment, particularly in terms of climate change caused by GHG emissions, which gives an additional incentive for countries to shift their energy use away from dirty fossil fuels toward renewable sources. All of these factors put together, the chapter concludes, have created an international energy security context which, on the one hand, has allowed energy statecraft to flourish, while on the other hand also serves as an incentive to adopt more renewable energy resources like biofuels, thus increasing the likelihood that energy statecraft using biofuels may succeed.

Chapter 5 serves as a case study to test the four conditional variables elaborated in previous chapters. As mentioned above, Brazil is chosen as the only case study for the simple reason that it is the only country that has employed biofuels as an instrument of energy statecraft so far. The chapter begins with a historical overview of Brazil's National Alcohol Program (*ProÁlcool*), a series of public policies aimed at reducing the country's dependence on costly oil imports as a response to the international oil price spikes of the 1970s. Though at first being strictly a domestic policy, Brazil's forty year-long success story with ethanol fuel gained a foreign policy component during the administration of President Luiz Inácio Lula da Silva. The rest of the chapter is dedicated to testing this study's main hypothesis with the four conditional variables that determine whether Brazil's energy statecraft through the use of biofuels has been successful, in order to answer this book's research question. The first of these sections describes the formulation of Brazil's twofold declaratory goal of creating an international market where ethanol is traded freely as a commodity by promoting the increased production and use of biofuels to as many countries as possible, and expanding Brazilian ethanol exports within such a market, as well as illustrating the diverse strategies pursued by the Brazilian government to achieve those objectives. Next, the chapter compares Brazil's fragile position as the world's former leading producer and exporter of ethanol – having been overtaken by the US in 2005 and 2011, respectively – to other major biofuel producers like the US and the European Union, warning that Brazil will need to invest significantly in the expansion of its biofuel sector if it is to regain its leading position. The third conditional variable is interesting in the sense that ethanol fuel has a very high price elasticity, which would indicate, in theory, that biofuels make a poor instrument of energy statecraft. While the demand is inelastic for compulsory biofuel blends into traditional fuels mandated by governments, however, the section clarifies that it is precisely ethanol's elasticity that makes it a strong candidate for energy statecraft. By complementing or substituting gasoline, biofuels increase the price elasticity of oil and diminish countries' dependence on petroleum imports. This partially counteracts the potential for energy statecraft using oil and enhances the energy security of biofuel-consuming states. The last conditional variable indicates that, unlike its oil and gas sector, which is firmly within the government's control through Brazil's national oil company, Petrobras, the country's ethanol industry is entirely private. Nevertheless, the interests of the Brazilian government and the ethanol industry were convergent during the Lula administration, which has led to good cooperation and coordination between the government and the private companies that implement Brazil's energy statecraft in practice, but clashed during the subsequent Rousseff administration, which favoured fossil fuels in its energy policy. In sum, the four conditional variables tested in this case study have generally been favourable at one point or another, revealing that Brazil's energy statecraft through the promotion of biofuels abroad has the potential to be successful.

The conclusion starts with a brief summary of the research's findings, followed by a rigorous critique of some of the strategies carried out under Brazil's energy statecraft. While the Brazilian government invested substantial efforts in promoting the increased production of biofuels around the world – in order to commoditise ethanol, the main goal of Brazil's energy statecraft – most of the increase in global biofuel production was driven domestically in producing states through their own national policies stimulating biofuel production, most prominently in the United States, Brazil and the EU. Moreover, the other major foreign policy goal pursued under Brazil's energy statecraft – to open markets for the country's ethanol exports – has not been achieved, as the world's main demand centres (the United States and Europe) have protected their markets from Brazilian imports through tariff and non-tariff barriers. Brazil's soft power strategy of encouraging other countries to emulate its example is also questioned: the specific conditions that made Brazil's successful domestic experience with ethanol possible may not be easily replicated in other countries, suggesting that Brazil's case could be unique in the world and the lessons it has to teach are the exception rather than the rule. In particular, the tactic to transfer Brazilian technology to developing countries with ideal climactic conditions for biofuel cultivation – especially in Africa, which hosts an important share of the target states of Brazil's energy statecraft – faces the obstacle of inadequate human infrastructure and governance needed to absorb this technical knowhow. Additionally, Brazil's recent discovery of mammoth offshore oil and gas reserves has dampened the country's enthusiasm for biofuels, somewhat changing its energy policy priority toward being a major oil exporter rather than flaunting its international credentials as a 'green energy power' – a shift that was more pronounced during President Dilma Rousseff's term in office from 2011 to 2016.

This book concludes that Brazil's energy statecraft was potentially effective only as long as the international context made it possible, citing David Baldwin in suggesting that the probability of success of an energy statecraft initiative – be it through the use of oil, natural gas or biofuels – is 'a function of the situation and not a quality intrinsic to the particular technique'[19] of foreign policy. With a significantly altered international energy security context following the shale revolution – especially where availability, reliability and affordability are concerned – the main incentive toward the increased use of biofuels worldwide now rests on sustainability concerns. Therefore, a theory of energy statecraft must consider not only the conditions of the sender state, but also the international context in which it takes place, as well as the domestic context of the target states toward which energy statecraft is directed.

19 Baldwin, *Op cit.*, p. 123.

CHAPTER 2
ECONOMIC STATECRAFT: A THEORETICAL FRAMEWORK FOR ENERGY STATECRAFT

2.1. Statecraft

A term originating in northern Europe to describe the 'science of government',[20] *statecraft* has come to mean the art of conducting state affairs, both domestic and international. Its use by scholars of domestic politics, however, has largely been relinquished, making it a term predominantly employed by International Relations academics. Its precise definition varies slightly according to the author, but for the purposes of this study David Baldwin's definition is fitting:

> *Among students of foreign policy and international politics [statecraft] is sometimes used to encompass the whole foreign-policy-making process, but more often it refers to the selection of means for the pursuit of foreign policy goals. Thus, for Harold and Margaret Sprout "statecraft embraces all the activities by which*

20 Ping, J.H. *Middle Power Statecraft: Indonesia, Malaysia and the Asia Pacific.* (Aldershot: Ashgate, 2005), p. 14.

statesmen strive to protect cherished values and to attain desired objectives vis-à-vis other nations and/ or international organizations." Similarly, K. J. Holsti defines "statecraft as the organized actions governments take to change the external environment in general or the policies and actions of other states in particular to achieve the objectives that have been set by policy makers." Insofar as such definitions depict statecraft as governmental influence attempts directed at other actors in the international system, they correspond to the conception of statecraft employed here. ... To study statecraft...is to consider the instruments used by policy makers in their attempts to exercise power, i.e., to get others to do what they would otherwise not do.[21]

In the literature on statecraft, foreign policy instruments are often interchangeably referred to as means, tools, techniques, levers, policy options and other synonyms.[22]

Although never having written those exact words, the phrase Machiavelli is most famous for – 'the ends justify the means'[23] – suggests that the choice of political goals precedes the choice of which instrument(s) best to pursue them with. As Brighi and Hill explain, a successful foreign policy implementation 'depends... on the crucial relation between ends and means. No matter how powerful or big a state is, the pursuit of foreign policy aims is contingent on the ever-important choice of the appropriate

21 Baldwin, D.A. *Economic Statecraft*, (Princeton, NJ: Princeton University Press, 1985), pp. 8-9.

22 Ping, *Op cit.*, p. 18. See also Baldwin, *Op cit.*, p. 12.

23 Variations on this phrase date back at least to Ancient Greece, such as Sophocles' play *Electra* (c. 409 B.C.), which includes the line 'The end excuses any evil', a thought later represented in the Roman poet Ovid's *Heroides* ii. 85 (c. 10 B.C.) as *exitus acta probat* or 'The result justifies the deed'.

means.'[24] The relationship between ends and means in foreign policy, however, is not simple. The choice of the former need not necessarily precede the choice of the latter; in fact, it is often the available means that determine what ends are possible to pursue, not to mention that an action can be seen either as means or an end depending on the situation. As Baldwin makes clear, the fact that few goals are final, but intermediate or even instrumental toward further goals, complicates any means-ends analysis: 'Noting this difficulty, inherent in all means-ends analysis, scholars sometimes describe the distinction between instruments and objectives as "no more than a convenient analytical device." For those interested in the effectiveness, efficiency, utility, or rationality of a given policy or technique of statecraft, however, the distinction is more than a "convenient analytical device"; it is a necessity.'[25]

A further problem in analysing ends and means, alluded to above, is similar to the ancient 'chicken and egg' conundrum: which comes first, the goal or the instrument? Assertions such as 'means determine the ends far more often than ends determine means'[26] are symptomatic of what has been called the 'law of the instrument' in social science, a concept which Charles Hermann has applied to foreign policy behaviour:

> *Kaplan has suggested the "law of the instrument" which is well remembered as a result of his characterization of the law through an analogy: "Give a small boy a hammer, and he will find that everything he encounters needs pounding". Does a similar phenomenon exist in*

24 Brighi, E. & Hill, C., 'Implementation and behaviour', in Smith, S., A. Hadfield & T. Dunne (eds.), *Foreign Policy: Theories, Actors, Cases*. (Oxford: Oxford University Press, 2008), p. 128.

25 Baldwin, *Op cit.*, p. 16.

26 From the Summer 2004 final examination for the 'IR 300 – Foreign Policy Analysis' course at the London School of Economics and Political Science.

> *the conduct of foreign policy? Governments that invest heavily in the development and maintenance of a certain set of skills and resources will tend to apply them widely – perhaps excessively. Wilkinson seems to suggest exactly such an effect with respect to the instruments of foreign policy. He observes that states "whose military means are notably better than their non-military capabilities are subject to a strong pressure to militarize their foreign policies".*[27]

Therefore, in order to understand foreign policy behaviour, careful attention must be paid to the instruments available to policy-makers, while acknowledging that these means are likely to affect the nature of policy and its goals. 'Any understanding of how states approach the problem of deciding on the best means of implementing their foreign policy must remember two dicta' write Brighi and Hill: 'firstly, instruments are themselves dependent on underlying capabilities, which are in turn a function of the resources at the disposal of the society in question; secondly, decision makers do not choose instruments as the surgeon selects the scalpel – rather, the nature of the available instruments tends to shape their policy choices in the first place.'[28]

Resources are what Pierre Renouvin and Jean-Baptiste Duroselle of the French school of International Relations called the 'basic forces' of foreign policy: the building blocks derived from a country's geography and history that determine a state's foreign policy choices. These include a country's geographical position, natural resources, climate, population and level of development. Assuming the expansion or loss of territory is discounted, these

27 Hermann, C.F., 'Instruments of Foreign Policy', in Callahan, P., L.P. Brady & M.G Hermann (eds.), *Describing Foreign Policy Behavior*. (Beverly Hills, CA: Sage, 1982), p. 156.

28 Brighi & Hill, *Op cit.*, p. 130.

elements take generations to change significantly and are thus inherited by governments. Though resources are enormously important, there is no automatic correlation between their possession and the ability to exert influence, as they are not operational levers of foreign policy by themselves. In order to pursue an effective foreign policy, resources need to be operationalised into capabilities before they can be translated into a variety of specific instruments at the disposal of policy-makers to be applied in practical politics.

Capabilities are 'the recognizable elements of a modern government's responsibilities for which separate departments might exist and where decisions may hope to have an effect, at least in the medium term.'[29] These include the armed forces, the quality of the civil service, industrial and technological capacity, levels of education, agricultural productivity, reputation and prestige, patterns of trade and diplomatic representation, GDP and the general strength of a country's economy, etc. *Instruments* of foreign policy, in turn, are the forms of pressure and influence available to decision makers that amount to what Don Puchala called 'externally projectable power'.[30] They comprise 'the inventory of means or capabilities used by a government or other foreign policy actor in the formation and implementation of its foreign policies.'[31]

From an analytic point of view, according to Hermann, 'instruments offer a way of classifying various foreign policy activities according to the devices and procedures employed in the

29 Hill, C. *The Changing Politics of Foreign Policy*, (Basingstoke: Palgrave Macmillan, 2002), p. 136.

30 *Ibid*., p. 138. For a pyramidal model illustrating the interrelationships between the resources, capabilities and instruments of foreign policy, see *Figure 6.2* on p. 137 of Christopher Hill's *The Changing Politics of Foreign Policy*.

31 Hermann, *Op cit*., p. 154.

pursuit of some substantive issue or problem.'[32] Whereas Hermann goes as far as offering an eightfold categorisation of foreign policy instruments – diplomacy, domestic politics, military, intelligence, economics, science/technology, promotion, and natural resources[33] – while acknowledging the possibility of significant overlap between some of these, most scholars place the main instruments of foreign policy into four broad categories that represent 'an ascending scale of seriousness in terms of commitment of resources, the impact on third parties, and the according degree of risk in use…akin to the spectrum of soft to hard power' discussed below:[34] cultural/ideological or information/propaganda (words/ideas); political/diplomacy (deals/negotiation); economic (money/goods); and military force (weapons/violence). While coercive strategies (hard power) draw on policy options from the last three categories, persuasive strategies (soft power) can use all four.

2.2. Hard and Soft Power

According to Christopher Hill, there are three different dimensions of power: power as an end; power as a means; and power as a context. 'Power *as an end in itself* represents a popular view of politicians and their motives. Actors are seen as out to maximize their own personal power, for the psychological satisfaction involved in controlling others, and for the glory, money and opportunities that come with it. When acting on behalf of states they blur, in this view, the distinction between their own aggrandizement and that of the state and come to identify the fate of the latter with themselves.' Power *as a means* 'explicitly deals with the question of power as the means to further ends derived

32 *Ibid.*

33 *Ibid.*, p. 156.

34 Brighi & Hill, *Op cit.*, p. 131.

from other values.' Power *as a context* suggests that 'foreign policy actors operate in an environment where they cannot sensibly *disregard* power.... Practitioners quite commonly, and disastrously, overlook the external "realities", by which is meant simply those factors outside the control of the actors in question.'[35] The context of power is a complex subject in its own right, and will therefore be covered separately in Chapter 4. For now, however, 'while individual cases of power-worship can erupt unpredictably, for most of the time states are in the hands of those who, however ruthless, are essentially concerned with power for what it can do to bring them closer to objectives with a much wider reach.'[36] Therefore the present chapter will focus on *power as a means*.

At the most basic level, *power* means the ability to achieve one's purposes or goals; in other words, to get the outcomes one wants.[37] Robert Dahl has defined power as the ability to get others to do what they otherwise would not do. But as Joseph Nye points out, 'when we measure our power in terms of the changed behaviour of others, we have to know their preferences. Otherwise, we may be mistaken about our power. ... Knowing in advance how other people or nations would behave in the absence of our efforts is often difficult.'[38] Baldwin also raises this issue, but takes it one step further by advocating the use of counterfactual analysis in assessing the utility of different instruments of foreign policy:

> Power analysis always requires consideration of counterfactual conditions. *If power relations involve*

35 Hill, *Op cit.*, pp. 129-134.

36 *Ibid.*, p. 130.

37 Nye, J.S.: *Bound to Lead: The Changing Nature of American Power*. Basic Books, 1991, pp. 25-26; *Soft Power: The Means to Success in World Politics*, (New York: NY: Public Affairs, 2004), pp. 1-2; *The Powers to Lead: Soft, Hard and Smart*, (Oxford University Press, 2008), p. 27.

38 Nye, *Bound to Lead*, p. 26.

> *some people getting other people to do something they would not otherwise do, the question of* what would otherwise have been done *cannot be ignored. … Nothing very significant can be said about the utility of…techniques of statecraft without addressing the question of what would have happened if they had not been used or if some other technique had been used. Such discussions may amount to little more than "educated guesses," but this is preferable to ignoring the problem.*[39]

Because the ability to control others is often related to the possession of certain resources, a second definition of power is commonly used, which 'simply define[s] it as the possession of capabilities or resources that can influence outcomes. Consequently…a country [is considered] powerful if it has a relatively large population and territory, extensive natural resources, economic strength, military force, and social stability. The virtue of this second definition is that it makes power appear more concrete, measurable, and predictable.' This definition is not without its problems, however: 'When people define power as synonymous with the resources that produce it, they sometimes encounter the paradox that those best endowed with power do not always get the outcomes they want.'[40]

Power conversion, writes Nye, 'is a basic problem that arises when we think of power in terms of resources. Some countries are better than others at converting their resources into effective influence.' Power conversion, therefore, is 'the capacity to convert potential power, as measured by resources, to realized power, as measured by the behavior of others. Thus, one has to know about a country's skill at power conversion as well as its possession of

39 Baldwin, *Op cit.*, p. 22. Original emphasis.

40 Nye, *Soft Power*, p. 3. See also *Bound to Lead*, p. 26, and *The Powers to Lead*, p. 28.

power resources to predict outcomes correctly.'[41] For Nye, skillful leadership and well-designed strategies are necessary to transform resources into influence, or realised power in terms of attaining desired outcomes.[42] Ned Lebow concurs that power is difficult to operationalise, citing Hans Morgenthau's recognition of this, in contrast to mainstream realists and liberals:

> *Morgenthau, to his credit, recognizes that there is no absolute measure of state power because it is always relative and situation-specific. He acknowledges that the strategies and tactics that leaders used to transform the potential attributes of power into influence are just as important as the attributes themselves.*
>
> *The fundamental problem – most pronounced in Waltz, but evident in other realists and many liberals as well – is the tendency to equate material capabilities with power, and power with influence. ... [M]aterial capabilities are only one component of power, and that power is only one basis of influence. ... This is an anomaly for most realist and liberal understandings of power, but not for a theory...that disaggregates influence from power...*[43]

Therefore, as Nye clarifies, 'proof of power lies not in resources but in the changed behavior of nations.'[44]

There are, of course, several different ways of affecting the behaviour of others. For Nye, these fall under three broad techniques: coercion through threats ('sticks'); inducement

41 Nye, *Bound to Lead*, p. 27.

42 Nye, *Soft Power*, p. 3.

43 Lebow, R.N., *A Cultural Theory of International Relations*, (Cambridge: Cambridge University Press, 2008), p. 557.

44 Nye, *Bound to Lead*, pp. 174-175.

through payment ('carrots'); and attraction through cooptation. The first two are ways to change what other states do, which might be called the commanding method of exercising power. The latter works indirectly by getting others to *want* what you want, and might be called the co-optive method of exercising power, which contrasts with active command power that makes others *do* what you want. In Nye's terminology, the resources associated with latter 'can be thought of as *soft* power, in contrast to the *hard* command power associated with tangible resources like military and economic strength.'[45] Thus, command and co-optive power refer to power as an abstract concept in the form of a continuum from the former at one end to the latter at the other, whereas hard and soft power generally represent the types of resources and capabilities associated with command and co-optive power, but more specifically denote the manner in which instruments are implemented.

> *Hard and soft power are related because they are both aspects of the ability to achieve one's purpose by affecting the behavior of others. The distinction between them is one of degree, both in the nature of the behavior and in the tangibility of the resources. Command power – the ability to change what others do – can rest on coercion or inducement. Co-optive power – the ability to shape what others want – can rest on the attractiveness of one's culture and values or the ability to manipulate the agenda of political choices in a manner that makes others fail to express some preferences because they seem to be too unrealistic. The types of behavior between command and co-option range along a spectrum from coercion to economic inducement to agenda setting to pure*

45 *Ibid.*, pp. 31-32. Emphases added.

> *attraction. Soft-power resources tend to be associated with the co-optive end of the spectrum, whereas hard-power resources are usually associated with command behavior. But the relationship is imperfect. For example, sometimes countries may be attracted to others with command power by myths of invincibility, and command power may sometimes be used to establish institutions that later become regarded as legitimate. A strong economy not only provides resources for sanctions and payments, but can also be a source of attractiveness. On the whole, however, the general association between the types of behavior and certain resources is strong enough to allow us to employ the useful shorthand reference to hard- and soft-power resources.*[46]

Table 1: Hard/Soft Power

	Hard		Soft	
Spectrum of Behaviors	Command ←—*————————*———— coercion	inducement	agenda setting ——*———————*———→ Co-opt	attraction
Most Likely Resources	force sanctions	payments bribes	institutions	values culture policies

Source: Nye, J.S., *Soft Power: The Means to Success in World Politics*, (New York: NY: Public Affairs, 2004), p. 8.

It goes without saying that coercion is a form of hard power; indeed, the very term, *hard* power, seems to suggest it. But why should inducements fall under that side of the power continuum? As Richard Sennett explains, 'the act of giving needn't in itself carry the positive charge of a cooperative act. Giving to others can be a way of manipulating them,' which falls under the category of

46 Nye, *Soft Power*, pp. 7-8. See also Nye: *Bound to Lead*, Chapter 1 endnote 11, p. 267; *The Powers to Lead*, pp. 30 & 39.

largesse: 'The two sides of largesse embody two extremes in the act which is at the heart of any welfare system: making a gift. At the one extreme is a gift freely given, at the other is a manipulative gift. The first embodies that aspect of character focused on the sheer fact that others lack something, that they are in need; the other act of giving uses it only as a means to gain power over them'.[47] Similarly, Baldwin cites Klaus Knorr in stating that 'there is a "clear difference in principle" between compliance that is "bought" and that which is "freely given." This distinction leads him to describe "aid given for some advantage to be received by the donor" as a "pseudogift".' Thus, for Baldwin, 'aid that is completely unilateral cannot be an instrument of statecraft at all, since the statecraft perspective implies that aid is a means to an end.'[48] However, Baldwin resorts to social exchange theory to explain how even a gift that is allegedly freely given is not without conditions:

> *In common parlance, gifts are freely given with no expectation of anything in return. It is considered bad taste to insist on a* quid pro quo *for what is supposed to be a gift. … Common parlance is quite misleading with respect to gifts since social deception is deeply embedded in the social process of giving and receiving gifts. Marcel Mauss identifies a set of social phenomena "which are in theory voluntary, disinterested and spontaneous; but are in fact obligatory and interested." … Thus, while people* pretend *not to expect a quid pro quo in return for a gift, they actually do expect gifts to be reciprocated and are likely to inflict social disapprobation on those who fail to reciprocate. Gift giving generates an obligation to*

47 Sennett, R., *Respect: The Formation of Character in a World of Inequality*, (London: Allen Lane, 2003), pp. 136-138.

48 Knorr, K., *The Power of Nations: The Political Economy of International Relations*, (New York, NY: Basic Books, 1975), pp. 172-175. Cited in Baldwin, *Op cit.*, pp. 292-293.

> *reciprocate regardless of whether any specific* quid pro quo *is agreed upon at the time the gift is given. Indeed, the giver is likely to – nay, is expected to – deny, explicitly or implicitly, that any* quid pro quo *is expected. This, however, is a social lie and is tacitly understood to be such by both giver and receiver.*[49]

Moreover, as Nye states, even though the economic part of hard power resting on inducements may not seem coercive, threats and inducements are closely related because coercion is a matter of degree: 'Inducements, rewards, and bonuses are more pleasant to receive than threats, but the hint of their removal can constitute an effective threat. ... Some inducements (and the threat of their removal) may be more enabling and others more coercive' in the eyes of those who receive them.[50]

Soft power, on the other hand, should not be discounted as 'just a question of image, public relations, and ephemeral popularity.' Instead, it should be viewed as 'a form of power – a means of obtaining desired outcomes.'[51] Soft power is 'the ability to get what you want through attraction rather than coercion or payments. ... A country may obtain the outcomes it wants in world politics because other countries – admiring its values, *emulating its example*, aspiring to its level of prosperity and openness – want to follow it. In this sense, it is also important to set the agenda and attract others in world politics, and not only to force them to change by threatening military force or economic sanctions. ... Soft power rests on the ability to shape the preferences of others.'[52]

49 *Ibid.*, pp. 293-294. Original emphasis.

50 Nye, *The Powers to Lead*, pp. 39, 141-142.

51 Nye, *Soft Power*, p. 129.

52 *Ibid.*, pp. x, 5. Emphasis added.

As Nye clarifies, however, the ability to shape preferences should not be confused with influence:

> *Soft power is not merely the same as influence, though it is one source of influence. After all, influence can also rest on the hard power of threats or payments. Nor is soft power just persuasion or the ability to move people by argument, though that is an important part of it. It is also the ability to entice and attract. Attraction often leads to acquiescence. In behavioral terms, soft power is attractive power. In terms of resources, soft power resources are the assets – tangible and intangible – that produce such attractions.*[53]

Soft power uses different resources to bring about cooperation or acquiescence from other actors than does hard power, which rests on coercion and payments. These resources are generally 'slower, more diffuse and more cumbersome to wield than hard-power resources' and 'often work indirectly by shaping the environment for policy, and sometimes take years to produce the desired outcomes.'[54] Hill goes further in stating that while hard power tends to focus on the target itself, soft power primarily seeks to change the target's environment, but argues that the use of such 'slow-acting, opinion-shaping instruments can still be a form of coercion, albeit barely understood by the target.'[55] Nye counters this by arguing that while soft power may indeed feel threatening and manipulative, 'it still leaves open a wider range of choices in the target's response. Soft power instruments are not all equal in

53 Nye, *The Powers to Lead*, p. 31. See also *Soft Power*, p. 7.

54 Nye, *Soft Power*, pp. 99-100.

55 Hill, *Op cit.*, p. 135.

this regard. They differ in the degree of rational appeal and respect for followers' autonomy.'[56]

For Nye, a country's soft power derives mainly from three sources: its culture, its values and its foreign policy.[57] The first two are clearly outside a government's control, but the last one is by definition a government's responsibility. This work will therefore focus on the latter source of soft power – indeed, in Nye's words, a government's 'foreign policies strongly affect soft power', which in turn 'can attract or repel others by the influence of their example.'[58] Foreign policies that are perceived to have moral authority and are legitimate in terms of the shared values they represent – along with 'the justness and duty of contributing to the achievement of those values' – will produce 'an intangible attraction that persuades [others] to go along with [one's] purposes without any explicit threat or exchange taking place.'[59] Soft power therefore depends on how these objectives are framed: 'Policies based on broadly inclusive and far-sighted definitions of the national interest are easier to make attractive to others than policies that take a narrow and myopic perspective.'[60] This is a point Lebow concurs with, adding that such policies are also likely to cost less:

> *It is easier to elicit support for policies that reflect shared norms because it is possible to persuade other actors that they are in the common interest. Policies contrary to accepted values and practices must rely on coercion or bribes, or a combination of the two, and are correspondingly more costly in resources. Cooperation*

56 Nye, *The Powers to Lead*, p. 142.

57 Nye, *Soft Power*, pp. x, 6, 11, 14.

58 *Ibid.*, pp. 13-14.

59 *Ibid.*, pp. 6-7.

60 *Ibid.*, p. 61.

> *[achieved] on this basis lasts only so long as the dominant state retains the power to punish and reward.*[61]

When a country can entice others to want what it wants, on the other hand, it does not need to spend as much on sticks and carrots to change their behaviour toward its own preferences. 'Seduction is always more effective than coercion,'[62] according to Nye. He warns, however, that whether 'attraction in turn produces desired policy outcomes has to be judged in particular cases. Attraction does not always determine others' preferences, but this gap between power measured as resources and power judged as the outcomes of behavior is not unique to soft power. It occurs with all forms of power.'[63]

2.3. Economic statecraft

In *War and Change in World Politics*, Robert Gilpin predicts a long-term trend in international relations toward the increased relevance of economics as a result of 'the expansion of a highly interdependent world market economy' and argues that this has 'enhanced the role of economic power as an instrument of statecraft.'[64] This assertion inevitably calls attention to the need for further academic work on economic instruments of foreign policy. In its simplest form, economic statecraft is to study economics as an instrument of politics.[65]

> *Baldwin defines economic statecraft as "all of the economic means by which foreign policy actors might*

61 Lebow, *Op cit.*, p. 495.

62 Nye, *Soft Power*, p. x.

63 *Ibid.*, p. 6.

64 Gilpin, R., *War and Change in World Politics*, (Cambridge: Cambridge University Press, 1981), pp. 68-69, 218. Cited in Baldwin, *Op cit.*, p. 68.

65 Baldwin, *Op cit.*, p. 3.

> *try to influence other international actors". To influence someone, he points out, is to induce someone to do something that they would not otherwise have done. Like most other forms of influence, economic statecraft will take effect by affecting attitudes, expectations or beliefs. It is of necessity a means of sending messages. It may impose or threaten to impose costs on the target nation, and such costs may be an important part of the message; but it may transmit a message effectively without necessarily imposing a cost.*[66]

Although economic policy instruments may be used to pursue economic ends, Baldwin illustrates that their use is not confined to such aims through an analogy with Carl von Clausewitz's famous dictum that war is a continuation of policy by other means: 'Clausewitz argues that what is peculiar about war "is simply the peculiar nature of its means." Likewise, the distinguishing characteristic of economic statecraft lies not in its goals but rather in the peculiar nature of its means.'[67] Thus, more specifically, economic statecraft signifies an international actor's use of *economic* instruments and relationships (or means) in the pursuit of *political* goals (ends) in foreign policy.[68]

Economic statecraft is analytically distinct from other similarly-named concepts – such as foreign economic policy, international economic policy, economic diplomacy, economic leverage, economic sanctions, economic warfare or economic coercion – in that these 'are usually defined in terms of actual or intended effects of a policy or in terms of the process by which the

66 Hanson, P., *Western Economic Statecraft in East-West Relations: Embargoes, Sanctions, Linkage, Economic Warfare, and Détente*. (London: Routledge & Kegan Paul, 1988), pp. 6-7.

67 Baldwin, *Op cit.*, p. 65.

68 Mastanduno, M., 'Economic Statecraft', in Smith, S., Hadfield, A. & Dunne, T. (eds.), *Foreign Policy: Theories, Actors, Cases*. (Oxford: Oxford University Press, 2008), p. 172.

policy was made.'[69] As Hill notes, economic statecraft 'refers to the extent to which an actor can pursue its goals through the use of economic instruments, even when the content of the goal is not centrally economic. It is not about foreign economic policy [and other concepts named above] in the service of economic goals, important as that is.'[70] In comparison with some of the available alternative definitions above, Baldwin summarises several advantages to the concept of economic statecraft:

> *"Economic statecraft" emphasizes means rather than ends. This usage is probably closer to ordinary language than definitions in terms of ends. ...*
>
> *"Economic statecraft" does not restrict the range of goals that may be sought by economic means. It makes it conceptually possible to describe the empirically undeniable fact that policy makers sometimes use economic means to pursue a wide variety of noneconomic ends. ...*
>
> *Unlike most alternative concepts, the definition of "economic statecraft" includes a definition of "economic" [i.e. "resources which have a reasonable semblance of a market price in terms of money"[71]]. It thus provides criteria for distinguishing economic techniques of statecraft from noneconomic techniques.*[72]

However, as Philip Hanson critiques, an underlying problem remains with this approach: 'The economic costs of sanctions, embargoes and economic warfare are measurable (however

69 Baldwin, *Op cit.*, p. 33.

70 Hill, *Op cit.*, p. 148.

71 Baldwin, *Op cit.*, pp. 13-14.

72 *Ibid.*, pp. 39-40.

imperfect) for both sender and target nations, but the political costs and benefits are not. Net economic costs and net political benefits for the nation imposing the sanctions cannot be weighed against one another.'[73] The economic-political cost-benefit analysis of economic statecraft notwithstanding, Baldwin's concept remains appropriate for the purposes of this study. 'Given the starting point of linkage between politics and economics, between foreign policy and the pursuit of wealth,' writes Hill, to study economic statecraft 'means analysing the extent to which economic instruments are indeed at the disposal of the state':[74] whether they are used positively as carrots, involving the use of economic relationships as incentives or rewards; negatively as sticks, involving the threat or use of sanctions or other forms of economic coercion or punishment;[75] or even as a form of soft power.

2.3.1. The literature

Much like the wider discipline of International Relations itself, the study of economic sanctions (more specifically, negative sanctions or economic coercion) began with optimism following the First World War, with high expectations that sanctions could deter future wars. However, the failure of sanctions to restrain military aggression and to achieve other important goals – most prominently such 'classic cases' as League of Nations sanctions against Italy, US sanctions against Cuba, UN sanctions against Rhodesia, NATO sanctions against the Communist bloc and Arab sanctions against Israel – led to a generalised scepticism concerning their use among post-Second World War IR scholars.

73 Hanson, *Op cit.*, p. 18.

74 Hill, *Op cit.*, p. 148.

75 Mastanduno, *Op cit.*, p. 172.

Indeed, the overall impression derived from the literature, writes Baldwin, 'is that economic statecraft is so obviously useless as to raise questions about the good judgment of any policy maker who gives serious consideration to such techniques' of statecraft.[76] The publication of Baldwin's *Economic Statecraft* in 1985, however, marks a turning point in the literature on economic means of interstate influence, and has 'profoundly influenced how the current generation of scholars approaches the study of economic statecraft and sanctions.'[77]

> *Baldwin reconceptualized the scholarly literature and argued that the use of economic sanctions – more generally economic statecraft – typically involved multiple objectives and targets, and that the assessment of success or failure could only be made convincingly by comparing the costs and benefits of economic statecraft to that of other forms of statecraft. Baldwin did not claim that economic sanctions were likely to succeed. His conceptual framework and reconsideration of classic cases, however, did suggest that the economic instrument was considerably more useful than scholars generally acknowledged.*[78]

For instance, as Michael Mastanduno states, 'even if sanctions do not solve major foreign policy problems, a variety of economic instruments…may still be useful to governments in signalling intentions, complementing diplomacy, building a political consensus, or even paving the way for the use of military force.'[79]

---

76 Baldwin, *Op cit.*, p. 115.

77 Mastanduno, M., 'Economic Statecraft, Interdependence, and National Security: Agendas for Research', *Security Studies*, Vol. 9, No. 1, 1999, p. 291.

78 *Ibid.*, p. 290.

79 Mastanduno, 'Economic Statecraft' (2008), p. 172.

Thus, Hanson considers Baldwin's view of economic sanctions as being primarily a form of signalling: 'An effective signal can change the expectations of decision-makers in the target nation about the sender's response to the original action that triggered the sanction. If it does so, this signalling may be more important on the whole than the costs directly imposed by the sanctions.'[80]

Baldwin critiqued the bulk of existing literature for the short-sighted assumption that no political end can possibly be achieved unless the economic means is effective: 'Some writers…argue that economic techniques of statecraft can succeed *only* through economic effects on the target. [Donald] Losman, for example… views infliction of economic damage on the target country as a necessary but not sufficient condition for political success.' Baldwin counters this argument by reminding us that economic sanctions 'may have diplomatic, psychological, political, military, or other effects when their economic effect is nil. Ignoring this fact severely impairs one's ability to evaluate the costs and effectiveness of economic sanctions as instruments of foreign policy.' Indeed, he concludes 'it seems unwise to rule out in advance the possibility that economic techniques may succeed because of their connection with noneconomic causal conditions.'[81] However, the drawback in Baldwin's methodology, in Hanson's words, is that 'his multiple and unqualified success criteria make it hard ever to conclude that an economic sanctions episode is a clear failure. Perhaps that is as it should be in the unclear world of international relations.'[82]

These shortcomings notwithstanding, Baldwin notes that the 'two most salient characteristics of the literature on economic

80 Hanson, *Op cit.*, p. 18.

81 Losman, D., *International Economic Sanctions: The Cases of Cuba, Israel, and Rhodesia*. Albuquerque, NM: University of New Mexico Press, 1979.Cited in Baldwin, *Op cit.*, pp. 63-64.

82 Hanson, *Op cit.*, p. 14.

statecraft are scarcity' – whose neglect he attributes partly to a tendency to focus on policy-making processes in detriment to policy techniques and outputs – 'and the nearly universal tendency to denigrate the utility of such tools of foreign policy.'[83] Despite these limitations, Jean-Marc Blanchard and Norrin Ripsman have listed three broad schools of thought in the economic statecraft literature: realism, economic liberalism and conditionalist approaches.

Realist stances on economic statecraft are straightforward and largely responsible for the popular view that economic instruments are not useful tools of statecraft. For realists, political and strategic goals always take precedence over economic ones, so states are unlikely to relinquish important political goals because of economic considerations, leading to the conclusion that economic instruments almost never succeed in achieving foreign policy goals. Thus, according to realists, 'economic statecraft – premised as it is on the exchange of political concessions for economic gains or the avoidance of economic losses – should usually fail, unless economic pressures are consonant with political ones or the sender's political demands are inconsequential.'[84]

Economic liberalism, on the other hand, draws almost opposite conclusions on economic statecraft than does realism, but has an equally straightforward logic. 'Economic liberals expect policy success to correlate directly with the magnitude of economic incentives or punishments offered. ... By focusing on the magnitude of economic signals, liberals implicitly acknowledge that compliance with economic statecraft is not automatic, but is the product of a calculation of the costs and benefits of compliance

83 Baldwin, *Op cit.*, pp. 51-52.

84 Blanchard, J.M. & Ripsman, N., 'A Political Theory of Economic Statecraft', *Foreign Policy Analysis*, Vol. 4, 2008, p. 374.

versus the costs and benefits of defiance.'[85] However, since economic statecraft, as defined above, entails the use of economic means for the purposes of achieving political goals, concentrating exclusively on the economic effects of statecraft may not tell us much about their efficacy in reaching political objectives. Being an inherently political act due to the nature of its ends, the economic effect of statecraft by itself, even if extreme, is 'unlikely to result in changes in behavior if the right political conditions are not present. ... Since economic sanctions are designed to influence target governments in large part by generating domestic political opposition to the proscribed policy, their political costs are more significant than their economic bite.'[86] As Robin Renwick puts it, 'the idea of an automatic correlation between economic deprivation and the loss of the political will to resist it is, to say the least, questionable.'[87] The same is true of economic incentives.

As Blanchard and Ripsman note, however, much of the literature on economic statecraft 'consists of a rather sterile debate about *whether* economic sanctions or incentives can achieve important foreign-policy objectives, with less attention to the more policy-relevant issue of *when* and *under what conditions* economic statecraft can achieve these goals.'[88] Since economic statecraft succeeds more frequently than the realist perspective predicts, but fails more often than economic liberalism suggests, they conclude not only that these two schools of thought are 'unsatisfying theoretically and unable to explain important, high profile cases', but also that a conditional model of economic statecraft is needed

85 *Ibid.*, pp. 373-374.

86 Blanchard, J.M. & Ripsman, N., 'Asking the Right Question: *When* Do Economic Sanctions Work Best?', *Security Studies*, Vol. 9, No. 1, 1999, pp. 220-223.

87 Cited in Blanchard & Ripsman, 'Asking the Right Question', p. 220.

88 Blanchard & Ripsman, 'A Political Theory of Economic Statecraft', p. 371. Original emphasis.

to understand when such instruments of statecraft are likely to be effective. Indeed, for Blanchard and Ripsman, 'conditionalist approaches represent a significant step forward for the study of economic statecraft by identifying the importance of intervening factors that influence how states view economic signals.'[89]

Conditionalist approaches stress that 'the economic costs and benefits associated with economic statecraft are only likely to have an important impact on decision making under certain political conditions.'[90] Within this broad school, scholars tend to focus on the international environment as a conditioning factor for economic statecraft, while a smaller number of studies concentrate on domestic conditions in the target state.

International conditionalists argue that the economic considerations brought on by economic statecraft are weighed against geopolitical interests like power, prestige and sovereignty, and list international political conditions necessary for effective economic statecraft such as 'the sender and target states' relative military power, the strength of international regimes, the sender's strategic relationship with the target, and the international threat situation',[91] to mention but a few. The international environment is complex in its own right and can include a myriad of conditions modifying the probabilities of success of economic statecraft depending on the context in which it takes place, and therefore warrants its own chapter in the present study (Chapter 4).

Meanwhile, domestic conditionalists focus on the internal circumstances in the target states as the key variable in an influence attempt through economic statecraft. As Mastanduno points out, 'the study of economic statecraft *must* proceed not only

89 *Ibid.*, p. 376.

90 *Ibid.*, p. 375.

91 *Ibid.*, pp. 375-376.

with an appreciation of the domestic level of analysis but with a sophisticated understanding of it. Economic sanctions involve the exploitation of power asymmetries, but the effectiveness of sanctions, that is whether those asymmetries can be exploited, depends vitally on how their effects are transmitted domestically. This is true of both positive and negative sanctions, although the mechanics of transmission are somewhat different.'[92] Therefore, domestic conditionalists 'view the success or failure of economic statecraft as a function of the extent to which economic pressure might harm vital domestic constituencies or to which economic inducements might enrich key powerbrokers.'[93] Most such studies tend to concentrate on the target state's regime type, with their most common contention being that negative sanctions are less effective against authoritarian regimes while being more effective against democracies, whereas economic inducements are more likely to work best on authoritarian states. But in doing so, these studies neglect the complexity of any given target state's internal political setting.

However, more recent domestic conditionalist studies, such as Blanchard and Ripsman's, stress that focusing only on target states' regime type is insufficient, since 'similar regimes can vary along critical dimensions, including autonomy of the state from society and the policy instruments at its disposal.' Instead, they separate domestic interest groups from the government, and propose a more detailed and sophisticated domestic condition in the form of a target state's ability to buffer its government against disaffected groups – or what they call 'stateness,' which comprises three factors: '(1) *autonomy*, or a state's ability to take decisions in the face of domestic political opposition; (2) *capacity*, or the

92 Mastanduno, 'Economic Statecraft, Interdependence, and National Security', 1999, p. 315. Original emphasis.

93 Blanchard & Ripsman, 'A Political Theory of Economic Statecraft', p. 376.

state's capability either to compensate or coerce those who stand to lose from defying the sender; and (3) *legitimacy*, or the ability of the state to rally disaffected domestic groups.' They conclude that 'when economic statecraft co-opts domestic interest groups, high stateness will interfere with an economic statecraft attempt by allowing leaders to ignore pressures to comply. Conversely, when economic statecraft resonates with the target government, rather than domestic interest groups, stateness can actually foster compliance by allowing the leadership to overcome domestic resistance to compliance.'[94] But even such ardent advocates of domestic conditions admit that in order to explain completely the dynamics of economic statecraft, 'we must not only consider the internal dynamics of the target state, but also international political variables that can alter the political costs facing the regime.'[95] In other words, even though conditionalist approaches to economic statecraft are preferable to, if not more accurate than, realist and liberal perspectives, both domestic as well as international conditions should be taken into account when analysing a state's attempt at economic statecraft on another.

In addition to being divided among different schools of thought, the economic statecraft literature is also separated by the types of techniques used by governments in their attempts to influence other states – mainly between negative and positive sanctions, the proverbial 'sticks and carrots', respectively. No matter what conclusions were reached – i.e. whether or not sanctions 'work', or under what conditions they might – up to the end of the Cold War, the literature focused almost exclusively on negative economic statecraft, or economic coercion. Indeed, as Mastanduno draws attention to, '[p]olitical scientists have

94 *Ibid.*, pp. 377, 372.

95 *Ibid.*, p. 393.

traditionally devoted relatively little attention to positive economic statecraft. ... Economic sticks have commanded more attention than economic carrots.'[96] As Baldwin has suggested, perhaps this is because 'researchers typically have tended to overestimate threats (negative sanctions) relative to promises (positive sanctions) in the study of international politics.'[97] Insofar as these studies compare negative sanctions to other alternative forms of statecraft, they tend to focus on economic *versus* military coercion,[98] rather than comparing negative and positive forms of economic statecraft. However, Mastanduno points out that 'the more carefully we examine the historical record, the more cases – successes and failures – we are likely to find', both of negative sanctions and of positive sanctions, which 'political scientists have only began to investigate.'[99]

Baldwin made an observation in 1971 regarding research on positive economic statecraft that remained accurate for the next two decades: 'It is not that political scientists have said wrong things about the role of positive sanctions in power relations; it is just that they have said little.'[100] However, the end of the Cold War, and the shift in focus away from primary (security) to secondary (economic) and tertiary (human rights, environment, etc.) agenda topics in IR scholarship, led to a rediscovery of positive economic statecraft:

96 Mastanduno, 'Economic Statecraft' (2008), p. 182.

97 Cited in Mastanduno, 'Economic Statecraft, Interdependence, and National Security' (1999), p. 305.

98 *Ibid.*, p. 310.

99 *Ibid.*, pp. 305, 304.

100 Baldwin, D.A., 'The Power of Positive Sanctions', *World Politics*, Vol. 24, No. 1 (October 1971), p. 19, cited in Mastanduno, 'Economic Statecraft, Interdependence, and National Security' (1999), p. 301.

> *The end of the Cold War has brought a changed global situation and a revival of scholarly interest in positive economic statecraft. The major powers of the world are now economically interdependent, as they were during the late nineteenth century. An understanding of great power politics once again requires an understanding of economic relationships and of the links between economics and foreign policy. ... As economic relations take centre stage in foreign policy, the traditional lines between high politics and low politics become blurred. It is not surprising that scholars have begun to rediscover the agenda of positive economic statecraft. ... Since the end of the Cold War, economic engagement has proved to be a key foreign policy strategy in relations both among major powers and between stronger and weaker states.*[101]

The new research focusing on economic incentives that has emerged in the post-Cold War era, however, has been inclined to flaunt the successes of positive sanctions in carefully selected case studies, to some extent as a response to the predominance of the negative sanctions in the literature up to that point.[102] But as Mastanduno makes clear, 'the positive use of economic incentives has considerable promise as an instrument of statecraft, and deserves more systematic attention from students of the subject.'[103]

In terms of which schools of thought tend to write about positive economic statecraft, many are liberals. For instance, Randall Newnham argues that if an economic incentive is strong enough, it can be more effective in changing a target state's

101 Mastanduno, 'Economic Statecraft' (2008), p. 183.

102 Mastanduno, 'Economic Statecraft, Interdependence, and National Security' (1999), p. 310.

103 Mastanduno, 'Economic Statecraft' (2008), p. 185.

behaviour than negative sanctions.[104] Meanwhile, there are few, if any, realists writing about economic incentives, which Blanchard and Ripsman attribute to a self-selection process: 'The few authors who write about incentives implicitly begin with the assumption that they can be of significance. However, [Blanchard and Ripsman] interpret the dearth of attention paid to economic incentives as evidence of the widespread realist attitude that economic gains are unlikely to move states to alter their policies.'[105]

According to Blanchard and Ripsman, the economic statecraft literature suffers from a crucial weakness: namely that it treats negative and positive sanctions as analytically distinct from one another, 'despite Baldwin's observation that various forms of economic statecraft follow a similar logic and Hirschman's assertion that economic incentives influence states because of the possibility they create for future economic sanctions'.[106] Yet the connection between negative and positive sanctions is 'relatively unexplored territory' in International Relations. 'Now that positive measures have been rediscovered,' writes Mastanduno, the next step will be to study their effectiveness more systematically, both on their own, and in relation to the more familiar forms of economic sanctions.'[107]

2.3.2. Basic types of economic statecraft: negative, positive, and short- *versus* long-term

When policy makers talk about 'economic sanctions', more often than not they are referring to negative sanctions – in other

104 Newnham, R., *Deutsche Mark Diplomacy: Positive Economic Sanctions in German-Russian Relations*, (University Park, PA: Pennsylvania State University Press, 2002), cited in Blanchard & Ripsman, 'A Political Theory of Economic Statecraft', p. 374.

105 Blanchard & Ripsman, 'A Political Theory of Economic Statecraft', p. 375.

106 *Ibid.*, p. 371.

107 Mastanduno, 'Economic Statecraft' (2008), p. 184.

words, the sticks (rather than carrots) of economic statecraft – which include the boycott of imports, embargoes on exports, restrictions on private business and travel, and the imposition of price rises through punitive duties.[108] Moreover, as Hill reminds us, '[i]t is important to distinguish between sanctions as an instrument of collective security, used by the League of Nations and the United Nations (where they have almost always proved a failure) and sanctions as an instrument of foreign policy, where they have been a qualified success in a number of cases despite the smaller number of enforcing states.'[109] The present study concerns itself exclusively with the latter. Nevertheless, it is also necessary to discuss the source of power behind the use of negative sanctions, rather than merely listing different instruments in which they might be manifested.

In a pioneering work on economic instruments of foreign policy, *National Power and the Structure of Foreign Trade* (1945), Albert Hirschman states that 'the power to interrupt commercial or financial relations with any country, considered as an attribute of national sovereignty, is the root cause of the influence or power position which a country acquires in other countries'.[110]

> *He calls the "two main effects" of foreign trade on "the power position of a country" the "supply effect" and the "influence effect". "The first effect is certain to be positive: By providing a more plentiful supply of goods or by replacing goods wanted less by goods wanted more (from the power standpoint), foreign trade enhances the potential military force of a country". Hirschman,*

108 Hill, *Op cit.*, p. 149.

109 *Ibid.*, endnote 52 to Chapter 6, pp. 336-337.

110 Hirschman, A.O., *National Power and the Structure of Foreign Trade*, (Berkeley, CA: University of California Press, 1945 [1980]), p. 16.

> *however, regards the implications of the supply effect as "obvious" and hardly in need of "further elaboration"; therefore, he devotes the bulk of his attention to the more theoretically interesting and less well-understood influence effect. Whereas the first effect derives from the would-be power wielder's "gain from trade," the second effect derives from the ability to deprive one's trading partners of* their *gains from trade by exercising the right of every sovereign state to interrupt its own export and import trade. Hirschman views the influence effect as more important than the supply effect and asserts "that economic pressure upon a country consists mainly of the threat of severance and ultimately of actual interruption of external economic relations with that country."*[111]

In Hirschman's own words, '[t]he stoppage of this trade obliges the other countries to find alternative markets and sources of supply and, should this prove impossible, it forces upon them economic adjustments and lasting impoverishment. True, the stoppage of trade will also do harm to the economy of the country taking the initiative in bringing about the stoppage, but this is not unlike the harm an aggressive country can do to itself in making war on another. A country trying to make the most out of its strategic position with respect to its own trade will try precisely to create conditions which will make the interruption of trade of much graver concern to its trading partners than to itself.'[112] Abdelal and Kirshner recall how Hirschman demonstrates that asymmetric economic relations between states afford more power to the larger state involved in the relationship: 'If large country A trades with small country B, commerce between them might account for only

111 Baldwin, *Economic Statecraft*, pp. 210-211. Original emphasis.

112 Hirschman, *Op cit.*, pp. 15-16.

two or three percent of country A's exports and imports, but might well represent over half of country B's. Such a relationship gives the larger country coercive power over the smaller, because an interruption of the relationship would cause much greater distress in B than in A. Threats of interruptions, then, both explicit and implicit, give A power.'[113] In other words, the power accrued by country A over country B is a form of hard power, and the threat of, if not an actual, trade interruption lies at the extreme end of the hard-soft power scale as an act of (economic) coercion, usually implemented as sanctions, as illustrated in Table 1 above.

The conception of power in Hirschman's book is cast primarily in terms of negative sanctions, but it is important to recall that economic statecraft can also be positive – used as a carrot, rather than a stick. Although Baldwin claims that 'Hirschman neither considers nor allows for the possibility that country A may want to enhance the supply effect in country B as a direct means of influence',[114] a closer inspection of Hirschman's book reveals that he does, in fact, briefly consider this possibility: 'country A, seeking to increase its influence in country B, might have an interest in altering the terms of trade in B's favor. Here, then, it would seem, we have an ideal instance of the opposition between a policy trying to maximize national income and a policy setting out to maximize national power.'[115] As Abdelal and Kirshner summarise, Hirschman illustrates how influence can be exercised indirectly by engaging in trade with another country, even without the threat of severing economic relations, although Hirschman dedicates much less attention to this dynamic than he does to his more fully and systematically developed argument on economic coercion:

113 Abdelal, R. & Kirshner, J., 'Strategy, Economic Relations, and the Definition of National Interests', *Security Studies*, Vol. 9, No. 1, (Autumn 1999), p. 120.

114 Baldwin, *Economic Statecraft*, p. 213.

115 Hirschman, *Op cit.*, p. 20.

> *Simply put,* National Power *[*and the Structure of Foreign Trade*] shows that the pattern of international economic relations affects domestic politics, which in turn shapes national interests. This is always true but is most vivid in asymmetric relations, where the effects are typically large, visible, and almost wholly found within the smaller economy. Consider, for example, a free trade agreement between a large and a small state. The likely result is a change in the smaller state's perception of its own interest: it will converge toward that of the larger. Why? Because the simple act of participation in the arrangement strengthens those who benefit from it relative to those who do not (by definition). This strength should translate into political power. Further, because firms and sectors engage in patterns of activity based on economic incentives, and since this constellation of incentives will be transformed by the trade agreement, the subsequent reshuffling of behavior will lead to new interests and the formation of political coalitions to advance those interests. Most importantly, decisions based on these new incentives give firms a stake in their country's continued participation [in the trade agreement], and they will direct their political energies to that end. In Hirschman's words, "…these regions or industries will exert a powerful influence in favor of a 'friendly' attitude toward the state to the imports of which they owe their interests." Finally, the central government can find its own interests reshaped, above and beyond that which results from domestic political pressures.*[116]

116 Abdelal & Kirshner, *Op cit.*, pp. 120-121.

Abdelal and Kirshner rightly find it important to distinguish between two different components, or sources, of Hirschman's influence effects: 'Hirschman considers "influence effects" to include both power that accrues to one state from asymmetric costs of exit *and* changes in domestic politics that result from international economic relations. [Abdelal and Kirshner] call the former "coercion" and the latter "influence." In other words, coercion refers to changes in policy, influence refers to changes in definition of interest.'[117] This distinction is important because it relates to Nye's hard and soft power dichotomy explained above, as Abdelal and Kirshner also acknowledge, while advocating the superior effectiveness of the latter: 'Hirschmanesque effects are more profoundly felt with regard to influence than coercion. ... [C]hanges in international political behavior do not occur because of pressure, but because new incentives alter perceptions of interest. This is akin to what Joseph S. Nye has called "soft power." Rather than forcing others to do what you want them to do, soft power, or influence, is about "getting others to want what you want."'[118] Thus, Hirschman's influence effects have the potential to be manifested as both hard and soft power, depending on how they are employed, either as trade severance or altered interest perception.

Meanwhile, Mastanduno focuses more on the deliberate use of positive sanctions than on influence as a nuanced side effect of trade. He defines positive economic statecraft as 'the provision or promise of economic benefits to induce changes in the behaviour of a target state.'[119] Furthermore, he argues that positive economic statecraft can bring about the same results as the use of their

117 *Ibid.*, footnote 5, p. 120. Original emphasis.

118 *Ibid.*, p. 121.

119 Mastanduno, 'Economic Statecraft' (2008), p. 182; and Mastanduno, 'Economic Statecraft, Interdependence, and National Security' (1999), p. 303.

negative counterparts: 'Just as trade denial can be used to change behaviour, weaken capabilities, or induce regime change, so trade promotion – the promise or actuality of expanded trade – can be a means to influence a government's domestic or foreign policies or to strengthen its capabilities. Governments can promise to increase aid, encourage foreign investment, or support a country's currency in exchange for desirable changes in that country's behaviour.'[120]

Mastanduno then goes on to argue that there are several reasons why positive economic statecraft might be more effective in achieving foreign policy goals than their negative counterparts, which bear repeating here:

> *Threats tend to inspire resistance and resentment in the target government; a typical response to the promise of rewards is hope and expectation. Negative sanctions often produce the 'rally around the flag' effect. Positive sanctions do not, and have the potential to undermine the target government by creating transnational coalitions between groups in the sanctioning and target countries at the societal [and business] level. Positive sanctions have a tendency to encourage the target government to cooperate with the sanctioning government on other issues; negative sanctions create a general reluctance to cooperate. With negative sanctions, multilateral cooperation is a necessity and there are strong incentives for third parties to break the embargo in order to gain above-normal profits. Positive sanctions do not require multilateral support, and alternative economic partners typically cannot gain by undercutting the sanctions. Business interests in the sanctioning state tend to mobilize against negative sanctions. But they are likely*

120 Mastanduno, 'Economic Statecraft' (2008), p. 175.

> *to support positive ones that coincide with their natural interest in expanding economic integration.*[121]

Based on such advantages, Abdelal and Kirshner conclude that nations are loath to engage in economic coercion because doing so forgoes the possibility of exercising positive sanctions, which they consider more valuable.[122]

However, there are also reasons to be sceptical of the overall utility of positive economic statecraft. Making a habit of handing out carrots to induce good foreign policy behaviour in a target state, as Mastanduno suggests, may well 'subject the sanctioning state to potential blackmail, since the state that hands out bribes in one context is likely to be pressured to do the same in others.'[123] The sanctioning state thus becomes a victim to perpetual demands for payments in exchange for the target state's sustained good behaviour. Mastanduno relates this to the subsequent problem pertaining to 'the political repercussions of "trading with an enemy". Even if positive economic measures stand a relative chance of success, governments might be reluctant to reward a government that they otherwise find to be politically or morally repugnant.'[124] Moreover, insofar as economic statecraft is employed to make an immediate or short-term change in another state's behaviour, policy makers tend to resort more often to negative sanctions than to positive ones, which Daniel Drezner attributes to the former's cost effectiveness relative to the latter.[125] It might be argued that the cost borne by the sanctioning state through

121 *Ibid.*, pp. 183-184. See also Mastanduno, 'Economic Statecraft, Interdependence, and National Security' (1999), p. 309.

122 Abdelal & Kirshner, *Op cit.*, p. 122.

123 Mastanduno, 'Economic Statecraft, Interdependence, and National Security' (1999), p. 309.

124 Mastanduno, 'Economic Statecraft' (2008), p. 184.

125 Drezner, D.W., 'The Trouble With Carrots: Transaction Costs, Conflict Expectations, and Economic Inducements', *Security Studies*, Vol. 9, No. 1, (Autumn 1999), pp. 188-218.

economic coercion, though potentially high in the short term, is likely to be lower than the long-term costs of positive sanctions, especially if the target state involves the sanctioning state in recurring blackmail for further bribes. This argument is in line with Hirschman's dictum, cited above, that the cost of coercion to the sanctioning state 'is not unlike the harm an aggressive country can do to itself in making war on another'; whereas positive sanctions can be compared to appeasement, which will not necessarily change the behaviour of the target state. However, as Mastanduno reminds us, negative and positive forms of economic statecraft need not be mutually exclusive: 'Positive and negative measures can be used as complementary instruments of statecraft. Positive economic sanctions can set up the threat or use of negative ones by developing the economic dependence of the target on the sanctioning country. Similarly, negative sanctions can structure opportunities for the use of positive measures. Once negative sanctions have been in place, lifting them is a change from the status quo for which sanctioning states can derive some concession in return.'[126]

This, in turn, leads to the important issue of the short- *versus* long-term effectiveness of economic statecraft. There seems to be a general consensus that economic statecraft is more, if not only, efficacious in the long run: 'From whichever viewpoint economic instruments [of foreign policy] are viewed there can be little doubt that they are slow-moving in their impact,' writes Hill.[127] Even so, Mastanduno distinguishes between two types of positive sanctions, the first of which is short-term and whose logic might also be applied to negative sanctions. 'The first [type] involves the promise of a well-specified economic concession in an effort to alter

126 Mastanduno, 'Economic Statecraft' (2008), p. 184.

127 Hill, *Op cit.*, p. 149.

specific foreign or domestic policies of the target government', he writes, calling 'this version tactical linkage; others refer to "carrots," or "specific positive linkage." ... Specific sanctions operate at a more immediate level: The sanctioning state calculates that the provision of a particular type of economic reward will be sufficient to convince policymakers in the target state to reconsider their existing foreign or domestic policies.'[128] The same might be said of punitive economic measures when enforcing negative sanctions in (often vain) hopes of short-term success in economic statecraft.

The other type of positive sanctions Mastanduno discusses is informed by a different logic, in line with Hirschman's argument that the influence effect alters the interests of the target state, but which bears repeating. This second version, which Mastanduno terms 'structural linkage and which others refer to as "general positive linkage" or "long-term engagement", involves an effort to use a steady stream of economic benefits to reconfigure the balance of political interests within a target country. Structural linkage tends to be unconditional; the benefits are not turned on and off according to changes in target behaviour. The sanctioning state expects instead that sustained economic engagement will eventually produce a political transformation and desirable changes in target behaviour.'[129] Hill states that it is in the long run that the use of economic statecraft has the most profound impact,[130] but in order to be effective, Mastanduno reminds us, 'economic engagement requires a patient, sustained commitment on the part of the sanctioning state.'[131] Though the slow but long-

128 Mastanduno, 'Economic Statecraft, Interdependence, and National Security' (1999), pp. 303, 306; and Mastanduno, 'Economic Statecraft' (2008), p. 182.

129 Mastanduno, 'Economic Statecraft' (2008), p. 182; and Mastanduno, 'Economic Statecraft, Interdependence, and National Security' (1999), pp. 303-304.

130 Hill, *Op cit.*, p. 151.

131 Mastanduno, 'Economic Statecraft, Interdependence, and National Security' (1999), p. 308.

term effects of economic statecraft have often been criticised in the literature, particularly by realists, Baldwin counters that 'this is not necessarily the "inherent weakness" it is often made out to be. Quicker is not always better.'[132] The altered interests of countries resulting from economic engagement is not without drawbacks, however, as the vested interests of the sanctioning state are also changed in favour of maintaining these economic relations: 'The deepening of interdependence has the potential to tie the hands of sanctioning state policy officials, should they decide in the future that they need to abandon engagement and adopt a more confrontational foreign policy strategy.'[133]

Lastly, as a rebuttal to those who denigrate the utility and effectiveness even of long-term economic statecraft, Baldwin stresses that '[t]he effects of economic statecraft are rarely sudden or dramatic but rather tend to be slow, circuitous, and unexciting. "Economic variables," as Gilpin observes, "tend to be accretive. Although sudden and dramatic economic changes can and do take place, in general the influence of economic changes tends to be cumulative, building up over decades or even centuries." This low profile makes it easy to overlook the effects of economic statecraft.'[134] He recalls that 'one of the most important foreign policy goals for most countries is how to get other countries to contribute to the enhancement of their economic welfare', and concludes:

> *No other technique of statecraft even begins to approach international trade for effectiveness in promoting this important foreign policy goal. International economic exchange is one of the most spectacularly successful*

132 Baldwin, *Economic Statecraft*, p. 111.

133 Mastanduno, 'Economic Statecraft, Interdependence, and National Security' (1999), p. 309.

134 Baldwin, *Economic Statecraft*, p. 134.

> *examples of international influence in history; yet it is rarely so described. Why? Because routine, mundane, day-to-day economic exchange is often* defined *as either not involving power or as not being "real" foreign policy. Such conceptions of power or foreign policy have important effects on conclusions about the efficacy of economic techniques of statecraft. ... It is easy to overestimate the importance of the spectacular, the unusual, the dramatic, the extraordinary while underestimating the cumulative impact of everyday things that we take for granted. The "low politics" of economic exchange may not be very noticeable on any given day; but over the long haul, it is one of the most important influence mechanisms in the world.*[135]

2.3.3. Causal factors that determine effective economic statecraft

Fairly early in his seminal work on the subject, *Economic Statecraft*, Baldwin advocates that what is clearly needed in this sub-field of International Relations and Foreign Policy Analysis is 'a conception of the instruments of policy that is independent of the causal conditions that determine success.... The instruments of policy, or techniques of statecraft, should thus be treated as properties of a single state and should be discussed without implying anything whatsoever about the probable effectiveness of an influence attempt employing a particular instrument.'[136] Instead, he dedicates the bulk of his work to redefine, in the broadest terms, what 'successful economic statecraft' means. His statement was in large part a reaction to what he saw as a disproportionate focus on

135 *Ibid.*, pp. 115-116, 118.

136 *Ibid.*, p. 24.

prescriptive approaches to the subject, rather than a systematic and more descriptive theory of economic statecraft, prior to the publication of his book. Though this is a valid point, given the scarcity of theoretical work on the matter at that time, Lebow reminds us of perhaps an even more significant observation, made by Morgenthau, that 'the role of international relations theory should never be limited to describing reality; it must educate actors about the necessity and feasibility of improving it.'[137] More specifically, with regards to economic statecraft, William Norris agrees that 'understanding exactly how states employ economics in practice to achieve their grand strategic objectives constitutes an important contribution to policy makers' understanding of how states behave in the international system.'[138] In that spirit, and since numerous authors have discussed the determining factors behind the effective use of economic instruments of statecraft, this sub-section will explore some of the main, and most addressed, criteria for successful economic statecraft.

Before analysing each of these factors individually, a crucial interpolation must first be made. Mastanduno affirms that economic statecraft is 'part of the wider array of foreign policy instruments that states have at their disposal; more often than not, economic measures are used in conjunction with diplomatic and military ones as part of any government's overall approach to addressing foreign policy problems and opportunities.'[139] It is therefore a widespread and popular (if not completely accurate) view in International Relations that '[e]conomic sanctions are

137 Lebow, R.N., 'Culture and International Relations: The Culture of International Relations', *Millennium*, Vol. 38, No. 1, p. 4.

138 Norris, W., 'Economic Statecraft: The Use of Commercial Actors in Grand Strategy', *Paper presented at the annual meeting of the International Studies Association: 'Theory vs. Policy? Connecting Scholars and Practitioners'*, New Orleans Hilton Riverside Hotel, The Loews New Orleans Hotel, New Orleans, LA, 17 February 2010. Cited with the author's permission.

139 Mastanduno, 'Economic Statecraft' (2008), p. 172.

more effective when used in conjunction other techniques of statecraft.' However, Baldwin quotes Harold Lasswell and Abraham Kaplan's *Power and Society* in stating that the previous proposition is generally applicable to all forms of power:

> *The forms of power are interdependent: a certain amount of several forms of power is a necessary condition for a great amount of any form. ... Each form of power always involves a number of others, to degrees and in ways which must be separately determined, in principle, in each case. ... In short, none of the forms of power can stand alone: each requires, for its acquisition as well as maintenance, the simultaneous exercise of other forms of power as well.*[140]

Which is why, as recognised by Hirschman, any examination of economic statecraft in general, and of the separate causal factors that determine its success in particular, must presuppose all other things being equal: 'In order to analyze the way in which foreign trade contributes to a certain distribution of power among the various nations, it must be isolated temporarily from the other determinants; for the purpose of this inquiry these other determinants may be impounded in a vast *ceteris paribus* upon which, for the sake of rendering our analysis more realistic, we shall have to draw from time to time.'[141]

In a recent paper,[142] Norris argues there are four principal factors that determine the success of economic instruments of foreign policy, the first three of which are drawn from previous works on economic statecraft, while he further develops the fourth,

140 Lasswell, H.D. & Kaplan, A., *Power and Society: A Framework for Political Inquiry*, (London: Routledge and Keegan Paul, 1952), pp. 92-94. Cited in Baldwin, *Economic Statecraft*, pp. 143-144.

141 Hirschman, *Op cit.*, p. 13.

142 Norris, *Op cit.*

which 'has received comparatively little attention.' These are: first, the relative importance of the issue at stake, which includes the scope and scale of the objectives(s) to which economic statecraft is directed, along with the costs incurred (economic and political) for both sanctioning and target states; second, the relative magnitude of, or overall dependence on, the economic interaction; third, the price elasticity of certain goods in the economic interaction, or how 'strategic' these goods are; (it should be noted that the second and third factors are somewhat related, in that they both amount to a form of dependence: on aggregate trade and on a specific good or commodity, respectively); and, fourth, the degree to which the state is able to control and implement that economic interaction, or the extent to which commercial actors are agents of the government.

2.3.3.1. Scope, domain and cost of economic statecraft

The first, and perhaps most important, determining factor behind an effective attempt at economic statecraft is reflected in Baldwin's warning that 'it may…be inappropriate to judge economic instruments without reference to underlying strategic purposes.'[143] Indeed, economic sanctions have different purposes, from changing the domestic or international behaviour of a state, to affecting a target state's economic or military capabilities, and even to undermine the very existence of a government, by attempting to bring about regime change.[144] Thus, for Norris, the primary determinant of effective economic statecraft is the relationship between the ends sought and the means used to achieve those objectives:

143 Baldwin, *Economic Statecraft*, p. 114.

144 Mastanduno, 'Economic Statecraft' (2008), p. 175.

> *The first factor that determines the likelihood of success is the purpose that economic statecraft is designed to achieve and how that end matches with the target state's own objectives. As has been noted in the sanctions literature, success of economic statecraft often depends on the relative importance of the jeopardized economic interaction* vis-à-vis *the contentious issue area. The ends sought cannot be out of proportion with the economic means available to realize those ends. …* Ceteris paribus, *economic statecraft that has a more modest objective targeting a less recalcitrant state will meet with success more readily than economic statecraft with a grandiose goal targeting a state whose domestic political climate is not conducive to the sought objective. … In other words, for economic statecraft to be successful, the ends must be commensurate with the means. To the extent that the objective sought is out of proportion to the economic tools available, economic statecraft is unlikely to succeed.*[145]

However, Baldwin clarifies that it is useful to distinguish between the targets (or what he calls 'domain') and the objectives (what he calls the 'scope') of an influence attempt in foreign policy:

> *The distinction refers to who is to be influenced (the target) and in what ways (the scope). Targets and objectives vary in number, specificity, and importance. In any given influence attempt, states may – and usually do – pursue more than one goal with respect to more than one target. … Not all goals or targets are equally important, but none is intrinsically unimportant. Thus, it may be useful to sort out the primary, secondary, and perhaps even tertiary goals and targets of a given*

145 Norris, *Op cit.*

> *influence attempt; but it is a mistake to assume that the content of such categories never varies. … Recognition that a given influence attempt may involve multiple goals and targets of varying generality and significance is an important first step for assessing the utility of various techniques of statecraft, especially economic ones.*[146]

Mastanduno, in turn, corroborates this point by stating that 'Baldwin's argument on the need to recognize that multiple objectives are at play in any sanctions attempt is compelling. The identification of sender objectives is obviously crucial to any assessment of the utility of economic sanctions in any particular case.'[147]

A further dimension of this causal factor is cost. The costs involved in an economic influence attempt, for both sanctioning and target state, are a key determinant in whether or not economic statecraft is likely to succeed. From the sender country's standpoint, Baldwin notes, costs do not only have negative connotations, since 'incurring costs adds to the credibility of mere words. Costs are widely regarded as a standard indicator of the intensity of one's resolve. In statecraft, observes [Thomas] Schelling, "words are cheap, not inherently credible when they emanate from an adversary. … Actions also prove something; significant actions incur some cost or risk and [thus] carry some evidence of their credibility."'[148] Thus, in Hanson's recount of Baldwin's argument, '[t]he message conveyed to the target nation is more imposing if it is sent at some evident cost to the sender. Cost is a disadvantage

146 Baldwin, *Economic Statecraft*, pp. 16-18.

147 Mastanduno, 'Economic Statecraft, Interdependence, and National Security' (1999), p. 292.

148 Baldwin, *Economic Statecraft*, p. 107.

in itself, but it is also a sign of seriousness, and that may heighten the impact of the message.'[149]

Baldwin then goes on to argue that even if strict compliance to a sanctioning country's demands is not observed, some degree of success still takes place:

> *[T]o the extent that economic sanctions increase a target country's costs of noncompliance, power is being exerted* even though no change occurs in the policies of the target country. ... *Thus, a typical conclusion is that sanctions succeeded in increasing the costs of intransigence to the target but failed to produce a political effect. From the standpoint of conventional power analysis, however,* increased costs are political effects. *Not all influence is manifest in terms of changes in policy; changes in the costs of noncompliance also constitute influence. The tendency to overlook this point contributes to underestimating the effectiveness of economic statecraft.*
>
> *This problem may also be viewed in terms of the target country's costs of compliance. The higher the costs of compliance, the more difficult the undertaking, and the higher the costs of noncompliance will have to be if the costs of compliance are to be offset by the influence attempt.*[150]

Blanchard and Ripsman acknowledge this last point and further elaborate it by analysing target states' incentives to resist or yield to economic statecraft based on costs to the target nation. Unlike Baldwin, their focus is not on the economic costs

149 Hanson, *Op cit.*, pp. 12-13.

150 Baldwin, *Economic Statecraft*, pp. 132-133. Original emphasis.

of compliance, but the political costs, 'which are more important for target state calculations.'[151] It should be noted, however, that despite concentrating on economic costs, Baldwin does acknowledge other forms of costs involved in economic statecraft:

> *The tools of economic statecraft involve things measurable in terms of money, but that does not mean that the costs of using such techniques are measurable solely in economic terms. The costs of using economic statecraft, like the costs of any other kind of influence attempt, may be political, military, or psychological as well as economic. To pretend that the costs or benefits of influence attempts can be calculated with great precision by even the most rational of decision makers would be false and misleading.*[152]

Because previous (mostly liberal) scholars have not been successful in their attempts to correlate the effectiveness of economic statecraft with the economic costs the sender state is able to impose on the target country – thus neglecting 'the essentially political nature of the policy changes that sanctions seek to achieve' – Blanchard and Ripsman's argument is that 'the efficacy of economic sanctions should depend not on the economic pain they promise, but on the corresponding political costs that the target state faces if it refuses to comply with the sender's wishes as well as the political costs it will incur if it accedes to the sanctioning state's demands.'[153] The political costs of compliance to economic statecraft are, in turn, affected by a variety of international and domestic conditions, some of which will be explored more specifically in Chapter 4.

151 Blanchard & Ripsman, 'Asking the Right Question', p. 224.

152 *Ibid.*, p. 128.

153 Blanchard & Ripsman, 'Asking the Right Question', p. 224.

Thus, the variation in targets, objectives and the costs for both sender and target states should be taken into consideration before evaluating the effectiveness of an influence attempt through economic statecraft, including whether or not such an attempt has been successful, as Baldwin concludes:

> *Power varies not only in degree but on several dimensions, including scope, domain, and cost. Thus, a simple dichotomy of "success/failure" obscures not only variations in degree but also the various dimensions for measuring success. Establishing the intended scope and domain of an influence attempt is a basic first step in assessing effectiveness. … To view the use of economic statecraft strictly in terms of securing compliance with explicit and publicly stated demands is to load the dice in favor of failure. Third parties, secondary goals, implicit and unstated goals are all likely to be significant components of such undertakings.*[154]

2.3.3.2. Magnitude of, and dependence on, the economic interaction

The second determining factor for effective economic statecraft that Norris lists is the relative magnitude of the economic interaction – in other words, the relative importance of trade to one country *vis-à-vis* the other and the extent to which a target state is dependent on the economic relations it maintains with the sender or sanctioning state. Hirschman explains that

> *the difficulty of substituting country A as a market or supply source for country B may be said to depend not only on the absolute amount of A's trade with B, but also on the importance of this trade relatively to B's*

154 Baldwin, *Economic Statecraft*, pp. 131-132.

> *total trade. … The greater the percentage of exports and imports involved in a dominant market, the more difficult it will be to provide substitute markets and sources of supply. … If a nation with an absolute volume of trade imports from or exports to, a small trading nation, the trade they conduct together will inevitably result in a much higher percentage for the small than for the large trading nation.*[155]

As Norris exemplifies, 'a country whose trade comprises 80% of its GDP will be much more sensitive to disruptions of that trade than one for whom trade plays only a minor role in its overall economy. The relative magnitude of the economic interaction ought to be fairly large for economic statecraft to be effective.'[156]

This kind of exploitable trade dependence for the purposes of extracting benefits for political goals is analogous to Hirschman's influence effect:

> *What [Hirschman has] called the influence effect of foreign trade derives from the fact that the trade conducted between country A, on the one hand, and countries B, C, D, etc., on the other, is worth* something *to B, C, D, etc., and that they would therefore consent to grant A certain advantages – military, political, economic – in order to retain the possibility of trading with A. If A wants to increase its hold on B, C, D, etc., it must create a situation in which these countries would do* anything *in order to retain their foreign trade with A. Such a situation arises when it is extremely difficult and onerous for these countries:*

155 Hirschman, *Op cit.*, p. 30.

156 Norris, *Op cit.*

> *to dispense entirely with the trade they conduct with A, or*
>
> *to replace A as a market and a source of supply with other countries.*
>
> *The principles of a power policy relying on the influence effect of foreign trade are in their essence extremely simple:* They are all designed to bring about this "ideal" situation. … *The difficulty for country B, C, D, etc., of dispensing with the trade conducted with A seems to depend on three main factors:*
>
> *The total net gain to B, C, D, etc., of their trade with A;*
>
> *The length and the painfulness of the adjustment process which A may impose upon B, C, D, etc., by interrupting trade;*
>
> *The strength of the vested interests which A has created by its trade within the economies of B, C, D, etc.*[157]

Thus Hirschman concludes that 'the influence which one country exercises upon another through foreign trade is…likely to be larger the greater the immediate loss which it can inflict by stoppage of trade.'[158] In other words, the more a target state benefits from trade with a sender state, the more dependent it is on that trade and the more vulnerable it is to interruption, thereby increasing the potential for effective (negative) economic

157 Hirschman, *Op cit.*, pp. 17-18. Original emphasis. It is important to remember a crucial distinction raised by Abdelal and Kirshner, between Hirschman's influence effect and dependency theory: 'Fostering dependence, as used by Hirschman…, is undertaken by states using economic means to advance political goals. This is distinct, and in essence the converse of "dependency," in which large states use their political power to enforce economic extraction. From the dependency perspective, then, power is a means to achieve an economic end. In Hirschman's story of dependence, wealth is used to advance a political goal.' Abdelal & Kirshner, *Op cit.*, p. 122.

158 Hirschman, *Op cit.*, p. 27.

statecraft. This is precisely the contention George Shambaugh makes, who also concurs that 'the higher the level of dependence, the more likely it is that economic sanctions will work.'[159]

Baldwin takes this argument one step further by demonstrating that a similar logic of dependence is also at work in positive forms of economic statecraft, such as giving foreign aid to target or recipient states:

> *Dependency on aid, like dependency on trade, stems from the opportunity costs of forgoing the relationship. Thus, the larger the gains from aid, the larger the costs of forgoing aid, and the greater the dependency on aid. The most asymmetrical case of aid dependency would be one in which one party…values the relationship very highly…and the other party…places little or no value on the relationship. Such a situation maximizes the potential influence of the indifferent party with respect to the dependent party. Since the former can make costless and credible threats to end the relationship.*[160]

For these reasons, the relative magnitude of an economic interaction between two countries, reflected in the level of economic dependence of a target state on a sender state, is a crucial factor in determining the effectiveness of economic statecraft, be it negative or positive.

2.3.3.3. 'Strategic' goods and their price elasticity

The third factor that determines the effectiveness of economic statecraft is the extent to which a good involved in the economic

159 Shambaugh, G., *States, Firms, and Power: Successful Sanctions in United States Foreign Policy*, (Albany, NY: SUNY Press, 1999), p. 583. Cited in Blanchard & Ripsman, 'A Political Theory of Economic Statecraft', p. 373.

160 Baldwin, *Economic Statecraft*, p. 306.

interaction is 'strategic'. Before delving into what is meant by a 'strategic good' for the purposes of this study, however, it is necessary first to point out what the concept usually refers to and why that narrow use of the concept is inappropriate. According to Baldwin, the basic intuitive notion behind the 'strategic goods' concept is that some goods '*have more strategic value than others*. That is, for any *given* strategy, some things have more utility than others'.[161] The traditional view that some goods are inherently more strategic than others – what Baldwin calls the 'strategic goods fallacy' – derives from the premise that 'some goods are only strategic if they can be used for war, or converted for war, or processed into war-type goods.' But as Schelling clarifies, this assumption 'ignores the fact that a nation's resources can be used to produce alternative goods.'[162]

Instead, Baldwin suggests that the 'strategic' value of a good is not inherent, but context-specific:

> The "strategic" quality of a good is a function of the situation; it is not intrinsic to the good itself. *Thus, the question of how strategic an item is cannot be determined by examining the item itself; nor can it be determined by analyzing all the possible uses to which the item may be put. What is highly "strategic" with respect to one target country may not be very "strategic" at all with respect to another. … From the standpoint of international trade a "strategic" item is anything that is needed to pursue a given strategy and that is relatively inefficient to produce at home.*[163]

161 *Ibid.*, pp. 214-215. Original emphasis.

162 Schelling, T., *International Economics*, (Boston, MA: Allyn and Bacon, Inc., 1958), p. 500.

163 Baldwin, *Economic Statecraft*, p. 215. Original emphasis.

As Hanson notes, this is a common theme throughout the works of a number of key authors on the subject: 'Schelling, Baldwin and [Peter] Wiles all consider that in particular circumstances, and when particular time-horizons are being considered, it can make sense to treat some goods as "strategic". For Baldwin, however, these are not items identified by their being usable directly for military purposes. He suggests that the term is best reserved for *items for which the target nation has a low price-elasticity of demand and little scope for replacement with substitutes*.'[164]

Hirschman also hints at demand inelasticity as a source of power between nations. A country ('A') that wants to gain power or influence over other nations through economic statecraft, he explains, 'has to seek trading partners with an "urgent" demand for its export goods...which have no possibilities of themselves producing the commodities country A exports.'[165] This in turn leads to another form of dependence of the target state on the exporting country ('A') – but on a single, 'strategic' good produced by the sender state, rather than on the aggregate amount of trade conducted between the two nations – which will persist unless the target country manages to diversify its consumption of the strategic good in question – (a topic which will be explored more specifically and in depth in the next chapter). Hirschman then goes on to prescribe a more concrete way to maintain such a power position over other countries: 'A more specific policy by which a country could try to prevent its trading partners from diverting their trade to other countries would consist in the creation of monopolistic or monopsonistic conditions with regard to certain products.'[166]

164 Hanson, go *Op cit.*, p. 9. Emphasis added.

165 Hirschman, *Op cit.*, p. 24

166 *Ibid.*, p. 31.

Based on the arguments exposed above – and other, similar ones in the literature – Norris lists the price elasticity of 'strategic' goods as one of the four key determinants for the successful use of economic statecraft, and even illustrates it with an example that is directly relevant to this study, which will be elaborated further in the following chapter in this study:

> *The third factor is the elasticity of demand (or, in some cases, supply) for the economic interaction. For economic statecraft to be effective, the nature of the economic interaction ought to be fairly inelastic. For example, a country whose domestic energy grid is based on light, sweet crude oil is not easily able to substitute alternative goods in place of this type of crude oil. Since energy also provides such a fundamental input for the rest of the economy, this country's demand for light sweet crude would be said to be fairly inelastic. Thus, we can hypothesize that economic statecraft based on large, inelastic economic interaction has a greater likelihood of success,* ceteris paribus.[167]

2.3.3.4. Principal-agent theory and government control of economic actors

As Hill notes, '[m]ost economic statecraft is a question of making some use of what is happening anyway, through trade, investment or development aid.'[168] However, Norris points out that even though 'states have some discretion over the elasticity and relative magnitude of their various types of economic interactions, for the most part these conditions are driven by relatively exogenous, long-run economic dynamics…rather than

167 Norris, *Op cit.*

168 Hill, *Op cit.*, p. 148.

deliberate state action *per se*.' Although the three aforementioned factors – cost and scope of objectives, relative magnitude and dependence, and price elasticity of strategic goods – are 'important for determining the ultimate effectiveness of economic statecraft,' writes Norris, 'the degree to which a government is able to control or direct the behavior of its commercial actors is the critical element that has not been as well developed in the existing work on economic statecraft.' This is conceptually significant because 'the study of economic power, like most works in international relations, has focused on states as the unit of analysis. This analytical perspective risks overlooking the importance of commercial actors and the role that commercial actors play in attempts to realize strategic national objectives using economic means.' Norris therefore devotes the bulk of his paper to answer the question of how states manipulate their commercial actors to behave in ways that support their political goals: 'Despite the centrality of economic actors in explaining international economic power, these actors have not been adequately incorporated into a general theory of economic statecraft. As a result, we have little sense of the micro-foundations of economic statecraft as practiced in [the] grand strategy' of a state's foreign policy.'[169]

The main problem in conceptualising a government's control of its foreign economic relations to serve its political objectives, as Hill reminds us, is that 'international economic activity derives for the most part from the private sector, while foreign policy is largely the business of states. There is therefore an uneasy public-private relationship at the heart of economic statecraft.'[170] Hirschman downplays this predicament by arguing that 'it is not essential that the state should exercise positive action, i.e.,

169 Norris, *Op cit*.

170 Hill, *Op cit*., pp. 148-149.

organize and direct trade centrally' for a state to derive power from its international economic relations; 'the negative right of veto on trade with which *every* sovereign state is invested is quite sufficient.'[171] While his contention may have made more sense at the time of his writing in the early 1940s, today it is too simple a dismissal, particularly in an age of globalisation and economic interdependence. In the current international system, writes Hill, 'where capital moves far more freely and trade liberalization has become entrenched, it is far more difficult for governments either to act unilaterally on major aspects of political economy or to disrupt the normal workings of the market for anything less than a national emergency.'[172] However, Norris maintains that 'even in a modern, liberal economic system in which states themselves are not directly responsible for conducting the majority of economic interaction, states can create incentives for commercial actors to behave in ways that…are conducive to a state's strategic interests.' In fact, it is precisely this sort of state manipulation of economic interaction that Norris defines as economic statecraft,[173] which is in line with Baldwin's definition of statecraft, which is not necessarily practised only by governments, but also by other (non-state) actors. This then leads to the final causal factor for effective economic statecraft, according to Norris:

> *The fourth factor determining the likelihood of success [in economic statecraft] is the state's ability to control or direct its economic interaction. The degree to which a state is able to direct its economic interaction is largely a function of its domestic economic system – in particular, the nature of its business-government relations. … The*

171 Hirschman, *Op cit.*, pp. 16-17. Original emphasis.

172 Hill, *Op cit.*, p. 149.

173 Norris, *Op cit.*

> *nature of these relations often determines the degree to which the state has control over the specific conduct of its economic interaction with other states.* Ceteris paribus, *states with a greater degree of control over their domestic economy will be better suited to direct their economic interaction and thus more likely to realize success in their attempts to engage in economic statecraft.*[174]

It is important to remember, though, as Hill recalls, that 'despite the ambiguities of the public-private relationship from the point of view of the [sanctioning] actor, from that of the recipient the distinction may seem trivial and the reality that of external pressure, even neo-colonialism.'[175]

On the other hand, Hill also raises the issue that while the long-run use of economic power by states 'has proved over the past fifty years to be the most effective way of pursuing foreign policy goals – so long as you are rich, powerful and capitalist' – it is nevertheless much 'more complex to operate in an era of *laissez-faire* than one of autarky'.[176] This in turn leads to a fundamental contradiction, identified by Norris, concerning the government-business relations of a state and its foreign policy ramifications:

> *A basic paradox confronts states seeking to exercise economic power. To be effective at directing its economic power, a state needs to be able to direct its economic activities. However, as demonstrated by states with centrally directed economies, the more a government, rather than markets, is in charge of directing a state's economic behavior, the less efficient the state's economic*

174 *Ibid.*

175 Hill, *Op cit.*, p. 149.

176 *Ibid.*, pp. 151, 149.

> *productivity tends to be.*[177] *Over time, this lower economic productivity limits the size of a nation's economy. The smaller or less powerful a state's economy is, the less intrinsic weight the state has to throw around... ['Of course, if the economy provides a unique, critical good (e.g. something with highly inelastic demand), the state can also derive considerable influence from the inelasticity (rather than the magnitude) dimension of its international economic relations.']*[178] *So although a state needs to be able to direct its economic might for economic statecraft to be effective, too much state direction tends to lead to inefficiency and a less robust economy overtime. Likewise an economy in which the state is relegated to a very small role may grow to exceptional proportions, but the state will find it difficult to meaningfully direct this latent economic power in any concerted way. This is the essence of the paradox inherent in the exercise of national economic power.*[179]

Governments then resolve this paradox by making a fundamental choice with regards to the economic system, and resulting government-business relations, of their states, depending on the extent to which they wish to interfere in (if not control) their economy. It is therefore not surprising, for Mastanduno, that

177 While Norris realises 'that the paradox presented here assumes some liberal economic tenets (i.e. that directed economic growth is not as efficient as market-oriented economic activity)', he assumes 'that directed economic growth is not as efficient as market-oriented economic activity over the long run and [focuses] on developing the implications of this in terms of the paradox. That said, the underperformance of centrally-planned economies is well documented. Economic inefficiencies stem not only from the challenge of the complexity involved, but also from the long-term implications of inefficient capital allocation. … Although intensive, government planned and directed economic growth is possible (and may even be sustained for some period of time), it does not seem to be the best path for economic dominance, or long term sustainability.' Norris, *Op cit.*, footnote 33.

178 Norris, *Op cit.*, footnote 34.

179 Norris, *Op cit.*

'powerful states – those with strong economies and many economic instruments at their disposal – are more likely than weaker states to initiate economic statecraft as a key foreign policy measure.'[180]

From a theoretical perspective, this choice is reflected in a diversity of possible mechanisms of interaction between principals and their agents, postulated in the 'principal-agent problem' (or 'agency dilemma'), which provides an appropriate conceptual framework for analysing states' implementation of economic statecraft through commercial actors. To recapitulate, Norris' summary of the principal-agent relationship is instructive:

> *At the heart of principal-agent theory lies a very simple concept: principals have one set of goals and objectives but they must rely on agents to act on their behalf to realize them. The wrinkle lies in that agents often have a different set of goals and objectives derived from the incentives that they face as autonomous actors. So the challenge becomes one of aligning the agents' incentives such that they will act in a manner that furthers the principal's goals. This is the principal-agent…problem in brief.*
>
> *The dynamics present in the principal-agent relationship mirror those present in the relationship between the state and commercial actors when the state exercises economic statecraft. The state (acting as the principal) desires to achieve some strategic national objective through the use of economics. However, in many economies, the practice of economic interaction is actually conducted by commercial actors. As such, if the state seeks to manipulate [its] economic interaction*

180 Mastanduno, 'Economic Statecraft' (2008), p.172.

> *[with another country,] and this economic interaction is being conducted on a day-to-day basis by commercial actors, the state must face up to the challenges of working through a proxy – namely, the commercial actors. Thus, the dynamics highlighted by principal-agent theory provide a useful guide for framing the issues that arise when states must work with commercial actors.*[181]

Consequently, states that do not have full control over their economic actors must be able to surmount the principal-agent problem involved in their government-business relations, in order for their economic statecraft to be successful.

In conclusion, all four determining factors proposed by Norris are required for an effective implementation of economic statecraft to take place:

> *If a state can overcome the principal-agent challenges, and the other three…variables (Relative Magnitude, Elasticity and Commensurate Purpose) are present, then we are likely to see states being able to realize their strategic goals through the use of economics. In this manner, overcoming the principal-agent challenges are a necessary but not sufficient requirement for economic statecraft. Without state manipulation of commercial actors, economic statecraft does not exist. At the same time, although state manipulation of commercial actors is an important factor for the success of economic statecraft, on its own it is not sufficient for effectiveness – state manipulation also relies on favorable values across the other three…variables for effective economic statecraft to occur.*[182]

181 Norris, *Op cit.*

182 *Ibid.*

However, it is important to bear in mind, as Hill reminds us, that 'sanctions are not precise tools whose impact can be predicted with confidence. Rather, they can usually be parried, if the target is prepared (as they usually are, given the threat to their reputation for sovereign independence) to pay the inevitable price for defying states on whom they are dependent, and at times the whole international community.' This is why a further factor is crucial in analysing whether any economic statecraft attempt can be successful: the context in which it takes place – a topic which will be explored at length in Chapter 4.

CHAPTER 3
ENERGY STATECRAFT: ENERGY RESOURCES AS FOREIGN POLICY INSTRUMENTS

For more than a century, write Carlos Pascual and Evie Zambetakis, 'energy, politics and power have been clearly intertwined as a force in international security.'[183] Despite the centrality of energy to a state's national security and the role of energy in international relations, Brenda Shaffer reminds us that 'professional journals in international relations and political science have paid scant attention to publishing research on the topic.' During periods of tight energy market conditions, however, 'there has generally been an increase in scholarly publications dealing with energy. For instance, following the 1973-74 oil crisis, a number of publications in major political science and international relations outlets appeared that dealt with energy.'[184] This is also true of the more recent five-year steady rise in oil prices since 2003 – which culminated in the summer of 2008 with a historical record

183 Pascual, C. & Zambetakis, E., 'The Geopolitics of Energy', in Pascual, C. & Elkind, J. (eds.), *Energy Security: Economics, Politics, Strategies, and Implications*, (Washington, D.C.: Brookings Institution Press, 2010), p. 31.

184 Shaffer, B., *Energy Politics*, (Philadelphia, PA: University of Pennsylvania Press, 2009), p. 18.

price of $147.27 a barrel – during which time renewed academic attention was paid to the role of energy in international relations.

Energy as an instrument of foreign policy is a more specific form of economic statecraft, for energy resources are economic resources, after all. As such, they have essentially similar conceptual characteristics. They are also alike academically in the sense that what relatively little research has been done on energy in International Relations and Foreign Policy Analysis, like the literature on economic statecraft up to David Baldwin's seminal work by the same title in 1985, 'tends to be narrowly focused and topical rather than general and theoretical.'[185] Thus, given the relative lack of theoretical research on energy statecraft so far, the current chapter will use the theoretical framework of economic statecraft delineated in the previous chapter as a conceptual model for the present study, while also building on some of the more recent works on energy in International Relations.

This chapter follows a similar structure to the previous one – although more narrowly focused on energy, rather than economic, statecraft – while exploring the characteristics that are specific to energy resources in contrast to most other economic instruments of foreign policy. It begins with a conceptual discrimination between three distinct but interrelated terms that are often applied interchangeably to energy in International Relations – security, diplomacy and statecraft – in order to clarify a certain level of theoretical confusion in the literature. Next is a brief discussion of the different types of energy statecraft, which is not just limited to the same typology as economic statecraft – namely negative, positive, short and long term – but also explores how the various types of primary energy sources can (or cannot) be implemented as instruments of statecraft. Then, following the same model used

185 Baldwin, D.A., *Economic Statecraft*, (Princeton, NJ: Princeton University Press, 1985), pp. 53-54.

in the previous chapter, the four causal factors that determine the effective use of economic techniques of statecraft – ends-means commensurability, market power and dependence, price elasticity, and government control of economic agents – will be applied specifically to energy statecraft. Lastly, in order to avoid merely 'showcasing' the efficacy of energy statecraft, this chapter lists a series of inherent and potential obstacles and limits to the use of energy resources as instruments of foreign policy.

3.1. Security, diplomacy & statecraft: three different but interrelated energy concepts

'Even though David Baldwin's work has been of seminal importance for the academic recognition of economic statecraft as an indispensable "portfolio" of policy means in the service of a nation's strategic goals,' Theodore Tsakiris calls attention to the fact that nowhere does Baldwin make a specific reference to energy-related concepts[186] – such as security, diplomacy or statecraft – despite energy resources permeating every 'aspect of social life in terms of the production and consumption of wealth that is measurable in terms of money', as Baldwin defines.[187] However, energy resources are distinct from all other goods and commodities that can be utilised for economic statecraft. In fact, Baldwin's disdain for the idea of 'strategic goods' notwithstanding – namely that 'for any *given* strategy, some things have more utility than others'[188] – energy resources are probably among the few (if not the only) goods that qualify as being strategic for *any given* strategy. Energy resources also fit Baldwin's more restrictive use of the term, seen from most energy-importers' position, in that they

186 Tsakiris, T., 'Energy Security Policy as Economic Statecraft: A Concise Historical Overview of the Last 100 Years', *Agora Without Frontiers*, Vol. 9, No. 4, 2004, p. 308.

187 Baldwin, *Op cit.*, p. 65. Also cited in Tsakiris, *Op cit.*, p. 308.

188 *Ibid.*, p. 215. Original emphasis.

are 'items for which the target nation has a low price-elasticity of demand and little scope for replacement with substitutes.'[189] Yet energy resources are not only strategic to importers, but are strategically vital commodities for all civilized countries.

Having access to energy supplies is crucial for the survival of a state both in security and in economic terms, and has been 'fundamental to any position of power in the world' since the Industrial Revolution, according to the first US Secretary of Energy, James Schlesinger,[190] whose Department was created in 1977 as a response to the extended energy crisis of the 1970s and the ensuing 'need for unified energy organization and planning' in the US government.[191] Like many others, Michael Klare asks why energy has come to play such a pivotal role in world affairs, and gives a thorough answer on its importance to the power of states:

> *To begin with, its continued availability – in great profusion – has never been as critical to the healthy operation of the global economy. Energy is required to keep the factories humming, power the cities and suburbs that house the world's rising population, and produce the crops that feed the planet. Most important, petroleum products are utterly essential to sustain the international sinews of globalization – the planes, trains, trucks, and ships that carry goods and people from one region of the planet to another. ... Without... additional energy, the world economy will fall into*

189 Hanson, P., *Western Economic Statecraft in East-West Relations: Embargoes, Sanctions, Linkage, Economic Warfare, and Detente*, (London: Routledge & Kegan Paul, 1988), p. 9.

190 Schlesinger, J., 'Foreword', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press, 2005), p. xiii.

191 U.S. Department of Energy, 'Origins & Evolution of the Department of Energy', <http://www.energy.gov/about/origins.htm>, accessed 19 May 2011.

> *recession or depression, the globalization project will fail, and the planet could descend into chaos.*
>
> *But the wheels of industry are not the only ones to slow down without an abundant supply of energy; military forces are equally dependent on a copious infusion of critical fuels. For major powers like United States that rely on airpower and mechanized ground forces to prevail in conflict, the need for petroleum products multiplies with each new advance in weapons technology.*[192]

The ubiquitous need for energy in almost every possible way of modern, civilized life inevitably makes energy inseparable from politics in all countries and often also with each other, as Shaffer notes: 'Energy trends and international politics are innately interconnected and energy security is an integral part of the foreign and national security policy of states.'[193] Because energy is so intertwined with everything else, it generates interdisciplinary debates, often brandishing different terms interchangeably to mean the same thing or employing the same expression with different meanings. Thus, before delving into the subject of energy as an instrument of foreign policy, a distinction must first be made between three different energy-related concepts – energy security, energy diplomacy and energy statecraft – whose definitions are sometimes confused or overlapping in the literature, and how they relate to each other.

3.1.1. Energy security

Given the basic need for energy to fuel all aspects of a state's economic activity, *energy security*, in its most fundamental sense, means having the 'assurance of the ability to access the energy

192 Klare, M.T., *Rising Powers, Shrinking Planet*, (Oxford: Oneworld Publications, 2008), p. 11.

193 Shaffer, *Op cit.*, p. 91.

resources required for the continued development of national power',[194] sustained economic performance and growth. In the simplest, un-politicised, economic terms, it is defined as 'reliable supply at affordable prices in the case of consuming nations and as reliable demand at sustainable prices in the case of producing nations.'[195] More specifically, the concept comprises a different number of elements, depending on the author, that constitute an overall definition of the term energy security. Among many similar classifications – most of which consist of *reliability* and *affordability* of energy supplies, but increasingly also *environmental sustainability* – Jonathan Elkind provides one of the most comprehensive definitions of the term, involving four basic elements, including one that is often taken for granted and only mentioned implicitly, namely *availability*:

> ***Availability***
>
> *First and foremost, energy security stems from the availability of energy goods and services – consumers' ability to secure the energy that they need. Availability requires the existence of commercial energy markets in which buyers and sellers trade energy goods and services, markets that take shape only when parties agree on terms that accommodate the commercial, economic, political strategic, and other interests of buyers, sellers, and shippers. Mutuality of interest among the players in the value chain is therefore a prerequisite for energy security. ...*

194 Kalicki, J.H. & Goldwyn, D.L., 'Introduction: The Need to Integrate Energy and Foreign Policy', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press / Woodrow Wilson Center Press, 2005), p. 9.

195 Goldthau, A., 'Energy Diplomacy in Trade and Investment of Oil and Gas', in Goldthau, A. & Witte, J.M. (eds.), *Global Energy Governance: The New Rules of the Game*, (Washington, D.C.: Brookings Institution Press, 2010), footnote 2, p. 26.

Reliability

Reliability involves the extent to which energy services are protected from interruption. Energy is an essential building block of economic activity; it enables daily life. Interruptions jeopardize the ability to run factories, illuminate hospitals, and heat homes continuously. In certain cases, therefore, energy reliability can be a matter of life and limb. …

Affordability

Energy that is not affordable in absolute terms is energy that cannot be used… However, the affordability element of energy security is not just a question of whether energy prices are low or high relative to disposable income. The volatility *of prices is even more central. Price shocks often cause serious humanitarian or economic hardship, even political instability, as energy consumers struggle to cope with unexpected financial burdens. Prices reflect market circumstances and signal market expectations, which in turn influence consumer choices and investment decisions, whether in favor of consumption or conservation. However, even in wealthy countries, when prices deviate seriously from established expectations, consumers find it hard to make rapid changes in their energy consumption.*

Sustainability

In the past, definitions of energy security typically did not include environmental considerations. However, a contemporary approach to energy security must place emphasis on environmental sustainability, for several reasons:

> – Energy infrastructure typically is long-lived. *Decisions made today will have long-term implications for how energy is produced, converted, stored, and used.* …
>
> – Promoting energy security without including sustainability will promote use of technologies and practices that will exacerbate climate change. …
>
> – Climate change clearly will affect energy systems profoundly. *For example, rising sea levels will require redesign and re-construction of the transportation infrastructure that serves energy systems – from oil terminals to shoreline rail and road systems.*[196]

Even so, despite the fact that all elements are essential to ensure the overall energy security of a state, countries tend to prioritise some elements of energy security over others – with the exception of *availability*, whose necessity is self-explanatory – as Shaffer exemplifies: 'the United States gives deference to reliability of supplies. The EU and its component states tend to place priority on affordability and friendliness to the environment, taking bigger risks with supply reliability. China emphasizes reliability of supply more than affordability or friendliness to the environment.'[197] These elements have also been emphasised differently though time, not just space, with *reliability* being the main concern in the 1920s, for instance, while *affordability* became a crucial concern during the oil crises of the 1970s, and *sustainability* appeared as an issue from the 1980s onwards, as the environmental movement gained momentum.

196 Elkind, J., 'Energy Security: Call for a Broader Agenda', in Pascual, C. & Elkind, J. (eds.), *Energy Security: Economics, Politics, Strategies, and Implications*, (Washington, D.C.: Brookings Institution Press, 2010), pp. 121-129. Original emphasis.

197 Shaffer, *Op cit.*, p. 93.

Access to energy resources is so critical to a state that Henry Kissinger remarked in 1982, only a couple of years after the second oil price spike of the 1970s, that 'aside from military defense, there is no project of more central importance to national security and indeed independence as a sovereign nation than energy security'[198] – a proposition many agree with. However, the underlying problem with this prioritisation is that military forces *also* depend on energy to fuel the diverse modes of transportation required to mobilise them, not to mention the production of their weapons and transports. Thus, in that sense, one could argue that energy security trumps military defence in national security priority, since the latter cannot function fully without ensuring the former.

'Notwithstanding obvious market concerns,' with such high importance attached to it, Adam Stulberg argues, it follows that 'energy security is fundamentally "politicized," as states allow foreign ambitions to alter their behavior in energy markets; employ political instruments to advance their position in energy markets; and exploit this standing to influence the strategic behavior of target states.'[199] What is interesting about Stulberg's statement is that it implicitly takes account of all three energy-related concepts, without distinguishing them as separate: energy *security* as being politicised; energy *diplomacy* in the use of political instruments to acquire energy resources; and energy *statecraft* in using energy as a tool to change the behaviour of other states, respectively. This, in turn, raises the analytical need to differentiate between these concepts, which relates back to the ends-means analysis problem described at the beginning of the previous chapter. States' need for energy security gives rise both to energy diplomacy for

198 Kissinger, H., 'Foreword', in Ebinger, C.K. (ed.), *The Critical Link: Energy and National Security in the 1980s*, (Cambridge: Ballinger, 1982), cited in Stulberg, A.N., *Well-Oiled Diplomacy: Strategic Manipulation and Russia's Energy Statecraft in Eurasia*, (Albany, NY: State University of New York Press, 2007), p. 3.

199 *Ibid.*

energy importers in search of the former (or producers in search of markets), and to energy statecraft for energy exporters that exploit importers' energy dependence that ensures their energy security. Whereas energy *diplomacy* is a political instrument used to achieve a strictly energy-related goal (namely, energy security), energy *statecraft* makes use of energy resources as an instrument – by manipulating another actor's need for energy security with one's own energy resources – to advance political aims that are not necessarily energy related. In simpler terms, energy diplomacy uses political means for energy ends, while energy statecraft uses energy means for political ends.

3.1.2. Energy diplomacy

Sascha Müller-Kraenner describes 'the political discipline aimed at making states more "energy secure" as energy foreign policy.'[200] However, foreign policy includes both goals and instruments, and the previous definition portrays energy security as the objective of 'energy foreign policy'. Insofar as energy security has a different meaning for consumers and producers, in their search for supplies and markets, respectively, Müller-Kraenner's definition denotes increased energy exchange between importers and exporters as an end in itself – in other words, energy *diplomacy* – rather than the manipulation of this exchange for other political goals, which is better termed *energy statecraft*, in order to be distinguished from the former term. Taking this distinction into account, one of the most complete definitions of *energy diplomacy* – that does not implicitly reference or encompass elements of statecraft – is provided by Andreas Goldthau:

> *The term commonly connotes the way countries give their energy companies a competitive edge in bidding for*

200 Müller-Kraenner, S., *Energy Security: Re-Measuring the World*, (London: Earthscan, 2007), p. 19.

> *resources by using the state's power: consumer countries strengthen their supply situation by diplomatically flanking energy contracts, whereas producer countries use diplomacy to enhance access to markets or reserves.*
>
> *... Despite a myriad of contributions linking the term to the nexus of energy, foreign policy, and supply security, there is no consensus on what exactly the term* energy diplomacy *means. ... As a general pattern, the term is used mostly in the geopolitics-informed debate on access to resources and points to a strategic and instrumental use of foreign policy to secure a country's energy supplies. ...*
>
> *While a generally accepted definition of energy diplomacy does not exist, it would seem appropriate to define the term as* the use of foreign policy to secure access to energy supplies abroad and to promote (mostly bilateral, that is, government to government) cooperation in the energy sector. *This definition suggests that the primary units of analysis are states or state actors; that the primary driver behind the conclusion of oil and gas deals is not necessarily maximizing business opportunities but national security goals; and that the underlying cost-benefit calculations do not follow an economic logic but rather a political one.*[201]

The above description, as much recent academic literature and media coverage have revealed, is illustrative of the behaviour of some of the rising powers of the past decade, China in particular. Such states 'have backstopped the activities of their state companies, donated or sold arms to producers at reduced prices,

201 Goldthau, *Op cit.*, pp. 25-28. Emphasis added.

and offered construction projects as side payments for access to resources', writes Edward Morse.[202] Despite the latest hype in public discourse about energy security in general and energy diplomacy in particular, Goldthau explains that the phenomenon of energy diplomacy is nothing new:

> *Oil and gas have always been politically charged commodities and, hence, have been subject to significant government intervention. ... Yet the current trend toward energy diplomacy coincides with the general perception that global energy politics has become a zero-sum game, in which one country's energy security is another's lack thereof. Energy diplomacy has thus emerged as a powerful concept in public discourse. ... A decade-long period of oversupply on oil and gas and resulting low prices calmed public debate on these issues. It is only since the turn of the new millennium, when supply-demand balances both in global oil markets and in regional gas markets tightened again, that energy diplomacy has come to receive renewed attention.*[203]

In spite of this renewed academic attention to the general subject of energy politics, what little literature there is on energy security is mostly focused on energy diplomacy, while comparatively little has been written on the concept of energy statecraft, which is the subject of this study and to which we now turn.

3.1.3. Energy statecraft

'Energy is both a factor that influences a state's foreign policy outcomes and a potential tool of foreign policy' writes Shaffer.

202 Morse, E.L., 'Low and Behold: Making the Most of Cheap Oil', *Foreign Affairs*, Vol. 88, No. 5, September/October 2009, p. 48.

203 Goldthau, *Op cit.*, pp. 25-27.

'During periods of tight international energy market conditions, energy tends to become a more prominent factor and tool in states' foreign policies and a higher priority on their policy agenda. At these times, energy needs affect the foreign policies of importers as well as exporters.'[204] Energy statecraft as an instrument of foreign policy – in contrast to energy diplomacy, which is used by net energy importers to reach the objective of securing their energy needs – is reserved for energy-exporting countries for a very simple reason, as Christopher Hill elucidates: 'When it comes to choosing the instruments with which to act, the differences between states do come into play. The wide variation in state capacities is a key determinant of what can even be attempted in the outside world.'[205] Consequently, only states that possess sufficient reserves of energy resources to be net exporters thereof, *ipso facto*, can make use of energy statecraft as one of their foreign policy instruments. In the simplest terms, therefore, *energy statecraft means the use of a sender state's domestic energy resources as a means to get one or more other international actors to do what they would otherwise not do, in order to achieve the political goals of the sender state's foreign policy*. This is achieved by manipulating or exploiting another actor's fundamental need for energy security, without which energy statecraft is likely to be ineffective, if not an outright exercise in futility.

While some scholars treat energy statecraft as a subset of economic statecraft, others view it as its own category of foreign policy instruments. As mentioned in the previous chapter's first section, Charles Hermann's broader typology of foreign policy instruments includes eight, rather than the usual four categories (cultural, diplomatic, economic and military), in which energy

204 Shaffer, *Op cit.*, p. 28.

205 Hill, C., *The Changing Politics of Foreign Policy*, (Basingstoke: Palgrave Macmillan, 2002), p. 130.

statecraft falls into the category of *natural resources*, as opposed to being a specific type of economic statecraft:

> Natural resources *instruments involve the potential or actual use of natural resources, or knowledge thereof, in the conduct of foreign policy activities. Skills and resources used in the development and protection of natural resources as well as their cultivation or extraction are included. No assumption is made concerning the level of expertise involved in these activities (for example, primitive farming could be included). Resources include not only the natural products (for example, fossil fuels, food, ores, timber, water) but also equipment necessary for their development and use. A potential overlap exists between this category of instruments and those classified as scientific/technological.*[206] *There is an important distinction, however. The natural resources category makes no necessary presumption of the application of the methods of science. In some parts of the world enormous technological investments have been made to capture and use natural resources, but in other areas the use of*

206 '*Scientific/technological* instruments share a common foundation in that body of knowledge produced by the generally accepted methods of science. Scientific skills and resources involve activities pertaining to the basic corpus of theory, empirical results, and the procedures for their continuous investigation and extension. Technological skills and resources concern the application of the existing body of scientific knowledge for practical problem solving rather than for the extension of fundamental knowledge. Individuals trained in the physical, biological, and certain behavioral sciences are part of the cadre of professionals with scientific and technological skills as well as those trained in such applied areas as medicine and engineering. The resources of scientific/technological instruments are widespread in industrialized societies and range from the vast array of scientific apparatus to the seemingly innumerable products of technology. Among the applications of scientific/technological instrumentalities in foreign affairs are such familiar undertakings as the establishment and maintenance of international satellite communications, explorations of the oceans for resource extraction, educational exchange programs, population projects, agricultural and other technical assistance programs, and more exotic enterprises such as joint ventures in space.' Hermann, C.F., 'Instruments of Foreign Policy', in Callahan, P., Brady, L.P. & Hermann, M.G. (eds.), *Describing Foreign Policy Behavior*, (Beverly Hills, CA: Sage, 1982), pp. 160-161.

> *natural resources has not necessarily involved modern technology. ... The government of a developing country may engage in considerable foreign policy activity using a recognized natural resource as an instrument even before it has the capability to employ that resource...*[207]

However, there are also good reasons to view energy statecraft as part of a wider array of economic instruments of foreign policy, given their similarity in the sense that they both use resources that can be measured in terms of money, as Stulberg explains:

> *Typically, the practice of statecraft involves the use of diverse policy instruments. Economic statecraft, for example, relies primarily on applying resources that have discernable market prices. The most widely analyzed forms are sanctions and inducements that entail the actual or threatened withdrawal/extension of economic resources to prompt policy change. Similarly, energy statecraft involves increasing or decreasing access to a resource, as well as to related property rights, pipelines, investment capital, prices and tariffs that are extended to deter, contain, or coerce a target. These tools of statecraft contrast with the value of military and diplomatic techniques that are generally stipulated in terms of violence, symbols, or negotiation.*[208]

The key difference, and main reason why energy statecraft is treated as its own category of statecraft in this study, is that the resources used in energy statecraft are 'strategic goods' vital to any functioning economy and whose price elasticity is low and is not easily substitutable, unlike most other resources employed in economic statecraft more generally.

207 *Ibid.*, p. 161.

208 Stulberg, *Op cit.*, p. 17.

'Energy supplies are frequently viewed by suppliers, consumers, and transit states as a potential tool to promote foreign policy and security goals', notes Shaffer, and recently 'there has been considerable commentary warning about the danger of the "oil weapon" and the "gas weapon." For example, U.S. senator Richard Lugar (R-Ind.), a leading U.S. lawmaker on foreign policy issues, has stated that "the use of energy as an overt weapon is not a theoretical threat of the future; it is happening now."'[209] When exporters such as Russia, Venezuela and Iran overtly use energy exports as a tool to promote their foreign policy goals, Shaffer writes, 'Europe and the United States regularly decry the use of energy as a "weapon" rather than accept it as a standard and legitimate tool of foreign policy.' She further argues that 'for energy exporters and important energy-transit states, energy supply is as much a part of the policy arsenal as other economic tools, military power, and diplomatic tactics. States are no more likely to refrain from using energy to promote their policy goals than to ignore economic or military means of doing so.'[210]

Such commentaries coincide with the increasing use of the 'energy weapon' at the onset of the twenty-first century, when runaway demand for energy resources outstripped supply and oil and other energy prices rose to unprecedented levels, leading to academic speculation that the world has entered a new era for energy security – a topic which will be explored in depth in the next chapter. As a consequence, Klare reasons, 'the problem of "energy security" – as it is widely termed – has climbed toward the top rung of the international ladder of unease and concern. Not surprisingly, this has fundamentally changed the perception of what constitutes "power" and "influence" in a dramatically altered

209 Shaffer, *Op cit.*, p. 29.

210 *Ibid.*, p. 1.

international system, forcing policymakers to view the global power equation in entirely new ways.'[211] To cite Senator Lugar again, in this allegedly new energy era, power in the international system shifts to countries with energy reserves.[212] Klare goes even further, arguing that

> *military superiority does not constitute the decisive, or even necessarily the leading, determinant of global paramountcy in this troubled new era. Other factors have come to rival military power in importance, and one – energy – has acquired unexpectedly vast significance.*
>
> *In this new, challenging political landscape, the possession of potent military arsenals can be upstaged by the ownership of mammoth reserves of oil, natural gas, and other sources of primary energy. Hence, Russia, which escaped the Cold War era in a shattered, demoralized condition, has reemerged as a major actor in the international arena by virtue of its colossal energy resources. For all its military might, the United States has, in contrast, sometimes found itself reduced to cajoling its foreign oil suppliers…to increase their petroleum output in order to slow the upward spiral in energy prices. The "sole superpower" has, in short, found itself scrambling…to somehow come to terms with what U.S. Senator Richard G. Lugar (R-Ind.) has termed "petro-superpowers" – nations that wield disproportionate power in the international system by virtue of their superior energy reserves. …*

211 Klare, *Op cit.*, p. 14.

212 Lugar, R., 'In oil's new era, power shifts to countries with reserves', *Wall Street Journal*, 14 June 2006, Opinion Page.

> *When military power was the principal determinant of a nation's global ranking, nuclear-armed behemoths like the United States and the Soviet Union occupied the top stratum and were able to influence the behavior of lower-ranked powers. Admittedly, military prowess still conveys an advantage in today's world, but it increasingly finds itself overshadowed by the clout of energy abundance. Saudi Arabia, for example, with a negligible military, commands substantial leverage in world affairs due to its possession of the world's largest known petroleum reserves. Even countries with smaller oil inheritances, such as Azerbaijan, Kazakhstan, Angola, and Sudan, are coming to enjoy influence disproportionate to their size and condition. The governing elites of these energy-surplus states have been able to exploit their privileged status to wring concessions of various sorts from their principal customers – whether in the form of political support at international institutions like the U.N. Security Council, the transfer of arms and military assistance, or even a disinclination by their clients to probe conspicuous human rights abuses.*[213]

However, like energy diplomacy, energy statecraft is nothing new. The most blatant and infamous use of energy statecraft, in the form of the 'oil weapon', was employed by the Arab members of the Organization of Petroleum Exporting Countries (OPEC) on 16 October 1973, ten days after the Yom Kippur War erupted between Israel and an Egyptian-Syrian alliance. These countries unilaterally announced a 70% increase in the price of oil, and on the next day announced production cuts of 5% and an additional 5% for every following month until Israel withdrew from the territories

213 Klare, *Op cit.*, pp. 9-10, 16.

it had occupied since 1967, in addition to a full oil embargo on the countries that had supported Israel during the war, causing severe economic damage to energy-importing countries around the globe. The ensuing recession – by then the worst since the Great Depression – led many member states of the Organization for Economic Cooperation and Development (OECD) to change their stance on the Israeli conflict and take heed to the plight of the Palestinian people, two of the goals behind OPEC's use of the 'oil weapon' (though the main goal of Israeli withdrawal from territories occupied since 1967 was not achieved).

Nevertheless, the 1973 embargo and the resulting oil price spike 'led to the emergence of new power centers in international affairs. Oil-exporting countries, either individually or through OPEC, began to play a more prominent role in [international] politics.' In Daoudi and Dajani's view, 'one cannot but observe the impressive economic and political impact of the oil weapon, which led Professor Harmut Brosche to describe it as "one of the most successful weapons introduced into world politics during the last years."'[214] The unexpected effectiveness of the oil weapon against rich, industrialised countries has led Tsakiris to characterise energy statecraft as 'asymmetric since the aforementioned consequences of the 1973 embargo occurred despite the fact that OPEC's Arab producers had only a fraction of the combined political, economic and military power of the OECD states.'[215] Ian Smart further illustrates how, despite this power asymmetry, the embargo's target states did not counterattack:

> *It is a fact that a small number of countries whose military strength, separately or together, is relatively*

214 Daoudi, M.S. & Dajani, M.S., *Economic Diplomacy and World Politics*, (London: Westview Press, 1985), pp. 157, 160.

215 Tsakiris, *Op cit.*, p. 321.

> *trivial were able to impose a politically motivated embargo on nations much stronger militarily without even having to consider seriously the possibility of a military reaction. The Western countries, against which Arab economic strength was primarily turned, did not seek to transform their own superior military strength into countervailing power.*[216]

This reinforces the point made by Senator Lugar and Klare, among others, that energy statecraft is on par with military power as an effective foreign policy instrument in terms of changing the behaviour of other states by getting them to do what they would otherwise not do.

3.2. Different types of energy statecraft

In theory, the most basic types of energy statecraft follow essentially the same logic as economic statecraft: they can be negative or positive, as well as short term or long term. The most important caveat is the indispensable nature of energy resources to the economy of any state, which should hypothetically make the use of energy statecraft more effective than most other economic instruments that can be employed in foreign policy. In practice, however, the diverse forms of energy statecraft are much more differentiated by the specific kinds of primary energy resources used, than by the way in which they are implemented (i.e. coercively, cooperatively, in the short or long term).

Negative energy statecraft is used as a disincentive or coercively in order 'to dictate/influence the political/security or economic behavior of a state or corporate actor in the international arena.' It can be implemented as embargos, sanctions, licensing

216 Smart, I. 'Uniqueness and Generality', *Daedalus*, Vol. 104, No. 4, Fall 1975, p. 278. Cited in Daoudi & Dajani, *Op cit.*, p. 168.

denials, production quota manipulation to reduce price elasticity, exclusion from tenders, among many other ways. Apart from the 'celebrated' cases of oil embargos such as the one in 1973, negative energy statecraft 'usually takes the form of oil and natural gas sanctions directed to impede domestic energy companies from developing the resources of a geopolitical competitor or adversary (actual or prospective), since such a development would enhance its military and diplomatic clout. ... Sanctions can also take the form of secondary sanctions targeting the technological equipment (pipeline tubes, compressors, turbines, refinery equipment) necessary for the construction of energy infrastructure.'[217]

Perhaps the most obvious current example of a country's use of negative energy statecraft is Russia, whose 'officials have made no secret of their use of energy for political purposes.' In 2005, 'Kremlin spokesman Dmitry Peskov commented on the abrupt energy price hikes that Russia was demanding of its neighbors, linking energy issues to Russia's broader foreign policy objectives. If a neighbor wished to join NATO, it would be viewed as disloyal, and "if you are not loyal then you [make the jump to higher energy prices] immediately," he said.'[218] Over the following two winters, in 2006 and 2007, 'a string of crises between Russia and the bordering former Soviet republics resulted in temporary energy cuts to those now independent states. Georgia and Ukraine claimed that Moscow tried to punish them for their Western orientations and color revolutions that had removed regimes that were accommodating to Russia's demands, and to use the gas weapon to destabilize their regimes.'[219] Indeed, as Müller-Kraenner reminds us, 'Russia has hardly any neighbour that is not

217 Tsakiris, *Op cit.*, pp. 326-328.

218 Elkind, *Op cit.*, p. 137.

219 Shaffer, *Op cit.*, p. 42.

threatened with energy deprivation as a weapon in the event of any political insubordination.'[220]

Positive energy statecraft is used cooperatively and 'has primarily taken the form of oil and natural gas subsidies that are used as an incentive for the harmonisation of foreign policy goals between the sender and the targeted state.' But it can also be implemented as preferential access to energy resource developments contracts, technological cooperation in order to increase energy efficiency or decrease energy intensity, state-sponsored investment guarantees, granting most favoured nation status, or simply using energy rents to give overseas development aid, among other ways.[221] For example, when Saudi Arabia demonstrates willingness to assist China in upgrading its refining capacity to use more Saudi crude oil[222] or Hugo Chávez sells heavily subsidised Venezuelan petroleum to several Latin American and Caribbean countries, they are not doing so out of generosity; they are pursuing their long-term national interest by creating dependence for *their* oil in these countries, in case their main markets – the United States and other OECD countries – one day decide to import less or none of their petroleum, if not demanding an outright political *quid pro quo* for their assistance. It should be noted that, unlike the 'celebrated' cases of oil embargos and Russia's more recent overt uses of the 'gas weapon', positive energy statecraft has received much less attention academically than its negative counterpart, and therefore warrants more research into the subject.

220 Müller-Kraenner, *Op cit.*, p. 54.

221 Tsakiris, *Op cit.*, p. 326.

222 Jaffe, A.M., 'Geopolitics of Energy', in Cleveland, C.J. (ed.), *Encyclopedia of Energy*, Vol.4, (San Diego, CA: Elsevier, 2004), p. 848.

As to whether energy statecraft is implemented over the short or long term, its negative manifestation tends to be short term, or tactical: its use or threat thereof is linked to a specific change in target state behaviour, such as Western support for Israel during the Yom Kippur War that led to the 1973 oil embargo by OPEC's Arab producers, or the Russian examples cited above. The long-term use of negative energy statecraft is ultimately counterproductive in foreign policy, as energy-rich states engaged in it would eventually lose money by not earning rents from their energy exports, which is often their governments' main source of revenue.

Positive energy statecraft, on the other hand, can be either short term or long term, following the same logic as positive economic statecraft: tactical linkage ('carrots') seeking a short-term *quid pro quo*, or structural linkage ('long-term engagement') which strategically 'involves an effort to use a steady stream of economic benefits [or, in this case, energy resources] to reconfigure the balance of political interests within a target country. Structural linkage tends to be unconditional; the benefits are not turned on and off according to changes in target behaviour. The sanctioning state expects instead that sustained economic [or energy] engagement will eventually produce a political transformation and desirable changes in target behaviour.'[223] Again, as with academic research dedicated to negative compared to positive energy statecraft, short-term tactical linkage in energy statecraft has commanded much more scholarly attention than strategic long-term engagement.

223 Mastanduno, M., 'Economic Statecraft, Interdependence, and National Security: Agendas for Research', *Security Studies*, Vol. 9, No. 1, 1999, pp. 303-304; and Mastanduno, M., 'Economic Statecraft', in Smith, S., Hadfield, A. & Dunne, T. (eds.), *Foreign Policy: Theories, Actors, Cases*, (Oxford: Oxford University Press, 2008), p. 182.

As mentioned above, in spite of these variations in implementation, the different types of energy statecraft are more distinguished by the specific kind of energy resource employed. There are numerous forms of what are called primary energy sources – 'energy [resources] found in nature that has not been subjected to any conversion or transformation process'[224] – but only a few of them are, or even can be, used as instruments of foreign policy. The main defining attribute of whether a primary energy source is exploitable as a technique of statecraft is its share of the world's total primary energy supply (TPES). In that respect, hydrocarbons (or fossil fuels) have by far the leading potential to be implemented as instruments of energy statecraft, due to their overwhelming share of TPES: a total of 81.2% in 2008, according to the International Energy Agency, of which 33.1% is petroleum, 27% is coal and 21.1% is natural gas.[225] Because of the long lead-times in energy projects, writes Christoph Rühl, 'one can make reasonable estimates ten, or even 20, years ahead. By all accounts, the foreseeable future in energy markets will remain dominated by fossil fuels.'[226] According to the US Department of Energy, for example, 'these [fossil] fuels will still be satisfying an estimated 87 percent of global energy needs in 2030…[and] petroleum, which, for the last half century, has been – and remains – the world's most important source of energy…is expected to remain number one in 2030.'[227]

224 Wikipedia, 'Primary Energy', <http://en.wikipedia.org/wiki/Primary_energy>, accessed 6 May 2011.

225 International Energy Agency, 'Share of total primary energy supply in 2008', <http://www.iea.org/stats/pdf_graphs/29TPESPI.pdf>, accessed 6 May 2011.

226 Ruhl, C., 'Global Energy After the Crisis', *Foreign Affairs*, Vol. 89, No. 2, March/April 2010, p. 74.

227 Klare, *Op cit.*, pp. 13-14.

Shaffer reminds us that the predominance of petroleum among primary energy sources stems from its multiple, if not ubiquitous, uses:

> *Oil is a popular energy source because it can be easily and cheaply transported and because it has flexible applications, including a range of uses: to generate electricity, provide heat and transportation, and fuel industry. Other fossil fuels can substitute for most of these functions. However, current modes of transportation were developed based on the availability of copious and mostly inexpensive quantities of oil during the twentieth century. ... In the transportation sector, there are no good substitutes for oil, unless radical changes are made in the way people transport themselves and goods.*[228]

Thus, the widespread use of petroleum, as well as the ever-increasing demand for it globally, makes oil a suitable resource for energy statecraft. This is particularly the case considering most of petroleum reserves and production is concentrated in relatively few countries, some of which have formed the OPEC cartel, which was the first to make use of negative energy statecraft overtly during the 1973 oil embargo.

Meanwhile, 'Moscow's recent rhetoric seems to suggest that natural gas is also regarded as a potential tool in fostering foreign policy objectives.'[229] This is in large part due to its rapidly increasing use – particularly in Europe, which imports a considerable amount of natural gas from Russia – but also because of its predominant mode of transportation through pipelines, which in principle fosters dependence on suppliers, leaving consumers vulnerable

228 Shaffer, *Op cit.*, pp. 11-12.

229 Goldthau, *Op cit.*, p. 31.

to energy statecraft. The wider share of TPES natural gas occupies in the future, the more it will have the potential to be the main primary energy source used for energy statecraft, which seems likely given its projected growth in consumption:

> *Natural gas is the world's fastest growing primary energy source. Global consumption is anticipated to double by 2030. Natural gas will soon overtake coal as the second most important energy source, and among the Organization for Economic Cooperation and Development (OECD) countries it has already supplanted it. If current trends continue, natural gas consumption will overtake that of oil within a couple of decades and become the leading global energy source. Natural gas is especially attractive because it releases significantly lower emissions that cause air pollution and lead to climate change.*[230]

In addition to the overall share of how much energy is consumed worldwide, another factor that determines what kinds of energy resources can be used in statecraft is its relative scarcity or abundance. In that sense, some fossil fuels are more implementable as instruments of statecraft than others. While coal comprises over a quarter of TPES and is the predominant source of the world's electricity production, its ease of transportation, 'relatively low cost, especially in electricity production, and the extensive reserves of exporters…make it low risk in terms of security of supply', and is therefore unsuitable for energy statecraft given the relative lack of international competition over its access. Moreover, the fact that coal is highly polluting – indeed, it is 'the major source of climate-altering greenhouse gases' – makes its continued widespread use unattractive unless 'significant research

230 Shaffer, *Op cit.*, p. 13.

and investment efforts are [made] in carbon dioxide capture and sequestration',[231] thus potentially decreasing its relative demand in the long term due to environmental concerns.

The remaining primary energy sources – nuclear power and several forms of renewable energy – together comprise such a relatively marginal share of TPES that their use as instruments of energy statecraft currently lacks potential. Where nuclear energy is concerned, it is limited not only by its high cost, but also by the fact that it is only used to generate electricity and therefore has restricted reach in terms of transportation and export to potential target states of energy statecraft. Moreover, as Tsakiris rightly recalls, 'it would be academically inept to analyze nuclear power without dedicating [part of the] analysis to its potentially devastating military uses. Such an analysis, though interesting, would fall outside the framework of economic statecraft'. As for renewable energy resources, most of them are limited by their focus on 'electricity generation,...their limited impact on the overall economic sphere...[and] oil's domination of the transportation and petrochemical sectors of the economy'.[232]

Though fossil fuels will continue to dominate energy consumption – and therefore also energy statecraft – Klare reminds us that the current drive to combat climate change by reducing greenhouse-gas emissions has at least the potential to increase the share and significance of renewables for energy security:

> *Scientists are avidly seeking ways to develop a new spectrum of fuels to replace those now at risk of depletion while releasing far fewer or zero climate-altering "greenhouse gases" into the atmosphere. But no major energy-consuming nation has yet devoted*

231 *Ibid.*, pp. 13-14.

232 Tsakiris, *Op cit.*, footnote 5, p. 309.

> *sufficient resources to this problem to ensure that these alternatives will be available on a large enough scale to replace existing energy sources in the foreseeable future.*[233]

However, should certain forms of renewable energy resources – for instance, biofuels – extend their reach beyond electricity generation, particularly to the transportation sector, and increase their share of TPES to a significant amount, they could potentially be used as an instrument of energy statecraft. To date, very little academic research has explored this potential, which merits further scholarly attention.

3.3. Causal factors that determine effective energy statecraft

Tsakiris postulates that 'energy…statecraft has always been a powerful foreign policy-making instrument, which has been proven to be – under specific conditions – much more effective than the use of force or threat of the use of force in enticing or coercing a state to "do something he would not otherwise do".'[234] But in order to be effective, energy statecraft (like economic statecraft in general) first needs to meet certain conditions. The list of criteria for successful energy statecraft varies from one author to another.

Stulberg, for instance, focuses on just two factors, namely market power and regulatory authority: 'the more market and regulatory power a state enjoys in a particular energy sector, the more successful it should be at securing strategic concessions from a target. Possessing both elements, an initiator can structure the

233 Klare, *Op cit.*, p. 13.

234 Tsakiris, *Op cit.*, p. 309.

framing effects and guide a target's risk-taking propensity toward compliance.'[235]

Meanwhile, Tsakiris enumerates four other criteria, whose 'control' thereof define what he calls 'energy power': exploitable reserves, net export capacity, transportation routes and pricing mechanisms (price elasticity), whilst also specifying that the energy resources employed must necessarily be hydrocarbons (oil and natural gas).[236]

The causal factors listed by both authors, though not necessarily overlapping, are all valid, but incomplete. Tsakiris' first three criteria fall largely under Stulberg's first factor, market power over a specific energy sector, though in different forms (as will be explained below). On the other hand, the remaining criterion in each author's list – regulatory power and price elasticity, respectively – is not considered by the other, leaving a gap in their coverage of the subject.

Therefore, the present study favours translating William Norris' four factors for successful economic statecraft,[237] delineated in the previous chapter, since the causal factors that determine effective energy statecraft broadly match those for economic statecraft, but with certain unique characteristics that are specific to energy resources in contrast to most other economic instruments. Moreover, these four factors not only encompass all criteria listed by Stulberg and Tsakiris – exploitable reserves, net export capacity and transportation routes in the form of market power; price elasticity; and governmental authority over the energy

235 Stulberg, *Op cit.*, p. 53.

236 Tsakiris, *Op cit.*, p. 308.

237 Norris, W., 'Economic Statecraft: The Use of Commercial Actors in Grand Strategy', *Paper presented at the annual meeting of the International Studies Association: 'Theory vs. Policy? Connecting Scholars and Practitioners'*, New Orleans Hilton Riverside Hotel, The Loews New Orleans Hotel, New Orleans, LA, 17 February 2010.

sector – but also include a fourth, often overlooked, factor that is inherent to all forms of statecraft: namely the commensurability between the means used for the ends sought, to which we now turn.

3.3.1. Goal-instrument commensurability

The first factor is by now obvious, but nevertheless bears repeating, for the sake of the argument: the effectiveness of 'a state's international influence turns on the leadership's capacity to balance the ends and means of statecraft.'[238] In other words, the foreign policy goals sought must be commensurate with the energy instrument employed.

For example, after the so-called 'oil weapon' was first used successfully in 1973, evaluation of its effectiveness has been mixed depending on which perspective is taken with regards to the scope of the objectives. On the one hand, when seen in light of the (somewhat ambitious) primary goals sought by the Arab member states of OPEC – namely to compel Israel to retreat back to its 1967 borders and fully to restore Palestinian rights – the oil weapon is often dismissed as having been ineffective. On the other hand, as Baldwin advocates, secondary and tertiary goals should not be ignored when determining the 'success' of an economic technique of statecraft, and in that respect the Arab oil weapon of 1973 was to some extent effective in that it called international attention to the plight of the Palestinian people and even led some (mostly European) countries to change or adapt their policies toward the Israeli-Palestinian conflict.

Baldwin's conceptual separation of the domain (or targets) from the scope (objective) of an influence attempt is also instructive when evaluating the relative success of the oil weapon

238 Stulberg, *Op cit.*, p. 43.

in 1973. While the oil weapon was more effective against Western European states in the OECD and Japan, in terms of their changed policies toward the Middle East, it was less effective against a much stronger country like the United States, let alone against Israel, for which the stakes in the conflict were obviously considerably higher and had much more to lose by yielding to the Arab states' demands.

With regards to the United States, the use of the oil weapon by the Arab members of OPEC was relatively successful in bringing their grievances to the top of the US foreign policy agenda and even encouraged the US 'to play a more conciliatory role in arranging the settlement of the Arab-Israeli dispute in the aftermath of the Yom Kippur War', though ultimately it 'did not change the basic policy of the United States in the Middle East.'[239]

Meanwhile, with regards to the effectiveness of the oil weapon against Israel, Daoudi and Dajani remind us that the Arab states' two primary objectives mentioned above 'were the ultimate political goals of the Arab *military* initiative of 6 October 1973. The oil weapon was unsheathed to *complement* the Arab war effort, *not to replace* it', which is why 'one needs to be aware that there is inevitable overlapping among the political, economic, and military dimensions' of an influence attempt when considering the impact and achievements of the oil weapon alone.[240] Thus, as Stulberg concludes, 'all else being equal, energy statecraft will be more successful when a central executive can affect the domain and value that a target assigns to an exchange of the strategic good [i.e., energy resources], and can ensure that domestic agents will pursue complementary policies.'[241]

239 Nye, J.S., *The Future of Power*, (New York: PublicAffairs, 2011), p. 67.

240 Daoudi & Dajani, *Op cit.*, pp. 149-150. Emphasis added.

241 Stulberg, *Op cit.*, p. 45.

The remaining causal factors that determine effective economic statecraft deserve further detailed analysis when applied to energy resources because of the specific ways in which these factors operate in the energy sector compared to other goods and services that can be employed in economic statecraft more widely. To recapitulate, these are: the magnitude of the economic interaction and target states' dependence on it, translated into a sender state's market power and target state's vulnerability in the energy sector; the price elasticity or 'strategicness' of a good, which is normally low and high, respectively, for most energy resources, and which translates into volatility during tight markets; and, finally, the extent to which a state has control over an economic resource, which is usually higher in the energy sector compared to other sectors of the economy in most countries, particularly in those that are energy-rich.

3.3.2. Market power, dependence and vulnerability

The first determinant of whether a state can effectively implement energy statecraft is its market power in a given energy sector. This is not as obvious as might seem at first, for in this case market power does not only mean the possession of great energy reserves or being a large producer thereof. The United States and China, for instance, are both great petroleum producers, but they are also even greater oil consumers, meaning they consume most of their domestic production and must also import additional petroleum, making both countries net oil importers. Thus, in the energy sector in general and for energy statecraft in particular, market power refers to export capacity, rather than merely production capacity and reserves.

But given certain distinguishing characteristics between the international oil and natural gas markets – the two most commonly used energy resources in statecraft – market power also involves control of export and transport routes. Despite a certain arbitrariness concerning the specific percentages involved, Stulberg's definition of market power is appropriate for taking both export market share and transportation routes into account:

> *Market power is measured in terms of both aggregate percentages of supply and competitive advantages at delivering energy to international markets. A state is traditionally considered to wield significant influence over markets if it controls nearly half the supply of the good. In the case of strategic goods, such as energy, however, the relevant percentages are typically much lower. This is because energy is essential to all aspects of a state's military, industrial, and consumer sectors, and that even marginal fluctuations in supply have potentially severe implications for the breadth of a target's national activities. Moreover, market power in the energy sector is not determined solely by raw supply, as states must be able to deliver energy to foreign markets. … Accordingly, [Stulberg] regard[s] an initiator as wielding significant market power in the oil and gas sector if it controls roughly 30 percent of supply and export to foreign markets, as well as possesses competitive advantages at reliably delivering low-cost energy via shorter-distance and wider-diameter pipelines than available through other routes.*[242]

This then begs the question of whether each of these two elements of market power has higher significance in one energy sector than in another. Though the relationship is imperfect, a high percentage of aggregate supply bears more significance in the international oil market, whereas control of transport routes plays

242 *Ibid.*, p. 56.

a stronger role in (mostly regional) natural gas markets. This, in turn, means that energy statecraft works differently depending on the energy resource employed.

The principal distinction stems from the fact that petroleum is a global, fungible commodity, 'traded primarily on international markets with little connection between the supplier and the consumer,...which allow[s] states to import from a variety of sources and quickly find new sources of supply on the open global market'.[243] As such, having control of transport routes for oil, specifically, has little if any impact on a state's ability to use petroleum as a form of energy statecraft, since a potential target state would be able to find alternative supplies on the open market, provided a higher price is paid. In that sense, it is mostly poor countries that are vulnerable to energy statecraft in the form of the oil weapon, as Klare points out, since wealthy countries 'will be able to buy their way out of scarcity, though no doubt damaging their economies in the process; poorer countries, lacking such advantages, will suffer egregiously.'[244] Therefore, market power in terms of share of aggregate supply is a more important element for energy statecraft using petroleum than control of transport routes.

But given oil's fungibility as a traded commodity, and the relative ease of consumers to diversify their sources of supply, in order for states to muster sufficient market power in the petroleum sector to employ that resource in their energy statecraft, they have had to resort to cartel formation. In increasing their collective market power by pooling their resources, the oil weapon is made 'most effective when it is collectively rather than unilaterally deployed,' which is why 'cohesion and cooperation among the

243 Shaffer, *Op cit.*, pp. 36-37.

244 Klare, *Op cit.*, p. 16.

various oil-producing nations is essential'[245] for energy statecraft to be effective with petroleum.

Although OPEC formed as a cartel in 1960, it was not until 1973 that its member states successfully managed to exploit their collective market power as a cartel, despite previously having tried to impose oil embargoes on consumer countries during the Middle East wars of 1956 and 1967. These two attempts at energy statecraft were unsuccessful, according to Nye, 'because the United States was producing enough oil to supply Europe when it was cut off by the Arab countries. Once American production peaked in 1971 and the United States began to import oil, the power to balance the oil market switched to such countries as Saudi Arabia and Iran. The United States was no longer the supplier of last resort that could make up for any missing oil',[246] thus transferring the bulk of market power in the petroleum sector to OPEC. On 16 October 1973, ten days after the Yom Kippur War erupted, OPEC members from the Persian Gulf unilaterally announced a 70% increase in the price of oil, and on the next day announced production cuts of 5% and an additional 5% for every following month until Israel withdrew from the territories it had occupied since 1967, in addition to a full oil embargo on the countries that had supported Israel during the war. This represented the first time that OPEC countries collectively used oil as a weapon to achieve political goals, which, in Henry Kissinger's words, 'altered irrevocably the world as it had grown up in the postwar period.'[247]

Now controlling approximately 70% of the world's known oil reserves and circa 40% of its production, OPEC derives its

245 Daoudi & Dajani, *Op cit.*, p. 173.

246 Nye, *Op cit.*, p. 65.

247 Yergin, D., *The Prize: The Epic Quest for Oil, Money, and Power*, (New York, NY: Simon & Schuster, 1991), p. 588.

strength as a petroleum cartel from its ability to export most of its production, whereas most non-OPEC producers consume most of their oil, having to import the remainder of their domestic demand for oil,[248] thus giving OPEC leverage over the countries that depend on its exports. Such a dependence on oil by importing countries is defined by Greene and Tishchishyna as the result of an uncompetitive global oil market dominated by OPEC and high levels of energy imports that are vital to these countries' economies.[249] Indeed, the more energy-consuming countries import, the more they become dependent on producing countries, which in turn gives the latter the ability to use their energy resources against the former, thus creating a higher degree of vulnerability in energy-importing countries. OPEC countries are keenly aware of this, and underlying their ideology is 'the view that the future is theirs and worth waiting for…bank[ing] their future on a combination of growth in oil demand and a presumed "natural" limit to the growth of non-OPEC production.'[250]

In its power projection, OPEC uses two interrelated instruments: spare production capacity and its role as 'swing producer', both of which are uniquely strongest in Saudi Arabia's case. Spare capacity – the capacity to produce additional oil above normal output levels that can be put into production quickly, or leave production idle depending on market conditions[251] – serves as

248 Maugeri, L., *The Age of Oil: The Mythology, History, and Future of the World's Most Controversial Resource*, (Westport, CT: Praeger, 2006), p. 229.

249 Kohl, W.L, 'National Security and Energy', in Cleveland, C.J. (ed.), *Encyclopedia of Energy*, Vol.4, (San Diego, CA: Elsevier, 2004), p. 199.

250 Morse, E.L. & Jaffe, A.M., 'OPEC in Confrontation with Globalization', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press, 2005), p. 78.

251 Kenderdine, M.A. & Moniz, E.J., 'Technology Development and Energy Security', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press, 2005), p. 430. Yergin, D., 'Energy Security and Markets', in Kalicki, J.H. &

a supply-side 'security margin' in the international energy market that can buffer against supply shocks by producing additional oil to replace the oil missing from the market due to disruptions.[252]

However, maintaining spare capacity is expensive: it costs billions to develop excess capacity to allow prompt, additional oil production in case of emergencies; and, being unable to sell it due to generally inexistent demand for the superfluous oil, there is no return on the investment made in spare capacity. Economically speaking, the opposite is preferable: 'The decision to minimize excess production capacity represents optimal economic behavior for any producer of any good. As Western economic textbooks teach, it is simply absurd to spend money to create something that will not be sold, and will probably induce a general fall of price of that very product.'[253] Following this economic rationale, all non-OPEC producing countries sell all the oil they produce internally or for export; private international oil companies do the same, in order to maximise their shareholder value.[254] 'The problem with this approach', writes Leonardo Maugeri, 'is that it takes a long time to put onstream new production when it becomes necessary, so that inevitably a razor-thin spare capacity generally turns into higher prices, and make any sudden supply disruption or consumption peak a lethal blow.'[255]

As a result, virtually all of the world's spare production capacity rests in OPEC countries, with Saudi Arabia alone responsible

Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press, 2005), p. 55.

252 Yergin, D., 'Ensuring Energy Security', *Foreign Affairs*, Vol. 85, No. 2, March/April 2006, p. 75.

253 Maugeri, *Op cit.*, p. 227.

254 Goldwyn, D.L & Billig, M., 'Building Strategic Reserves', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press, 2005), p. 515.

255 Maugeri, *Op cit.*, p.228.

for nearly 80% thereof, allowing them to manipulate the short-term price of oil according to their spare capacity level. Also being responsible for one-tenth of the world's oil supply, Saudi Arabia therefore holds a unique position in the global oil market, as its prime 'swing producer', by being 'the only oil producer in the world that can singlehandedly replace, within a short period of time, the total loss of exports for any other oil producer in the globe'.[256] It is that role which gives OPEC and Saudi Arabia in particular their international clout and geopolitical influence, lowering production to raise prices, or increasing production to accommodate the interests of importing nations, normally in return for other economic or political compensations – a role Saudi Arabia does not want to relinquish. Therefore, it should be recognized that 'Saudi Arabia uses its spare capacity not as a favour to the West but as an instrument designed to enhance its power and influence in the world.'[257]

Meanwhile, market power in terms of control of energy transport routes is much more relevant to the use of natural gas as an instrument of foreign policy. This is essentially because natural gas, due to its gaseous form, is not as easily or inexpensively transported as petroleum under current technology, and relies either on pipelines or liquefied natural gas (LNG) terminals, both of which demand high investments in infrastructure. The result of this, particularly where pipelines are concerned, is that direct, long-term linkages are created between energy suppliers and consumers. These commercial relations are further solidified not only due to the physical infrastructural ties between supplier and consumer states, but also because of the high costs involved – both for pipelines and for LNG terminals – which lead to long-term contracts between the states involved.

256 Jaffe, *Op cit.*, p. 846.

257 Morse & Jaffe, *Op. cit.*, p. 87.

According to Shaffer,[258] these direct and fixed long-term linkages foster much more dependence and vulnerability between natural gas suppliers and consumers than in the oil market, which in turn lead to more opportunities for political manipulation through energy statecraft. Unlike petroleum, where a disruption in supply from one source can be compensated for by buying from another source (albeit normally at a higher price), the fixed nature of gas supply through pipelines means that most natural gas importers have little flexibility or alternatives when faced with a disruption in supply. Which is why 'states rarely have options of diversifying their natural gas supplies or creating multiple parallel supply mechanisms to enhance their energy security. ... Because of the lack of commercial or government interest, states rarely have multiple gas supply infrastructures. ... In theory, all natural gas importers that lack extensive alternative import capability, such as extensive LNG import capacity, are potentially at risk for supply disruptions and accordingly dependent on their suppliers, rendering them vulnerable to the dictates of the supplier state.'[259]

A further factor that has repercussions for energy statecraft, which may arise specifically for energy resources transported through pipelines – be it oil or natural gas, though not LNG – is transit through other countries between supplier and consumer states. 'With the increasing internationalization of the oil and gas trade, rising consumption of natural gas, and initiation of the export of oil and gas from landlocked states,' Shaffer explains, 'energy transit states are emerging regionally and in the international system. Their role affects their strategic value and position. ... The main potential value of achieving a role as a major

258 Shaffer, *Op cit.*, pp. 4, 10, 13, 28.

259 *Ibid.*, pp.37-39.

energy transit state is geopolitical, since transit is not especially lucrative financially for the transit states.'[260]

What is interesting with regards to market power in the form of control of energy transport routes (i.e. pipelines) as an enabling factor for effective energy statecraft is the fact that it is a tool mostly employed by transit countries, rather than by producing states let alone consumers. This is due to the interdependence established between suppliers and end-users connected by pipelines, as they both lose from disruptions in energy supply: consumers do not get access to energy resources vital to the healthy functioning of their economies and producers lose revenue from lost markets, while transit states have comparatively little to lose by disrupting the energy supply going through their countries. 'This has been seen in Ukraine and Belarus,' writes Shaffer, 'which have at times inhibited the flow of Russian oil and gas to markets in Western Europe in an attempt to attain political and economic goals. ... While energy suppliers and consumers are cautious in their denial of supplies or markets, transit states are more likely to be tempted to use their role to elicit economic, security, and other gains. As a result, supply arrangements that have transit states in between supplier and the consumer are less stable than direct ones.'[261]

Of course, it is not just transit states that can use transnational pipeline transit as a tool in their energy statecraft; producing states can also use transit to their advantage in their own use of energy statecraft. Again, Shaffer illustrates that 'exporting states, while not enjoying their vulnerability to supply disruptions, recognize that transit can be an important carrot in their relations with transit states. In the 1990s, Moscow used the transit carrot effectively with neighboring Baltic states, even playing them

260 *Ibid.*, p. 64.

261 *Ibid.*, pp. 4-5, 40.

against each other to offer Moscow better conditions to retain its transport facilities in their respective states. Once Russia stops using transit routes through these states, it will also lose a tool for influence in them.'[262]

Ultimately, market power in the energy sector – be it a high share of aggregate supply or though control of transport routes – is a determining factor behind effective energy statecraft because it translates into target-state dependence on the energy resources in question, which is exacerbated by a lack of alternative sources of supply. This, in turn, makes target states vulnerable to political influence and manipulation by sender (or transit) states that employ energy statecraft against them. It follows logically, writes Stulberg, that 'the capacity to manipulate a target's domain rests on the *net vulnerability* of that target'[263] – a term he further defines:

> *In the energy sector, vulnerability can be measured in terms of market power. Market power is a function of the percentages of global imports/exports accounted for by a state's consumption/supply of a specific resource. The greater the percentage, the greater the concentration of exchange, the lower the probability that alternate trade partners will be available, the higher the costs of adjustment, and the greater the capacity of a state to orchestrate the framing effects for foreign targets in that sector. Conversely, the weaker the market power, the lower the concentration of exchange, the more likely opportunities exist to diversify relations, the lower the costs of changing the terms of an existing relationship, and the more difficult it will be for a state to manipulate a target's decision choices. All things being equal, the lower*

262 *Ibid.*, p. 41.

263 Stulberg, *Op cit.*, p. 46. Emphasis added.

> *the opportunity costs of compliance for other states, the more likely a state will be able to exploit strategic energy advantages to shape a target's reference point, decision domain, and risk-taking propensity.*[264]

Thus, if an energy-producing and -exporting state enjoys high market power – either in terms of share of aggregate supply and/or by controlling pipelines – it has a better chance of engaging in effective energy statecraft toward energy-consuming states.

This formula is made even more powerful for the state initiating energy statecraft if it has several potential consumer states competing for its energy resources. Shaffer illustrates this point by quoting the managers of Russia's state-controlled natural gas company, Gazprom, who demonstrated a propensity for political blackmail in response to European energy security concerns regarding Russia's reliability as a natural gas supplier: 'We want European countries to understand that we have other alternatives in terms of gas sales. We have a fast growing Chinese market, and a market for liquefied natural gas in the U.S. If the European Union wants our gas it has to consider our interests as well.'[265] This is a typical stance adopted by energy-exporting countries during tight market conditions, when demand for energy outstrips supply, and which brings us to the next determining factor for effective energy statecraft.

3.3.3. Price elasticity and volatility under tight market conditions

As is the case with economic statecraft in general, price elasticity is somewhat related to the previous determining factor in that they both amount to a form of dependence: on a specific

264 *Ibid.*, p. 48.

265 Cited in Shaffer, *Op cit.*, p. 46.

good or commodity and on aggregate trade, respectively. Yet, when viewing this distinction in terms of a single kind of commodity (in this case, energy resources), the discrepancy becomes even more subtle. Dependence on energy refers to a situation in which a country imports much of its energy needs from a single or few, undiversified sources; whereas elasticity refers to the fact that not only are energy resources (in general) a prerequisite for a modern, functioning economy, but also that some of these resources are not easily substitutable with other energy resources in certain sectors of the economy.

Ultimately, the elasticity of an energy resource depends on its end-use. For instance, electricity can be generated by a wide variety of energy resources – coal, petroleum, natural gas, nuclear power, hydropower, solar power and other renewables, etc. – and a shortfall in the supply of one of these resources could *theoretically* be compensated with another, provided the appropriate infrastructure is in place. Of course, lack of infrastructural fungibility among different kinds of energy resources would lower their price elasticity. Meanwhile, some energy resources are much less elastic due to an economic sector's complete dependence on that specific kind of energy source, such as the 'limited elasticity of oil demand in the short run, a result of the transportation sector's high level of reliance on gasoline and other petroleum-based motor fuels.'[266]

Inelasticity of demand (and supply) for an energy resource is, therefore, an important factor in determining effective energy statecraft. Where petroleum is concerned, OPEC has mostly been successful at using its market power to keep the price of oil well above production costs (which in the Persian Gulf has generally been less than $2 per barrel or $4 when exploration and

266 Pascual & Zambetakis, *Op cit.*, p. 15.

development costs are included) since the 1970s. In this regard, OPEC's success has derived from the relative inelasticity of demand and, to a lesser extent, supply of oil, meaning they do not respond quickly to changes in the price of oil, on the demand side, because consumers take a long time to adapt and change their habits and lifestyles to reflect new, high market prices for oil and limited readily available alternatives, particularly in the transportation sector;[267] and, on the supply side, because it takes several years to develop new production capacity to meet faster-rising demand.

But there are also seasonal factors affecting not just oil's, but other energy resources' elasticity. 'An oil embargo imposed at the beginning of winter [in the northern hemisphere], when there is a high, inelastic demand on oil for heating,' Daoudi and Dajani remind us, 'is more effective than an embargo imposed in early summer, when an elastic demand on oil for traveling represents a large share of the market'[268] – which can also be applied, albeit for different reasons, to other energy resources, such as increased gas demand during winter for heating or hydropower supply varying seasonally according to precipitation levels, for example.

Nevertheless, the relative price elasticity of energy resources becomes a much stronger factor in influencing the potential success of energy statecraft during times of tight energy markets, when demand outstrips supply. In such scenarios, energy markets become much more volatile and vulnerable even to minor disruptions in supply, for whatever reason: 'International economic and political developments can exacerbate the effects of inelastic supply and demand on global energy markets, causing massive price fluctuations even when the underlying nature of the market remains unchanged. Under such volatile conditions,

267 Kohl, *Op cit.*, pp. 197-198.

268 Daoudi & Dajani, *Op cit.*, p. 174.

political power has accrued in the hands of energy exporters,' write Pascual and Zambetakis.[269]

Morse calls attention to the fact that 'when prices are low, resource-rich countries are at least as dependent on energy markets as their markets are on them. This means that they cannot simply take advantage of their customers or make gains at their expense. Rather, sellers and buyers must think in terms of relative gains and losses: they might both gain or both lose, but one will gain or lose more than the other. In tight markets, however, some producers nakedly resort to using energy as a tool of leverage.'[270] This is in large part because tight markets translate into higher energy prices, which in turn increase the revenue of energy-exporting states, giving them not only more economic resources in terms of money, but also affords them more leverage against energy-importers who are competing for scarce energy resources. This can then become a vicious cycle in which producers are emboldened to take measures to tighten energy markets further – e.g., through production cuts – in an attempt to increase the power and international influence derived from their energy resources. 'During periods of high oil and gas prices and thus windfall profits,' Shaffer reminds us, 'energy exporters often conduct a more assertive foreign policy, increasing their regional and at times international involvement. Indeed, their energy and political interests can overlap, with oil exporters initiating crises that lead to further oil price hikes.'[271]

The increased effectiveness of energy statecraft under tight market conditions was first realised by OPEC after first successfully employing the oil weapon in 1973. As mentioned above, OPEC's previous oil embargo attempts had failed because the market had

269 Pascual & Zambetakis, *Op cit.*, p. 11.

270 Morse, *Op cit.*, p. 47.

271 Shaffer, *Op cit.*, p. 32.

been oversupplied and the United States retained a significant spare production capacity. In 1973, however, the market was already tight, and under such conditions, 'removal or threat of removal of even a small amount of oil can significantly affect world prices.'[272] Even though the actual amount of oil removed from the market (7.5%)[273] was not as staggering as OPEC had threatened, 'the insecurity and uncertainty created by the war and the embargo declaration triggered a 400 percent increase in world oil prices in a short period. These tight market conditions allowed OPEC's declarations further to boost already rising oil prices.

In periods when oil production significantly outstretches demand, these political declarations and developments have less impact on oil prices.'[274] The lesson that 'the oil weapon is most effective if it is accompanied by production cuts'[275] would not be forgotten by OPEC, which since then also increased its overall effectiveness as a cartel by limiting its members' production through quotas, in order to maintain a certain tightness in the international oil market, as Nye explains:

> *Cartels generally have a problem because there is a tendency to cheat on production quotas when markets are soft and the price drops. ... OPEC was unable to enforce price discipline from the year it was founded, 1960, until the early 1970s. But after oil supplies tightened, OPEC's role in coordinating the bargaining power of the producers increased.*

272 *Ibid.*, p. 35.

273 *The Economist*, 'The 2011 oil shock', 5 March 2011, p. 13.

274 Shaffer, *Op cit.*, p. 7.

275 Daoudi & Dajani, *Op cit.*, p. 174.

> *The Middle East war of 1973 gave OPEC a boost, a signal that now it could use its power. The Arab countries cut off access to oil during the 1973 war for political reasons, but that created a situation in which OPEC could become effective.*[276]

The situation referred to above is, of course, a tight international oil market – kept that way through limited petroleum production quotas agreed amongst OPEC, when its member states' interest are unified or when global demand for oil outstrips even OPEC's capacity to supply the market fully. Most of the 1970s through the early 1980s saw a tight oil market provoked by OPEC production cuts (both deliberate as well as by supply disruption due to the Iranian Revolution), whereas the first decade of the twenty-first century saw the latter case of a tight market built up by runaway demand for oil in rapidly-emerging countries.

Regardless of differing reasons behind the tight market of the 1970s and the most recent one, the result has been the same for the relative power of energy-exporters in the international system: 'rising demand for oil and gas imports and limited capacity to expand short-term supply drove up prices, supplier wealth, and producer leverage, allowing producers such as Russia, Venezuela and Iran to punch above their weight in regional and international politics.'[277] As Nye complements, oil-sale windfalls gave oil-exporting countries 'extra cash [that] provided money for payments and aid to advance their foreign policy objectives.'[278]

Yet the reverse is also true: countries that need to rely on exorbitant energy-export revenues to support assertive foreign policies, as well as to fund domestic stability and social programmes,

276 Nye, *Op cit.*, p. 66.

277 Pascual & Zambetakis, *Op cit.*, p. 10.

278 Nye, *Op cit.*, p. 76.

lose much of their power and international leverage when energy markets are not tight and prices are low. Russia, for instance, is a prominent recent example of this trend, as Morse illustrates:

> *In Russia, revenues from taxes on energy sales, domestic or foreign, are critical to the legitimacy of the state and to its hopes of pursuing assertive policies abroad. Especially during the years of Vladimir Putin's presidency, when oil prices rose steadily, the former superpower grew critically dependent on its oil and gas sales as a form of influence. Russia has built its foreign policy on controlling the resources of former Soviet states and their access to pipelines that would connect them to third-party markets around the Mediterranean, in northern Europe, and in East Asia. But having pegged its hopes – and its budget – on oil priced at $140 a barrel, Moscow has found its plans challenged when oil is $90 and almost impossible to meet when it is $40. ... And yet the Russian government has been slow to recognize that the effectiveness of its energy weapon has declined.*[279]

Being emboldened to pursue more assertive foreign policies by using energy resources as a tool of leverage, however, is not the only practice that becomes prevalent among large energy exporters during periods of tight markets and high energy prices. Higher revenue from energy sales often prove too tempting for most governments of energy-exporting states to stand by idly while private companies reap the profits themselves. This brings us to the next factor that determines effective energy statecraft: namely, the trend among energy-rich countries, during extended periods of high energy prices, toward resource nationalism, or what Morse describes as 'the tendency of producing countries to

279 Morse, *Op cit.*, p. 49.

concentrate control over their resources in the hands of state-run entities, that has characterized energy politics for most of the last decade.'[280]

3.3.4. Resource nationalism and government control of national oil companies

'Are instruments that are more directly and uniquely susceptible to government control in a given society more frequently used?' asks Hermann. 'This question suggests the possibility that ease of access rather than appropriateness for a given problem may influence the use of certain skills and resources.'[281] Hermann's answer might seem obvious in the sense that the possession of, or ease of access to, energy resources allows the states that have them to use them as instruments of their domestic and foreign policies, whereas those that do not possess them, *ipso facto*, cannot. However, it does not fully answer his own question in terms of *why* certain instruments are particularly susceptible to government control, compared to other resources at the disposal of a state.

One such instrument is energy. In paraphrasing the French Prime Minister during the last year of the First World War, Georges Clemenceau, who famously said that 'war is too important a matter to be left to the military', former US Representative Lee Hamilton has written that 'energy is too important to be left just to the engineers and geologists.'[282] As mentioned above, because energy security is so ubiquitously important to every aspect of a functioning modern society and economy, energy as an instrument of state policy becomes highly susceptible to politicisation.

280 *Ibid.*, p. 37.

281 Hermann, *Op cit.*, p. 158.

282 Hamilton, L.H., 'Foreword', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press, 2005), p. xxii.

This is also true in the international arena, where some states are unable to ensure their own energy security by themselves and therefore need to procure their energy needs from other states that have them in surplus through energy diplomacy. For that reason, it is important to bear in mind that it is precisely the politicised nature of energy resources in general, and of the fundamental need for energy security of a state in particular, that attributes any power and leverage to the use of energy statecraft by one state on another. Which is why an energy-exporting state's ability effectively to pursue energy statecraft hinges on its capacity to cater not only to its own energy security, but also (and particularly) to that of other states, especially those that the sender state wishes to influence. The way in which a state chooses to pursue the goal of energy security – for itself and/or for others – goes a long way to explain the manner in which it engages in energy diplomacy and statecraft, as well as how effective it is in those endeavours. Thus, energy statecraft, defined as the manipulation of another state's energy security for one's own political purposes, inevitably becomes politicised as well, given energy-importing states' inelastic need for these resources to ensure their energy security.

Energy security is a 'public good', and is therefore also a government responsibility[283] – regardless of whether a country has nationalised or private energy companies and other energy-provision mechanisms – because 'as long as there are externalities, market forces alone cannot achieve…energy security'.[284] Out of the four elements of energy security, only *availability* and *affordability* are provided by the free market (although geology also plays a role in the former, while the volatility component of affordability

283 Kenderdine & Moniz, *Op cit.*, p. 453.

284 Martin, W.F. & Harrje, E.M., 'The International Energy Agency', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press, 2005), p. 112.

can be politically induced), while the other two – *reliability* and *sustainability* – are not, as Shaffer explains: 'Environmental friendliness [*sustainability*] and security of supply [*reliability*] are not provided by the market. This means that the state will need to stay involved in crafting energy security policies. The market does not create the diverse sources, infrastructures, or storage policies that can enhance security of supply. The market does not know how to fashion wider political relations in a way to foil [the] use of the energy weapon. In addition, the market can lead to decisions to promote short-term personal interests and not the long-term energy security of the state.'[285]

Therefore, regardless of whether a country is a net importer or exporter of energy, the fundamental need for such resources to ensure the proper functioning of any state makes energy a particularly politicised economic resource, usually with a high level of government involvement in the sector, which Klare terms 'resource nationalism':

> *One way to describe the growing role of senior government officials in national energy policy is to brandish the term "resource nationalism," which might be defined as* the management of energy flows in accordance to vital state interests. *Some analysts have tended to apply this term solely to nations with an abundance of energy that have maximized state control over domestic oil and gas deposits and sought to leverage this latent power into a source of political advantage. But there is no conceptual reason to limit the term's use that way; it also applies to efforts by leaders of the deficit states to protect their national interests in a world of intense competition over the available pool of supply. …*

285 Shaffer, *Op cit.*, p. 3.

> *However one applies "resource nationalism," one thing is clear: The state, itself, is acquiring greater authority over national energy sectors – as the owner of key assets and/or as a key actor in the procurement, transportation, and disposition of energy flows.*[286]

Again, because the need for energy security is so prevalent in modern societies, resource nationalism manifests itself both in the search for energy resources by energy-deficit states through energy diplomacy and in the increased control of domestic energy resources by energy-surplus states for political use through energy statecraft.

Resource nationalism first emerged in Latin America during the first oil concessions in the early twentieth century and gained momentum after the Second World War, culminating with the 'overturn of OPEC' in the 1970s. As an ideology, it extends the traditional nationalist principle of territorial sovereignty to its subsoil, thus claiming the state's ownership and administration of all the natural resources it contains. It also envisions the creation or strengthening of national companies while either restricting access to, or increasing the state's share of rents from, international companies operating in the country.[287] The right to nationalise natural resources is recognized by the United Nations:

> *In order to safeguard its resources, each state is entitled to exercise effective control over them and their exploitation with means suitable to its own situation, including the right to nationalize or transfer ownership of such resources to its nationals, this right being an expression of the full permanent sovereignty of the*

286 Klare, *Op cit.*, p. 23. Emphasis added.

287 Rodríguez-Padilla, V., 'Nationalism and Oil', in Cleveland, C.J. (ed.), *Encyclopedia of Energy*, Vol. 4, (San Diego, CA: Elsevier, 2004), p. 181.

> *state. No state may be subjected to economic, political, or any type of coercion to prevent the free full exercise of this inalienable right.*[288]

However, resource nationalism is not a constant factor in international relations, and it usually emerges when conditions are favourable – i.e. higher prices and/or demand for a natural resource during a tight market – while it wanes when conditions are inauspicious.

Even though petroleum is traded today as a fungible commodity and a global market for LNG is currently in its fledgling stages, Tsakiris contends that the oil and gas industries have ‘not followed the typical model of economic liberalisation’ of other commodities.[289] Through much of the Cold War (particularly during its first two to three decades), Klare argues, ‘the United States and other Western powers largely relied on market forces and the international oil companies rather than state-directed efforts and outright military intervention, to ensure adequate supplies of energy. Freeing these companies to establish worldwide operations in the pursuit of corporate profit, so the argument went, was the best way to ensure the maximum production of energy and avoid crippling inefficiencies.’[290] However, with the ‘overturn of OPEC’ in the 1970s, when almost every major oil-producing country had nationalised their petroleum industries, the nature of the international oil market changed dramatically, paving the way for the increased use of energy statecraft.

The oil embargo imposed by Arab members of OPEC on Western countries in 1973 gave OPEC countries greater control over

288 ‘Declaration and Action Program for the Establishment of a New International Economic Order’ by the United Nations General Assembly, 1974. Cited in Rodríguez-Padilla, *Op cit.*, p. 185.

289 Tsakiris, *Op cit.*, p. 324.

290 Klare, *Op cit.*, p. 22.

their domestic energy resources, boosted their economic and even political power and international influence, advanced their autonomy to pursue their own oil-production policies and demonstrated OPEC's (and that of its Arab members in particular) ability to act as a unified body in international relations. Accordingly, the majority of worldwide oil production shifted from private, multinational ownership to national government control, leading to 'the curtailment of the traditional domination of the oil trade by the integrated international oil companies known as the "seven sisters" by the new power of the oil-exporting countries who now controlled both the volume of production and the price of crude oil.' Since then, '[n]ew nationalistic governments with radically different economic and political approaches from their predecessors have emerged in a number of the oil-exporting countries. Their say in their national oil industries has increased tremendously, and their share in the profits has been greatly enlarged. Furthermore, they have been more inclined to give higher priority to politics than to economics. Some have exhibited an increased tendency to put their natural resources to political use.'[291]

This is true not only of OPEC member states, but also of non-OPEC oil and gas exporters, among which perhaps the most prominent example is currently Russia's Gazprom, where the state 'owns 50 percent plus one share of the company, and almost all of the company's top executives are devout Kremlin loyalists. The current Russian President Dmitri Medvedev was Gazprom's Chairman. He replaced Putin, who became Prime Minister, replacing Victor Zubkov who became Gazprom's Chairman.'[292] As a result, given the deep involvement of top politicians in the

291 Daoudi & Dajani, *Op cit.*, pp. 158, 171.

292 Glover, P.C. & Economides, M.J., *Energy and Climate Wars: How Naive Politicians, Green Ideologues, and Media Elites Are Undermining the Truth About Energy and Climate*, (New York: Continuum Books, 2010), pp. 170-171.

Russian hydrocarbon sector, Gazprom 'has come to be portrayed as the Kremlin's foreign policy arm.'[293]

Among other reasons, due to the highly politicised nature of energy resources and their use in domestic and foreign policy, today by far the largest part of the oil and gas industry is state-controlled through governments' majority share, if not outright monopolistically state-owned. While private international oil companies (IOCs) have full access to merely 15% of oil reserves worldwide, national oil companies (NOCs) are currently responsible for at least 55% of petroleum production and control 85% of the world's proven conventional oil reserves[294] – 'an enormous source of latent power for the states that control them. And because they operate in the countries with the most promising untapped energy fields, they are bound to retain their dominant position for years to come.'[295]

Following Klare's logic that it is not just energy-rich countries that engage in resource nationalism, government leaders in energy-importing states are getting progressively more involved in the acquisition of foreign energy reserves to ensure their countries' energy security through energy diplomacy, '[l]acking confidence in the capacity of private firms to overcome many [of the] challenges' posed by increasingly politicised and state-controlled energy resources.[296]

293 Goldthau, *Op cit.*, p. 32.

294 2010 figures. NOCs control 85% of the world's proven oil reserves, only 1% of world reserves have equity access to IOCs while 37% have limited equity access and 47% of world reserves are held by NOCs with no equity access to IOCs. U.S. Energy Information Administration, 'Who are the major players supplying the world's oil market?', 15 March 2012. <http://tonto.eia.doe.gov/energy_in_brief/world_oil_market.cfm>, accessed 27 March 2012.

295 Klare, *Op cit.*, p. 17.

296 *Ibid.*, p. 22.

Similarly, energy-exporting states' ability to ensure energy security – for themselves and especially for other states – is a crucial determinant of how effectively they will be able to engage in energy statecraft, since the latter is the manipulation of another state's energy security for the sender state's own political purposes, thus increasing the incentive for government control of its energy resources, as Stulberg explains:

> *A manipulator [i.e., national government]…must ensure that domestic actors with direct responsibility for controlling energy resources and extraterritorial activities line up behind its statecraft. This requires that a national leadership possesses discrete regulatory authority to mobilize national resources so that domestic energy firms pursue policies that align the substantive appeal of compliance with a target's risk-taking propensity. This does not necessitate the political capacity to impose or enforce compliance at home, as much as the authority to shape the commercial and political incentives for domestic agents and firms in ways that make upholding national interests more rewarding.*[297]

But energy monopolies are not a prerequisite to ensure the energy security of a state, nor, by consequence, to be able to pursue energy diplomacy or statecraft. What matters is how much influence a country's government has over energy companies to implement its energy security strategy in tandem with them, be they nationalised or private. Because 'formal authority to oversee the formulation and implementation of foreign policy is hierarchical', writes Stulberg, 'foreign policy decisions are the product of interaction between principals – central executives empowered

297 Stulberg, *Op cit.*, p. 7.

to devise and oversee policy – and agents – administrative actors tasked with carrying them out. To influence the behavior of another state, a central executive must convince foreign targets to sacrifice preferred policies or to take a risk on compliance, as well as secure the dutiful implementation of statecraft by functionaries and interest groups at home.' Therefore, in order to engage in energy statecraft, 'statesmen must be able to devise a strategy and secure the cooperation of domestic actors (both government and private) that possess the critical expertise and control over respective policy resources.'[298]

This resonates with the principal-agent dilemma explained in the previous chapter, which also suggests that national monopolies are often less efficient than their private, international counterparts. With a few notable exceptions – such as Saudi Aramco, Norway's Statoil, Brazil's Petrobras and Malaysia's Petronas – precisely because nationalist or protectionist sentiments tend to limit the access of foreign investment in a country's energy sector, national companies seldom have the same technical expertise, organisational skills and capital as IOCs, giving the latter a better record at developing energy-production capacity, and with it energy security, than the former. As Shaffer explains,

> *Resource nationalism policies usually make little economic sense, since they tend to harm production and export capabilities and thus ultimately state revenues. Substituting state oil companies for foreign and private partners often means less efficient operation and more limited access to advanced exploration and production technologies. These policies also hurt the climate for future foreign and private investment in the states. As stated by William Ramsay, deputy director of the*

298 *Ibid.*, p. 43.

> *International Energy Agency, "The rise of nationalism is a concern for future (oil and gas) production."*[299]

Therefore, the need for more capital and better technical knowhow often drives producing countries to invite IOCs to participate in their energy sectors by promising them equity stakes in their operations. Since the mid-1970s, according to Adam Sieminski, 'there have been very few examples of national oil companies making significant net increases in production capacity without some form of direct participation by the IOCs.'[300] Moreover, IOCs are much better at managing their revenues over the long term than NOCs because they set aside parts of their profits during booms in order to avoid deficits during business troughs.

Meanwhile, governments with energy monopolies habitually take away from their NOC's profits to spend on national development programmes and/or more assertive foreign policies, thus creating budgetary constraints that limit these companies' ability to reinvest in future production capacity and energy security: 'In contrast to private firms, largely motivated by the lure of profits and a desire to increase shareholder value, the NOCs are often driven by what the Congressional Research Service terms "governmentally mandated objectives." ... But for many of the countries involved, the national oil companies are also being wielded by their governments as a tool of foreign policy. "It is no surprise," the James A. Baker III Institute of Rice University in Texas, U.S., reported, "that NOCs, with their vast access to the

299 Shaffer, *Op cit.*, p. 31.

300 Sieminski, A.E., 'World Energy Futures', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press, 2005), p. 37.

world's resources, are becoming important players in global power politics."'[301]

In principle, because NOCs act in accordance with their government's national interests, while IOCs follow their shareholders' interests, energy security can sometimes better be served by NOCs than by IOCs, which 'cannot be expected automatically to consider the energy security concerns of client nations as they are driven mainly by commercial pressures.'[302] This, in turn, compromises the ability of states relying on private energy companies not only to pursue their energy security, but also to convert that ability into effective energy diplomacy and statecraft. Conversely, NOCs with a strong international projection, whose chairmen are typically also their country's energy minister, are increasingly able to outbid IOCs for new oil concessions abroad by providing the host country's government with additional political incentives that may well be more attractive than the (usually purely economic) offers made by IOCs.[303]

However, as Goldthau calls attention to, a quick assessment of the motivations behind China's energy diplomacy and Russia's energy statecraft challenges the assumption that the primary driver is energy security or national security. Rather, he argues, 'both strategic government goals and corporate business interests – which may often coincide but not necessarily be identical – are reflected in energy diplomacy [and statecraft]. As the cases of China and Russia reveal, the driving force of (energy-related) foreign policy is not necessarily only the Kremlin or the Chinese

301 Klare, *Op cit.*, pp. 18-19.

302 Jaffe, A.M., Hayes, M.H. & Victor, D.G., 'Conclusions', in Victor, D.G., Jaffe, A.M., & Hayes, M.H. (eds.), *Natural Gas and Geopolitics: From 1970 to 2040*, (Cambridge: Cambridge University Press), p. 477.

303 Howell, D. & Nakhle, C., *Out of the Energy Labyrinth*, (London: I.B. Tauris, 2006), p. 22.

presidency but may be also the headquarters of Gazprom or PetroChina.'[304]

In that respect, the principal-agent dynamic can work both ways: the government using energy companies as agents to carry out their political strategy, and energy companies using the governments where they are based as instruments to achieve their (usually profit-driven) goals. But, in any case, in order for more effective energy statecraft (or diplomacy) to take place, a solid principal-agent relationship should be in place between national governments and their energy companies, national or otherwise.

3.4. Limits to energy statecraft

In order to avoid one of the criticisms that Michael Mastanduno has directed at the new literature on positive economic statecraft – namely that it 'has tended to focus research on "showcasing" the effectiveness of economic inducements in carefully selected case studies'[305] – it is important to list and assess the limits and potential hindrances to the successful implementation of energy statecraft, be it negative or positive. As Daoudi and Dajani remind us, 'in their efforts to use oil leverage most effectively, the oil producers need to consider the counterleverage options open to the target nations.'[306]

With regards to negative energy statecraft, Shaffer has noted that 'oil supply embargos by producers have been an infrequently used and very ineffectual tool' of foreign policy, while reminding us that it is more often the oil- and gas-producing countries that are the targets of consuming countries' sanctions, given the large

304 Goldthau, *Op cit.*, pp. 33-34.

305 Mastanduno (1999), *Op cit.*, p. 310.

306 Daoudi & Dajani, *Op cit.*, p. 174.

investment necessary to develop their hydrocarbon industry.[307] It is, after all, 'in the national interests of major oil consumers who may eventually find themselves the targets of the oil weapon to guard themselves against such a possibility by seeking to minimize conflict with the producers and having multiple policy options available should those conflicts fail to be resolved. ... [Therefore, p]otential target nations need to adopt energy policies that will make them less vulnerable to drastic supply restrictions.'[308]

For Pascual and Zambetakis, the short-term options are limited for consumer states and those 'who see the wider risks of vesting so much political power in energy-rich states' (particularly during tight market conditions), since energy production is managed by producer states.[309] However, there are several inherent limits to energy statecraft as well as a number of long-term options available to energy-importing states against exporters' energy statecraft, and many such energy security countermeasures have been put in place. These include the resource curse and export dependence; resource nationalism; OPEC's lack of cohesion as a cartel; the International Energy Agency and strategic petroleum reserves; and diversification and conservation of energy resources.

3.4.1. The resource curse and export dependence

Though being richly endowed with energy and other natural resources can be a boon and a source of power for some countries, it can have the opposite effect if their resources and revenues are not well managed. This is the so-called 'resource curse': countries that are dependent on revenues from the sales of their hydrocarbons or other natural resources often fail to

307 Shaffer, *Op cit.*, p. 36.

308 Daoudi & Dajani, *Op cit.*, pp. 176-177.

309 Pascual & Zambetakis, *Op cit.*, p. 23.

translate their short-term wealth into long-term economic growth and sustainable development due to poor governance and fiscal mismanagement.[310] And the resource curse is not just limited to countries lacking good governance; it can also happen in advanced, industrialised countries like The Netherlands, which has given its name to a particular form of economic malaise caused by its first discovery of natural gas in the North Sea in the 1960s – 'Dutch disease':

> *The affliction hits when a country becomes a significant producer and exporter of natural resources. Rising resource exports push up the value of the country's currency, which makes its other exports, such as manufactured and agricultural goods, less competitive abroad. Export figures for those products then decline, depriving the country of the benefits of dynamic manufacturing and agricultural bases and leaving it dependent on its resource sector and so at the mercy of often volatile international markets.*[311]

But the resource curse goes well beyond 'Dutch disease', especially where less developed countries with poor governance are concerned. High energy prices and their resulting windfalls in the coffers of less developed energy-producing and exporting countries can lead to other economic problems, excessive and wasteful government spending, corruption and internal conflict. The 'easy money' resulting from high energy prices reduces incentives to invest in future production capacity, meaning that energy-producing countries could derive less revenues over a

310 Jaffe, Hayes & Victor, *Op cit.*, p. 480.

311 Ross, M.L., 'Blood Barrels', *Foreign Affairs*, Vol. 87, No. 3, May/June 2008, p.3

twenty-year period than if prices had been low.[312] Paul Collier's research has shown that countries benefitting from an oil boom grow on average 7% during the first five years but shrink an average of 17% over the following ten years.[313] This means that energy producers are ultimately much more dependent on their exports than consumers are on energy imports, which can be illustrated by comparing the United States and Saudi Arabia, the world's biggest oil importer and exporter, respectively:

> *From the exporters' point of view, "energy security," or perhaps, to be more precise, "demand security," is at least as important, perhaps more so, than for the importers. Energy represents about 15 percent of the U.S. total import bill and 2 percent of GDP but 90 percent of Saudi exports and 45 percent of GDP. The Saudis need the United States more than the United States needs them.* In extremis, *the United States can turn to coal and nuclear power; Saudi Arabia has neither of these nor any other realistic way of earning a living. If the United States manages to cut oil demand by just a few percent, it might not import any Saudi oil. During the period of the oil crises, say from 1973 to 1980, real U.S. GDP per head rose by 9 percent. The production cutbacks and low prices that followed led to real Saudi per capita GDP falling by 42 percent, taking them from parity with Switzerland to lying just ahead of Mexico.*[314]

312 Burrows, M. & Treverton, G.F., 'A Strategic View of Energy Futures', *Survival*, Vol. 49, No. 3, September 2007, pp. 83-84.

313 Cited by Javier Solana, 'Towards an EU External Energy Policy', keynote speech delivered at the EU Energy Conference in Brussels, 20 November 2006.

314 Mills, R.M., *The Myth of the Oil Crisis: Overcoming the Challenges of Depletion, Geopolitics, and Global Warming*, (Westport, CT: Praeger, 2008), p. 201.

Thus, during low-price scenarios, the export dependence created by the resource curse severely hampers the ability of producing countries to engage in energy statecraft, since their revenues depend on these exports, like 'Russia's now-critical need for revenue from natural gas exports [that] limits the credibility of its threats to deny supplies to buyers.'[315]

And, as is often the case under high prices, importing countries become more efficient in their oil use through conservation and look to other sources of energy to substitute for expensive oil, thus curbing future demand for exporting countries' oil even under low price scenarios.

> *Despite the sustained tight oil market conditions in the early twenty-first century, the major industrial states are less vulnerable to the price surges and spikes caused by threat of supply disruptions then they were in the 1970s. Today the United States and Europe use half the amount of oil per dollar of GDP produced that they did in the 1970s. … Moreover, the major oil exporters are much less prepared to sustain extended export disruptions than in the past, with their economies increasingly dependent on oil revenues. Those oil exporters with large populations supported by the oil revenues, such as Iran and Venezuela, are particularly dependent on continuing high exports.*[316]

Instead of making wise investments, such governments often lack fiscal discipline and spend their windfalls on projects that they cannot afford when prices are low, which given the nature of the business cycle, inevitably happens after booms. In that sense, in Yahia Said's words, the oil curse 'is similar to financial crises

315 Morse, *Op cit.*, p. 49.

316 Shaffer, *Op cit.*, p. 35.

where problems are created on the up-side even if they are only manifested when the bubble bursts. Thus the mismanagement of the oil windfalls from the 1970s boom contributed to the debt crisis in the 1980s. Having squandered the windfalls from the 1970s boom many resource rich countries experienced economic, social and political upheavals in the 1990s which did not spare even the wealthiest ones.'[317]

Even worse than their economic side-effects are the political repercussions of oil windfalls. Sudden and huge amounts of revenue not only tend to increase corruption at the expense of democracy and good governance, often solidifying dictatorships, but they also tend to delay badly needed reforms, instead spending the windfalls on payoffs and patronage in order for the regime to stay in power while silencing their opponents. This, in turn, is likely to increase economic disparities inside the country, which often lead to internal conflicts and civil wars – the so-called 'Arab spring' of 2011 in Libya and other Middle Eastern and North African countries is a case in point. Indeed, Collier also argues that resource-rich countries are nine times more likely than 'resource-poor' countries to experience violent internal conflicts.[318] Thus, higher revenues from energy windfalls tend to create increased dependence on export rents in energy-producing countries.

3.4.2. Resource nationalism

Resource nationalism, though a potential source of control and increased effectiveness of energy statecraft, can also be a limitation. When oil prices are high over extended periods of time, writes Shaffer, 'states often become emboldened and reduce or remove the participation of foreign or private companies in

317 Said, Y., 'Energy', *LSE Magazine*, Vol. 19, No. 2, Winter 2007, p. 8.

318 Cited by Javier Solana, *Op cit.*

energy exploration, production, or export. They adopt a policy of resource nationalism, and take advantage of their newly acquired power under tight oil markets to attempt to revise agreements with foreign energy companies, nationalize energy industries, and advance state ownership of energy resources.'[319] While such actions may accrue more power and revenue to energy-rich states in the short term, the long-term ramifications tend to be detrimental, as explained above. Robert Mills clarifies that 'recurrent attempts by petro-states to found their economies primarily on oil and gas will lead…to stagnation. The temporary feeling of power given their leaders by their possession of a scarce resource will turn out to be illusory; it will cause them to dally in making fundamental reforms and thus, ironically, make them weaker than their rivals, not stronger.'[320]

This can be illustrated by the fall in OPEC's market share of oil production relative to non-OPEC producers over the years: from 53% at the time of the 1973 boycott to around 35% today,[321] which, according to Mills, is 'too low for a really effective cartel, even if all its members were perfectly aligned, and OPEC is not itself homogeneous.' Moreover, with so many more producers and exporters in the international oil market, the fungible nature of oil 'make[s] it impossible to enforce a selective boycott or preferential supply',[322] since a buyer can always procure oil elsewhere (though probably for a higher price) in case of a supply disruption. This is also true of most commodities, and was realised at least as far back as the publication of Albert Hirschman's *National Power and the Structure of International Trade* (1945): 'A country menaced with

319 Shaffer, *Op cit.*, p. 31.

320 Mills, *Op cit.*, p. 3.

321 Shaffer, *Op cit.*, p. 35.

322 Mills, *Op cit.*, pp. 193, 200.

an interruption of trade with a given country has the alternative of diverting its trade to a third country; by so doing it evades more or less completely the damaging consequences of the stoppage of its trade with one particular country. The stoppage or the threat of it would thus lose all its force.'[323]

In addition to competition from non-OPEC producers, there are several factors that limit OPEC's ability to manage the world's oil supply and price as a cartel, as the former Deputy Secretary General of OPEC, Fadhil al-Chalabi, enumerates.[324] One of OPEC's key limitations is its short-termism both politically and economically. The intense politicisation of OPEC became apparent once it took over the pricing of oil, which its members immediately turned into a political weapon to gain 'short-term benefits with little regard for the long-term consequences of their decisions.' OPEC's short-termism has also been reflected economically due to its members' almost total dependence on oil revenues – over 90% of their total exports – for their national budgets, making their decisions based on the immediate financial requirements of their treasuries rather than long-term economic rationale. Indeed, as Chalabi himself puts it, 'OPEC's decision-making process had little to do with sound economics.' The politicisation of oil by OPEC has led, time and again, to disruptions in supply and wide price fluctuations caused above all by political events than by market forces: 'World oil markets can be seen as simply reacting to interruption of supplies caused by political events.' This is in stark contrast to how the IOCs managed the market before OPEC took over its control. The former 'controlled the upstream in response to downstream requirements, all of which were

323 Hirschman, A.O., *National Power and the Structure of Foreign Trade*, (Berkeley, CA: University of California Press, 1945 [1980]), p. 29.

324 Chalabi, F.J., 'History of OPEC', in Cleveland, C.J. (ed.), *Encyclopedia of Energy*, Vol.4, (San Diego, CA: Elsevier, 2004), pp. 760-762.

controlled by the major oil companies in a way as to create a stable market by avoiding a shortage or surplus of crude oil. In OPEC's case, decisions on crude oil production are not organically related to downstream requirements. OPEC production is based simply on the difference between world demand and the production from outside the organization, without any knowledge of the downstream exigencies of consumer countries', thus inevitably leading to worldwide price volatility and less control over markets, limiting OPEC's ability effectively to pursue energy statecraft.

As natural gas augments its share of overall energy demand, securing gas supplies will increasingly be considered as part of gas-importing countries' national interests. This raises fears that a few countries could dominate international gas markets, particularly LNG trade, and form a natural gas cartel emulating OPEC, an idea that has existed almost as long as OPEC but has only recently started to come to fruition. In May 2001, the Gas Exporting Countries Forum (GECF) held its inaugural meeting in Tehran, seeking to increase the coordination of gas production among its members.[325] Since then, GECF has tried without success to influence Europe's natural gas market: 'GECF helped to catalyse the formation of a working group headed by Russia and Algeria who sought to resist EU attempts to outlaw destination clauses that prevent contracted gas buyers from reselling to third parties. (The option to resell gas is a pivotal mechanism for market arbitrage and efficiency, as it helps to prevent the segregation of markets that allows gas sellers to exert monopoly power.)'[326]

Despite its creation, there are several factors keeping GECF or other future gas cartels from being able to act collectively

325 Algeria, Brunei, Egypt, Indonesia, Iran, Libya, Malaysia, Nigeria, Oman, Qatar Russia, Trinidad & Tobago, the United Arab Emirates and Venezuela, and Norway as an observer rather than a member.

326 Jaffe, Hayes & Victor, *Op cit.*, pp. 477-478.

with the same relative success as OPEC. First and foremost, because of its insubstantial characteristic in its natural state, gas is mostly transported through fixed pipelines that require long-term contracts and good relations between gas-producing and -consuming countries, which have resulted in regional markets rather than a fungible, global market like oil. However, while the rising global trade in liquefied natural gas could facilitate gas cartel formation, not only is this market still being developed but LNG also competes with pipeline gas. Unlike oil, natural gas reserves are currently much more widely distributed in the world – 'largely as a result of natural gas not having been a priority for development'.[327] Owing to the large and growing number of natural gas suppliers, GECF or other attempts at gas cartelisation are faced with too many potential members and too many diverging interests among them to act effectively with unity of purpose, not to mention fierce competition from those countries that do not join the cartel as well as competition from other energy sources, as Mills points out: 'Gas, primarily used for power, is much more easily substitutable than oil, having strong competitors in nuclear, coal, and renewables and being available as LNG from a wide and growing variety of suppliers.'[328] Moreover, the natural gas industry, particularly LNG, is extremely capital-intensive to develop, but is much cheaper to operate once production has started, putting a 'premium on full operation once the equipment is in service'[329] rather than limiting production to achieve political ends. Lastly, with the exception of Russia, which is both the largest reserve holder and biggest exporter of natural gas, there is much less of a correlation between

327 Juckett, D.A. & Foss, M.M., 'Can a "Global" Natural Gas Market Be Achieved?', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press, 2005), p. 538.

328 Mills, *Op cit.*, p. 195.

329 Jaffe, Hayes & Victor, *Op cit.*, p. 478.

gas reserves and export market share than there is with oil – e.g. Canada is the world's second-largest gas exporter despite only having the nineteenth-largest reserves, whereas Iran holds the world's second-largest reserves and is not a significant gas exporter and is not even among the world's top twenty gas exporters[330] – meaning it is critical for gas exporters to maintain good relations with their customers in order to attract further investments for this highly capital-intensive industry and to protect their revenues, market share and reputation as reliable suppliers.[331] Thus, for Amy Jaffe, Mark Hayes and David Victor, 'the countries most likely to become [natural gas] exporters are those that are able to combine prodigious gas resources with a business environment that favors private investment; those same conditions would impede the successful implementation of an effective cartel', making the latter 'still a theoretical prospect rather than a real present danger.'[332]

3.4.3. OPEC's lack of cohesion as a cartel

OPEC's drawbacks in effectively controlling the global oil market are not limited to its collective actions, but they also include internal power struggles. OPEC members often fail to abide by their official production quotas, especially when oil prices are high – their degree of compliance tends to be greater when prices are low. This form of 'cheating' is a result of the heterogeneous nature of OPEC's membership, which sparks a conflict of interest between its larger and smaller members: 'those with low oil reserves always seek higher prices so as to maximize their oil revenues by increasing the per barrel income; also, because their

330 Jaffe, A.M. & Soligo, R., 'Market structure in the new gas economy: is cartelization possible?', in Victor, D.G., Jaffe, A.M. & Hayes, M.M. (eds), *Natural Gas and Geopolitics: From 1970 to 2040*, (Cambridge: Cambridge University Press, 2006), pp. 442-443.

331 Yergin, 'Energy Security and Markets', *Op cit.*, pp. 59-60

332 Jaffe, Hayes & Victor, *Op cit.*, p. 478.

production capacity is so limited, they do not even care about the market share or the long-term effects of high prices on demand and supply. Conversely, member countries with large reserves (e.g., Saudi Arabia) in principle have regard for their market share to maximize income from their larger volume and, thus, higher market share. OPEC has in the past tried to formulate a long-term strategy but has never succeeded due to these conflicts of interest within the organization.'[333] There are two main examples of how diverging interests among OPEC members have backfired, both of which resulted in an oil price collapse, in 1986 and in 1998.

The Iranian Revolution of 1979, followed by the outbreak of the Iran-Iraq War in 1980, caused severe supply disruptions which more than tripled the price of oil to over $40 a barrel, which in turn 'encouraged fuel switching, the development of more efficient technologies, and a strong increase in non-OPEC oil production, which, along with decreasing demand due to recession, reduced OPEC's market share from more than 30 million barrels/day (mbd) in the 1970s to as low as 16 mbd by the mid-1980s'[334] – or, in percentage terms, OPEC's market share fell from 53% during the mid-1970s to around 30% in 1985.[335] This drastic loss of market share was a direct result of Saudi Arabia playing the role of swing producer by cutting its production – from 10 mbd in 1981 to 3.5 mbd in 1985 – in a vain attempt to keep prices high as increasing amounts of non-OPEC oil flooded the market, while other OPEC members took advantage of the situation by cheating on their quotas.[336] Both concerned about the ongoing loss of its market

333 Chalabi, *Op cit.*, p. 762.

334 U.S. Energy Information Administration, *Annual Energy Review 1997*, DOE/EIA- 0384(97). (Washington, DC, July 1998), Table 11.4. Available at: <http://www.eia.doe.gov/emeu/25opec/sld003.htm>, accessed 17 May 2011.

335 Chalabi, *Op cit.*, p. 759.

336 Gause, F.G., 'Saudi Arabia Over a Barrel', *Foreign Affairs*, Vol. 79, No. 3, May/June 2000, p. 87.

share and in an attempt to discipline overproducers, Saudi Arabia not only increased its output almost overnight from 2.3 mbd to over 6 mbd, but it also sold its oil at a discount known as 'netback pricing' to guarantee a considerably larger market share for itself.[337] Saudi production rose quickly during the first half of 1986, making prices tumble to less than $8 per barrel that summer, showing that 'opening up the spigots to discipline others could backfire.'[338]

During the mid-1990s, OPEC was characterised by overproduction and disunity among its members to the point of Venezuela questioning the cartel's viability. In 1991, Venezuela's state-owned company, PDVSA, completely ignored its OPEC quota and embarked on an ambitious campaign to increase its production from 2.8 mbd to 7 mbd by 2006, by reopening its nationalised petroleum sector to foreign investment and participation, in order to overtake Saudi Arabia as the top oil supplier to the United States, a position it reached in January 1997. Faced with the potential loss of its most important export market, this provided Saudi Arabia with a strong disincentive to cut its own production for the sake of defending the price of oil. Instead, Saudi Arabia once again decided to wage a price war by opening its taps, surpassing its 1996 OPEC quota of 8 mbd by 500,000 barrels a day for all of 1997, to punish Venezuela for challenging its share of the vital US market.

However, this infighting happened against a backdrop of aggressively increasing Iraqi exports under the auspices of the UN Oil for Food programme, the unexpected Asian financial crisis of 1997, which led to a drastic fall in Asian demand for oil – a drop in 1.9%, in contrast to a 4.5% rise in Asian demand the previous year – and two consecutive warm winters that stagnated OECD countries' winter demand for oil. The combination of OPEC

337 Morse & Jaffe, *Op cit.*, p. 77.

338 Gause, *Op cit.*, p. 88.

overproduction and worldwide demand slump resulted in yet another price collapse, from $27 a barrel in 1997 to as low as $8 the following year.[339]

> *This event was a stunting reminder of the special glue that binds OPEC countries together – fear that the Saudis will use their own oil weapon for punitive purposes and for discipline within the producer group. In game-theoretic terms, OPEC politics involves a dominant producer – Saudi Arabia – and the peripheral countries – the other OPEC members. The dominant producer's motive is to assure itself the maximum autonomy while preventing the others from "free riding" on its efforts to manage the market. It does so by maintaining its "deterrent," consisting of its shut-in production capacity, which it can use to feed the market and to discipline other producers. The peripheral countries, conversely, try to work together to prevent the dominant producer from acting on its own to produce flat out but rather offer cooperation as a means to ensure a floor under prices.*[340]

As is often the case with countries dependent on oil export revenues, the price collapse of 1998 bankrupted Venezuela's treasury, giving rise to popular discontent, which paved the way for regime change through the election of a radical, leftwing leader in the form of Hugo Chávez in December that year, who soon cancelled PDVSA's expansion plans, heralding a major shift not only in his country's oil policy but also within OPEC itself. That is why, in Morse and Jaffe's view, '[t]here is no doubt that without the Saudi weapon, OPEC cooperation would be far shorter-lived

339 Morse & Jaffe, *Op cit.*, pp. 72, 75-76; and Jaffe, *Op cit.*, pp. 849-851.

340 *Ibid.*, pp. 76-77.

than it has been. Other members are mindful of the damage Saudi Arabia can inflict over the short run with increased production.'[341]

3.4.4. The International Energy Agency and strategic petroleum reserves

With virtually all the world's spare production capacity resting in the Middle East at the time of the 1973 Arab oil embargo, there was no mechanism in place for OECD countries to protect themselves from the economic fallout of such a major disruption. The oil price spike of 1973 thus revealed the full extent to which oil-import-dependent countries in the OECD were to supply shocks. In response to these events, US Secretary of State Henry Kissinger summoned the leaders of OECD countries to meet in Washington in February 1974 to establish a framework for international energy cooperation. Underlying the reason for the meeting was a recognition that 'consuming countries have a clear interest in undertaking policies that will undermine OPEC's short- and long-term ability to act as a cartel to inflate oil prices' and that '[p]olicies undertaken in conjunction with other consuming nations are likely to be more effective than policies undertaken individually by increasing the strength of the monopsony wedge' – i.e. collective buying power of major oil consumers[342] – in other words, the reverse of monopoly power. After almost a year of intense negotiations, the International Energy Agency (IEA) was created on 15 November 1974, through a decision of the Council of the OECD – to which the new organisation is formally linked and headquartered in Paris – to serve as the collective mechanism though which its oil-consuming members would coordinate their actions in response to future energy crises, cooperate to prevent

341 *Ibid.*, p. 77.

342 Jaffe, *Op cit.*, p. 855; and Morse & Jaffe, *Op cit.*, pp. 66-67.

scrambles for oil supplies and deter oil-producing countries from using oil as a political weapon to influence the foreign policies of its members.[343] In the words of a former US representative to the IEA, Edward Morse, the founding member states sought to 'blunt the use of the oil weapon', which the Agency does through its two major functions: 'sharing oil among member states in the case of short-term supply disruptions, and long-term plans to reduce dependence on OPEC.'[344]

> *The IEA's members currently agree on the following as their core objectives: maintaining and improving systems for coping with oil supply disruptions; promoting rational energy policies in a global context through cooperative relations with non-member countries, industry, and international organizations; operating a permanent information system on the international oil market; improving the world's energy supply and demand structure by developing alternative energy sources and increasing the efficiency of energy use; and assisting in integration of environmental and energy policies.*[345]

The centrepiece of the IEA mechanism during its formative years was an emergency oil-sharing system through which its member states would share their supplies in case of another embargo or other serious supply disruptions affecting one or more of its members. This system would be triggered in the event of either a 7-11% or a 12% or greater shortfall in daily oil supply in one or more of IEA member states, with two different responses depending on the case: for a 7 to 11% shortfall, demand restraint and conservation measures would be adopted by members, while

343 Yergin, 'Ensuring Energy Security', *Op cit.*, p. 75.

344 Cited in Shaffer, *Op cit.*, p. 95.

345 Martin & Harrje, *Op cit.*, p. 108. See also Kohl, *Op cit.*, p. 200.

only a 12% or higher shortfall would require the actual sharing of IEA members' oil supplies.[346]

However, the second oil price shock provoked by the Iranian Revolution in 1979 demonstrated that the oil-sharing plan was inadequate to cope with the new crisis. The shortfall in supply caused by the decrease of 4.5 mbd of Iranian production, although serious, did not reach the IEA's minimum, but staggering, trigger of 7%. The resulting action by OECD countries was in complete opposition to the IEA's *raison d'être*, provoking a panicky scramble for supplies, oil stock building and hoarding, putting additional upward pressure on prices and worsening the crisis.

The Iranian Revolution taught the IEA a valuable lesson, however: the importance of oil stocks and member state coordination in the event of a disruption.[347] The United States Congress had already enacted legislation in 1975 authorising the construction of a Strategic Petroleum Reserve (SPR) that would allow the US government to purchase and store huge amounts of petroleum to be released according to need. After the Iran-Iraq War erupted in September 1980, the IEA decided to shift its emergency coordination system away from oil-sharing and demand restraint toward a more flexible and rapid response mechanism of releasing oil stocks to the market similar to the American SPR, a policy that became formalised in the IEA in 1985, requiring its 26 members to hold the equivalent of at least 90 days of oil imports in emergency stocks, and endures to this date:

> *There was a fundamental understanding in 1985 that oil stocks could buy time for diplomacy. They had become an essential tool of foreign policy, and there was an understanding that the tool must be implemented*

346 Kohl, *Op cit.*, pp. 199-200.

347 Martin & Harrje, *Op cit.*, p. 101.

> *internationally in a coordinated manner. Recognizing this, the United States endorsed the development of a more formal system of stock usage and the need for the United States and its allies to expand their strategic oil stockpiles. As a result, the IEA undertook a major effort to formalize coordinated stock policy and urge all member countries to build stocks.*[348]

Thus, when faced with energy statecraft in the form of a supply disruption, oil-consuming countries are faced with three choices: suffer high prices, try to convince countries with sufficient spare capacity to increase production, or draw down strategic oil stocks.[349] Strategic reserves represent the *demand-side* of the international energy market's 'security margin', absorbing supply shocks by releasing stored oil to replace the amount missing from the market without having to rely on spare capacity from the *supply-side*.

> *The development of strategic reserves sufficient to cover [ninety] days of imports by all IEA members (and more recent accumulation by China) provides a valuable buffer in the case of an interruption or embargo. The actual period of cover would be longer because not all exports worldwide would be cut off simultaneously; at most, one or two countries might be implicated (as with Iraq and Kuwait in 1990-1991). This gives consumers "staying power," ensuring that a boycott by a major exporter would have to be sustained for a long period, causing them severe economic hardship.*[350]

348 *Ibid.*, p. 104.

349 Goldwyn & Billig, *Op cit.*, p. 517.

350 Mills, *Op cit.*, pp. 197-198.

As the former executive director of the IEA, Claude Mandil, has noted, 'strategic stocks are a very important tool of deterrence for OECD countries'[351] against politically motivated embargoes and OPEC's monopolistic control of the market, ensuring price stability through intermittent checks on high oil prices, thus increasing the international influence of countries that have such stocks.[352] Moreover, the threat to draw down strategic stocks can also encourage OPEC countries to increase production from their spare capacity – as was the case shortly before the Gulf War in 1991, when the Bush administration in conjunction with the IEA expressed their willingness to do so, leading Saudi Arabia to increase production – since such an action would deflate prices and revenue from oil exports, if not lead to an outright price collapse if the drawdown is sufficiently large. Thus, 'in theory, [strategic] oil reserves are an important tool of both economic and foreign policy.'[353]

3.4.5. Diversification and conservation of energy resources

The IEA's limited success as an international organization with formal mechanisms to counter OPEC's monopoly power notwithstanding, there is one strategy Western, oil-importing countries have adopted, which, more than any other, has potentially worked to cripple OPEC's long-term hold over the oil market, and, if used again, could repeat its feats of the 1970s and 80s: diversification. The principle of diversification is almost as old as the international politics of oil, and, like its ultimate goal today, was born out of fears of the Middle East and its unreliability as

351 Martin & Harrje, *Op cit.*, p. 107.

352 Goldwyn & Billig, *Op cit.*, pp. 516, 526-527.

353 Victor, D.G. & Eskeris-Winkler, S., 'In the Tank', *Foreign Affairs*, Vol. 87, No. 4, July/August 2008, p. 71.

a secure source of oil supplies. In 1913, when Great Britain and Imperial Germany found themselves in the midst of an arms race for naval superiority preceding the First World War, Winston Churchill, then the First Lord of the Admiralty, made the landmark decision to substitute coal for petroleum as the main energy source to fuel the Royal Navy's ships. Not only would this change make the ships faster and more manoeuvrable, but they would also require fewer men in the engine rooms, shovelling coal into the ships' furnaces, allowing them to be on the deck, fighting. But this shift represented at the same time a geopolitical and strategic gamble in the sense that the Royal Navy would no longer rely on abundant and safely available Welsh coal, instead having to rely on insecure oil supplies from Persia, thus turning Britain's energy security into a foreign policy matter. 'In addressing the risks associated with this historic move,' Daniel Yergin recounts, 'Churchill declared, "Safety and certainty in oil lie in variety and variety alone." With that, he was articulating the fundamental principle of energy security: diversification of supply.'[354]

Almost a century later, experience has shown that diversification remains the 'overarching principle' of energy security.[355] 'Multiplying one's supply sources', writes Yergin, 'reduces the impact of a disruption in supply from one source by providing alternatives, serving the interests of both consumers and producers, for whom stable markets are a prime concern.'[356] Norris notes that, in theoretical terms of economic statecraft, this means that 'over the long term, states may seek to limit their exposure to economic statecraft by consciously seeking to alter their elasticity exposure or relative magnitude exposure (e.g. changing a state's

354 Yergin, 'Energy Security and Markets', *Op cit.*, p. 52.

355 Yergin, D., 'What does "energy security" really mean?', *The Wall Street Journal*, 11 July 2006, Opinion Page.

356 Yergin, 'Ensuring Energy Security', *Op cit.*, p. 75.

economic dependence on oil,…diversifying trade partners or sources of investment etc.).'[357] But the principle of diversification has evolved to take on a wider meaning, not just of varied sources of petroleum, but, more crucially, also of different kinds of energy sources, old and new – thus remaining 'the essential starting point for any thinking of energy security.'[358] Indeed, the ability of IEA members and other energy-importing countries to exercise their monopsony power against OPEC and other unreliable suppliers 'depends in large part on the availability of alternative energy supplies.'[359]

The purpose of diversification is to reduce dependence on a few, unreliable and/or unstable suppliers of a single energy source. Therefore, the outbreak of the Iranian Revolution in 1979 and the ensuing war between that country and Iraq – both of which caused the price of oil to skyrocket to significantly higher levels than they had been throughout the decade following the 1973 price spike – had unintended negative consequences for OPEC countries, which at first were satisfied with their monumental increase in oil rents. The exorbitant price of oil during the first half of the 1980s not only gave incentive for a strong increase in non-OPEC oil exploration and production, but also for fuel switching to alternative energy sources as well as the development of more fuel-efficient technologies and energy conservation – all of which halved OPEC's market share and made importing countries more energy-secure and less dependent on the former during the latter half of the 1980s, and could have the power to do so again.[360]

357 Norris, *Op cit.*

358 Yergin, 'What does "energy security" really mean?', *Op cit.*

359 Hayes, M.H. & Victor, D.G., 'Politics, Markets and the Shift to Natural Gas', in Victor, D.G., Jaffe, A.M., & Hayes, M.H. (eds.), *Natural Gas and Geopolitics: From 1970 to 2040*, (Cambridge: Cambridge University Press, 2006), p. 339.

360 Kohl, *Op cit.*, pp. 195, 199. See also Daoudi & Dajani, *Op cit.*, p. 158.

High oil prices after 1979 provided a twofold incentive for non-OPEC producers. First, high prices offered such a wide profit margin for oil producers and investors that hitherto high-cost oil-rich regions not only became economically viable to explore but also very lucrative for continued reinvestment in and of themselves. Second, the higher return on dividends from oil sales encouraged investment in scientific research and development of new and more cost-effective technologies to improve the efficiency of upstream oil operations – exploration, development and production of new oil fields – thus reducing the costs of producing oil in these otherwise high-cost areas while making them more profitable and attractive for reinvestment. One such example was oil production in the North Sea, which leaped from 2 million barrels a day (mbd) in 1975 to 3.5 mbd a decade later. And since 'OPEC adhered to the system of fixed price and swing production, any additional oil coming from outside OPEC would first capture its share in the market before buyers resorted to OPEC oil. Also, the greater the supplies of non-OPEC oil, the less OPEC oil that was on the market to meet world demand.'[361]

The same strategy of oil diversification could be pursued today, like in the early 1980s, using the returns from high oil prices to invest in research and development of heavy and/or unconventional oils, which 'have the potential to alter the geopolitics of oil without necessarily reducing oil consumption.' Venezuela's ultra-heavy oil and Canada's tar sands (bitumen) together make up c. 600 billion barrels, or almost half of the world's unconventional oils, which are about the same as the world's conventional oil reserves of 1.1 trillion barrels. But producing, transporting and refining these unconventional oils on a massive scale requires more widespread investment in and use of 'technologies to reduce viscosity, additives

361 Chalabi, *Op cit.*, pp. 762, 759-760.

to enable transport, and the removal of significant contaminants in the refining process', all of which are lacking in major oil-importing regions, such as North America. Investment in these areas could repeat their success of the early 1980s in countering OPEC's geopolitical influence while ensuring the energy security and national interests of energy-importing states.[362] As Kenderdine and Moniz remind us, '[e]ach of these options is expensive and the strategic objective – diminishing OPEC's market power – would be enhanced if technology investments were made in conjunction with policies to increase global strategic oil reserves and heavy oil refining capacity.'[363]

But as the North Sea and other non-OPEC oil and gas fields mature, hence slowing down their production, the need to find more fields outside OPEC's reach becomes paramount, considering the goal of decreasing OPEC's monopoly power. However, there is another, and even more effective, form of diversification that can permanently slash at least part of OPEC's market share: oil substitution for different kinds of energy sources. One fundamental consequence of OPEC's price spikes for the industrial economies of the West was that they sparked a long-term process of gradually shifting the bulk of their energy use away from petroleum toward alternative energy sources, from 45% of the world's total energy mix in 1973 to around 35% today, a figure that is projected potentially to decline, especially if the relative share of natural gas increases.[364] This scenario could still repeat itself today, as Mills explains:

> *Even if conventional non-OPEC oil goes into decline, oil prices in the level of recent years ($80-120) are*

362 Kenderdine & Moniz, *Op cit.*, p. 433.

363 *Ibid.*, p. 434.

364 Shaffer, *Op cit.*, p. 35.

not sustainable in the long term, because they create strong incentives to the development of new frontiers and unconventional production, and efficiency and alternative energy sources. This premature shift to unconventional fuels and alternatives would levy a heavy investment burden and be economically inefficient on a worldwide scale, but eventually the oil exporters would suffer more than the importers, as happened after the past two oil crises. OPEC nations are also well aware that they would ultimately pay the price for a global recession, reducing demand for their main export. This spectre increasingly confronted OPEC during 2008 as the consequences of the credit crisis unfolded.[365]

Past examples from the first oil crisis include the French policy to build thirteen 1,000-Megawatt nuclear power stations between 1973 and 1975 under presidents Pompidou and Giscard D'Estaing,[366] and Brazil's 1975 policy to manufacture car engines that run on ethanol rather than gasoline; but the leading case of diversification in the 1970s was the shift to natural gas, instead of oil, for electric power generation in the US, Japan and several European countries. These countries sought to replace the unexpectedly expensive and unreliable oil supplies with natural gas in order to reduce their dependence on oil imports. But natural gas was also more attractive than other fossil fuels, like oil and coal, because of its lower emissions of carbon dioxide and other pollutants. These qualities stimulated both a policy and industry shift toward natural-gas-fired electric power generation in industrialised countries, with developing countries soon following suit: 'Environmental preferences for natural gas were augmented

365 Mills, *Op cit.*, p. 194.

366 *The Epic of Black Gold. Episode 3: Oil as a Weapon*, a documentary produced by Yves Billion (2005), 25:06–26:21.

by relatively cheap supplies from the mid-1980s through the 1990s, improvements in natural gas turbine technologies, and much cheaper construction and maintenance costs for natural-gas-fired power plants.'[367] However, the shift to natural gas motivated mainly by energy security, but also by environmental concerns, brought two main challenges:

> *First, importing governments needed to ensure that they did not replace oil with another insecure and volatile import. Second, a shift to gas would require building infrastructures (pipelines and LNG systems) that were even more costly than their oil equivalents. A long time horizon would be needed to justify these investments. The response to these two challenges was found in long-term contracts. For governments, these contracts promised to assure energy security; for investors in gas projects, such contracts created a context in which capital could be risked when returns were distant.*[368]

Today, such challenges are somewhat overshadowed by the relative urgency of mitigating climate change, making the shift from fossil fuels (oil and coal in particular) to alternative energy a social and political imperative, rather than merely relying on economic incentives. 'Climate change creates added incentives to move away from oil, just as clean gas displaced somewhat cheaper but dirty coal,' writes Mills, 'and therefore oil will increasingly need an additional competitive edge. Given the enormous sums of money pouring into the alternative energy complex so far this millennium, $100 billion in renewables alone in 2006, oil exporters

367 Juckett & Foss, *Op cit.*, p. 536.

368 Hayes & Victor, *Op cit.*, pp. 330-331.

are playing a very dangerous game by resisting signals to increase output.'[369]

But the problem back then is the same as it is today, with natural gas as well as other, newer forms of alternative energy: namely whether resource development and infrastructure for delivery can keep up with the rising demand for these energy resources.[370] The current need to develop a new generation of nuclear power, 'clean coal' technologies, biofuels and other renewables, as well as hydrogen fuel cells in the longer term, will inevitably face infrastructural and investment challenges, but they are likely to overcome them because of their increased competitiveness with oil as a result of the latter's astronomic price rise in the last few years and the technological development of the former fuels. As Chalabi argues, 'technology favors these shifts because it reduces the costs of otherwise expensive alternatives.'[371] Indeed, as Jaffe points out, amidst current anxiety over terrorist threats in the Middle East and elsewhere, which can cause severe oil supply disruptions, the drive for alternatives is even stronger:

> *In the post-September 11 climate, consumer governments are increasingly discussing enhancing development of backstop technologies or promoting alternative energy sources that can serve to reduce the need for fossil fuel. In this practice, backstop technologies create an incentive for oil producers to avoid oil price shocks and supply disruptions for fear that the new technologies would be released and used, permanently eliminating sales markets. Alternative energy supplies provide ready substitutes if an increase in the price of oil is too extreme,*

369 Mills, *Op cit.*, p. 194.

370 Juckett & Foss, *Op cit.*, p. 536.

371 Chalabi, *Op cit.*, p.762.

> *and they can shield the economy from the negative impact from disruption of any one fuel source.*[372]

No matter what energy security benefits might ensue from diversifying the sources of a country's oil supplies or its overall energy matrix, perhaps the most advantageous form of diversification is not the substitution of oil for other energy resources, but for nothing at all. Enhanced energy efficiency in the use of energy generally, and its conservation in particular, is a paramount source of energy security. As Yergin postulates, '[c]onservation – energy efficiency – should be thought of as an energy source, and one with very large potential.'[373] That being the case, energy conservation should also be considered as form of diversification. A third unintended consequence of OPEC's 1973 price spike – the other two being diversification toward non-OPEC oil and the gradual shift to natural gas and other alternative energy sources – was its incentive for greater efficiency in fuel use and its conservation in the West, which were often adopted as national policies, especially in Western Europe. Various measures were taken by these countries' governments to diminish oil consumption, ranging from laws reducing the speed limit for automobiles, to public awareness campaigns, to fiscal policies. In France, for example, television ads encouraged motorists to drive in high gears (4th or 5th) to increase mileage, and housewives were told to do their laundry only if their washing machines were fully loaded with clothes.[374] With petroleum products extremely expensive for end-users, oil consumption growth, which had been a staggering 8% a year in Western Europe from the 1960s up to

372 Jaffe, *Op cit.*, p. 856.

373 Yergin, 'Energy Security and Markets', *Op cit.*, p. 54.

374 Billon, Y. (producer) *The Epic of Black Gold. Episode 3: Oil as a Weapon* (2005 documentary), 18:13–19:28.

1973, turned negative thereafter, falling from 15.2 mbd in 1973 to 13.5 mbd in 1975, levelling at circa 14 mbd from 1975 onwards.[375]

> *With a lead time, the price shock heralded a process of structural change in the world oil industry. Significantly, the emerging energy-saving campaigns led to diminishing oil consumption while achieving the same level of economic growth. Prior to the price shock, an increase in gross domestic product (GDP) had entailed an equal increase in oil consumption, but after the shock, the relationship between economic growth and oil consumption changed. A process of gradual "decoupling" of oil consumption from economic growth would not be attenuated later with the advent of even higher oil prices; that is, less consumption per unit of GDP became a permanent feature.*[376]

This sort of 'decoupling' also took place in the United States, where the impact of energy conservation in the economy has been vast over the past 30 years: between 1975 and 2005, US GDP grew by 150%, compared to a mere 25% increase in energy consumption,[377] while producing $1,000 of US GDP required 1.8 barrels of oil in 1980 compared to only one-third of that in 2004.[378] Yergin explains this phenomenon by citing the former Chairman of the US Federal Reserve, Alan Greenspan, who attributes much of this 'decoupling' to fundamental changes in the American economy: 'many of the gains in energy efficiency have come because the U.S. economy is "lighter"...than it was three decades ago – that is, GDP today is composed of less manufacturing and more services (especially

375 Chalabi, *Op cit.*, p. 758.

376 *Ibid.*

377 Yergin, 'Ensuring Energy Security', *Op cit.*, p. 81.

378 Maugeri, *Op cit.*, p. 187.

information technology) than could have been imagined in the 1970s. But the basic point remains: conservation has worked.'[379]

Given that most countries' oil dependence is predominant in the transportation sector, it is particularly important to apply energy conservation to automobiles. After the 1970s' oil shocks, this was recognised in the United States and especially in Western Europe and Japan – namely that oil dependence can be reduced by improving vehicle fuel efficiency.[380] Although overall fuel efficiency in the US declined during the low oil price scenario of the 1990s, with the rise in sport-utility vehicle (SUV) sales, the lesson stuck in Western Europe and Japan, where automobiles are significantly more efficient than in the US. Despite their success with fuel efficiency since the 1970s and 1980s, the return of exorbitant oil prices today indicates that the reduction of oil dependence in the transport sector requires more than just improved efficiency of automotive engines that run on petroleum derivates. As Wilfred Kohl points out,

> *[t]he best long-term strategy to reduce the costs and risks of oil dependence lies in research and development of affordable alternatives to petroleum, especially in the transportation sector, in which there is a need for new technologies and fuels. ... Such a development could have a major impact on reducing future world oil demand, although the transition to a new transportation technology will take a considerable amount of time.*[381]

Though such developments offer great promise for the future, these technologies will take time to have a real impact

379 Yergin, 'Ensuring Energy Security', *Op cit.*, p. 81.

380 Kenderdine & Moniz, *Op cit.*, p. 434.

381 Kohl, *Op cit.*, pp. 202-203.

on the reduction of oil dependence. Yergin explains that the relatively slow capital turnover, especially in terms of exchanging current inefficient cars for newer and more efficient and/or environmentally friendly ones, will make 'these new-technology paths to higher fleet-average fuel efficiency take time to reach their full potential.'[382] Nevertheless, as Mills points out, the most worrying prospect for oil exporters is 'if there is a breakthrough such as highly competitive hybrid or electric cars, [or] algal biofuels,' in which case 'OPEC might condemn itself to early extinction.'[383]

Overall, the demand-side instrument against OPEC's influence which has had the strongest impact – more so than strategic oil stocks – has proved to be consumer taxes on energy to reduce demand for oil. The price volatility brought on by market deregulation can also be alleviated by imposing hefty taxes on energy use in importing countries, which can serve as a buffer against wide price variations. According to Jaffe, not only do such taxes discourage wasteful use of energy, but they also collect rents that would otherwise go to oil-exporting countries, thus compelling OPEC to accept lower oil prices: 'When OPEC's monopoly power strengthens due to short-term market tightening, the incentive to exploit that power is tempered by the fact that increases in monopoly rents will not accrue entirely to producers but rather must be shared with consuming countries that have high energy taxes.'[384]

This has sparked scathing anti-tax rhetoric by OPEC directed at OECD governments that accumulate higher oil rents than OPEC by imposing high energy taxes, which is reminiscent of OPEC's early 1970s rhetoric against IOCs for depriving them of

382 Yergin, 'Energy Security and Markets', *Op cit.*, p. 55.

383 Mills, *Op cit.*, p. 194.

384 Jaffe, *Op cit.*, p. 854.

a 'fair share' of rents accumulated from the sales of their own natural resources. 'The leaders of OPEC countries cannot be seen as delivering benefits to Western consumers at the expense of their own citizens', writes Jaffe, since 'such perceptions would leave regimes more vulnerable to public attack and to the efforts of opposition groups.'[385] Indeed, the lower oil prices resulting from importing countries' oil and other energy diversification, as well as energy taxes and conservation, were perceived by OPEC countries as far more damaging to them, whose oil revenues make up the bulk of their national budgets, than the previously high prices had been for OECD countries, whose oil import costs are a much smaller fraction of their aggregate trade. In other words, OPEC perceives low oil prices as a subsidy for growth in importing countries at expense of their own growth, which is mainly stimulated by high oil prices.[386]

Diversification is not only an important protection from the rent-seeking behaviour of energy-exporting countries, but also against that of importing countries that use their collective monopsony power. While diversity of *supply* is stressed *ad infinitum* as the principal source of energy security, diversification of *demand* is not often emphasised, even though it is a crucial mechanism for ensuring the energy security of countries dependent on energy rents to survive: the guarantee that it can export its energy resources to other countries in case one or more of its usual customers decide, for whatever reason, to cease importing their energy. In the 1980s, for instance, Saudi Arabia learned bitterly that if oil prices are too high, importing countries will switch to alternative sources of energy, which, as OPEC's largest oil producer

385 Morse & Jaffe, *Op cit.*, p. 74;and Jaffe, *Op cit.*, p. 851.

386 *Ibid.*, pp. 70-71.

with reserves that will last over a century at current production rates, is clearly against its long-term interests.[387]

But the fundamental way for oil-exporting countries to ensure their overall economic security, rather than merely their energy security, is not through diversification of different sources of demand for their oil, but by diversifying their economies as a whole, so as not to rely solely or mostly on oil rents for their national budgets – a strategy that unfortunately is rarely, if ever, taken into consideration. As Daoudi and Dajani have advised, 'oil producers should assign priority to developing their industry and diversifying their economies. Meeting domestic economic and social demands is essential for diffusing counterleverages. … The oil producers should make serious attempts to decrease imports and weaken trade linkages, particularly with consumer nations that might become embargo targets. In this respect, diversification of import sources is essential.'[388] Therefore, diversification is not only an economic end for a country, be it a net importer or exporter of energy, but also a strategic means.

3.5. Concluding remarks

The countermeasures against energy statecraft notwithstanding, the 'energy weapon' – be it in the form of oil, natural gas, or other energy resources – still has the potential to be effective if applied properly within an auspicious context, given the ubiquitous need for energy resources for a modern society to function. In the case of petroleum, on which there is a near-universal dependence for the transportation sector, this is particularly true, as Daoudi and Dajani point out below, but it could equally apply to any other energy resource on which a given target

387 Gause, *Op cit.*, pp. 86-87.

388 Daoudi & Dajani, *Op cit.*, pp. 171-173.

country excessively depends on. And, as such, '[j]ust as oil power should not be overestimated, it should not be underestimated. Even in times of oil oversupply, the Western nations' economies remain heavily dependent on oil as their primary source of energy, and because other sources are failing to compete successfully with oil in terms of safety, practicality, and low cost, the use of oil as a political weapon still poses a serious threat to the consumer nations.'[389]

389 *Ibid.*, p. 5.

CHAPTER 4
THE INTERNATIONAL ENERGY SECURITY CONTEXT

Energy statecraft – the use of energy resources as an instrument of a state's foreign policy – is a source of state power in that it has the potential to influence the behaviour of other actors, or getting them to do what they would otherwise not do. Being a subset of economic statecraft, energy statecraft might be conflated into some of the debates and criticisms traditionally directed at the former, such as whether 'the use of economic instruments of statecraft [is] a sign of weak and pusillanimous statesmanship or an indication of firm commitment'. But no general rule can answer this question, says David Baldwin, 'since the situational context is likely to be crucial in determining the symbolic importance of any given instance.' Indeed, for Baldwin, the utility of any given instrument of foreign policy is 'a function of the situation and not a quality intrinsic to the particular technique.'[390] This is a proposition many agree with, such as Hans Morgenthau, whom Ned Lebow alludes to when affirming that 'power is not so readily transformed into influence because it is heavily context-dependent',[391] and

390 Baldwin, D.A., *Economic Statecraft*, (Princeton, NJ: Princeton University Press, 1985), pp. 104, 123.

391 Cited in Lebow, R.N., *A Cultural Theory of International Relations*, (Cambridge: Cambridge University Press, 2008), p. 551.

Christopher Hill, who states that 'both the power to act and the ability to exert power over another require an understanding of the nature of the wider context in which action has to take place.'[392]

This makes it essential to understand the context in which energy statecraft takes place in order properly to assess its utility as an instrument of foreign policy. Moreover, the power of any given foreign policy instrument may also change over time, according to Hill: 'A currency only has value if it is recognized by others, and power thus always has a relational element.'[393] Applied specifically to energy resources as a source of state power, Jonathan Elkind reminds us that

> *attention to energy security typically reaches fever pitch when global energy prices spike or international conflict threaten to disrupt energy trade. ... The attention paid to the issue by the public and policymakers alike wanes as soon as prices subside naturally, which they generally tend to do in a sector that is predisposed to long, recurring business cycles. The lower prices lull the country into a false sense of security even as the energy intensity of its economy remains substantially undiminished. In a few years, the cycle repeats.*[394]

Since energy statecraft is herein defined as the manipulation of another state's energy security for one's own political purposes, this chapter will examine the international energy security context that has fostered an increasing use of energy statecraft by energy-rich states during the long oil price spike of the previous decade.

392 Hill, C., *The Changing Politics of Foreign Policy*, (Basingstoke: Palgrave Macmillan, 2002), pp. 134.

393 *Ibid.*, p. 132.

394 Elkind, J., 'Energy Security: Call for a Broader Agenda', in Pascual, C. & Elkind, J. (eds.), *Energy Security: Economics, Politics, Strategies, and Implications*, (Washington, D.C.: Brookings Institution Press, 2010), p. 120.

This context, which Dieter Helm calls 'a new energy paradigm,'[395] has been characterised not only by high prices for oil and other energy resources, but also by a myriad of other threats, 'ranging from rapidly growing competitors for traditional hydrocarbon resources, to terrorists whose willingness to wreak human suffering and economic chaos is beyond debate, to environmental impacts that threaten the global climate system.'[396] Especially with regards to the latter, the growing acceptance of climate change as a threat not just to energy security but to the world in general has 'helped turn energy use policy into a major foreign policy and even national security issue.'[397]

All of these defining features of the international energy security context have helped promote a drive toward the production and consumption of alternative energy resources. Energy security concerns surrounding petroleum have been central to this drive, although problems raised by other fossil fuels like natural gas and coal have also contributed to a partial shift to alternative energy. However, since this book specifically concerns itself with the use of biofuels as an instrument of foreign policy, this chapter will focus on the threats posed by oil to energy security because it is the main energy source that biofuels compete with. While natural gas, for instance, is a cleaner fossil fuel with the potential to substitute 'dirtier' energy resources in a multitude of sectors – such as electricity generation, heating and a variety of industrial and agricultural purposes – it is rarely used as a source of energy for transportation.[398] Petroleum, on the other hand, is used for everything, as Leonardo Maugeri reminds us: 'from transportation to heating,

395 Cited in Giddens, A., *The Politics of Climate Change*, (Cambridge, UK: Polity Press: 2009), p. 44.

396 Elkind, *Op cit.*, p. 121.

397 Shaffer, B., *Energy Politics*, (Philadelphia, PA: University of Pennsylvania Press, 2009), p. 2.

398 Klare, M.T., *Rising Powers, Shrinking Planet*, (Oxford: Oneworld Publications, 2008), pp. 43-44.

to electricity generation, and to plastics and synthetics.' But the transportation sector is 'the only area where [oil] is truly irreplaceable.' Interestingly, it is precisely by complementing (though not replacing) petroleum in the transportation sector that biofuels have made their foremost contribution to energy security – in addition to being increasingly able to substitute oil-derived products in all other fields as technology advances, including electricity and plastics. Nevertheless, Maugeri insists that 'petroleum will continue to be central to any energy scenario. Furthermore, its cycles will influence the fate of all other sources of energy. Therefore, we cannot ignore oil while thinking about a new energy paradigm.'[399] Hence the focus on the energy security risks of petroleum at the expense of lengthy analysis of other energy resources.

As explained in the preceding chapter, energy security involves four basic elements: availability, reliability, affordability and sustainability. The risks that fossil fuels in general, and oil in particular, pose to all four of these elements have created a context in which traditional energy resources have gained value as an instrument of state power in international relations. On the other hand, because this situation has also allowed renewable energy to compete with fossil fuels in general – and biofuels to compete with petroleum in particular – the international energy security context has also paved the way for the possibility of using biofuels as a tool of energy statecraft – the subject of this study. The present chapter will therefore assess the concerns that oil raises to each of these elements – availability, reliability, affordability and sustainability, respectively – in the current international energy security context, with secondary consideration paid to other energy sources.

399 Maugeri, L., *Beyond the Age of Oil: The Myths, Realities, and Future of Fossil Fuels and Their Alternatives*. Translated from the Italian by Jonathan T. Hine Jr. (Santa Barbara, CA: Praeger, 2010), pp. 3-4.

4.1. Availability

Given the finite nature of petroleum and other non-renewable energy resources, there has for a long time been a popular belief that the world is running out of oil. However, such warnings and predictions of global peak production, or 'Peak Oil' – when half the world's petroleum has been depleted – are almost as old as the oil industry itself. For example: in 1885 the US Geological Survey (USGS) expected there was 'little or no chance of [finding] oil in California' (which currently ranks fourth among oil-producing states in the US, responsible for 6% of total US oil output);[400] in 1914 the US Bureau of Mines estimated there were only ten years left of national oil supply, only to be proven wrong with an enormous oil glut in 1930 after the stock-market crash of 1929; this fear was also prevalent during World War II, a crucial reason behind Japan's and Hitler's invasions of the southeast Pacific and the Soviet Union, respectively, but gave way to overproduction after the war until the end of the 1960s; and, most notoriously, the two oil price shocks of the 1970s also resurrected these fears, until the price of oil collapsed in 1986. In 1972, for instance, the Club of Rome think tank published a controversial report entitled *Limits to Growth*, admonishing that only 550 billion barrels of oil were left on earth, which would run out by 1990. But the 1986 oil price collapse took much credibility out of this neo-Malthusian view, especially considering that the world had consumed 600 billion barrels of oil between the publication of *Limits to Growth* and its doomsday year of 1990 and still had almost twice that recoverable amount left,[401] while world oil production has increased by 60%

400 U.S. Energy Information Administration, 'U.S. States – State Profiles and Energy Estimates', available at: <https://www.eia.gov/state/rankings/#/series/46>, accessed 29 July 2017.

401 Jaffe, A.M. & Manning, R.A., 'The Shocks of a World of Cheap Oil', *Foreign Affairs*, Vol. 79, No. 1, January/February 2000, pp. 17-18.

since the 1970s.[402] It is easy enough to conclude, writes Michael Klare, that 'the "peak oil" theorists are but so many boys once again crying wolf – that the current upsurge of concern over energy scarcity is destined to prove a passing phenomenon, either because colossal new reservoirs will be discovered or alternative fuel sources will come on line.'[403]

Peak oil theorists build on the assumptions of the model first proposed by Marion King Hubbert in 1956, which accurately predicted the date for the peak of oil production in the United States sometime between 1965 and 1970 depending on worst- or best-case scenarios,[404] which eventually happened in 1970. Hubbert and his followers have since then applied his model to the rest of the world in order to try to predict global peak oil production. Peak Oil theorists therefore assume that the entire world's subsoil has been exhaustively explored and therefore its geology is well known, as is the case in the United States, meaning that undiscovered oil deposits are unlikely still to exist – in other words, almost all of the world's oil has already been found and it is being depleted faster than it can be replaced by modest new discoveries – a questionable idea, given the erratic distribution of oilfields in the world and continuing discoveries of new ones, some of them gargantuan, such as the recent discoveries made during the past decade in Kazakhstan and Brazil.

However, when it comes to hydrocarbons, the rest of the world has not been explored for those natural resources to anywhere near the same extent as they have in the US. As Maugeri reminds us, the US is 'by far the oldest and most intensively

402 Yergin, D., 'Ensuring Energy Security', *Foreign Affairs*, Vol. 85, No. 2, March/April 2006, p.74.

403 Klare (2008), *Op cit.*, p. 33.

404 Hubbert, M.K., 'Nuclear Energy and the Fossil Fuels', Paper presented before the Spring Meeting of the Southern District Division of Production, American Petroleum Institute, San Antonio, Texas, 7-9 March 1956, pp.22-24.

known, explored, and aggressively exploited area in the world. The knowledge of its subsurface outpaces that of any other region of the world except Western Europe by a factor of 100.' Hydrocarbons can be found in sedimentary basins, 30% of which have yet to be explored worldwide.[405] But the most important example of under-exploration, ironically, is the Middle East, despite its long and notorious history with oil: between 1980 and 2006, around 70% of hydrocarbons exploration has taken place in the US and Canada, which together hold close to 3% of the world's proven reserves, in contrast to Persian Gulf countries, which hold over 65% of the world's proven reserves, but together have barely been responsible for 1% of exploration worldwide.[406]Furthermore, around 1.5 million wells have been drilled in Texas alone[407] compared to 2,300 in Iraq,[408] while there are currently almost 1.7 million active wells in the US[409] compared to around 1,500 in Saudi Arabia.[410]

But as oil prices started climbing relentlessly after 2002 – pressured by skyrocketing global demand that not even the members of the Organization of Petroleum Exporting Countries (OPEC) were able to meet, eventually reaching its highest level ever on 11 July 2008 at $147.27 a barrel – the peak oil theory regained popularity and doomsday predictions became more widely publicised in the media. In addition to the unprecedented heights of consumption and demand for oil and other energy resources, Klare lists a faster-than-expected decline in output from existing

405 Maugeri, L., *The Age of Oil: The Mythology, History, and Future of the World's Most Controversial Resource*, (Westport, CT: Praeger, 2006), p. 204.

406 Maugeri, *Beyond the Age of Oil*, p. 7.

407 Bryce, R. 'More Precious Than Oil', *Texas Monthly*, February 1991, p. 158.

408 Maugeri, *Beyond the Age of Oil*, p. 7.

409 Kelso, M., '1.7 Million Wells in the U.S. – A 2015 Update', Fracktracer Alliance, available at: <https://www.fractracker.org/2015/08/1-7-million-wells/>, accessed 19 July 2017.

410 Maugeri, *Beyond the Age of Oil*, p. 7.

oilfields, fewer discoveries of new fields and the running out of 'cheap oil' as factors behind the return to thinking on peak oil.[411] According to Klare,

> *non-renewable fossil fuels – oil, coal, and natural gas – are still projected to jointly satisfy a whopping 87 percent of world energy requirements, about the same proportion as today. But because worldwide energy demand in 2030 will be so much greater, the supply of all three will have to be correspondingly larger to retain this combined share: Oil production will have to rise by an estimated 42 percent, natural gas by 65 percent, and coal by 74 percent. And this is where the problem lies: In the view of many energy analysts, increases of this magnitude are almost inconceivable in a world where a peak in oil and gas production may be in the cards, possibly followed by a contraction in the overall global supply; even coal, the most abundant of the three, may not satisfy future expectations.*[412]

A problem that compounds the fast rise in global demand for energy resources – and, indeed, is a symptom of peak oil – is the prospect of accelerating rates of decline in production in older oilfields. This matters greatly, writes Klare, because 'every lost barrel from an existing reservoir must be replaced by an added barrel from some new deposit just to stabilize world production at existing levels; if the net rate of decline exceeds the rate of increase in newer fields, there can be no hope of meeting higher levels of demand.'[413] But even if global demand for oil remains static until 2030, the International Energy Agency (IEA) estimates that the

411 Klare (2008), *Op cit.*, p. 37.

412 *Ibid.*, p. 34.

413 *Ibid.*, p. 37

equivalent of four times the current capacity of Saudi Arabia's oil production will need to be brought on line only to compensate for the rate of decline in production in existing oilfields.[414] Thus, in order to avoid a peak, followed by gradual decline in oil production, the newer fields now coming on line, as well as those yet to be discovered, must be 'ample enough to both supplant those now being exhausted *and* provide the added oil needed to satisfy rising international demand. But that is not happening', according to Klare.[415]

The relatively disappointing record of new oil discoveries since the 1980s supports this proposition: whereas the petroleum reserves discovered between 1960 and 1989 were over twice the amount produced during that period, new discoveries between 1990 and 2006 amounted to half of the cumulative oil production over the same time. If no sufficiently large new discoveries were made, the IEA's former chief economist, Fatih Birol, stated that 'the output of conventional oil will peak in 2020 if oil demand grows on a business-as-usual basis.' The IEA's *World Energy Outlook* released in November 2009 states that *conventional* oil production 'is projected to reach a plateau sometime before' 2030, although that does not include hard-to-extract and unconventional forms of petroleum like Canada's tar sands. Meanwhile, optimists such as those at Cambridge Energy Research Associates (CERA) believe that advances in technology incited by high oil prices 'will allow demand to be met for at least a couple of decades. After that, CERA reckons, "supply may well struggle to meet demand, but an undulating plateau rather than a dramatic peak will likely unfold".'[416] Thus, insofar as 'peak oil' refers to 'the traditional sort

414 Birol, F., 'The Coming Supply Crunch', *Foreign Policy*, September/October 2009, p. 105.

415 Klare (2008), *Op cit.*, p. 38. Original emphasis.

416 *The Economist*, '2020 vision', 12 December 2009, p. 81.

[of petroleum] that comes cheaply out of holes in the ground, [it] probably will arrive soon. There is oil aplenty of other sorts (tar sands, liquefied coal and so on), so the stuff is unlikely to run out for a long time yet. But it will get more expensive to produce, putting a floor on the price that is way above today's.'[417]

The IEA anticipates that such unconventional forms of petroleum will make up for its projected decline in future production of conventional, 'easy' oil, since increasingly high oil prices will make them economically viable.[418] Therefore, argues Maugeri, 'the availability of oil will not be a problem if advanced technologies for exploration and production are applied on a vast scale to old and new areas of the planet. Critics may argue that while there may actually be plenty of oil left underground, the "easy" and cheap oil is gone forever. This view is partially true, but it is also true that today's difficult oil will become tomorrow's easy oil, thanks to the economies of applying currently expensive technologies on a large scale.'[419]

According to 'the most credible studies', the world's ultimately recoverable reserves are estimated at over 2.6 trillion barrels of *conventional* oil, including those yet to be discovered, of which 1.2 trillion are currently 'proven' while the remaining 1.4 trillion are 'recoverable' but may soon be classified as proven reserves when technology and prices allow. Today's proven reserves are 'enough to satisfy current consumption needs for thirty-nine years' (as of 2010), although including 'recoverable reserves extends the limit to eighty-six years. The figures on recoverable reserves exclude crude oil that costs more than $18 per barrel to extract' writes

417 *The Economist*, 'The power and the glory', A special report on the future of energy, 21 June 2008, p.4.

418 *The Economist*, '2020 vision', p. 81.

419 Maugeri, *Beyond the Age of Oil*, p. 9.

Maugeri, which 'dramatically underestimates the real total.'[420] This brings us to the concept of 'recoverability': 'proven' reserves are those that can be extracted profitably with currently available technology, and are but a fraction of the total oil in place in any given oilfield; that fraction is the recovery rate, or recoverability.

This has several implications.[421] First, in percentage terms, the difference between the recovery rate and 100 is the percentage of the original amount of oil in place still in the ground after a field has been exhausted under current price and technological conditions, which today is an average of 65% worldwide, meaning that almost two-thirds of all the oil found to date is still beneath the ground. Second, technological improvements and higher prices can, and often will, increase the recoverability of a field, because '[t]echnical evolution also makes recoverable what was not recoverable before, which increases the reserves without the discovery of new deposits.'[422] Third, even fields that have been 'exhausted' in the past can start producing again under improved technological and price conditions. In other words, proven reserves figures can be revised upwards even without new discoveries. A notable example that illustrates this is the Kern River oilfield, discovered in 1899 in California:

> *Initially, it was thought that only 10 percent of its heavy, viscous crude oil could be recovered. In 1942, after a cumulative production of 254 million barrels of oil, it was estimated that the field still contained 54 million barrels of recoverable petroleum. As Morris Adelman pointed out in 1995, "In the next forty-four years, it produced*

420 *Ibid.*, p. 6.

421 Howell, D. & Nakhle, C., *Out of the Energy Labyrinth*, (London: I.B. Tauris, 2006), p.81. See Also Maugeri, *The Age of Oil*, p. 209, and *Beyond the Age of Oil*, p. 7.

422 Maugeri, *Beyond the Age of Oil*, p. xxxi.

> *not 54 million barrels but 736 million barrels and it had another 970 million barrels remaining in 1986." Yet even data reported by Adelman were underestimated. In November 2007, Chevron announced that cumulative production had reached 2 billion barrels. The Kern River is still producing more than 80,000 barrels per day, and in 2009, the state of California estimated its remaining reserves to be about 627 million barrels. The explanation of this apparent miracle is the injection of steam into the subsoil, a technology that Chevron began using in the early 1960s.*[423]

A similar upward trajectory in revised proven reserves over the years has also characterised the world's total proven oil reserves, which are almost 2.5 times greater today than they were in 1980.[424]

Moreover, while the world's average recovery rate is 35, it is considerably higher in countries that allow free access to private oil companies, which normally hold the most advanced technologies – such as the US, Canada and the North Sea area – where recoverability surpasses 50%, whereas many of the world's most oil-rich countries – like Russia and most Arab states – have recovery rates lower than 25%.[425] Given current production levels, writes Maugeri, 'an increase of a single percentage point in the [average worldwide] recoverability factor can result in additional reserves of between 25 and 55 billion barrels, equivalent to one or two years of global consumption.'[426] And better technology

423 *Ibid.*, p. 8.

424 Dale, S., 'New Economics of Oil', speech delivered at Society of Business Economists Annual Conference, London, 13 October 2015, available at: <http://www.bp.com/content/dam/bp/pdf/speeches/2015/new-economics-of-oil-spencer-dale.pdf>, accessed 3 August 2017.

425 *Ibid.*

426 Maugeri, *The Age of Oil*, p. 216.

also tends to cut production costs, making it possible to produce oil from fields that in the past were considered too expensive to develop at all.

All these factors are particularly pertinent when it comes to *unconventional* oils, which are specifically excluded from proven and sometimes even from recoverable reserves. Precisely because they are heavy and highly viscous, requiring a mixture of light oil, water and/or detergent to make them flow smoothly through pipelines, they have traditionally been considered too expensive to produce in general and too costly to refine in particular due to their high concentration of sulphur and other pollutants, and were therefore not worth considering as part of official reserve figures. But with light crude prices above $50 per barrel, unconventional oils become competitive and attract investment.[427]

This is especially significant because their quantities are truly massive: the USGS estimates unconventional oils – like the bitumen-like ultra-heavy oil in Venezuela's Orinoco belt, Canada's tar sands, the US shale oil, and others – to amount to 8 trillion barrels, 1.3 trillion of which are considered to be recoverable with current technologies. These quantities indicate an important fact, says Maugeri: 'Worldwide petroleum resources are enormous, and proven reserves are only a small fraction of the overall total.'[428] The problem, however, is not geological (how many resources are under the ground); it is whether technological, economic and political conditions will allow the development of these resources – a problem well illustrated in Venezuela:

> *Venezuela's Orinoco tar sands are estimated to be the largest deposits of their kind in the world, potentially rivaling conventional world oil reserves. Their*

427 Howell & Nakhle, *Op cit.*, pp. 114-116. Jaffe & Manning, *Op cit.*, p. 17. Maugeri, *The Age of Oil*, p. 214.

428 Maugeri, *Beyond the Age of Oil*, p. 7.

> *strategic importance for global energy is enhanced by improvements in extraction technology and by potential future recovery rates with the turn to unconventional oil. When oil prices recover from the financial downturn, of the unconventional sources for oil – including Canadian tar sands – the Orinoco tar sands are the most economical. A poor investment climate combined with aggressive political rhetoric, unsound economic policy, and the current economic crisis poses a risk for development of these reserves, which could enhance global oil supply.*[429]

Where there is an investment climate conducive toward developing unconventional oil and gas reserves, however, the potential to expand the availability of petroleum is enormous. This has been the case of the so-called 'shale revolution' in the United States, where the exploration of unconventional oil and gas resources has experienced an impressive boom since the end of the previous decade. The shale revolution is the result of technological innovations in horizontal drilling and hydraulic fracturing ('fracking') that have made the exploration of vast oil and gas reserves in tight rock formations economically viable.[430] Fracking has allowed US oil and gas production to skyrocket, putting to rest erstwhile predictions of perpetual oil-import dependence and its exorbitant financial burden: in 2015 the US produced 91.2% of its energy needs compared to 70% ten years earlier. In terms of imports, the US was importing merely 21.5% of its oil consumption in 1970, when its conventional production peaked,

429 Pascual, C. & Zambetakis, E., 'The Geopolitics of Energy', in Pascual, C. & Elkind, J. (eds.), *Energy Security: Economics, Politics, Strategies, and Implications*, (Washington, D.C.: Brookings Institution Press, 2010), pp. 18-19.

430 Aguilera, R.F. & Radetzki, M., 'The shale revolution: Global gas and oil markets under formation', *Mineral Economics*, Vol. 26, Issue 3, January 2014

rising to 60.3% in 2005 as its production declined and its domestic demand kept rising, and has since fallen to 24.2% in 2015 after the shale revolution.[431] More specifically, since the start of the shale revolution in 2008, US production of shale oil has risen by some 4 mbd, cutting American oil imports from OPEC by half.[432]

Just to make sense of the magnitude of the potential impact shale reserves around the world could have on the availability of oil and gas, a report by the US Energy Information Administration,[433] assessing 137 shale formations across 41 countries, estimates that shale oil could add around 11% to the world's 3 trillion barrels of recoverable conventional oil reserves and approximately 47% to the world's 15,583 trillion cubic feet of conventional natural gas reserves. The report estimates that 32% of the world's total natural gas reserves are found in shale formations, while 10% of the world's petroleum is located in such tight rock formations.

Despite having increased US oil and gas production by 64% and 42%, respectively,[434] the exploration of shale resources remains insignificant everywhere else in the world. Though shale formations are widespread throughout the world, their exploration has so far only taken off in the United States, whose remarkable success can be attributed to its favourable regulatory and economic environment:

431 Perry, M.J., 'Some charts and updates on America's amazing shale revolution, it's not over yet…', AEIdeas, 1 March 2016, available at: <http://www.aei.org/publication/some-charts-and-updates-on-americas-amazing-shale-revolution-its-not-over-yet/>, accessed 30 July 2017.

432 *The Economist*, 'Unsustainable energy', 11 October 2014.

433 U.S. Energy Information Administration, 'Technically Recoverable Shale Oil and Shale Gas Resources: An Assessment of 137 Shale Formations in 41 Countries Outside the United States', June 2013, available at: <https://www.eia.gov/analysis/studies/worldshalegas/archive/2013/pdf/fullreport_2013.pdf >, accessed 30 July 2017.

434 *Ibid.*

> *Much has been written lately about the discovery of new oil and gas deposits around the world, but other countries will not find it easy to replicate the United States' success. The fracking revolution required more than just favorable geology; it also took financiers with a tolerance for risk, a property-rights regime that let landowners claim underground resources, a network of service providers and delivery infrastructure, and an industry structure characterized by thousands of entrepreneurs rather than a single national oil company. Although many countries possess the right rock, none, with the exception of Canada, boasts an industrial environment as favorable as that of the United States.*[435]

Because the unique industrial landscape that facilitated America's aggressive exploration of its shale reserves does not exist anywhere else, most other countries with shale formations might not be able (or willing) to explore their reserves and add more oil and gas to the market to the same extent as the US has.

Another way that countries can contribute to the availability of energy in the world is by complementing oil consumption with biofuel production, for which there is much land available. According to the UN's Food and Agriculture Organization (FAO), of the 13.1 billion hectares (ha) of total land area in the planet, 3.2 billion ha of that land is arable. Today, only 1.5 billion ha are utilised in agricultural activities; in other words, 46% of total arable land. The majority of available land is found in Africa (734 million ha of arable land and only 185 million ha are used in agriculture) and in Latin America (681 million ha of arable land, where only 142 million ha are used for agriculture). Moreover, the introduction

435 Blackwill, R.D. & O'Sullivan, M.L., 'America's Energy Edge: The Geopolitical Consequences of the Shale Revolution', *Foreign Affairs*, Vol. 93, No. 2, March/April 2014, p. 102.

of new agricultural technologies and irrigation techniques could make agricultural production more efficient and further extend the world's arable land; in fact, over the last 30 years more than 100 million ha of arable land were added.[436]

> *Several studies have been carried out to shed light on the main issues governing the future of biofuels, and bioethanol in particular. How much and where can they be made available? This question is not simple, since the potential of biofuel supply is not an absolute and static number, like in the case of a mineral reserve. In fact, it is a very dynamic figure dependent on changing geographic, economic and political scenarios, as well as on technologies of production and conversion that in many cases are still being developed.*[437]

A report by the IEA estimates that biofuels can sustainably provide up to 27% of the world's transportation fuel by 2050: 'The area required for biofuel feedstock production in 2050 is estimated at around 100 million hectares of land, a three-fold increase of the gross area under biofuels compared to the current situation. This translates into a share of 2% of current total agricultural land (cropland + pastures).'[438]

However, the possibility that biofuel production might compete with food crops for available arable land around the world has been the cause of much controversy. The so-called 'food *versus* fuel' debate climaxed during the 2008 food price spike, casting a shadow of mistrust over biofuels since then. This controversy has not been fully laid to rest, but there is a growing consensus that the

436 Interview with senior Brazilian Foreign Ministry official, Brasília, Brazil, 3 June 2011.

437 BNDES & CGEE (eds.), *Sugarcane-Based Ethanol: Energy for Sustainable Development*, (Rio de Janeiro: BNDES, 2008), p. 213.

438 *Biofuels International*, 'Biofuels: 27% of world transport fuel by 2050', Issue 4, Vol. 5, May 2011, p. 33.

food price spikes of 2007-2008 and 2011-2012 are better explained by the impact of high oil prices on commodities markets, than by increasing demand for biofuels: 'Biofuels provide a link between the food and energy markets. The existence of such linkages, as well as the induced correlation between prices, is widely recognized. However, the strength of the correlation is disputed. In addition, short-term (effects on volatility) and long-term correlations are shown to be quite different, as well as very dependent on the different biofuel feedstocks and pathways.'[439] Indeed, one hectare of agricultural land can yield enormous variations of biofuels depending on what feedstock is grown, where it is grown and how it is grown: '4179 litres for ethanol from Brazilian sugarcane, 4054 litres for ethanol from sugar beet, 3907 litres for biomass to liquid (BTL, so-called second-generation liquid biofuels), a lousy 1660 litres for bioethanol from corn.'[440] From another perspective, the land required to produce one million litres of gasoline equivalent (MLge) is 300 ha/MLge for sugarcane, 310 ha/MLge for palm, 350 ha/MLge for sugar beet, 460 ha/MLge for corn and 1540 ha/MLge for *jatropha*.[441] Not to mention that these figures are bound to improve as technologies and economies of scale advance.

However, the last two decades have shown that suitable weather and geographical conditions, by themselves, are not enough to guarantee that the potential for biofuel production will be explored. Experience demonstrates that domestic regulation and favourable trade policies are more important than geophysical comparative advantages. Thus, the exponential production growth

439 High Level Panel of Experts (HLPE), *Biofuels and food security: A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security*, (Rome: FAO, 2013), p. 14.

440 Maier, J., 'Bioenergy: Neither Golden Solution nor Prescription for Disaster', in Dodds, F., Higham, A. & Sherman, R. (eds.), *Climate Change and Energy Insecurity*, p. 39.

441 HLPE, *Op cit.*

of the last two decades notwithstanding, biofuels output still only corresponds to roughly 4% of the energy consumed in the transport sector. This share could possibly fall as lower oil prices might discourage the use of biofuels, according to the *OECD-FAO Agricultural Outlook 2016-2025*: 'Demand for agricultural commodities for biofuel production is projected to stagnate due to the lower energy prices and more conservative biofuel policies in several countries.'[442]

4.2. Reliability

If oil and other energy prices have been higher than ever during this century's first decade, it is in part because supply has been too unreliable, as well as insufficient, to meet demand, thus sending prices on an upward spiral. Several supply-side factors, ranging from economic to political ones, have converged to beget unreliable and inadequate oil supplies, most of them springing from one common view of the oil market preceding the 'demand shock' of the 2000s: no one foresaw the demand boom. The 1997 Asian financial crisis provoked a severe drop in oil demand, which, combined with subsequent OPEC overproduction, led to an oil price collapse in 1998. Very few expected Asian economies and their demand for oil to rebound from that crisis as fast as they did. In fact, as late as 2000, a common view was that the danger to the oil market in the first decade of the new millennium was not scarcity but an oil glut: 'contrary to much received wisdom, the energy problem looming in the early 21st century is neither skyrocketing prices nor shortages that herald the beginning of the end of oil age. Instead, the danger is precisely the opposite; long-term trends point to a prolonged oil surplus and low oil prices

442 Organization for Economic Cooperation and Development & Food and Agriculture Organization of the United Nations, *OECD-FAO Agricultural Outlook 2016-2025* (Paris: OECD Publishing, 2016), p. 17.

over the next two decades.'[443] With such mainstream forecasts, the vast majority of oil producers – both inside and outside of OPEC – had made long-term preparations for the opposite reality of what emerged in the years following. Thus Maugeri points out that the 'high cost that the world paid for oil until 2008 was the consequence of low prices, which for almost twenty years had discouraged the exploration and development of new deposits in the richest areas of crude oil on the planet.'[444]

OPEC countries, which are collectively responsible for almost two-fifths of the world's oil production and four-fifths of its proven reserves, were unable to meet the world's aggregate demand during the previous decade's commodities boom not because they lacked oil, but because they had been running behind on investment for new production for several years. The lesson that history had taught them is that having excess production capacity almost inevitably leads to oil price collapses with subsequent gluts. Having followed this logic since the 1986 price collapse, OPEC countries have 'aimed at mere reserve replacement, limiting exploration and the development of new oilfields. Moreover, U.S. economic sanctions against oil countries such as Iran, Iraq, and Libya during the 1980s and 1990s further frustrated their ability to adequately replace their production capacity, or to increase it.'[445] Even with record revenues following the demand boom starting in 2003, most OPEC countries did not increase their investments in their energy sectors significantly and continued to keep low commercial inventories.[446]

443 Jaffe & Manning, *Op cit.*, pp. 16-17.

444 Maugeri, *Beyond the Age of Oil*, p. 11.

445 Maugeri, *The Age of Oil*, pp. 188-189.

446 Kalicki, J.H. & Goldwyn, D.L., 'Introduction: The Need to Integrate Energy and Foreign Policy', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press / Woodrow Wilson Center Press, 2005), pp. 2-3.

Politically, the financial crisis that ensued in OPEC countries after the 1998 oil price collapse led to a rapprochement inside the organisation with a new, more unified dynamic. Moreover, a recent 'rise in democratization, freedom of the press and political debate, and a growing tide of anti-Americanism are bringing a greater concern for popular opinion inside OPEC countries,' which in some cases led to the election of radical leaders like Mahmoud Ahmadinejad in Iran and 'is restricting the options of regional leaders to accommodate Western interests',[447] while the 1998 price collapse itself was a crucial factor behind the election of Hugo Chávez in Venezuela. Coinciding changes at the highest levels of government in other OPEC members, such as Kuwait and an 'increasingly hawkish' Saudi Arabia, gave 'OPEC the solidarity needed to turn idle rhetoric into political action' and 'moved the agenda of the organization away from the moderate policies of the 1990s toward a more radical, confrontational developing-world approach that favors revenues over other issues, including market share.'[448] Indeed, OPEC's new interest is to maximise Western, particularly US, dependence on its oil[449] – a premise the former King of Saudi Arabia, Abdullah, had been increasingly willing to test even before 11 September 2001. As Edward Morse and Amy Jaffe point out: 'Critical to the newer OPEC consensus is the view that OPEC is in a position to stand up to the West and that it should feel justified in doing so, because the West stood by and did

447 Jaffe, A.M., 'Geopolitics of Energy', in Cleveland, C.J. (ed.), *Encyclopedia of Energy*, Vol.4, (San Diego, CA: Elsevier, 2004), p. 851.

448 Morse, E.L. & Jaffe, A.M., 'OPEC in Confrontation with Globalization', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press, 2005), pp. 75, 73.

449 Kalicki & Goldwyn, *Op cit.*, p. 4.

nothing to help ease the debilitating suffering and destabilizing consequences of the 1998 price collapse.'[450]

The resulting economic stagnation in OPEC happened against a backdrop of growing populations in those countries, which put pressure on government revenues not only to assure their macroeconomic stability but also to increase spending on social programmes to appease their embittered and increasingly poor populations, making higher oil prices a budgetary necessity for OPEC countries. 'Owing to increased government spending and domestic consumption, as well as inflation and the erosion of the dollar,' writes Sheila McNulty, 'the threshold oil price has risen for every Opec member with the exception of Qatar since 2000.' While no OPEC country can currently afford the price of the barrel to drop below $50, their required minimum price varies according to the member state, with Venezuela being the most dependent on high and rising prices: the Bolivarian government needed a minimum price of $94 and $97 per barrel to balance its budget in 2008 and 2009, respectively,[451] and its government expenditures have not gone down since then. As a result, the more radical members of OPEC – Algeria, Iran and Venezuela – have consistently argued against boosting OPEC production as a whole, and have often pushed for production cuts to raise the price even further, a position that can be considered 'more aggressive than defensive.'[452] This has also been the case even during booming times, when 'the rise in oil demand strengthens oil producers, which reap massive profits by intentionally underinvesting in oil-production capacity. ... As oil producing countries amass substantial financial reserves, they tend to allocate investment and expenditure disproportionately

450 Morse & Jaffe, *Op cit.*, p. 73.

451 McNulty, S., 'Domestic needs drive Opec price', *Financial Times*, 10 March 2008, p.10.

452 Morse & Jaffe, *Op cit.*, p. 73.

less to oil-production capacity and more toward areas that benefit the ruling elites.'[453]

With Saudi Arabia being one of the few members worried about their long-term interest of preventing a fall in aggregate demand because of what eventually came to be a high-oil-price-induced global recession, and the only one with sufficient spare capacity to lower prices through an increase in production, OPEC summits in 2007 and 2008 usually ended in deadlock and their oil production remained unchanged until the financial crisis despite prices mushrooming beyond the landmark figure of $100 after January 2008. But even if out-of-control prices have recently raised concerns in Saudi Arabia, the Kingdom is partly to blame for the price run-up. As the organisation's swing producer, Saudi Arabia has been the driving force behind successive OPEC reductions in oil output since 1999 in response to the 1998 price collapse, with the Kingdom solely responsible for over one million barrels a day (mbd) in production cuts in 1999 alone.[454]

More recently, during the previous decade's price hike – with oil prices hovering above $60 per barrel after March 2006, but eventually starting to retreat from $80 (the record price by then) in the fall of that year – Saudi Arabia began to decrease its production steadily from 9.56 mbd in March 2006 to 8.53 mbd in April 2007, in order to stop the decline in prices. This led to 'six consecutive quarters of inventory reduction and a 2007 drop in global inventories of about 930,000' barrels a day.[455] As a result, the price of crude oil tripled between January 2007 and July 2008, from $50 to $147 a barrel. Naturally, following this exorbitant price

453 El-Gamal, M.A. & Jaffe, A.M., 'Subpriming the Pump', *Foreign Policy*, September/October 2009, p. 100.

454 Gause, F.G., 'Saudi Arabia Over a Barrel', *Foreign Affairs*, Vol. 79, No. 3, May/June 2000, p.80.

455 Hoyos, C. & England, A., 'Riyadh set to test its power to move the market', *Financial Times*, 17 June 2008, p. 8.

rally, OPEC members (mostly Saudi Arabia) increased production. However, given the significant time lag to bring oil production on line, demand tumbled under pressure from record prices and the financial crisis that hit simultaneously, leading to new production cuts by OPEC, in order to maintain a suitably high oil price for its members' needs:

> *Just as the increased production found its way to inventories, in the summer of 2008, the global credit crisis broke. Global oil demand, especially in the United States and other OECD countries, fell off a cliff. Caught between rising production and falling consumption, prices fell from $147 per barrel in the summer to $34 by late December.*
>
> *OPEC reacted swiftly. Racing to catch up with falling demand, it announced production cuts totaling 4.2 million barrels a day. Although implementation was solid, it lagged behind events and could not prevent prices from temporarily taking a nosedive. It took until the first quarter of 2009 for OPEC's cuts to match the decline in demand. Still, from OPEC's point of view, its supply management was a success. Oil prices stabilized soon after the Christmas holidays of 2008, on the expectation that the cartel members would follow cartel discipline, and then started to rise…*[456]

As *The Economist* pointed out after oil prices picked up again, 'most oil-rich states, naturally enough, are happy to see the price rise. Many have become used to bumper revenues in recent

456 Rühl, C., 'Global Energy After the Crisis', *Foreign Affairs*, Vol. 89, No. 2, March/April 2010, p. 67.

years and have struggled to balance their budgets since the price slumped' in 2008.[457]

During the price rally in 2008, King Abdullah of Saudi Arabia said: 'I keep no secret from you that when there were some new finds, I told them: "No, leave it in the ground, with grace from God. Our children need it."'[458] That statement reflects a lesson learned from the 1986 oil glut and price collapse, and reinforced after their repetition in 1998, which has led OPEC countries to minimise their spare production capacity in order to avoid similar crises in the future. From 1986 onwards, 'the de facto guiding principle of several OPEC countries was to exploit only those fields that were already in production and to develop no new fields beyond those necessary to maintain steady production levels.'[459] OPEC's lack of investment in developing new oil production and infrastructure over the last two decades – instead spending their revenues on social programmes for their growing populations – has gradually eroded the organisation's ability to cushion the oil market from sudden disruptions in supply through excess production capacity, thus making it 'much easier for cartel members to agree to restrain output' than to decide to increase it.[460]

The resulting drastic reduction in spare production capacity exacerbated an already tight global oil market under pressure from growing demand: 'The tightness in supplies exposed the complacency or, rather, the failure of Saudi Arabia and other producers to adequately invest in exploration and the production of crude. … The disappearance of spare Saudi production capacity was the most critical element in driving up prices from 2003 to

457 *The Economist*, 'Bust and boom', 23 May 2009, p. 70.

458 Hoyos & England, *Op cit.*, p. 8.

459 Maugeri, L., 'Two Cheers for Expensive Oil', *Foreign Affairs*, Vol. 85, No. 2, March/April 2006, p. 151.

460 Jaffe, *Op cit.*, p. 851.

2008', according to Edward Morse.[461] Christoph Rühl provides a helpful explanation for why spare capacity is such an important factor influencing the price of oil:

> *Like any complex system, the global oil market needs a degree of redundancy to operate smoothly. In the short term, inventories can provide this safety cushion; in the longer term, it is provided by spare production capacity. Following strong demand growth in 2003 and 2004, spare capacity in the global oil market was hovering around record lows, at little more than two percent of global production (that is, less than two million barrels per day, almost all of it in Saudi Arabia). In other words, even after the OPEC cuts of 2006 and 2007, the global oil market was running at above 97 percent of capacity – an exceptionally high rate and one much too high to guarantee any meaningful stability in prices.*
>
> *When set against the backdrop of high global economic growth, this fundamental market tightness meant that as soon as the production cuts had translated into tighter inventories, prices accelerated their journey upward.*[462]

This formula is not new to the oil market and it has always been the case that low spare capacity drives up prices and makes them volatile. Thus, as Maugeri writes, 'minimal spare capacity made the price of oil dangerously vulnerable to almost any event: regional conflicts, hurricanes, pseudoscientific theories about the end of oil, market rumors, or financial speculation.'[463]

461 Morse, E.L., 'Low and Behold: Making the Most of Cheap Oil', *Foreign Affairs*, Vol. 88, No. 5, September/October 2009, pp. 38, 40.

462 Rühl, *Op cit.*, p. 67.

463 Maugeri, *Beyond the Age of Oil*, p. 14.

With spare production capacity at its lowest level since 1973 – a low point of little over a million barrels a day in 2008, compared to around 3 mbd throughout the 1990s and a peak of 12 mbd in 1985[464] – the global oil market was more vulnerable than ever to any disruption in supply during the previous decade's supply crunch. In David Howell's words: 'The big spare tap that used to be so easy to turn on to raise production significantly at short notice is shut off, or if it is turned on only a trickle comes out. Any further surge in oil demand, or any sudden cut in supplies anywhere in the world in the present supply system, is immediately reflected in a shortage warning and a price blip as traders mark up their stocks.'[465] According to Henry Groppe,[466] a Texas-based oil and gas consultant, every 100,000 barrels per day of production that is added to or subtracted from the market represents a $1 decrease or increase in the price of oil, respectively. During the past decade several disruptions in oil supply worldwide – whose production difficultly recover to their full pre-disruption levels – have contributed to the steady oil price rise over the same period. In Saudi Arabia's Prince Turki al-Faisal's words, 'the sad fact is that four oil-producing countries failed to live up to production expectations. In 1998, Iran, Iraq, Nigeria, and Venezuela were producing 12.7 million barrels per day. Everyone…expected them to be producing 18.4 million barrels per day in 2008. Instead, due to civil strife, failed investments, or in the case of Iraq, a U.S. invasion, they were producing only 10.2 million barrels per day.'[467]

464 Butler, N., 'The falling oil price is a lull in the storm', *Financial Times*, 20 August 2008. Maugeri, *The Age of Oil*, p. 227.

465 Howell & Nakhle, *Op cit.*, p. 144.

466 Interviewed in London, 6 February 2007.

467 Al-Faisal, T., 'Don't be Crude', *Foreign Policy*, September/October 2009, p. 103.

The first and most important disruption, which launched the steep upward shift in prices, was a December 2002 strike by the employees of Venezuela's national oil company, Petróleos de Venezuela S.A. (PDVSA), in a failed attempt to depose President Hugo Chávez in response to his drive to consolidate his control over his country's political system, PDVSA and its oil revenues.[468] The strike completely shut down Venezuela's production of almost 3 mbd, which accounted for more than 4% of the world's production at the time.[469] The loss of Venezuelan oil from the market was greater than the cessation of Iraqi production during the 2003 Iraq war that started a couple of months after the end of the PDVSA strike, whose output has never fully recovered and has since been producing around 500,000 barrels a day less than its pre-strike level.[470] The US-led invasion of Iraq in 2003, for its part, not only led to a shutdown of production during the war, but during its aftermath looting and sabotage impeded the country's oil sector from recovering to its pre-war 2 mbd export levels, with the country exporting merely 500,000 barrels a day by the end of 2003.[471] Similarly, acts of sabotage made on Nigerian oil infrastructure by militants of the Movement for the Emancipation of the Niger Delta (MEND) were responsible for disrupting a further million barrels a day in 2003,[472] and their periodic attacks have continued to this day. And supply disruptions need not be man-made, as evidenced by Hurricanes Katrina and Rita, which

468 Yergin, *Op cit.*, p. 73.

469 Kuenzler, L.T., 'Latin America', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press, 2005), pp. 383-384.

470 Yergin, *Op cit.*, p. 73.

471 Jaffe, *Op cit.*, p. 852.

472 Goldwyn, D.L & Billig, M., 'Building Strategic Reserves', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press, 2005), p. 515.

raged through the Gulf of Mexico in late August 2005, destroying numerous offshore oil platforms and refineries on the Louisiana coast, causing a disruption which sent the region's fuel prices to their highest ever.

But perhaps the most definitive new feature of supply disruptions this decade has been the emergence of Islamic terrorism as a threat to energy security following the attacks of 11 September 2001. Indeed, the renewed focus on energy security in International Relations is driven in large part by the threat of terrorism. In contrast to the period following the 1970s price spikes, when energy security concerns focused mainly on 'the reliability of the flow of oil...and the response to and management of any disruptions', energy security in the twenty-first century has widened its focus to include 'the entire infrastructure of energy supply that supports...the global economy – offshore platforms and pipelines and tankers as well as refineries, storage, generating facilities, transmission lines, and distribution systems. This vast network was not designed with terrorism in mind. But its operations now have to be managed with that continuing danger in view'.[473]

Al Qaeda has repeatedly menaced to launch terrorist attacks against energy infrastructure, or what Osama bin Laden called the 'hinges' of the world economy.[474] Bin Laden himself had also specifically urged Muslims to stop the flow of oil to the West by sabotaging Saudi Arabian oilfields and infrastructure.[475] Terrorists almost succeeded in doing so on 24 February 2006, when they targeted the world's largest refinery in Abqaiq, where nearly two-

473 Yergin, D., 'Energy Security and Markets', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press, 2005), pp. 60, 52.

474 Yergin, D., 'Ensuring Energy Security', p. 70.

475 Maugeri, *The Age of Oil*, p. 185.

thirds of Saudi oil production is processed before export.[476] Such threats have highlighted Saudi Arabia's importance to the oil market, given that around 80% of the world's spare capacity[477] and well over 10% of production rests in that country, 'in turn creating unique political pressures and augmenting a so-called terror premium onto world oil prices due to worries about the Kingdom's internal stability.'[478]

Since the Second Gulf Crisis in 2003, Maugeri assesses that '"black gold" prices incorporated a fear factor difficult to quantify. Saudi oil minister Ali Naimi estimated it at 10-15 dollars per barrel in November 2004, when oil prices were around 45 dollars per barrel.'[479] And given that bin Laden's aforementioned appeal for Muslims to sabotage Saudi infrastructure was posted on the internet in December 2004,[480] the 'terror premium' on oil the price may well have exceeded $25 per barrel since then.[481] Moreover, since Islamic terrorism is most active in the oil-rich Middle East, operating in those countries has become more dangerous and thus more expensive, propping up oil prices even further. As Howell and Nakhle explain, '[d]anger spells risk and risk has to be paid for when investors put up their money. More capital up front, more spending on security, higher wages to persuade staff to work in personal danger – it all adds up to a bigger spend to get

476 ArabNews.com, 'Attack on Abqaiq Oil Facility Foiled', 25 February 2006.

477 Kenderdine, M.A. & Moniz, E.J., 'Technology Development and Energy Security', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press, 2005), p. 430.

478 Morse & Jaffe, *Op cit.*, p. 81.

479 Maugeri, *The Age of Oil*, p. 194.

480 *Ibid.*, p. 185.

481 Interview with Henry Groppe, London, 6 February 2007.

a barrel of oil out of the ground and moved to market, wherever the location.'[482]

As mentioned above, however, the 2008 financial crisis led to a fall in demand which made oil prices plummet, followed by three separate rounds of production cuts by OPEC since September of that year. These production cuts have effectively brought OPEC members' spare capacity back to as much as 6 million barrels a day,[483] the highest it has been since the 1980s, most of it in Saudi Arabia. According to Morse, the re-emergence of Saudi Arabia's spare production capacity should be 'the most critical element' to maintain lower oil prices through the end of 2012 – 'or more, if global demand fails to rebound enough' – which the Kingdom is likely to use in order to 'keep prices moderate in order to spur global economic growth, maintain long-term demand for oil, and deter investments in alternative sources of energy.'[484] However, after oil prices dropped abruptly over the second half of 2008, reaching as low as $34 in December that year, they began a sooner-than-expected recovery, returning above the $100 mark in the years that followed. The uncertainty to the petroleum market brought on by the many upheavals of the Arab Spring seemed to point, yet again, to ever-increasing oil prices due to concerns related to the safety and reliability of supply.

In June 2014, oil prices began to drop continuously, however. This occurred not only due to the remarkable development of the American shale industry, but also because of the way the main players in the oil market responded to the increasing supply coming from the US. Saudi Arabia's reluctance to endorse production cuts among OPEC members, coupled with increased production in non-

482 Howell & Nakhle, *Op cit.*, p. 144.

483 *The Economist*, 'Bust and boom', p. 69.

484 Morse, *Op cit.*, p. 40.

OPEC producers such as Brazil and Canada, led to the market being oversupplied: global output reached 96.3 mbd in 2015, of which 94.5 mbd were consumed, sending around 1.8 million barrels of oil into storage tanks each day, which have been filling up fast.[485]

This oversupply led some of the more oil-rent-dependent OPEC producers – such as Venezuela, Algeria and Nigeria – to call for production costs in order to raise prices. The organization's swing producer, however, was more concerned with its battle against US shale producers for long-term market share than with short-term revenue, like some of the smaller members: 'Saudi Arabia, in particular, seems mindful of the experience of the 70s, when a big leap in the prices prompted huge investments in new fields, leading to a decade long-glut. Instead, The Saudis seem to be pushing a different tactic: let the price fall and put high-cost producers out of business. That should soon crimp supply, causing prices to rise.'[486]

The tactic did not work, however, as the implications of the shale revolution went much further than just the huge amount of fossil fuels being brought to market. It turned out that the shale industry is much more flexible than the conventional oil industry, and therefore shale oil acts as a kind of shock absorber in the global oil market, similar to Saudi Arabia's swing-producing capacity: 'fracking is unusually flexible. Setting up an oil rig in the gulf of Mexico can take years. But American frackers can sink wells and start pumping within weeks. So if the oil price spikes, they drill more wells. If it falls, they let old ones run down. In theory, fracking should make future oil shocks less severe, because American producers can respond quickly.'[487] Thus, while some of the least

485 *The Economist*, 'The oil conundrum', 23 January 2016.

486 *The Economist*, 'Sheiks v Shale', 4 December 2014.

487 *The Economist*, 'The petrostate of America', 15 February 2014.

efficient shale producers were indeed crowded out of the market through bankruptcy, the industry as a whole showed remarkable resilience due to its ability to react to the market on relatively short notice. With several OPEC members under financial stress, without seeing results of their previous tactic, the cartel reverted back to its old ways of market management.

After recurring deadlock in OPEC meetings in 2014 and 2015, the oil-exporters' cartel agreed to a concerted production cutback in September of 2016. Thus, the 'great experiment' that began in 2014 with OPEC's 'historic decision to pursue a market share strategy' came to an end, leading to the 'most comprehensive output reduction agreement' since 2008.[488] By reducing output by 1.2 mbd by January 2017, the cartel sought to cuts its production down to 32.5 mdb. While the agreement was lenient on some of its members – notably Libya, Nigeria and Iran, which had only recently returned to the market after decades of US sanctions were lifted in 2015 – it not only imposed quotas on Iraq for the first time since the 1990s, but it also included Russia, a non-OPEC member and major oil producer cutting an additional 600,000 barrels a day of production.[489] Thus, according to BP Group's chief economist, Spencer Dale,

> *The ability of OPEC to respond to temporary shocks in order to stabilise the market has not changed. OPEC still accounts for around 40% of crude oil production – close to its average over the past 40 years. Many of the key producers still have the ability to control directly their levels of production. And Saudi Arabia has the only*

488 International Energy Agency, *Oil 2017: Analysis and Forecasts to 2022*, Executive Summary (Paris: IEA Publications, March 2017).

489 Razzouk, N., Rascouet, A. & Motevalli, G., 'OPEC Confounds Skeptics, Agrees to First Oil Cuts in 8 Years', Bloomberg, 1 December 2016, available at: <https://www.bloomberg.com/news/articles/2016-11-30/opec-said-to-agree-oil-production-cuts-as-saudis-soften-on-iran>, accessed 3 August 2017.

> *significant margin of spare capacity. But OPEC has never had the ability to stabilise the market in response to structural shocks, at least not in a sustainable way.*[490]

And that is what the shale revolution has come to represent: a structural shock, that may well have changed the structure of the international oil market for good, adding a new security of supply cushion, much like swing production. Indeed, *The Economist* goes as far as saying that 'American shale firms have become the new swing producer of the global oil market.'[491] As such, it is uncertain whether OPEC's recent production cut agreement will ultimately succeed. What is certain, however, is that the 1.8 mbd of agreed production cuts 'are taking place just as production from the non-OPEC sector as a whole, led by the US, is actually recovering – after falling in 2016 for the first time since 2008 – and when stocks of crude oil and products are at record highs.'[492]

The resulting persistent low oil price scenario of these developments over the last few years has important geopolitical consequences. For Klare, 'the oil price meltdown initiated a transformation of the basic structure of international politics. In a world in which the possession of adequate supplies of energy plus mastery of the technologies needed to convert those supplies into meaningful economic productivity constitute the fundamental underpinnings of political and military power, any shift from one system of energy to another is bound to have profound geopolitical ramifications.'[493] These consequences could take many forms. Declining oil revenues can affect domestic politics in

490 Dale, *Op cit.*

491 *The Economist*, 'After OPEC', 14 May 2015.

492 International Energy Agency (2017), *Op cit.*, p. 3.

493 Klare, M.T., 'Oil Price Meltdown: The Collapse of the Old Energy Order', Paper presented at the 58th Annual Convention of the International Studies Association, 22 February 2017, Baltimore, MD.

countries dependent on oil-export rents in the Middle East and in other major oil-producing regions. These countries' drastically reduced government revenues are, in some cases, leading to reforms of energy subsidies, which have traditionally shielded their consumers from high international oil prices.[494] Without their historically generous subsidies, domestic energy demand could fall as consumers are forced to economise and become more energy efficient, further reducing overall demand for oil, not just internationally but domestically too.

Another possible consequence of the shale revolution and the resulting low oil price scenario could be a gradual American disengagement from the Middle East as US dependence on foreign oil decreases. The ramifications of a power vacuum left by US disengagement from the Middle East would be huge in and of themselves, and would be even more unfathomable when considering China's growing dependence on Middle Eastern and African fossil fuels.[495] Similarly, lower gas prices, which are often pegged to oil prices, could also affect relations between Europe and Russia.[496]

Ultimately, the question of whether petroleum will be a reliable energy resource in the future, and whether OPEC and other major oil-producing countries can be reliable suppliers, will depend on how these developments unfold. On the one hand, perhaps a lasting oil glut will completely remove threat of output reduction

494 Husain, A.M., Arezki, R., Breuer, P., Haksar, V., Helbling, T., Medas, P., & Sommer, M., *Global Implications of Lower Oil Prices*, IMF Staff Discussion Note, July 2015, available at: <https://www.imf.org/external/pubs/ft/sdn/2015/sdn1515.pdf>, accessed 3 August 2017. El-Katiri, L. & Fattouh, B., 'A Brief Political Economy of Energy Subsidies in the Middle East and North Africa', *International Development Policy | Revue Internationale de Politique de Développement*, Vol. 7, No. 0, 2017.

495 Blackwill & O'Sullivan, *Op cit.*

496 National Institute for Defence Studies, 'The Shale Revolution and the International Security Environment', in The National Institute for Defence Studies, *East Asian Strategic Review 2014* (Tokyo: The Japan Times, Ltd, March 2014).

and tight markets that characterised the threat to the reliability of supply during the previous decade. On the other hand, should the latest OPEC production cuts succeed in attaining their goals, we may well see the return of concerns that in the previous decade strongly encouraged switching to alternative fuels such as ethanol.

Indeed, one of the main selling points of biofuels is the reliability of their supply, compared to petroleum, since they can be home grown, rather than imported from potentially unreliable or unstable countries. However, biofuels are not immune from problems related to reliability of supply, either. While oil supply can indeed be disrupted by extreme weather conditions, such as Hurricane Katrina mentioned above, biofuels are particularly vulnerable to climatic variations, since they are, for the most part, produced from agricultural crops. For instance, most crops will yield poor harvests when hit by droughts, while others, like sugarcane, do not grow well under excessive rain. Such climatic variations, which are increasingly frequent and extreme due to global climate change, can have a profound effect on the reliability of supply of first-generation biofuels.

Of course, this vulnerability to unpredictable weather could, in theory, be offset by an international market catered by a large number of biofuel producers, where a shortfall in output by one producer could be compensated by imports from another. However, the fact that global biofuel production still remains concentrated in only three main players – Brazil, the United States and the European Union, all of which produce biofuels predominantly for their domestic markets – raises serious concerns over the security of supply and the possibilities of building a global market for biofuels. These three main players are collectively responsible for 84% of the world's total biofuel production and consumption; more specifically, 90% of the world's ethanol production and consumption, while the global biodiesel market is slightly more diversified, with 65% of production and 72% of consumption concentrated in these three players.[497] The comparatively meagre production in other parts of the world, especially in Africa – which, despite having the most land available for biofuel production, has been unable to fulfil that potential, contributing less than 0.5% of global ethanol production and even less for biodiesel[498] – represent another major obstacle toward establishing a reliable global biofuel supply chain.

4.3. Affordability

The fundamental difference between the oil price spikes of the 1970s and the most recent one during the previous decade is that, unlike the former, which were immediate and deliberately politically motivated, the latest price spike was slow in coming and predominantly driven by demand. In *The Economist*'s words: 'If the Arab oil-weapon felt like a hammer-blow, this time stagnant oil output and growing emerging-market demand have squeezed the oil market like a vice.'[499] Throughout the previous decade there has been an unexpected explosion in demand coming, for the most part, from emerging economies in Asia and elsewhere, which have not been outweighed by slower consumption in the West.[500] Almost 85% of the world's demand growth for crude oil between 2000 and 2007 – a rise in 9.4 million barrels a day – was in emerging markets in Asia (especially China and India), the Middle East and Latin America.[501]

497 U.S. Energy Information Administration, 'International Energy Statistics', available at: <https://www.eia.gov/beta/international/data/browser/index.cfm>, accessed 29 July 2017.

498 *Ibid.*

499 *The Economist*, 'Recoil', 31 May 2008, p. 15.

500 Webb, S., 'Oil consumers and producers to meet', *International Herald Tribune*, 21-22 June 2008, p. 17.

501 Yergin, 'It's still the one', *Foreign Policy*, September/October 2009, p. 92.

The specific impact of Asia, particularly China, began to be felt from 2003 onwards, when global oil consumption growth led by China doubled compared to average annual rates during the 1990s, creating a 'demand shock'[502] rather than a supply shock typical of the past. Global oil consumption grew by 1.8 mbd in 2003 and 3 mbd in 2004, compared to 600,000 to 700,000 barrels a day during the preceding years in the decade. China alone was responsible for almost a third of the 2004 global demand growth, with its own demand leaping by 17% that year, an increase of over 900,000 barrels a day, thereby becoming the world's second-largest oil consumer after the United States. Bearing in mind that China still consumes only 2 barrels of oil a year *per capita*, compared to 13 in Western Europe and 26 in the US, China's drive to become a developed country indicates that its demand for energy could continue to increase inexorably – unless it successfully overcomes the most energy-intensive phase of its development by transitioning toward a more services-oriented economy – giving credence to Napoleon Bonaparte's prophetic words two centuries ago: 'Let China sleep, for when she awakes she will shake the world.'[503]

Even though record oil prices have reduced demand in the developed world, in emerging countries it is still rising. In the United States – 'where low tax rates on fuel, consumer disregard for efficiency, and demographic growth have increased oil consumption' and 'more than half of the 17 million cars sold... each year between 2000 and 2004 were gas-guzzling sport-utility vehicles',[504] representing an important portion of the previous decade's increase in demand for oil and its price – demand fell under

502 Yergin, 'Ensuring Energy Security', p. 72.

503 Maugeri, *The Age of Oil*, pp. 193-194.

504 *Ibid.*, pp. 159-160.

pressure from exorbitant prices, but consumption in developing countries did not drop to the same extent. This is because fuel prices in emerging markets representing half of the world's population[505] – especially in Asia, Latin America and the Middle East – have been shielded by heavy subsidies and other kinds of market regulations by their governments, though some of these countries have reformed their energy subsidies in response to the oversupply and lower oil price of recent years.[506] These subsidies, in turn, have boosted demand distortedly since roughly a quarter of the world's petrol has been sold below the real market price, keeping oil prices at artificially high levels. This is particularly the case in Middle Eastern countries, which, according to Michael Levi, 'will gobble up nearly 50 percent more oil than India in 2030, despite being home to just a fifth as many people. The reason? Massive oil subsidies that put China and India to shame. ... That probably means less oil left for the rest of the world – and higher prices to boot.'[507] In theory, *The Economist* points out, 'rising crude-oil prices should reduce global demand. But if domestic prices are capped, then emerging economies will continue to guzzle oil, pushing world prices still higher.'[508] But even more importantly, in terms of how that has affected the price of oil, Carola Hoyos calls attention to the fact that 'the countries that subsidise their fuel account for [more than] 100 per cent of current demand growth, because demand in developed regions such as the US, Europe and

505 *The Economist*, 'Recoil', p. 15.

506 Sdravelich, C., Sab, R., Zouhar, Y. & Albertin, G., *Subsidy Reform in the Middle East and North Africa: Recent Progress and Challenges Ahead*, (Washington, D.C.: International Monetary Fund, 2014).See also Husain *et al.*, *Op cit.*, and El-Katiri & Fattouh, *Op cit.*

507 Levi, M.A., 'Gas Guzzlers', *Foreign Policy*, September/October 2009, p. 103.

508 *The Economist*, 'Crude measures', 31 May 2008, p. 91.

Japan is either flat or contracting, as drivers have been feeling the full effect of higher, unsubsidised fuel costs.'[509]

Being unprepared for such an unexpected rise in demand from emerging markets, the oil industry's risk-aversion in its investments since the 1990s has also contributed to higher prices in the previous decade. The oil industry faced low prices and sluggish growth in consumption throughout the 1990s, thus assuming that the industry had fully matured, and therefore did not embark on new investments in exploration because they would not be profitable under such conditions.[510] As stated in *The Economist*, 'ExxonMobil [the world's largest oil company] claims that it still assesses the profitability of potential investments using the same assumptions about the long-term oil price as it did at the beginning of the [last] decade, for fear that prices might tumble again.'[511] This is also true more generally for the industry as a whole, as explained by Howell and Nakhle:

> *Years of weak oil prices may have been a joy for the consumer and for the oil-drinking advanced world. But the inevitable price paid on the supply side has been weak investment in the entire supply chain, from exploration and development through to production and refinery processing, and through to every kind of equipment supply in the chain in between. These were years in which no one wanted to spend too much on new rigs, new platforms, new drilling equipment or new tankers.*[512]

509 Hoyos, C., 'China fuel price rise is no quick fix', *Financial Times*, 20 June 2008, p. 3.

510 Maugeri,'Two Cheers for Expensive Oil', pp. 150-151. Burrows, M. & Treverton, G.F., 'A Strategic View of Energy Futures', *Survival*, Vol. 49, No. 3, September 2007, p. 80.

511 *The Economist*, 'Double, double, oil and trouble', 31 May 2008, p. 90.

512 Howell & Nakhle, *Op cit.*, pp. 26-27.

The international oil companies' (IOCs) financial prudence by not launching high-capital investment ventures in new exploration has therefore 'partially eroded their capacity to replace reserves – i.e., to find new oil to replace their daily production.'[513]

The previous two decades of underinvestment have also inhibited the updating of refining capacity to match the changing quantities of different kinds of oil being produced. As Maugeri puts it, 'Refining has been the weakest link in the petroleum production chain for the last 20 years.'[514] Before the two oil crises in the 1970s, petroleum consumption was expected to grow at 5% a year at least until the end of the century, incentivising investments not only in exploration and production of crude oil but also in refining capacity and infrastructure. But the crises of 1973 and 1979 disrupted the flow of enormous amounts of oil while refining capacity grew significantly. Demand for oil rose by less than 2% a year from 1980 to 2000, a period characterised by excess refining capacity and no investments made in new refining infrastructure – e.g. no new refineries with significant downstream unit capacity have been built in the US since 1976 – or updating current refining capacity to refine heavier oils than the light variety predominant in the 1970s.[515] Today, the 'world can be swimming in oil,' says Maugeri, 'but the refineries may not be able to find the type of crude oil that they need.'[516] While lighter crudes generate more petrol and diesel, heavier crudes produce more fuel oil for heating. In mid-2008, *The Economist* wrote that 'diesel is in short supply and there is a glut of fuel oil. That makes processing heavy oil unprofitable

513 Maugeri, *The Age of Oil*, p. 192.

514 Maugeri, 'Two Cheers for Expensive Oil', p. 155.

515 Howell & Nakhle, *Op cit.*, pp. 26-27. See also, U.S. Energy Information Administration, 'When was the last refinery built in the United States?', available at: <https://www.eia.gov/tools/faqs/faq.php?id=29&t=6>, accessed 30 July 2017.

516 Maugeri, *Beyond the Age of Oil*, p. 21.

for some refineries, since the gains from diesel are outweighed by losses on fuel oil. As refineries turn instead to lighter grades, it pushes their prices yet higher.'[517] Skyrocketing demand for crude oil after 2000 has therefore put additional pressure on light oil prices, since there is limited refining capacity for heavier oils, for which there is lower demand and are thus cheaper than light oils. Meanwhile, fears that oil prices would drop again have also been a deterrent to investments in more efficient and advanced refining technologies, putting further pressure on prices due to the relative lack of alternatives to light oil.

But as record oil prices kept getting higher and showed no signs of abating, it became clear to oil companies that new exploration and production was not only profitable but necessary to meet spiralling demand, encouraging a rush to invest in new capacity. Ironically, this has increased exploration, production and development costs by 110%, according to Cambridge Energy Research Associates,[518] putting a higher price floor on the cost of the marginal barrel. This is because the engineers, oil platforms, seismic rigs and survey ships required to explore and produce new petroleum deposits were expensive at that point: 'The costs of finding oil [had], temporarily, doubled precisely because everybody want[ed] to give them work.'[519] All of these increased development costs, in turn reflected in higher oil prices.

Moreover, the unexplored reserves that can be accessed by IOCs, despite their generally superior technological and managerial expertise, tend to have higher development costs than the ones under national oil company (NOC) control. When oil prices are low, it is usually the case that 'oil-rich countries welcome

517 *The Economist*, 'Double, double, oil and trouble', p. 90.

518 *Ibid.*

519 *The Economist*, 'Recoil', p. 15.

the low-cost, high-tech and well-capitalised oil firms',[520] while high-price scenarios incite resource nationalism and politicisation, often leading to the expulsion of IOCs from such countries. The recent price spike was no exception, a period during which oil-producing countries' government intake (i.e., taxes and royalties) had escalated, raising the overall cost of delivering oil to the market,[521] with Venezuela and Russia as prominent examples of countries where the state politicised hydrocarbon resources by taking over their control. 'The danger from both an economic and energy security standpoint', warn Jan Kalicki and David Goldwyn, 'is that state control will have an adverse impact on investment and production, with collateral damage to both economic growth and global energy supplies – a danger reflected in oil price jumps in response to strikes against Petróleos de Venezuela'.[522] Although global oil reserves are vast, IOCs have access to a very small portion thereof, since the vast majority is under NOC control, including the fields that are cheapest and easiest to develop. The plain truth, says Maugeri, is that 'from the 1980s…the world's private oil companies…controlled no more than 8 percent of the world's oil reserves. At the same time, any new frontier of petroleum exploration and development was technically and environmentally challenging, and above all costly.'[523] Profitable production of such challenging reserves may therefore require high long-term prices due to their more prolonged and more expensive development.

520 *Ibid.*

521 Maugeri, *Beyond the Age of Oil*, p. 25.

522 Kalicki, J.H& Goldwyn, D.L., 'Conclusion: Energy, Security, and Foreign Policy', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press, 2005), p. 573.

523 Maugeri, *The Age of Oil*, p. 193. It should be noted that in this book, Maugeri uses 2005 figures. More recent figures (2010) are used elsewhere in this study: see previous chapter (3), section on '*Resource nationalism and government control of National Oil Companies*'.

But considering the limited amount of petroleum supplies given runaway demand, inevitably leading to higher prices, standard economic theory has it that demand should fall when oil prices become too high. For years, consumption and demand for oil was widely believed to be inelastic and uninfluenced by price rises, 'a result of the transportation sector's high level of reliance on gasoline and other petroleum-based motor fuels.'[524] But as the drive for energy efficiency and conservation, along with the investment spree in diversification toward alternative energy sources, of the 1980s following the 1970s price spikes have proven, oil consumption does, in fact, respond to higher prices, meaning that demand for oil is inelastic only in the short term. As Maugeri points out, 'price always affects demand, even if the connection takes time to manifest itself, as consumers try to maintain the lifestyle they are used to for as long as possible. Consumer inertia makes it difficult to establish quick and direct correlations between the demand for oil, the price of oil, and economic or demographic growth but these links do exist.'[525] In that sense, the sustained rise in oil prices of the previous decade was a key contributing factor to the recession that ensued after the 2008 financial crisis, which led global demand for oil to tumble and, with it, the price of the barrel. The record price of $147 in July 2008 collapsed by almost 80% by the end of the year due to decreased demand inflicted by the recession – the first time global oil consumption had fallen since 1993.[526]

This sharp fall in prices halted the investment rush that resulted from the preceding boom, making energy suppliers worldwide question whether future demand would be certain and

524 Pascual & Zambetakis, *Op cit.*, p. 15.

525 Maugeri, 'Two Cheers for Expensive Oil', p. 158.

526 Rühl, *Op cit.*, p. 66.

high enough to justify the substantial investments necessary to develop new conventional oil production capacity – a worry that has been particularly pronounced since increasingly accepted environmental concerns are casting doubt on the future of fossil fuels.[527] For example, in 2010 close to $90 billion worth of new projects were deferred in Canada's tar sands alone.[528] Moreover, while some IOCs said they would maintain their planned investments in new capacity, OPEC indicated that it would put 35 new projects on hold, which at that point in time represented half of the projected increase in global conventional oil production capacity expected by 2014.[529] The irony is that, by diminishing investments into new production capacity to meet demand growth after the world economy recovered from recession, the signal that was sent to the market was that these long-term structural factors were likely to lead to an eventual reversal to higher oil prices.

Indeed, oil prices made a remarkable recovery since their trough of $34 per barrel in December 2008, reaching levels consistently over $70 during the second half of 2009. With global demand for oil showing signs of recovery by the end of 2009, prices once again surpassed the $100 mark in 2010, reaching close to $120 a barrel upon civil war breaking out in Libya in February 2011, before stabilising again below $100 per barrel after Saudi Arabia used its spare capacity to make up for its fellow OPEC-member's supply disruption. For the next few years, international oil prices fluctuated between the $80-120 range.

As was the case with the prolonged high oil price scenario of the 1970s and early 1980s, however, windfall profits reinvested

527 Victor, D.G. & Yueh, L., 'The New Energy Order: Managing Insecurities in the Twenty-first Century', *Foreign Affairs*, Vol. 89, No. 1, January/February 2010, pp. 68-69.

528 *The Economist*, 'Vapour trails', 3 July 2010, p. 66.

529 Pascual & Zambetakis, *Op cit.*, pp. 16-17.

in bringing new technologies and production capacity to market eventually bore fruits. Supply-side factors such as new production developed outside OPEC, especially the shale revolution in the United States, played a more important role than demand-side factors in the 50% drop in oil prices from $115 per barrel in mid-June 2014 to early 2015, eventually reaching as low as $26 in January 2016.[530] The persistent low oil price scenario since mid-2014 is explained not only by the glut of additional oil brought to market but also by the supply-side flexibility of the shale industry: 'All this supports the claim that fracking has brought a new dynamic to global oil markets: the ability to flex output up and down more quickly than conventional oil drilling, rather like factories responding to changes in demand.'[531]

Another reason behind the impressive development of the US shale industry is the unique financial and regulatory environment that has allowed frackers to hedge their financial position, enabling them to increase output even at lower prices. Even in the face of OPEC's strategy to pump more oil to stifle its new competitors, leading to even lower prices, these financial mechanisms have provided a remarkable resilience to the US shale industry. It would seem, therefore, that OPEC 'has underestimated the ability of shale oil producers in America – its nemesis in the sheikhs-*versus*-shale battle – to use more efficient financial techniques to weather the storm of lower prices. A lifeline for American producers has been their ability to use capital markets to raise money and to use futures and options markets to hedge against perilously low prices by selling future production at prices set by these markets.'[532]

530 Husain *et al.*, *Op cit.*

531 *The Economist*, 'Rigonomics', 18 June 2016.

532 *The Economist*, 'Know thy enemy', 18 May 2017.

In addition to its recent oversupply, there has also been a structural change to the demand-side of the oil market, as developed countries' demand has stagnated while developing economies have been growing slower than during the previous decade. Thus, the persistent lower oil price scenario of the last few years has raised concerns about 'peak demand', in stark contrast to the discussions on peak oil that were so prevalent during the previous decade, characterized by triple-digit oil prices: 'Industry analysts are beginning to invoke "peak demand", as opposed to "peak supply", as a factor that may determine the trajectory of prices in the long run.'[533] Klare goes as far as predicting that 'the global demand for oil is likely to reach a peak at some point in the not-too-distant future (it has already peaked in Europe and Japan) and commence a downward trajectory. Indeed, many analysts believe that the price depression of 2014-2016 represents, in some sense, a foreshadowing of this eventual reality.'[534]

While peak oil is a 'below the ground' concept related to the geological availability of recoverable oil reserves, peak demand is an 'above the ground' concept related to policy changes aimed at reducing fossil fuel consumption in both developed and developing countries, which could dramatically alter the energy intensity of developing countries' future economic growth. In China, for instance, twenty years of strong demand growth, fuelled by rapid industrialisation and infrastructure spending, is now giving way to a slower pace of growth as the Chinese economy transitions toward a more services and consumer-led structure.[535] Hence, the energy-intensive growth of emerging economies that prompted the commodity super-cycle of the previous decade and spurred

533 *The Economist*, 'Abnormally normal', 14 November 2015.

534 Klare (2017), *Op cit.*

535 International Energy Agency (2017), *Op cit.*

oil prices to the $140 range is unlikely to reappear, as demand-side measures – such as improving energy efficiency standards and introducing renewable energy mandates – are increasingly decoupling economic growth from energy consumption, even in the developing world. As Klare puts it, 'slower worldwide economic growth is bad enough for the energy industry, as oil demand generally follows the ups and downs of global economic activity. But the tepid growth in oil demand has also been tied to something far more threatening: an accelerating trend toward increased fuel efficiency in the transportation sector.'[536]

All of these recent developments in both the supply and demand side are not temporary, for Klare, but point to long-term structural changes symptomatic of a new era in the international oil market, characterised by a permanent (if not expanding) imbalance between supply and demand:

> *The fact that oil prices remained as low as they have for so long and are not expected to return to pre-rout levels for the foreseeable future tells us that the price decline is not just the result of temporary conditions but rather reflects a fundamental shift in the underlying structure of the entire petroleum enterprise. Prior to 2014, that enterprise was governed by a demand driven system in which the prospect of an ever-increasing global consumption prompted oil producers to invest more and more production capacity, resulting in ever expanding supply. Since then, however, we have entered in era which steady growth in demand can no longer be taken for granted; consumption may rise in some years, but will*

536 Klare (2017), *Op cit.*

> *never grow fast enough to overtake the oil industry´s theoretical capacity to supply the market.*[537]

Whether or not Klare's prediction of perpetually low oil prices materialises, remains to be seen. But the preceding scenario of exorbitant oil prices – whose long-term structural factors before the shale revolution seemed to put the future affordability of petroleum in question – made the drive toward alternative energy sources increasingly imperative, particularly for those able to substitute the transportation sector's inelastic dependence on oil, such as ethanol and other biofuels. Indeed, the supply and demand for biofuels are directly affected by oil price fluctuations. Therefore, the exceedingly high oil prices of the previous decade have been the main driving force behind the boom in all types of biofuels, even incentivising subsidies in uncompetitive advanced technologies, given the expectation of continuously rising long-term oil prices.

While some biofuels would never have taken off without astronomical oil prices or subsidies, others have been competitive with petroleum at less intimidating prices, not to mention that nearly all biofuels' production costs have tended to decrease over time due to innovation and economies of scale. To illustrate the enormous variability in production costs of different biofuels' feedstocks compared to gasoline, sugarcane can cost between $5 and $9 per Gigajoule (GJ), corn ranges from $9 to $20 per GJ and sugar beet is more expensive at $18 to $25 per GJ, compared to gasoline, whose cost can vary between $9 and $21 per GJ, according to FAO.[538] With the notable exception of Brazil's 'competitive bioethanol', Maugeri wrote that 'the most efficient production methods for first-generation biofuels can stand on their own

537 *Ibid.*

538 HLPE, *Op cit.*, p. 49.

(without government subsidy) only when the cost of petroleum goes over $70 per barrel. In the case of biodiesel produced from rapeseed oil in Europe, an MIT study estimated the breakeven oil price to run as high as $160 per barrel.'[539] Meanwhile, Johanna Mendelson compared the world's two main ethanol producers in a July 2008 testimony in the US House of Representatives, just after the price of oil reached its zenith: 'As long as oil prices remain over $40 dollars a barrel Brazil's ethanol will remain competitive. This is comparatively lower than bioethanol made from corn in the United States which costs $65 per barrel.'[540] Over the following years, however, economies of scale and enormous investments drastically improved the economic productivity of US corn ethanol, making it cost-competitive even with Brazilian sugarcane ethanol, despite the former's lower energy return on investment (EROI) and higher carbon emissions.[541]

While the high oil prices of the previous decade made biofuels an attractive option to counter the prohibitive affordability of petroleum, the low oil price scenario of the last few years has diminished the competitiveness of biofuels *vis-à-vis* fossil fuels, despite their productivity gains and decreasing prices. However, the compulsory demand for biofuels generated by blend mandates into gasoline and diesel has somewhat shielded biofuels from lower oil prices: 'the declining attractiveness of biofuels production in an environment of low oil prices will likely be mitigated by current policies. Because most…biofuels [are] policy mandated, the increase in oil consumption triggered by low oil prices may, in fact,

539 Maugeri, *Beyond the Age of Oil*, p. 131.

540 Mendelson, J., 'Testimony of Dr. Johanna Mendelson Forman, Senior Associate, Americas Program, Center of Strategic International Studies, House Foreign Affairs Subcommittee on the Western Hemisphere – "Energy in the Americas"', in Carlson, J.E. (ed.), *Latin America: Energy and Politics*, (New York: Nova Science Publishers, 2010), p. 85.

541 Heal, G. & Hallmeyer, K., *How Lower Oil Prices Impact the Competitiveness of Oil with Renewable Fuels*, (New York: Columbia SIPA Center on Global Energy Policy, October 2015).

increase…the production of biofuels.'[542] Therefore, the recent and enduring collapse of oil prices has had a two-edged effect on the US ethanol market, as illustrated by the *Financial Times*, though the consequences are also valid for other biofuels' markets elsewhere: 'On one hand, cheap petrol has enticed drivers back on the roads. About 10 per cent of each gallon of US gasoline is blended with ethanol, so high gasoline demand also lifts ethanol sales. … But wholesale gasoline is now cheaper than ethanol, curtailing consumption beyond what is needed to meet the mandate or follow air-quality regulations.'[543]

4.4. Sustainability

As humanity enters the twenty-first century, a new era of energy security is emerging, where the need to curb fossil fuel consumption is paramount. What characterises this new energy era, above all, is the environmental threat posed by these polluting energy sources, manifested in the form of global warming and climate change. According to some, climate change is 'arguably the greatest challenge facing the human race.'[544] Whether or not such statements are scientifically unequivocal is immaterial; what matters is that it is by now increasingly accepted as such, not only by the scientific community – where a steadily growing consensus on the matter has emerged over the past twenty years, while climate-change sceptics now find themselves in a minority[545] – but also by politicians and decision makers worldwide, who 'are now

542 Baffes, J., Kose, M.A., Ohnsorge, F. & Stocker, M., *The Great Plunge in Oil Prices: Causes, Consequences, and Policy Responses*, (Washington, D.C.: World Bank Group, March 2015).

543 Meyer, G., 'US food *versus* fuel debate losing its rage', *Financial Times*, 5 September 2016.

544 Pascual, C. & Elkind, J., 'Introduction', in Pascual, C. & Elkind, J. (eds.), *Energy Security: Economics, Politics, Strategies, and Implications*, (Washington, D.C.: Brookings Institution Press, 2010), p. 5.

545 Elkind, *Op cit.*, p. 121. Giddens, *Op cit.*, p. 22.

well aware of the hazards posed by climate change and the need to respond to them.'[546]

The UN Intergovernmental Panel on Climate Change (IPCC) states that the rise in our planet's average temperature is caused by increases in greenhouse gas (GHG) concentrations in the atmosphere – instigated mostly by the burning of fossil fuels since the Industrial Revolution – and asserts with '*very high confidence* [emphasis in original] that the global averaged net effect of human activities since 1750 has been one of warming.'[547] The precise implications of climate change are moot and still the subject of ongoing research, but 'there is a consensus that greenhouse-gas-induced climate change will entail not only higher average and extreme temperatures but also an increasing disruption of weather patterns, increases in both floods and droughts, rising sea level, and more, with adverse effects on agriculture, forestry, fisheries, patterns of disease, the livability of cities in summer, and many other aspects of human well-being.'[548] This, in turn, aggravates energy security by creating a vicious cycle in which the violent weather conditions brought on by climate change, 'generating out-of-season typhoons and exceptionally powerful hurricanes, such as Katrina and Rita, in the oil-producing Gulf of Mexico, are helping to intensify the short-term [energy security] crisis by tipping platforms over and rupturing pipelines.'[549] Climate change is therefore referred to as a 'threat multiplier': 'a destructive force that will exacerbate existing social, environmental, economic,

546 Giddens, *Op cit.*, p. 4.

547 Cited in Bordoff, J., Deshpande, M. & Noel, P., 'Understanding the Interaction between Energy Security and Climate Change Policy', in Pascual, C. & Elkind, J. (eds.), *Energy Security: Economics, Politics, Strategies, and Implications*, (Washington, D.C.: Brookings Institution Press, 2010), p. 211.

548 Holdren, J.P., 'Commentary on Part IV', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press, 2005), p. 558.

549 Howell & Nakhle, *Op cit.*, p. 35.

and humanitarian stresses. ... Such impacts may spark conflict in weak states, lead to the displacement of millions of people, create environmental refugees, and intensify competition over increasingly scarce resources.'[550]

Unlike most environmental problems, climate change is a long-term global challenge with profound implications for energy security; it is primarily a problem caused by human use of energy resources, and it 'has a greater impact on the environment than any other human activity.'[551] According to the IPCC, around 76% of global GHG emissions in 2010 derived from energy use, with fossil fuel combustion constituting the largest part total emissions, and the remaining 24% of emissions coming from agriculture, forestry and other land use. Electricity and heat production are the largest GHG-emitting sector with 25% of all emissions; fossil fuels burned for onsite energy use in industrial facilities emit 21% of GHGs; the transportation sector, whose energy comes almost entirely (95%) from petroleum-based fuels, emits 14% of global GHGs; while other energy use and buildings emit 10% and 6%, respectively.[552] Because of the causal link between fossil fuel use and global warming, it is impossible to mitigate climate change without transforming the way energy is produced and consumed worldwide. Therefore, responding to climate change, writes Anthony Giddens, 'has to be closely integrated with questions of energy security.'[553]

550 Pascual & Elkind, *Op cit.*, p. 5.

551 Baumert, K.A., 'The Challenge of Climate Protection: Balancing Energy and Environment', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press, 2005), p. 485.

552 Intergovernmental Panel on Climate Change, *Climate Change 2014: Mitigation of Climate Change – Working Group III Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, (New York: Cambridge University Press, 2014).

553 Giddens, *Op cit.*, p. 10.

But how does the world at once meet both the challenge of climate change and the challenge of economic growth by ensuring energy security, asks Daniel Yergin. The answer, for him, lies in 'an emphasis on technology to a degree never before seen.'[554] The technological developments required to meet these challenges are multiple, and should be focused not only on developing renewable energy resources, but also in making better use of existing ones, as well as investing in home-grown energy in order to avoid dependence on volatile and often uncertain energy imports. Investing vast amounts into developing these varied technologies, particularly in renewable energies, is essential to counter climate change, but as Giddens recalls, 'those resources won't develop in some sort of automatic way, nor will they be stimulated by the operation of market forces alone. The state has to subsidize them, in order for them to be competitive against fossil fuels and to protect investment in the face of fluctuations to which the prices of oil and natural gas are subject.'[555] Otherwise, these investments need to be buttressed by a prolonged period of steep market prices for fossil fuels, in order to succeed without government subsidies.[556] In that sense, the exorbitant rise in oil prices of the previous decade was in part a blessing for the cause of climate change because it encouraged a reduction in oil consumption and spurred investments into renewable energies and other technologies that make better or more efficient use of existing resources.

But even though such technological advances will in the future allow the refining and use of heavy and unconventional oils, these forms of petroleum are less attractive environmentally

554 Yergin, 'It's still the one', p. 94.

555 Giddens, *Op cit.*, p. 8.

556 Nivola, P.S with Carter, E.E.R., 'Making Sense of "Energy Independence"', in Pascual & Elkind (eds.), *Energy Security: Economics, Politics, Strategies, and Implications*, (Washington, D.C.: Brookings Institution Press, 2010), p. 114.

because they are much more polluting and emit more GHGs than lighter oils. Meanwhile, switching from conventional combustion engines to hybrid battery-powered vehicles offers little relief to the environment, 'since the electricity for those is commonly produced by burning fossil fuels at another location. Although local air quality is improved, total carbon dioxide emissions are not curtailed; they are merely exported.'[557] Moreover, the different kinds of alternative, cleaner energy sources are not without their limitations. Nuclear energy, with which several countries have extensive experience, is attractive both for energy security and environmental reasons: it does not require vast quantities of uranium (compared to the volumes of oil, natural gas and other fuels to generate the same amount of energy) and its GHG emissions are minimal. But to play this role successfully, as Amy Jaffe reminds us, 'nuclear power will have to overcome serious economic and political challenges, including concerns over nuclear waste, safety, and non-proliferation.'[558] And even 'non-threatening' renewable energy sources – such as biofuels, geothermal, wind and solar power – face the financial and logistic obstacle of high fuel-switching costs given their still limited market penetration.

All of these examples point to an underlying incongruity between the goals of ensuring energy security on the one hand, and mitigating climate change on the other: 'Because climate change and energy security concern different fuels to different degrees, efforts to make progress on one may come at the expense of the other.'[559] The most affordable and widely available energy resources tend to be more polluting, while those that are least offensive to the environment tend to be more expensive. In Maugeri's words:

557 Lugar, R. & Woolsey, R.J., 'The New Petroleum', *Foreign Affairs*, Vol. 78, No. 1, January/February 1999, p. 94.

558 Jaffe, *Op cit.*, p. 845.

559 Bordoff, Deshpande & Noel, *Op cit.*, p. 222.

> *The uncomfortable truth that we must all accept is that cheap energy is not good for the health of our planet, and it is not compatible with the fight against climate change. People's quest for cheap energy has made fossil fuels the over-dominant actors of the contemporary world, it has made energy efficiency a subject of minor relevance, and it has depressed investment in new technologies to develop affordable primary sources of energy other than fossil fuels.*[560]

The high cost of ensuring both energy and environmental security simultaneously suggests that these two goals are mutually exclusive in the short term, with energy security apparently ranking higher as a short-term priority. 'Too much focus on policies intended to make energy cheaper', write David Pilling and Chris Giles for *The Financial Times*, 'threatens to conflict with efforts to reduce consumption and greenhouse gas emissions.'[561] The problem is not that energy and environmental security are mutually exclusive overall, but that achieving each goal individually is, in and of itself, very expensive, and even more so if both are to be achieved simultaneously. 'Establishing a more reliable and secure energy supply system and reducing carbon emissions lie in part on the same road, which is a happy coincidence,' according to Howell and Nakhle. 'But long before we get any results from cutting carbon emissions the world will probably be shaken by problems of security and supply disruption that could blow the highest hopes off course.'[562] Thus, in the long-term, the way to rectify both problems is essentially the same: namely through

560 Maugeri, *Beyond the Age of Oil*, p. xxix. Original emphasis.

561 Pilling, D. & Giles, C., 'G8 sees more squalls on horizon', *Financial Times*, 12 June 2008, p.3.

562 Howell & Nakhle, *Op cit.*, p. 36.

energy conservation and diversification to more environmentally friendly energy sources.

However, both of these problems – energy security and climate change – are exacerbated by ongoing increases in energy demand of dramatic proportions, which could lead to equivalent increases in greenhouse gas emissions, making possible solutions to these problems particularly elusive. While most of the GHGs that are currently contributing to global warming have been created by the energy needs of industrial countries over the past couple of centuries, it is now the rapidly growing developing countries' steep rise in fossil fuel consumption that is the main contributor to GHG emissions. To illustrate this, Rühl calls attention to the fact that 'the entire *net* increase in global oil consumption since 1999 has come from outside the OECD countries', leading to a noticeable acceleration in GHG emissions 'after the turn of the century, driven by growing demand in the developing world.'[563] Because of their rapid and highly energy-intensive growth over the past decade, developing countries 'already account for just over half of total carbon emissions… The lifetime emissions from these countries' planned power stations would match the world's entire industrial pollution since 1850.'[564] A further aggravating concern is that despite technological improvements to engine efficiency and environmental friendliness, 'vehicle miles traveled continually increases as more cars are purchased,'[565] a problem that is becoming particularly acute as automobile sales grow in developing countries, which are nowhere near as 'motorised' as Western countries. As stated in *The Economist*:

563 Rühl, *Op cit.*, p. 65. Emphasis added.

564 *The Economist*, 'A bad climate for development', 19 September 2009, p. 76.

565 Kohl, W.L, 'National Security and Energy', in Cleveland, C.J. (ed.), *Encyclopedia of Energy*, Vol.4, (San Diego, CA: Elsevier, 2004), p. 201.

> *The number of cars in the rich world will grow only slowly in the years ahead, but car ownership elsewhere is about to go into overdrive. Over the next 40 years the global fleet of passenger cars is expected to quadruple to nearly 3 billion. China, which will soon overtake America as the world's biggest car market, could have as many cars on its roads in 2050 as are on the planet today; India's fleet may have multiplied 50-fold. Forecasts of this kind led Carlos Ghosn, boss of the Renault-Nissan alliance, to declare [in March 2008] that if the industry did not get on with producing cars with very low or zero emissions, the world would "explode".*
>
> *Cars already contribute around 10% of the man-made greenhouse gases that are responsible for climate change.*[566]

If these trends continue – with 'developing countries responsible for almost all growth in energy demand, whose energy consumption is expected to exceed that of the industrial world in about two decades and to climb even more rapidly thereafter'[567] – developing countries' GHG emissions will soon dwarf those of developed countries.

As the worldwide debate on climate change unfolds, a political cleavage is being created between rich and developing countries: 'The currently wealthy want measures that will put [GHG emission] limits on everyone, at least eventually, while the rapidly developing argue that they should not be penalised for coming late to the party. They should be allowed a phase of energy-intensive growth like the one the rich countries went through.'[568] To deny

566 *The Economist*, 'Charge!', 5 September 2009, p. 16.

567 Kenderdine & Moniz, *Op cit.*, p. 443.

568 Burrows & Treverton, *Op cit.*, p. 85.

developing countries the right to grow economically, and thereby also increase their GHG emissions significantly, their argument goes, is to resign them to eternal poverty. For without energy, writes Maugeri, 'there is no economic development and no freedom from poverty. This need for energy tends to put environmental and climate concerns on the back burner. For the vast majority of [poor or developing] countries, access to low-cost energy will remain a top priority.'[569] Though it seems fair that developing countries should not be denied a chance to catch up with rich ones, the problem with this approach is that these countries normally seek 'the easiest and most direct way to obtain the necessary energy resources for development,'[570] which is found in the increased use of fossil fuels. As Paul Roberts puts it,

> *In today's economy, clean, sustainable energy is a luxury reserved for the richest nations. In countries staggering under high population growth, the drive for energy security rarely means "leapfrogging" to a sophisticated, clean technology. Instead, these nations tend to take the easiest, fastest, and cheapest path possible – which usually means technologies that are obsolete, low-quality, and highly polluting.*[571]

As the prices of oil and natural gas increased, poorer consumers desperately turned to the worst possible way to solve their energy security in environmental terms, namely coal, which is the most carbon-intensive fossil fuel and makes up over a quarter

569 Maugeri, *Beyond the Age of Oil*, pp. xxiv-xxv.

570 Leal, J. & Samaniego, J., 'Environmental Issues in Latin America and the Caribbean', in Weintraub, S. (ed.), *Energy Cooperation and Confrontation in the Western Hemisphere*, (Washington, D.C.: Center for Strategic and International Studies, 2007), p. 436.

571 Roberts, P., *The End of Oil: The decline of the petroleum economy and the rise of a new energy order*, (London: Bloomsbury Publishing, 2004), p. 246.

of the world's energy matrix,[572] thus putting energy security considerations above environmental concerns for many states, including even some countries in Europe where utilities calculate that burning coal is cheaper than burning cleaner natural gas.[573]

Coal reserves worldwide are much more abundant and more widely dispersed than other fossil fuels and their production costs are also much lower. 'Faced with the insecure nature of imported oil supply and potentially rising prices,' writes Amy Jaffe, 'even countries seeking environmental improvement may find themselves unable to move away from heavy reliance on coal in power and industrial sectors.'[574] In order not to aggravate the environmental threat brought on by the expanding use of coal, new technologies for carbon dioxide capture and sequestration are necessary. Unlike other technological advances in energy use, which are motivated mostly by energy security and financial concerns, carbon sequestration 'is motivated uniquely by global climate change concerns, because it is always less expensive to vent carbon dioxide directly to the atmosphere.'[575] Nevertheless, if strong GHG-emission reduction policies are implemented worldwide, coal consumption is more likely to fall than other energy sources not only because coal is the most polluting, and therefore more expensively charged under potential carbon taxes or cap-and-trade systems, but also because 'there are more low-cost alternatives to coal used in the electricity sector than there are to oil used in the transportation and manufacturing sectors.'[576]

572 Kenderdine & Moniz, *Op cit.*, p. 447.

573 Bordoff, Deshpande & Noel, *Op cit.*, p. 222.

574 Jaffe, *Op cit.*, p. 844.

575 Kenderdine & Moniz, *Op cit.*, p. 444.

576 Bordoff, Deshpande & Noel, *Op cit.*, p. 221.

Meanwhile, in the highest GHG-emitting sector – power generation for heat and electricity – the fuel that offers the best alternative to carbon-intensive energy sources like oil and coal, is actually another fossil fuel, natural gas, since it produces more energy per unit burned while emitting far fewer GHGs than either of the former.[577]

> *Because of its relative abundance, versatility, and environmental benefits compared with other fossil fuels, natural gas is widely viewed as* the *"bridge fuel" to the next energy future (whatever that may be). Whether the global demand for natural gas will grow during the next two decades and whether natural gas will graduate to the full status of a global energy source like oil will hinge on how these four challenges – supply development, frameworks for delivery and use, the expansion of international trade through LNG or other options, and balancing supply availability and use – are met.*[578]

But in order for natural gas to have a significant positive impact on the environment, its use must become much more widespread, which in turn requires an 'aggressive program to develop stranded and unconventional gas reserves'[579] in order to create a global market for it, as currently exists for oil – a proposition which also holds true for ethanol and other biofuels. Moreover, if coal use is substituted by natural gas worldwide, GHG emissions would be cut by approximately 50%,[580] which, as promising as it sounds, may

577 Kenderdine & Moniz, *Op cit.*, p. 444.

578 Juckett, D.A. & Foss, M.M., 'Can a "Global" Natural Gas Market Be Achieved?', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, (Baltimore, MD: Johns Hopkins University Press, 2005), p. 536.

579 Kenderdine & Moniz, *Op cit.*, p. 444.

580 Baumert, *Op cit.*, p. 489.

not turn into reality given the vastly cheaper cost of coal compared to natural gas. But even if natural gas is plentiful and cheap enough to replace carbon-rich coal, asserts *The Economist*, 'it will also be in a position to replace carbon-free nuclear and renewables, and in doing so more carbon dioxide will be emitted than would otherwise be the case.' In that sense, prioritising natural gas over other energy sources would be a 'mixed blessing' for climate change mitigation, since 'the overall increase in energy use and the reduced use of nuclear and renewables in a gas-happy world would almost perfectly balance out the gains made by burning gas instead of coal', according to a hypothetical scenario projected by International Energy Agency for the year 2035.[581] This prospect is particularly alarming when considering that by the turn of the millennium it was estimated that the world had only 50 to 60 years' worth of natural gas left to produce, but is now estimated to have over two centuries' worth of production because of the shale gas revolution.[582]

As for the transportation sector, a partial shift to biofuels made from biomass 'stands out as an excellent way to introduce an environmentally friendly energy technology'. A fundamental advantage of biofuels is that they are not mutually exclusive with current and more advanced, forthcoming engine technologies, like cars powered by petroleum-derived fuels, hybrid engines or fuel cells, respectively. Moreover, the environmental advantages of their *consumption* – as opposed to their *production* – might be even greater than their practicality. There is a virtual consensus among scientists, write Richard Lugar and James Woolsey, that 'when considered as part of a complete cycle of growth, fermentation, and combustion, the use of cellulosic ethanol as fuel, once

581 *The Economist*, 'Cleaner, not cooler', 6 August 2011, p. 12.

582 *The Economist*, 'An unconventional bonanza', 14 July 2012.

optimized, will contribute essentially no net carbon dioxide to the atmosphere.'[583] Brazil, for instance, avoided emitting over 600 million tonnes of carbon dioxide between 1975 and 2009 – roughly equivalent to a tenth of the country's emissions over that period[584] – as a result of introducing biofuels on a large scale through its National Alcohol Program. Much like the land required to produce different biofuels and their varying costs, however, the GHG-emission reduction profile of different feedstocks, as well as where and how they are grown, also vary immensely: compared to gasoline, ethanol made from sugarcane can reduce emissions by 65-105%, while corn ethanol reduces emissions by 20-55%; biodiesel made from rapeseed reduces 20-80% of emissions, whereas palm oil reduces 30-75% of emissions, compared to diesel oil.[585]

However, in terms of biofuel *production*, as environmentalists often point out, the cultivation of *some* (but not all) biofuel-yielding crops can lead to rainforest destruction in developing countries, exacerbating environmental problems, and displacement of other food crops in developed countries, raising food prices. Thus, another source of criticism against first-generation biofuels is that 'production of feedstocks in a new geographical area may cause undesirable effects from the so-called *indirect land use change* [ILUC]. For example, the energy demand for palm oil could be supplied from an existing plantation that used to supply the food market. The shortage created in the food market will over time result in the creation of a new palm oil plantation elsewhere.'[586] As the former

583 Lugar & Woolsey, *Op cit.*, pp. 99, 94.

584 International Energy Agency, Office of Global Energy Dialogue, 'The Energy Situation in Brazil: An overview', paper prepared for the Standing Group on the Global Energy Dialogue, in June 2006. Mendes Thame, A.C., 'Apresentação', in Maffeis Neto, J., *A História do Carro Flex no Brasil*, (Embu, SP: IQUAL Editora, 2009), p. 7.

585 HLPE, *Op cit.*, p. 50.

586 Zarrilli, S., 'Development of the Emerging Biofuels Market', in Goldthau, A. & Witte, J.M., (eds.), *Global Energy Governance: The New Rules of the Game*, (Washington, D.C.: Brookings Institute Press, 2010), p. 86.

UK Secretary of State for Energy, David Howell, questions: 'If that is the price of independence from fossil fuels, is it worth it?'[587] That is a legitimate concern, but one that raises further questions given the complexity of measuring ILUC empirically. This issue is still widely debated in the scientific literature and the prevailing view – which is fiercely contested by some players in the industry – is that, despite the significant uncertainties related to the quantification and methodological approaches used to measure them, ILUC and land-use patterns can have a significant impact on the GHG reductions attributed to biofuels.[588] These questions over the relation of biofuel use and ILUC, in conjunction with the food *versus* fuel debate, have cast a shadow of mistrust over biofuels, especially in Europe. Although the attraction of biofuels in terms of reducing carbon emissions and oil-import bills is less prominent now than in during the previous decade, they remain the best route to diversify transport fuels, since other technologies able to decarbonise the transportation sector – such as second-generation biofuels or electrification – are still a long way from being widespread.

Although the drive for energy diversification toward conservation and 'greener' alternative fuels to diminish dependence on fossil fuels is worthy for reasons of energy security, it is a *necessity* for environmental reasons, in order to mitigate climate change. But even if this drive offers much future potential and gives reason for optimism, the shift to alternative energy sources faces major obstacles. Normally such obstacles include high technical costs, creating new infrastructure for distributing alternative energies, long lead-times for new investments and entrenched interests in power generation, transportation, industry

587 Howell & Nakhle, *Op cit.*, p. 120.

588 HLPE, *Op cit.*, p. 89.

and agriculture sectors – all of which put renewable energies at a crucial disadvantage against fossil fuels, due to the latter's dominance in most markets, existing knowhow and infrastructure for fossil fuels and the perceived high costs of adjusting to new, low-carbon policy frameworks.[589] For these reasons, the exorbitant oil-price scenario of the past decade was in fact a blessing for investment in alternative energies – because it is inconceivable for most consumers to shift to renewable energies merely out of environmental concerns, unless there is also a strong financial incentive to do so.

However, the collapse of global oil prices induced by the 2008 financial crisis has held back an otherwise necessary investment drive toward a 'greener' future, as has often been the case in the past: 'History has shown that low prices for petroleum or excessive uncertainty about future price movements are the worst enemies of research and development into alternative energy sources.'[590] If fossil fuels remain too cheap for renewables to compete with them, Maugeri suggests that we can expect 'a continued drop in investment in new forms of energy. ... As a case in point, the greatest wave of investment in renewable sources took place during the oil shocks of the 1970s. However, when prices dropped, spending on alternatives to oil, gas, and coal evaporated.'[591]

There is, conversely, a fundamental and crucial difference between the 1986 price collapse following the two oil crises of the 1970s and the most recent one after the 2008 financial crisis. Unlike in the 1970s and 80s, the concern about the environmental impact of energy use and its overwhelming contribution to climate

589 Jaffe, *Op cit.*, p. 844. Baumert, *Op cit.*, p. 489.

590 Maugeri, *Beyond the Age of Oil*, p. 31.

591 *Ibid.*, p. xxv.

change caused by GHG emissions has come into the political limelight. It is now almost ubiquitously recognised as 'a challenge of the highest order', requiring technological, institutional and behavioural change.[592] According to Edward Morse, the opportunities presented by relatively lower oil prices after the 2008 financial crisis and, particularly, the shale revolution should not, therefore, 'detract from the important goals of reducing global greenhouse emissions…and building a new generation of energy-efficient nonhydrocarbon fuel sources.'[593] Indeed, it could well be, as Maugeri believes, that the 'environmental conscience now shown by many governments could help sustain interest and investment in alternative energy when fossil fuels are cheap.'[594] We can consequently expect to see a surge of technological innovation in renewable energy resources in the future in order simultaneously to tackle energy security and climate change, Giddens affirms: 'Without such innovation, it is impossible to see how we can break our dependency upon oil, gas and coal, the major sources of environmental pollution. A turn to renewable sources of energy is *essential*, and it has to be on a very large scale.'[595]

One of the main obstacles in the transition toward a low-carbon economy has been the policy uncertainty surrounding international climate change negotiations. The failure to reach an agreement at the 15th Conference of the Parties (COP-15) in Copenhagen in 2009 was symptomatic of the deadlock between developed and developing countries regarding binding emission reduction targets, which had characterised international climate change negotiations at least since the Kyoto Protocol of 1997. In

592 Baumert, *Op cit.*, p. 489.

593 Morse, *Op cit.*, p. 52.

594 Maugeri, *Beyond the Age of Oil*, p. xxv.

595 Giddens, *Op cit.*, p. 11. Emphasis added.

the years that followed, negotiators started calling for a different approach to these talks, whereby this stalemate could be overcome. In December 2015, the Paris Accord was reached at the end of COP-21, in which all of the world's 195 nations agreed[596] to hold the increase in average global temperatures "well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels",[597] recognising that this will considerably mitigate the risk and impacts of climate change. Instead of the Kyoto Protocol's top-down approach, in which binding reduction targets were only imposed on Annex I (developed) countries while developing economies were free of such obligations, the Paris Accord introduced a bottom-up mechanism where each country pledges its own Intended Nationally Determined Contributions (INDCs) to reduce GHG emissions. This flexible and voluntary approach was a reassurance to developing countries, whose previous intransigence on binding emission reduction targets would no longer be an impediment to reach a compromise. Moreover, the Paris Accord also introduced a 'stocktaking' mechanism whereby countries can reformulate their pledges every five years as new developments take place. As explained by *The Economist*, 'past climate deals failed in part because they tried to impose mitigation targets on reluctant countries, rather than allowing each country to decide for itself what it thinks is achievable.'[598]

Nevertheless, it is widely recognised that, even if all the INDCs pledged under the Paris Accord were fully implemented, the world will still fall short of the GHG reduction required to avoid the 2 degree threshold. However, the Paris Accord unequivocally

596 In June 2017, President Donald Trump pulled the United States out of the Paris Accord.

597 *The Economist*, 'Deal done', 12 December 2015.

598 *The Economist*, 'Up in smoke?', 26 November 2016.

signals that there is a concerted global effort to change dramatically the energy-intensive way the world economy has functioned in the past. Indeed, many of the INDCs pledged in the Paris Accord include measures to reduce oil consumption, especially in the transportation sector.[599] Even if these pledges are non-binding, the signal they send to the market are part of the reason why oil prices have fallen so much in recent years, resulting in underinvestment in the conventional oil industry. In that sense, 'perhaps the most significant effect of the Paris Agreement in the next few years will be the signal it sends to investors', according to *The Economist*: 'the united governments of the world say that the age of fossil fuels has started drawing to a close.'[600]

4.5. Concluding remarks

The assessment of energy statecraft as an effective instrument of foreign policy cannot be made without a proper understanding of the context in which it takes place. Being defined as the manipulation of another state's *energy security* for one's own political purposes, energy statecraft is useful only under an auspicious international context for that end. Such a situation exists if one or more of the four elements of energy security – namely, availability, reliability, affordability and sustainability – raise cause for concern. The 'new energy paradigm' that emerged during the new millennium's first decade – simultaneously characterised by worries over the future adequacy of global oil reserves and other finite energy resources; the questionable ability and willingness of energy producers to supply them in a reliable fashion; skyrocketing demand for energy sources across the board by rapidly growing developing countries, coupled with extremely volatile oil prices

599 Klare (2017), *Op cit.*

600 *The Economist*, 'Deal done', *Op cit.*

that jeopardised investments in new supply capacity, both of which aggravated the affordability of hydrocarbons; and the threat posed by climate change caused by burning fossil fuels – raised the value of energy resources as an instrument of state power to those that possess them, and thus influence over those that are in want of them. But this so-called new energy paradigm also created a context in which the drive to switch to alternative energy blossomed as a necessary response to the aforementioned threats to energy security. However, the advent of the so-called shale revolution, and the ensuing oil price collapse it provoked, drastically altered the aforementioned new energy paradigm. Even though the availability, reliability and affordability of fossil fuels no longer pose as great a threat to global energy security, somewhat dampening the drive toward an alternative energy future, the urgent need to curb GHG emissions responsible for climate change remains, in and of itself, a sufficiently compelling reason to propel the world's energy use toward more renewable sources.

The last time such a massive switch to renewable energy sources was widely discussed was after the Arab oil crisis of 1973. As *The Economist* points out:

> *Then, too, a spike in the price of oil coincided with a fear that natural limits to supply were close. … Of course, there was no geological shortage of oil, just a politically manipulated one. Nor [was] there a geological shortage this time round. But that does not matter, for there are two differences between then and now. The first is that the price rise [was] driven by demand. More energy [was] needed all round. That [gave] alternatives a real opening. The second is that 35 years have winnowed the technological wheat from the chaff.*[601]

601 *The Economist*, 'The future of energy', 21 June 2008, p. 16.

As mentioned above, one particular energy resource that stands out as ‘an excellent way to introduce an environmentally friendly energy technology’ is ethanol and other biofuels, especially considering their applicability in transportation, the only sector where alternatives have not been able to replace petroleum. Given the need to curb GHG emissions from burning fossil fuels and the huge projected rise in car ownership in the developing world, biofuels seem like an increasingly attractive alternative and renewable energy source.

With such an appeal, in view of the international energy security context described above, biofuels have the potential to join the ranks of the few energy resources that can be used as instruments of foreign policy. There are but a few major producers of biofuels (ethanol in particular) in the world, but only one country has employed biofuels in its energy statecraft, namely Brazil. The subsequent chapter will therefore evaluate the effectiveness of Brazil’s energy statecraft focused on ethanol.

CHAPTER 5
THE ENERGY STATECRAFT OF BRAZIL

Energy statecraft has been an established instrument of foreign policy among energy-rich countries at least since the first international oil crisis of 1973, but its employment has thus far been restricted to petroleum and natural gas, more often than not in a negative way by restricting or disrupting target states' access to these energy resources. What is new in this century, however, is the use of biofuels as an instrument of energy statecraft. So far, only Brazil presents a case study of a country using biofuels as an instrument to achieve its foreign policy goals. This chapter seeks to assess the efficacy of using biofuels as a form of energy statecraft by testing the conditional variables identified in the economic statecraft literature, which have been examined in pervious chapters, against the single case study of Brazil.

The chapter begins with a historical outline of Brazil's National Alcohol Programme – a series of public policies implemented by the Brazilian military regime in response to the oil crises of the 1970s – through its various phases, from a strictly domestic energy security policy to its launch as a foreign policy initiative during the administration of President Luiz Inácio Lula da Silva (2003-2010). The four conditional variables identified in the literature that, in theory, determine the potential for success of energy statecraft are then assessed individually against the foreign policy strategy employed by the Brazilian government during the Lula administration. The first of these variables analyses whether the instrument employed by the state – in this case, the promotion of biofuel use to other countries – is commensurable with the foreign policy goals that it seeks to achieve. In Brazil's case, energy statecraft is carried out with the aim of attaining two main objectives: first, is the so-called commoditisation of ethanol, that is the creation of an international market where ethanol is traded freely without barriers; second, is the increase in Brazilian ethanol exports within this market. In order to create this market, however, more countries need to produce ethanol or other biofuels, since Brazil is unable to supply global demand for biofuels while potential importers are unwilling to substitute their dependence on unreliable petroleum supply for dependence on a single (or few) suppliers of biofuels. Thus, the main strategy pursued by the Brazilian government to accomplish its goal of commoditising ethanol is to encourage and assist other countries to use and produce their own biofuels by promoting its use to these countries and transferring the technology to do so.

The second conditional variable is the market share of a given product, in this case biofuels. Here Brazil holds a relatively comfortable position as the world's second-largest producer and exporter of ethanol. Until 2010, Brazil was the world's main ethanol exporter, but was surpassed by United States as a result, on the one hand, of increasing US production exceeding its 10% blend mandate (the so-called 'blend wall') and, on the other hand, of Brazil's ethanol sector going through a period of stagnation.[602] Brazilian ethanol exports peaked in 2008 at 5.1 billion litres, but

602 Beckman, J., *Biofuel Use in International Markets: The Importance of Trade*, EIB-144, United States Department of Agriculture, Economic Research Service, September 2015.

dropped to less than half of that in 2011. In 2012, Brazil's exports rose to 3.1 billion litres and maintained this level the following year. However, the last three years experienced another slump: in 2016, Brazilian ethanol exports were even lower than they were in 2004, exporting only 1.8 billion litres.[603]

On the other hand, the US has been the world's top ethanol exporter since 2011, exporting one billion gallons that year, though declining to 200 million gallons in 2012-2013 but rising steadily from 2014 onward.[604] This situation reveals that despite huge comparative advantages – such as technological expertise, land availability, favourable weather conditions, and so on – Brazil risks lagging behind the US and the EU due to Brazil's shortage of investment and inappropriate policy regulation. Unlike the US and the EU, however, Brazil has much land available in which further to expand its biofuel production. In order to maintain its leading position in the international biofuels market, Brazil therefore needs to invest significantly in expanding its production capacity – both to meet rising internal demand, as well as to supply growing global demand for biofuels.

The elasticity of demand for a given good is the third conditional variable: in order for a resource to be used effectively as a form of energy statecraft, it should have a low degree of elasticity. This is where biofuels differ most significantly from other, more traditional resources used in energy statecraft, such as oil and natural gas: demand for biofuels is extremely elastic. Thus, while this makes biofuels poor instruments of energy statecraft in principle, it is their capacity to complement, if not substitute, tradition-

603 Empresa de Pesquisa Energética, *Análise de conjuntura dos biocombustíveis – ano 2016* (Brasília: Ministério de Minas e Energia, 2016).

604 Renewable Fuels Association, *2016 Ethanol Industry Outlook: Fueling a High Octane Future*, 2016, available at: <http://www.ethanolrfa.org/wp-content/uploads/2016/02/RFA_2016_full_final.pdf>, accessed 24 July 2017.

al fossil-based fuels that give strength to energy statecraft using biofuels. To be sure, the inelastic demand for biofuels generated through the increasing number of countries enforcing compulsory biofuel blend mandates in gasoline adds to the potential for successful energy statecraft through biofuels. However, the ultimate strength of biofuels as a form of energy statecraft lies in their competition with petroleum and the increased elasticity of the latter as a result of introducing the former – a competition which only matures after introducing flexible-fuel ('flex-fuel') technology in the transportation sector, the sector which is most dependent on inelastic demand for oil.

Fourth and last among the conditional variables tested is the degree of control a government has over the private commercial actors that carry out the specific measures of a country's energy statecraft. National oil companies are usually the avenue through which most energy-rich states pursue their energy statecraft. In Brazil, however, unlike the oil and gas sectors which are more firmly under government control through the national energy company, Petrobras, the country's biofuel industry is entirely private. This means that a large degree of cooperation between the government and the private biofuel industry is required in order to implement an energy statecraft strategy employing biofuels. As such, the fact that the objectives of Brazil's government and its biofuel industry are largely the same – namely to create an international market for ethanol, in which Brazil plans to be a major exporter thereof – is a favourable condition when testing this variable. Moreover, the Brazilian government's recent decision to intervene in the country's biofuel sector – by classifying ethanol as a strategic fuel rather than as an agricultural product, and regulating it under the auspices of the National Petroleum Agency, using the same market rules for oil and gasoline – is also a favourable factor in terms of improving the prospects of significantly increasing ethanol exports abroad. However, the government's subsequent decision to subsidise gasoline prices in detriment of ethanol, has signalled the prioritisation of fossil fuels over biofuels by the Brazilian government. This has weakened the overlap in interests between the government and the private actors in Brazil's ethanol industry, which is essential for energy statecraft to be effective.

The chapter then concludes by discussing a common theme that runs through each of these conditional variables: the fact that the international market for biofuels is still in its fledgling stage. In principle, the lack of such a market should hinder the use of biofuels as a form of energy statecraft. However, as debated throughout these sections, energy statecraft using biofuels does not operate in a manner similar to energy statecraft using oil or gas. The very fact that there is no full-fledged international biofuel market indicates that energy statecraft using biofuels cannot be employed in a negative manner, only positive – through carrots rather than sticks. However, countries that adopt biofuels as part of their national energy mixes enhance their own energy security by doing do. Since energy statecraft is herein defined as the manipulation of another country's energy security to attain one's own political goals, biofuels can still be used as a form of energy statecraft by enhancing the energy security of target states.

5.1. Brazil's National Alcohol Programme (*ProÁlcool*)

Often being touted as the most successful producer of biofuels in the world, Brazil has a long history of biofuel production, particularly with ethanol made from sugarcane. Though sugarcane is one of the country's oldest crops, exporting sugar since 1532, it was not until the 1920s that the crop was grown to produce biofuels. Starting with a 1931 government mandate to blend a modest 5% of ethanol in all gasoline imports, national consumption slowly grew to 7% in 1937 and 9.4% at the outbreak of the Second World

War. During the war, however, the government's mandatory blend of ethanol to gasoline reached as high as 50% in 1943, due to the threat posed by German submarine attacks to the supply of oil. But cheap and plentiful oil after the war led only to periodic mandates for ethanol blends in gasoline until the first global oil crisis of 1973.[605]

The gasoline shortages provoked by OPEC's 1973 oil embargo led policymakers in Brazil and elsewhere to realise the threat to energy security caused by dependence on a few unreliable suppliers of petroleum and their ability to raise oil prices dramatically. This situation alarmed the government of General Ernesto Geisel, which anticipated that such a crisis could happen again in the future, and therefore set out to implement a series of policies drastically to reduce Brazil's dependence on foreign energy sources. At the time of the embargo, Brazil imported 80% of its oil needs, representing roughly half of its total import bill, meaning that the subsequent increase in petroleum prices placed a substantial burden on the country's balance of payments.[606] In reaction, the Brazilian government launched the National Alcohol Programme (*ProÁlcool*) in 1975, which coincided not only with a sharp rise in global oil prices but also with a fall in world sugar prices, thus providing a new market for an otherwise struggling domestic sugarcane industry,[607] while at the same time taking advantage of Brazil's vast tracts of fallow land and its long history of growing sugarcane. In terms of ensuring the country's energy security, the *ProÁlcool* programme

605 Wikipedia.com, 'History of Ethanol Fuel in Brazil', available at <http://en.wikipedia.org/wiki/History_of_ethanol_fuel_in_Brazil>, accessed 28 June 2012.

606 Smith, J., *Biofuels and the Globalization of Risk: The biggest change in North-South relationships since colonialism?*, (London: Zed Books, 2010), p. 22.

607 Spencer, N., *Energy and Climate Change in Brazil*, Energy Action Group Working Paper (Washington, D.C.: Americas Society/Council of the Americas, November 2009), p. 6. See also: International Atomic Energy Agency, *Brazil: A country profile on sustainable energy development*, (Vienna: IAEA, 2006), p. 184.

was driven mainly by concerns over the affordability of oil as well as the reliability of its delivery, whilst also considering the lack of availability of known domestic petroleum reserves *versus* the vast availability of land to grow sugarcane in Brazil. Another goal of the Brazilian government in implementing *ProÁlcool* was to help lessen the economic disparity between the more developed south and the underdeveloped northeast regions by stimulating the latter's agricultural industry. Even though it is well known today that ethanol made from sugarcane has a positive impact on the GHG emissions, environmental sustainability was not among the original driving forces behind *ProÁlcool*'s creation.[608]

Since its relatively modest beginning in 1975 (compared to its scale and reach today), Brazil's National Alcohol Programme evolved through the following decades in four distinct phases, according to the first head of the recently-created Department of Energy at the Brazilian Foreign Ministry, Ambassador Antônio José Ferreira Simões.[609] The first phase, from 1975 to 1979, saw the Brazilian government implementing the multi-pronged *ProÁlcool* programme by taking measures to stimulate both the supply and demand for ethanol fuel, initially as an additive to be blended with gasoline. At the outset of the programme, when the production costs of ethanol were still relatively high, *ProÁlcool* was heavily dependent on government incentives. The government required a mandatory blend of ethanol in gasoline, fluctuating between 10% (E-10) and 22% (E-22) until the end of the decade, thereby guaranteeing the purchase of set amounts of ethanol fuel

608 Vieira, M.A. & Dalgaard, K.G., 'The Energy Security-Climate Change Nexus in Brazil', *Environmental Politics*, Vol. 22, No. 4, July/August 2013.

609 Simões, A.J.F., 'Petróleo, Gás Natural e Biocombustíveis: Desafio estratégico no mundo e no Brasil', paper presented at I Conferência Nacional de Política Externa e Política Internacional: O Brasil no mundo que vem aí, Rio de Janeiro, 6-7 July 2006.

by Petrobras, the state oil company, at a guaranteed fixed price considered adequate to generate a reasonable profit to producers.[610]

The second phase of *ProÁlcool* was a reaction to the second oil price spike in the 1970s, sparked by the Iranian Revolution of 1979, when global petroleum prices quadrupled. Lasting until 1989, this phase is considered the heyday of Brazil's National Alcohol Programme, characterised by a series of new policies and government incentives to expand the use of ethanol.[611] On the supply side, in addition to giving tax rebates on ethanol production, the government offered preferential low-interest loans and credit guarantees for the construction of new ethanol distilleries. More important, however, was the government's decision to allow the sale of pure ethanol (E-100) in petrol stations, rather than merely blend it with gasoline, ordering Petrobras to create a distribution infrastructure by installing E-100 pumps in most of the country's petrol stations.[612] On the demand side, the government generously fixed the price of neat ethanol at the pump at 59% of gasoline, largely subsidised by substantial taxes on gasoline, thereby guaranteeing competitive prices for consumers. These measures solved the 'chicken-and-egg' concern raised by the big automobile manufacturers operating in Brazil, who were reluctant to produce vehicles with engines that ran only on E-100 until they could be certain of a guaranteed demand for these new cars, as well as by the sugarcane producers, who worried about not being able to sell

610 International Atomic Energy Agency, *Op cit.*, pp. 184-185. Spencer, *Op cit.*, pp. 6-7. Roett, R., *The New Brazil*, (Washington, D.C.: Brookings Institution Press, 2010), p. 120. Seelke, C.R. & Yacobucci, B.D., 'Ethanol and Other Biofuels: Potential for U.S.-Brazil Energy Cooperation', Congressional Research Service Report for Congress, 27 September 2007, pp. 8-9.

611 Simões, *Op cit.*

612 Bundy, D., *The Global Dynamics of Biofuels: Potential supply and demand for ethanol and biodiesel in the coming decade*, Brazil Institute Special Report, April 2007, Issue No. 3, Woodrow Wilson International Center for Scholars, p. 5. Almeida, A.O., 'Exports, Energy, Food: The Multiple Functions of Brazilian Agriculture', Paper prepared for presentation at the 2009 LASA Congress, Rio de Janeiro.

all the additional ethanol the government was incentivising them to produce.[613] Thus the government signed an agreement with automobile manufacturers requiring them to build pure ethanol-run cars on a large scale. Consumer demand for these vehicles was further stimulated by sales tax incentives throughout the 1980s, peaking at roughly 90% of all cars sold in Brazil in 1986.[614]

Although *ProÁlcool* was very successful in its first and halfway through its second phase – during which time ethanol production skyrocketed in Brazil, quadrupling during the programme's second phase – a series of concomitant exogenous factors led to its discredit. The Latin American debt crisis of 1982 had already severely restricted the Brazilian government's ability to continue subsidising its National Alcohol Programme, when the oil price collapse of 1986 made ethanol uncompetitive with gasoline, even with subsidies, thus forcing the government to phase out its financial support for ethanol, although the minimum blend in gasoline was kept. To make matters worse, when global sugar prices rose sharply at the end of 1988, Brazilian sugarcane growers shifted their crops to sugar production for export, provoking a severe ethanol shortage in the second quarter of 1989. As a result, ethanol-run car drivers were left stranded, which seriously undermined consumer confidence in the availability and reliability of ethanol fuel, and sales of ethanol-fuelled cars rapidly declined afterwards. *ProÁlcool* was further discredited when the Brazilian government had to authorise ethanol imports, turning Brazil from the world's largest producer of ethanol to its largest importer.[615]

613 Rother, L., *Brazil on the Rise: The Story of a Country Transformed*, (London: Palgrave Macmillan, 2010), p. 184.

614 Seelke & Yacobucci, *Op cit.*, p. 8. Smith, *Op cit.*, p. 22. International Energy Agency, Office of Global Energy Dialogue, 'The Energy Situation in Brazil: An overview', paper prepared for the Standing Group on the Global Energy Dialogue, in June 2006, p. 11.

615 Spencer, *Op cit.*, pp. 6-7. IEA, *Op cit.*, p. 11. International Atomic Energy Agency, *Op cit.*, p. 185. Bundy, *Op cit.*, p. 5.

Larry Rother reminds us that ethanol was questioned as a fuel in Brazil for purely economic, rather than technical, reasons: 'It continued to be an efficient fuel source, but if reliable supply could not be guaranteed, consumers preferred to protect themselves by returning to gasoline, supplies of which were never interrupted' – a situation that persisted throughout the 1990s. 'Even after sugar prices returned to their historically low levels, motorists were wary of being tricked again, and the sales of ethanol-fueled cars continued to lag.'[616]

During *ProÁlcool*'s third phase, throughout the 1990s, the Brazilian government focused its efforts on reducing runaway inflation and cutting its expenditures, thus characterising this phase by deregulation in the country's fuel sector and phasing out of all ethanol-related subsidies, leaving all decisions concerning the ethanol sector in the hands of private industry. While the ethanol blend in gasoline was maintained – and indeed made mandatory by law in 1993 (varying between 20% and 25%), thus creating a smaller but permanent market for ethanol – E-100 sales at the pump dropped significantly throughout the decade, putting an end to imports from 1996 onward. The same decline occurred in the sales of pure ethanol-fuelled vehicles, which were discontinued after 1998 when their sales amounted to less than 1% of total annual auto sales in Brazil. This put pressure on the sugarcane industry to lower production costs, increase efficiency and improve management practices. By the late-1990s, when the price of ethanol was fully liberalised, the retail price dropped, making it competitive with gasoline again. Renewed interest in E-100 as a fuel by both consumers and car manufacturers then led to an increase in demand and supply for ethanol in Brazil.[617]

616 Rother, *Op cit.*, pp. 184-185.

617 International Atomic Energy Agency, *Op cit.*, p. 185. Simões, *Op cit.* IEA, *Op cit.*, p. 11.

The fourth and current phase of *ProÁlcool*, from 2000 onward, has seen the revitalisation of ethanol fuel in Brazil and elsewhere. Daniel Yergin lists three factors that 'brought "alcohol" back in Brazil': the steadily rising price of oil of the 2000s; the accumulated thirty-year experience in research and development of ethanol fuel and learning curve which led to dramatically reduced production costs; and, most importantly, Volkswagen's introduction of flexible-fuel technology ('flex-fuel') in automobiles in 2003, which are given tax breaks in Brazil. Flex-fuel vehicles (FFVs) work with any combination of ethanol and gasoline, including 100% of either, due to electronic sensors that automatically detect whether the fuel in the tank is gasoline, ethanol or a mixture of both, and then properly adjust the engine combustion parameters accordingly, giving the driver the choice of the cheapest fuel available at the pump. 'This was the impressive breakthrough that would put confidence back into the minds of motorists', he writes.[618] Flex-fuel cars protect consumers both from sharp increases in the price of gasoline provoked by high international oil prices and potential shortages in ethanol supply. As a result, FFVs have become immensely popular in Brazil, and all automobile manufacturers in the country followed Volkswagen's suit in producing them: by 2006, 75% of cars sold in Brazil had flex-fuel engines, and today virtually all of the cars sold annually in Brazil (over 3 million) are equipped with this technology. Consequently, domestic demand for ethanol rose dramatically during this phase, eventually surpassing gasoline.[619] Today, the Brazilian ethanol sector is driven predominantly by market forces, including demand from abroad, rather than by government incentives. The sugarcane industry has made significant investments in technological improvements to

618 Yergin, D., *The Quest: Energy, Security and the Remaking of the Modern World*, (London: Allen Lane, 2011), p. 653. See also Bundy, *Op cit.*, pp. 5-6.

619 Rother, *Op cit.*, p. 185.

increase production, and now produces ethanol efficiently and at competitive prices.[620]

Despite its ups and downs along the years, the Brazilian National Alcohol Programme has developed into a definite success story overall, catching the attention of other countries, particularly in the past decade, when concerns over energy security have been paramount. In this context, the Brazilian government has identified an opportunity to promote the use of ethanol abroad based on its own positive experience with it. Though the first attempts to promote Brazilian biofuels abroad were undertaken by the state government of São Paulo under governor Mário Covas in 1988 and 1989 in places like Sweden, Canada and Iowa in the United States, in order to make up for the gradual loss of domestic demand for the fuel at the time,[621] it was not until the Luiz Inácio Lula da Silva administration, from 2003 to 2010, that promoting biofuels in other countries became a part of the federal government's foreign policy. Indeed, 'Lula is the "father of ethanol", in terms of promoting the image of ethanol and incentivising its use abroad', according to a representative of Brazil's Sugarcane Industry Association (UNICA).[622] The following sections will describe this particular foreign policy strategy and analyse it in terms of the criteria for effective energy statecraft discussed in previous chapters, testing the hypothesis that if each of these conditional factors is favourable, energy statecraft should be more likely to be successful in its implementation.

620 Simões, *Op cit.*

621 Brazilian Congressman Antônio Carlos Mendes Thame, interviewed in Brasília, Brazil, 22 June 2011.

622 Interview with UNICA representative, São Paulo, Brazil, 14 June 2011.My translation.

5.2. Goal formulation

Effective energy statecraft – herein defined as the manipulation of the energy security of one or more target states by a sender state to advance the political goals of the sender state – depends, according to the theoretical framework used in previous chapters, on the fulfilment of four conditional criteria: 1) the formulation of foreign policy goals being commensurable with the instruments used in their pursuit; 2) the sender state should have a high market share in the commercialisation of the energy resource in question; 3) low elasticity of demand for the energy resource in question on the part of the target states; and 4) a high level of government control over the commercial actor(s) that sell(s) the energy resource in question. However, what is unique and completely novel in the study of biofuels as an instrument of energy statecraft, as opposed to existing forms of energy statecraft (oil and natural gas), is that there is not yet an international market for it. Thus, theoretically speaking, one cannot pursue negative energy statecraft using biofuels for the very simple reason that there is not a market for it in most countries, whereby a sender state can implement negative biofuel energy statecraft by denying a target state that energy resource, since there are no sender states dependent on biofuels in the same way they are dependent on oil and gas. Since biofuels cannot be used as a negative form of energy statecraft, it can only be employed in a positive manner, through incentives and carrots: by positively manipulating the energy security of a country by enhancing their energy security with biofuels – i.e. 'exporting energy security' by exporting biofuels. Therefore, the ability to use bioenergy as a form of energy statecraft depends on the creation of an international market for it – in other words, to transform ethanol and other biofuels into a globally traded commodity – whereby producing states can manipulate the energy security of consumer states, positively or negatively.

As mentioned above, the promotion of biofuel use abroad, particularly of ethanol, has been undertaken by Brazilian sub-state actors since the late 1980s. From the Lula da Silva administration (2003-2010) onward, however, promoting the use of biofuels to other countries has become an instrument of the Brazilian government's foreign policy. According to President Lula, the idea to promote increased biofuel consumption not only domestically but also abroad, was inspired by his first Minister of Agriculture, Roberto Rodrigues, who in 2003 walked into Lula's office saying, 'Mr President, the country has an extraordinary opportunity' to spread the use of biofuels, and 'you could go down in history as the "biofuel president".'[623] The 'opportunity' for Brazil and Lula, in this case, was an international energy context plagued by steadily rising oil prices in the face of growing populations in developing countries, concerns over the future availability of fossil fuels and their effect on the environment, as well as the reliability of having a large portion of the world's energy needs provided by a limited number of countries. In other words, the world was faced once again, like in the 1970s, with threats to energy security – threats which Brazil overcame with its National Alcohol Programme, and whose experience could benefit other countries faced with similar energy security challenges today. It is within this context that Brazil's foreign policy strategy to disseminate the production and consumption of biofuels is situated, according to Lula's Foreign Minister, Celso Amorim: 'President Lula has determined biofuels as one of the priorities of his administration. He has committed himself personally to defend the economic, environmental and social benefits of these energy resources.'[624] Since then, there was

623 Lula da Silva, L.I., Speech given at the 2nd Top Ethanol Award Ceremony, Sao Paulo, Brazil, 6 June 2011. Available at: <http://www.youtube.com/watch?v=L23Y2-GSyF4&feature=autoplay&list=PLBB2BCE9E5EB2637D&playnext=2>, accessed 28 June 2012.

624 Amorim, C., 'Prefácio', in Ministério das Relações Exteriores, *Biocombustíveis no Brasil: Realidades e Perspectivas*, (Brasília: Ministério das Relações Exteriores, 2007), p.6.

hardly a presidential trip abroad or visit by a foreign dignitary to Brazil in which Lula did not mention Brazil's successful experience with ethanol production, if not staunchly advocated its use, often admitting to being 'in love with biodiesel':[625] 'I have been, as everyone knows – almost in an obsessive manner – an advocate of renewable sources of fuel.'[626]

The speeches delivered by President Lula from 2004 onward in his trips abroad, as well as at home, may have varied in the attention given to biofuels, depending on the occasion, but the basic message remained the same. Lula repeatedly recalled the need to tackle the energy security challenge the world faces, listing the advantages of adopting biofuels in his speeches, such as those summarised in an article published in his name in the *Miami Herald*:

> • *First, these products constitute renewable energy alternatives, which allow us to diversify the world's energy supply while lessening the undesirable dependency on a limited number of sources and suppliers.*
>
> • *Second, these products protect the environment, both by emitting fewer of the gases responsible for the greenhouse effect and by using agricultural wastes and depleted lands.*
>
> • *Third, these biomass products are development tools with a strong positive impact on society. Given the*

625 Lula da Silva, L.I., 'Palavras introdutórias do Presidente da República, Luiz Inácio Lula da Silva, por ocasião de entrevista coletiva ao final da Reunião de Cúpula África-América do Sul, Abuja, Nigéria, 30 de novembro de 2006', in Ministério das Relações Exteriores, *Resenha de Política Externa: 2º Semestre de 2006*, (Brasília: FUNAG, 2007), p. 187. My translation.

626 Lula da Silva, L.I., 'Declaração à imprensa do Presidente da República, Luiz Inácio Lula da Silva, após visita à Transpetro com o Presidente dos Estados Unidos, George W. Bush, 9 de março de 2007', in Ministério das Relações Exteriores, *Resenha de Política Externa: 1º Semestre de 2007*, (Brasília: FUNAG, 2007), p. 80. My translation.

> *abundance and variety of their feedstocks and the versatility of the technology employed, these products facilitate job creation on small and family farms, as well as in related industries. Moreover, they generate export revenue for countries that in many cases depend on a single export commodity and which now lack energy resources.*
>
> *Using the full potential of biofuels, however, depends on creating new models of energy cooperation. We need to join efforts to create and disseminate these technologies and open up world markets for new fuels. …*
>
> *Given that each country can produce and consume different kinds of biofuels, it's no longer a question of dividing up the world between producers and importers nor of creating new dependency relationships. Our aim is to maximize the advantages that these new sources of energy can produce, in terms of agricultural diversification, job creation and environmental conservation.*[627]

Spreading this message wherever Lula went in the world, and to all those who visited him in Brazil, followed by other instruments and subsequent strategies, has been the core of what some have called Brazil's 'biofuels diplomacy'[628] or 'ethanol diplomacy' – which the present work defines as 'energy statecraft' or, in this case, biofuels/ethanol statecraft – and was, 'without

627 Lula da Silva, L.I., 'Summit offers chance to gain consensus', *Miami Herald*, 16 July 2006. Also in Ministério das Relações Exteriores, *Resenha de Política Externa: 2º Semestre de 2006*, (Brasília: FUNAG, 2007), p. 402.

628 Seelke & Yacobucci, *Op cit.*, p. 21.

doubt, one of the hallmarks of [Lula's] administration', according to Ambassador Simões.[629]

Brazil has many overlapping objectives in its energy statecraft – including creating new export markets for Brazilian biofuel-related products, enhancing energy security in terms of reducing dependence on expensive imported oil, limiting greenhouse gas emissions, improving the environment by substituting lead additives in gasoline, creating jobs in rural communities and developing poorer countries – but the overarching declaratory goal is to transform ethanol into a globally traded commodity.[630] Thus, the aspirations of Brazil's energy statecraft are twofold: 'to increase demand for Brazilian biofuels around the world, and to help guarantee reliability of supply in the global marketplace, enhancing private-sector development. For instance, if a drought resulted in lower production levels in Brazil, other countries such as South Africa and India could still supply the market, and vice versa.'[631] Despite being the world's most efficient ethanol producer and having the most potential for its expansion, it is not in Brazil's interest to be the world's only biofuels exporter. As a former director of UNICA, Eduardo Carvalho, explains, Brazil is 'not interested in becoming the Saudi Arabia of ethanol… It's not our strategy because it doesn't produce results. As a large producer and user, I need to have other big buyers and sellers in the international market if ethanol is to become a global commodity, which is our real goal.'[632]

629 Simões, A.J.F., 'Biocombustíveis: A Experiência Brasileira e o Desafio da Consolidação do Mercado Internacional', in Ministério das Relações Exteriores, *Biocombustíveis no Brasil: Realidades e Perspectivas*, (Brasília: Ministério das Relações Exteriores, 2007), p.11. My translation.

630 Amorim, C., Speech delivered at *Seminário do TCU Sobre Política do Comércio Exterior Brasileiro*, in Brasília, Brazil, 28 August 2007.

631 Worldwatch Institute, *Biofuels for Transport: Global Potential and Implications for Energy and Agriculture*, (London: Earthscan Publications, 2007), p. 285.

632 Cited in Rother, *Op cit.*, p. 188.

In order for biofuels to be traded as commodities in a global market, a number of conditions – or complementary goals – must also be met. First and foremost is the need to promote both the production and the consumption of ethanol fuel in other countries. There are currently a limited number of producers, and even fewer exporters, of ethanol, while overall demand for it is low in the world. Nicole Spencer expects that more countries will adopt biofuels in their national energy mix once they have access to a larger biofuel market globally, which will likely increase and become more competitive as more countries produce biofuels.[633] But more importantly, the need to commoditise ethanol by spreading its use and production to other countries is inherently linked to the energy security component of biofuel use. One of the main advantages of biofuels is how they reduce dependence on oil imports from a few unreliable producers, and energy consumers and importing countries are not interested in substituting one energy dependence for another, which is why it is crucial to have as many biofuel suppliers as possible in the world. Potential ethanol-importing countries are wary of using a product from a single supplier, in case there is a bad harvest or other disruption in supply from Brazil. Therefore, expanding production to other countries is paramount to the strategy of turning ethanol into a commodity because the more countries that produce biofuels, the more importing countries' energy security is enhanced by consuming them.[634] As Lula's Foreign Minister, Celso Amorim, has clarified, 'when we are talking about ethanol, we are not thinking about an "ethanol OPEC", we want the opposite, seeking something that

633 Spencer, *Op cit.*, p. 16.

634 Corrêa do Lago, A., 'Entrevista com André Corrêa do Lago', in Tribunal de Contas da União, *A Nova Matriz Energética Brasileira*, (Brasília: TCU, 2008), p.71.

involves other countries in a solidary manner. We will win and others will win too.'[635]

Second, common technical standards for ethanol and other biofuels must be adopted internationally. Similar to the need to increase the number of ethanol producers, adopting universal standards for biofuels would ensure that a disruption of supply from one country would be met by another supplier using the same or similar technical standards, ensuring similar end-products. Third, biofuels need to be traded in relevant commodity exchanges, creating a futures market for them and the option of long-term contracts, much like the current international petroleum market.[636] Finally, in order for a global biofuels market to function smoothly and without distortions, all barriers to its trade, including tariffs and subsidies, must be removed.

There are many motivations behind these goals, some idealistic and others more narrowly self-interested. An obvious interest behind Brazil's objective to create an international market for biofuels is economic. By creating a world market for ethanol and other biofuels, it follows that more export opportunities arise for Brazilian biofuel producers, with benefits to Brazil's trade balance. But equally important is the potential for export of Brazilian energy production technologies along the entire sugarcane-ethanol industry, including flex-fuel vehicles. Many of the countries that have the appropriate climactic conditions to grow biofuels lack the technical expertise to make them, so every biofuel cooperation agreement that Brazil signs with such countries is integrated with the promotion of technologies along the entire ethanol production chain, providing opportunities for

635 Amorim, C., Lecture delivered at the University of Brasília, Brasília, Brazil, 24 April 2007. My Translation.

636 Simões, A.J.F., 'Biocombustíveis: A Experiência Brasileira e o Desafio da Consolidação do Mercado Internacional', p. 31.

Brazilian companies in many sectors to benefit.[637] In this regard, write Freemantle and Stevens, 'it is in the interest of Brazil's large state-owned and private sugarcane growers and biofuels machinery manufacturers to see ethanol develop as a global commodity'. Foreign policy is merely serving Brazilian economic interests in the pursuit of this objective by providing its companies with 'a formidable competitive advantage in expanding their global reach and establishing market participants on both the demand and supply sides' in growing markets with large agricultural potential and technological deficit.[638] In that sense, the concerted effort to disseminate ethanol production worldwide should be understood as being part of the overarching objectives of Brazil's foreign policy. In other words, Brazilian ethanol diplomacy is embedded in the broader strategy of Brazil's economic insertion into an increasingly globalised world.[639]

Another, less obvious, interest behind Brazil's 'teach a man to fish' strategy of investment and technology transfer in biofuels to developing countries is political. Lavishing such investments and technical assistance on these countries helps Brazil compete with India and China for soft power influence among developing countries and alleviates whatever mistrust they may have over Brazil's dominant role in world trade. It also promotes the country's international image as a relatively moderate and apolitical energy supplier, while garnering support for Brazil's 'lonely quest for a permanent seat on the UN Security Council. Since rising powers like Brazil will one day run the world, argues Samuel Pinheiro

637 Interview with UNICA representative, São Paulo, Brazil, 14 June 2011.

638 Freemantle, S. & Stevens, J., 'Brazil weds itself to Africa's latent agricultural potential', Standard Bank Group Economics, BRIC and Africa, 1 February 2010, p. 5, available at: <http://www.biofuelsdigest.com/bdigest/2011/07/21/biofuels-mandates-around-the-world/>, accessed 28 June 2012.

639 Interview with Claudia Santos Vieira, former Head of the Renewable Energy Division at the Brazilian Ministry of External Relations, via Skype call, 22 May 2017.

Guimarães Neto, the [former] foreign ministry's secretary-general, they can save trouble later by reducing poverty in developing countries now.'[640] Therefore, Brazil's ethanol diplomacy is meant to create opportunities to develop economic and political ties between Brazil and African and Latin American countries. These South-South cooperation initiatives fit well with Brazil's long-term geopolitical strategy of diversifying partnerships around the world, lessening its dependency on the US and enhancing Brazil's historical role as an emerging leader of the global South.

But there are also more long-term and idealistic motivations behind the goal of commoditising ethanol. According to Celso Amorim's successor as Foreign Minister, Antonio de Aguiar Patriota, Brazil wants to project internationally an agenda of peace and development. From a more idealistic perspective, Brazil is motivated by the idea that it has something to contribute to a peaceful and developed world. In that light, the Brazilian government sees agriculture as an instrument of peace, as are sustainable and economic development, since social tensions can arise in places without energy and food security. Accordingly, Brazil's international projection, particularly its promotion of biofuels abroad, is not directed at any specific objective, but toward the idea of creating an international order where there is more room for sustainable development and poverty reduction.[641] President Lula himself also endorsed this view when stating that 'Brazil is actively preparing itself for a new development paradigm that will meet the environmental and social challenges of the coming decades. Ethanol and biodiesel are the key components of our approach,

640 *The Economist*, 'Speak softly and carry a blank cheque', 17 July 2010, p.52. See also, Beattie, A., 'Ethanol puts power in Brazil's tank', *Financial Times*, 16 May 2006.

641 Interview with Brazil's Minister of External Relations, Antônio de Aguiar Patriota, Brasília, Brazil, 22 June 2011.

and we are determined to "plant the oil of the future".'[642] In poor countries, he writes, 'production of ethanol and biodiesel can have an extremely positive impact. It assists in dealing with the energy deficit, influencing internal consumption and exports. It can also generate a vast number of jobs, redistributing the population more harmoniously between urban and rural areas.'[643]

The Brazilian government has employed different strategies to pursue its goal of commoditising ethanol, depending on the target state in question, mainly whether the target states are potentially great consumers and/or producers of biofuels, since both demand for and the supply of biofuels need to be increased to become a globally traded commodity. Part of the strategy behind commoditising ethanol is to increase and diversify the consumer base for the product, particularly for Brazil's own exports. The United States is currently Brazil's largest single export market for ethanol, making Brazil highly dependent on the ups and downs of the American market. In order to diversify its own ethanol exports, as well as to bolster the fuel's commoditisation, Brazil has identified the Europe and Asia as potential key demand centres, in addition to the US,[644] given these regions' high energy consumption. However, many of these countries, particularly the US and European countries, have highly protected agricultural markets with barriers to biofuel imports from Brazil and elsewhere. Thus, in terms of encouraging potential large ethanol demand centres to increase their biofuel consumption, one of the Brazilian government's strategies has been to put pressure

642 Lula da Silva, L.I., "Join Brazil in planting oil – Only radical solutions will overcome the energy and environmental crises while promoting equality", *The Guardian*, 7 March 2006. Also available in Ministério das Relações Exteriores, *Resenha de Política Externa: 1º Semestre de 2006*, (Brasília: FUNAG, 2006), pp. 444-445.

643 Lula da Silva, L.I., 'Fuel for Thought', *The Wall Street Journal*, 14 July 2006.Alsoavailable in Ministério das Relações Exteriores, *Resenha de Política Externa: 2º Semestre de 2006*, (Brasília: FUNAG, 2007), p. 101.

644 Spencer, *Op cit.*, p. 10.

on these countries to reduce, if not eliminate, their trade barriers to ethanol imports. Another tactic employed is to encourage the introduction of compulsory ethanol blend mandates into gasoline in these countries, where there are few or none, although both the US and the EU have already set somewhat ambitious targets.

Currently, biofuel blend mandates are in place in sixty-six countries. This policy instrument encourages the development of national biofuel industries in places where they would not otherwise develop through market forces alone. The hope that increasing biofuel production worldwide would boost the global trade in biofuels has not been realized, however, since blend mandates are often intertwined with other protectionist agricultural policies. The share of biofuels traded internationally has plateaued around 10% of global production and could even diminish as blend mandates are aimed mostly at the development of national biofuel production.[645] This inward-looking tendency toward domestic biofuel production is a result of an overall perception over the risks of an export-oriented model in an international policy environment plagued by regulatory uncertainty.[646]

While Brazilian talks with potential large biofuel demand centres, especially the US and the EU, have been limited in their success in terms of opening markets, their importance has been much more pronounced in cooperation agreements to disseminate the use of biofuels to other countries. The most significant of such agreements is the Memorandum of Understanding Between the United States and Brazil to Advance Cooperation on Biofuels, signed in São Paulo on 9 March 2007. According to President Lula, the idea behind the agreement originated over lunch with

645 Organization for Economic Cooperation and Development & Food and Agriculture Organization of the United Nations, *OECD-FAO Agricultural Outlook 2015* (Paris: OECD Publishing, 2015).

646 United Nations Conference on Trade and Development (UNCTAD), *The State of Biofuels Markets: Regulatory, Trade and Development Perspectives* (Geneva: United Nations Publications, 2014).

President George W. Bush, during the latter's visit to Brasília in 2005, where Lula ('obsessed with biofuels') told Bush about Brazil's success story with ethanol so eagerly that Bush 'almost couldn't have lunch because [Lula] wouldn't stop talking about biofuel.'[647]

The Memorandum of Understanding (MOU) between the two countries is based on three pillars: bilateral, other countries and global. On the bilateral front, the two countries agreed to share technologies and cooperate in the research and development of the next generation of biofuels, such as those made from lingo-cellulosic material. Second, Brazil and the US have agreed to spread the benefits of biofuels to other countries by conducting feasibility studies and providing technical assistance aimed at stimulating private sector investment in domestic biofuel production for local consumption in these countries. Initially, this pillar of the MOU targeted the Dominican Republic, El Salvador, Haiti and Saint Kitts and Nevis, but was later expanded to include Guatemala, Guinea-Bissau, Honduras, Jamaica and Senegal. Globally, the two countries have been working multilaterally to establish common standards and codification for biofuels in order to advance commoditisation. Involved in these efforts are the Brazilian National Institute for Metrology, Normalization and Industrial Quality (INMETRO) and the US National Institute of Norms and Technology (NIST), as well as the International Biofuels Forum (IBF), whose members include the EU, China, India and South Africa, in addition to Brazil and the US.[648]

647 Cited in Yergin, *Op cit.*, p. 651.Seealso Lula da Silva, L.I., 'Declaração à imprensa do Presidente da República, Luiz Inácio Lula da Silva, após visita à Transpetro com o Presidente dos Estados Unidos, George W. Bush, 9 de março de 2007', in Ministério das Relações Exteriores, *Resenha de Política Externa: 1º Semestre de 2007*, (Brasília: FUNAG, 2007), p. 79.

648 Launched on 2 March 2007, the International Biofuels Forum is an informal and temporary forum that gathers biofuel producing and consuming countries with the goal of establishing norms and technical standards that will facilitate the international commercialisation of biofuels and their trade in futures markets. On 31 December 2007, the Forum announced the publication of a *White Paper on Internationally Compatible Biofuels Standards*, which compared the specifications on biofuels

In addition to accelerating the process of biofuel commoditisation, the MOU brings political benefits to both countries: 'For the United States, biofuels serve as a bridge to a closer relationship with Brazil, a leader in Latin America and a growing world power. Likewise, collaborating with the United States and other countries on biofuels shines a spotlight on Brazil's achievements in this area and further enhances its profile as an international leader.'[649] Concurrently, the MOU also helps improve the US's image in Latin America while countering the influence of Venezuela's petroleum-based version of energy statecraft. Indeed, Brazil's ethanol diplomacy was instrumental in 'helping Brazil reassert regional leadership relative to oil-rich Venezuela under Hugo Chávez.'[650]

Brazil has also signed similar 'triangular cooperation' agreements on biofuels with the European Union, although the target states of EU-Brazil agreements are all in Africa, rather than predominantly in Central America and the Caribbean, as is the case with the MOU with the US. But even though Brazil's agreements with the US and the EU, as well as Brazil's exclusively bilateral agreements on biofuel cooperation (mostly with South American countries), differ on their target states, these countries nevertheless share some basic similarities, which make them ideal countries for biofuel production. President Lula explained in several speeches that Brazilian ethanol is competitive because Brazil has the right technology, fertile soils, abundant sunshine and water available for the best ethanol-yielding crop: sugarcane. But he stressed that these conditions are not exclusive to Brazil, and similar climactic conditions are found in large parts of other

standards currently in place around the world. Feres, P.F.D., *Os Biocombustíveis na matriz energética alemã: possibilidade de cooperação com o Brasil*, (Brasília: FUNAG, 2010), p.58.

649 Spencer, *Op cit.*, p. 10.

650 Seelke & Yacobucci, *Op cit.*, p. 1.

tropical and subtropical countries in Africa, Latin America and the Caribbean, as well as parts of Asia, where enough land is available to expand biofuel production, especially in those countries that already cultivate sugarcane. With energy cooperation agreements and technology transfer, based on over thirty years' experience in Brazil, Lula believed that Brazil could incite a 'green revolution' in developing countries with the right combination of available land and appropriate climactic conditions, generating jobs, wealth and development.[651] 'The good thing is that a poor country can reduce what it pays for imported oil and earn money exporting this,' explains Ambassador Simões. 'That way they will have more money to invest in social programs, and the production of energy will be democratized in the world, with a hundred countries producing energy instead of just fifteen or twenty.'[652]

According to the Food and Agriculture Organization (FAO), roughly one tenth of the world's 200 million hectares of land that is both available and suitable for sugarcane cultivation is currently being used, not counting forests and protected areas, spanning more than one hundred countries.[653] Among such target states, the Brazilian government's effort to spread the production of biofuels has paid particular attention to Africa. The reasons behind Brazil's focus on African countries are not restricted to the fact that the continent has, after Brazil itself, the largest area of available land for potential expansion of biofuel production, nor that African

651 Lula da Silva, L.I., 'Discurso na Reunião de Alto Nível da FAO sobre Segurança Alimentar, Mudanças Climáticas e Bioenergia', Roma, Itália, 3 de junho de 2008, in Ministério das Relações Exteriores, *Discursos Selecionados do Presidente Luiz Inácio Lula da Silva*, (Brasília: FUNAG, 2008), p. 77. See also Coutinho, L., Melo, L. et al, 'Preface', in Banco Nacional de Desenvolvimento Econômico e Social & Centro de Gestão e Estudos Estratégicos (eds.), *Sugarcane-Based Ethanol: Energy for Sustainable Development*, (Rio de Janeiro: BNDES, 2008), pp. 17-19

652 Cited in Rother, *Op cit.*, p. 188.

653 UNICA, *Brazilian Sugarcane Ethanol: Get the facts right and kill the myths*, November 2009, available at <http://www.unica.com.br/downloads/folhet_MITHYS&FACTS.pdf>, accessed 28 June 2012.

savannahs are geographically very similar to the Brazilian *cerrado*, which was supposedly barren until new techniques were applied to increase the productivity of sugarcane grown there – an experience that could be replicated in the African savannah with Brazilian assistance.[654] During the Lula administration, the Brazilian government acted in Africa with a modern-day sense of *mission civilisatrice*, in which helping Africa to fulfil its entire potential for development was officially a part of Brazil's foreign policy,[655] as part of its wider 'South-South diplomacy'. A junior Brazilian Foreign Ministry official[656] has explained that the Brazilian government is convinced that it is contributing to the development of African states by sharing its experience with biofuels. This conviction sometimes borders on quasi-ideological 'techno-utopianism',[657] reflected in a recent statement by a Brazilian Cooperation Agency (ABC, Brazil's equivalent of USAID in America) representative in Maputo, Mozambique, asserting that 'for each African problem, there is a Brazilian solution'.[658]

Brazil's experience demonstrates that biofuel programmes are an important instrument of sustainable development, if implemented in a responsible manner, in five different ways. First, by incorporating new agricultural technologies, the entire

654 Cabral, L. & Shankland, A., "Narratives of Brazil-Africa Cooperation for Agricultural Development: New Paradigms?" China and Brazil in African Agriculture (CBAA) Project, Working Paper 051, 2013, p. 10, available at: <http://www.future-agricultures.org/publications/search-publications/political-economy-conference-2013/conference-papers-political-economy-2013/brazilian-and-chinese-engagement/1677-narratives-of-brazil-africa-cooperation-for-agricultural-development-new-paradigms-1/file/>, accessed 4 February 2015.

655 Lula da Silva, L.I., 'Discurso do Presidente da República, Luiz Inácio Lula da Silva, durante almoço oferecido pelo Presidente do Quênia, Mwai Kibaki - Nairóbi, Quênia, 06/07/2010', in Ministério das Relações Exteriores, *Resenha de Política Externa: 2º Semestre de 2010*, (Brasília: FUNAG, 2011), p. 104.

656 Interviewed in Brasília, Brazil, 6 February 2012.

657 Cabral & Shankland, *Op cit.*, p. 18.

658 Cited in Alves, A.C., "Brazil in Africa: Achievements and Challenges." In Kitchen, N. (ed.), *Emerging Powers in Africa* (London: LSE IDEAS, 2013), p. 42.

agricultural sector's productivity is increased, including food production. Second, native biofuel industries reduce dependence on imported petroleum for net oil-importing countries, while increasing the amount available for export in oil-producing nations. Third, biofuel programmes have an important industrial side, unlike most traditional agricultural products, which attracts and stimulates investment in industry. Fourth, biofuels diversify not only sources of liquid fuels for transport but also sources of electricity, since biofuels can co-generate electricity during their production cycle when using advanced technologies. And, fifth, biofuels can generate significant export revenues for countries that have a small domestic consumer market and/or that can produce biofuels beyond their internal needs. In sum, Brazil's assistance in generating deeper socioeconomic stability in Africa by actively positioning itself to be the main partner in several African countries' pursuit of energy and food security 'fits Brazil's desire to see, and actively participate in, the ongoing shift in the global economy towards the developing markets of the South.'[659]

In order to propagate biofuel production in Africa and other developing countries, the Brazilian government has employed a series of tactics. First and foremost has been the use of presidential diplomacy. President Lula was a 'marketing man',[660] who travelled the world preaching the virtues of biofuels wherever he went and inviting other world leaders, such as President George W. Bush, to come see the success of Brazilian ethanol for themselves. The fact that roughly two-thirds of Brazilian biofuel cooperation agreements made during President Lula's term were signed abroad confirms the importance of Lula's foreign visits to this strategy.

659 Freemantle & Stevens, *Op cit.*, p. 1.

660 Interview with Paulo César Lima, Legislative Consultant on Energy Matters to the Brazilian Chamber of Deputies, Brasília, Brazil, 2 June 2011. My translation.

However, from 2006 onward Brazil's strategy to spread biofuel production abroad became more unified. Former Foreign Minister Patriota recalls that 'during inter-ministerial meetings – involving the President's Chief of Staff, the Ministries of Energy and Agriculture, among others – what bewildered [the Foreign Ministry] at the time was that many ministries [involved in matters pertaining to biofuels] were in contact with their counterparts in other countries, without having a unified vision behind [these contacts].'[661] This led to the creation of the Energy Department within Brazil's Ministry of Foreign Relations in April 2006, whose role is systematically to coordinate the multiple fronts on which the Brazilian government and private sector engage with the outside world in matters related to biofuels.[662] Since then, Brazil's promotion of biofuels to other countries has followed a largely uniform model of knowledge and technology transfer through exchanging visits by officials and technicians.

Delegations from countries interested in starting up their own biofuels programme are invited to come to Brazil and attend seminars at the Foreign Ministry in Brasília, where they learn about the Brazilian ethanol programme, the different phases of biofuel production, including distribution and the manufacture of flex-fuel vehicles, as well as the socioeconomic impact of ethanol production, its role in the mitigation of greenhouse gas emissions and the current state of biofuels research. Foreign delegations are also invited to go to Rio de Janeiro and/or São Paulo to visit Petrobras, regulatory agencies such as the National Petroleum Agency, the National Development Bank (BNDES), INMETRO, as

661 Interview with Brazil's Minister of Foreign Affairs, Antônio de Aguiar Patriota, Brasília, Brazil, 22 June 2011. My translation.

662 Sequeira, C.D., 'Energia ganha status diplomático', *Correio Braziliense*, 25 June 2006, p.19.

well as sugar mills, ethanol plants and the automobile industry.[663] Equally, Brazil sometimes sends its own officials and specialists abroad to conduct seminars and courses on the aspects of biofuels listed above.

Once a target state decides to adopt a biofuel programme of its own – be it through a bilateral or trilateral agreement (with the US or EU) – a standard three-phase model is followed.[664] During the first phase, Brazil sends a team of researchers from the Getúlio Vargas Foundation, an academic institution, to conduct feasibility studies (using the same methodology in all target states) analysing the country's potential to develop biofuels in a sustainable fashion. These feasibility studies make comprehensive analyses of the social, economic and environmental aspects related to the sustainable production and use of biofuels and bioelectricity, taking into account local stakeholders' views and assessing the potential to meet domestic and foreign demand in order to determine the most appropriate sites, technologies and feedstocks for the implementation of bioenergy projects.[665] The feasibility study's final report is then presented to local authorities, identifying sustainable bioenergy projects with high potential for implementation. The second phase would consist in the host government selecting or prioritising one or more among the potential projects presented by the feasibility study, and finding investors, funding from governmental sources and/or potential partners to participate in those bioenergy projects.[666]

663 Ministério das Relações Exteriores: *Resenha de Política Externa: 2º Semestre de 2005*, (Brasília: FUNAG, 2006), p. 289; and *Resenha de Política Externa: 1º Semestre de 2006*, (Brasília: FUNAG, 2006), p. 255.

664 Interview with senior Brazilian Foreign Ministry Official, Brasília, Brazil, 3 June 2011.

665 Brazil-EU-Mozambique Joint Declaration on the Partnership for the Sustainable Development of Bioenergy, signed at Brasília, 14 July 2010, available at: <http://www.itamaraty.gov.br/sala-de-imprensa/notas-a-imprensa/declaracao-conjunta-brasil-uniao-europeia-mocambique-relativa-a-parceria-para-o-desenvolvimento-sustentavel-de-bioenergia>, accessed 28 June 2012.

666 Interview with junior Brazilian Foreign Ministry official, Brasília, Brazil, 6 February 2012.

Brazilian companies and the BNDES could be involved in funding some of these projects, whose third phase would be their actual implementation, potentially through joint ventures with Brazilian firms.[667]

As a sign of the priority given to African countries in Brazil's quest to disseminate biofuel production worldwide, in 2007 the Brazilian Agricultural Research Corporation (Embrapa), linked to the Ministry of Agriculture, opened an African branch office in Accra, Ghana. When visiting Accra in April 2008, President Lula referred to Embrapa's African branch as 'the cornerstone of a new Brazilian foreign policy strategy, and the spearhead of [Brazil's] commitment to extend to developing countries, particularly African, the benefits that Embrapa has and continues to bring to Brazil'[668] in areas of tropical agriculture, including food and bioenergy production. During its first year, Embrapa's office in Accra sent representatives to seventeen African countries while providing long-distance assistance to thirteen others. Thus Embrapa's office in Ghana serves as bridge of technology transfer and cooperation between Brazilian and African institutions, and is an integral part of the Brazilian government's policy of deepening ties with African countries.

Ideal environmental conditions aside, however, the Brazilian government's strategy to replicate the country's experience with biofuels in African countries through technology transfer is limited by significant socioeconomic differences between the Brazilian and African contexts. Such differences are often overlooked by Brazilian civil servants and researchers, whose optimism regarding

667 Interview with senior Brazilian Foreign Ministry official, Brasília, Brazil, 3 June 2011.

668 Lula da Silva, L.I., 'Discurso do Presidente da República, Luiz Inácio Lula da Silva, durante cerimônia de descerramento de placa alusiva à visita às instalações do escritório regional da Embrapa na África. Acra, Gana, 20/04/2008', in Ministério das Relações Exteriores, *Resenha de Política Externa: 1º Semestre de 2008*, (Brasília: FUNAG, 2008), p. 87. My translation.

African countries' capacity to replicate Brazil's experience with biofuels though technology transfer is overstated, according to Cabral and Shankland:

> *While Brazilian 'development workers' are experts in their own trade, they are not...typically (though there are exceptions) well-acquainted with Africa and the challenges of development in African contexts. The segmented nature of Brazil's cooperation programmes also means that they tend to operate as groups of single-sector specialists, without the opportunities for developing a broader understanding of local realities that can come from involving different disciplinary perspectives. Embrapa researchers may have the skills to become world-class authorities on African plant genetics and soil structures, but establishing successful and sustainable research programmes will require not only good crop science but also a good grasp of the functioning of local institutions and the political dynamics of development.*[669]

Perhaps the most striking difference between the Brazilian and African agricultural contexts is the scale of production. In Brazil, where most sugarcane is cultivated in large plantations, experience demonstrates that ethanol production benefits from economies of scale and mechanisation. The African sugarcane sector, on the other hand, has a large number of smallholders and informal land tenure institutions,[670] making it hard for African biofuel production to reach the same scale and efficiency as Bra-

669 Cabral & Shankland, *Op Cit.*, p. 18.

670 Gasparatos, A., Lee, L.Y., von Maltitz, G.P., Mathai, M.V., de Oliveira, J.A.P. & Willis, K.J., *Biofuels in Africa: Impacts on Ecosystem Services, Biodiversity and Human Well-Being*, UNU-IAS Policy Report, (Yokohama: United Nations University – Institute of Advanced Studies, 2012), pp. 83-88.

zil's.[671] While introducing Brazilian machinery could potentially raise the productivity of African agriculture, it would also create fewer jobs, making mechanisation less viable in Africa, according to a study funded by the European Commission,[672] because Africa has an abundance of cheap labour while qualified labour (required for mechanisation) is still relatively scarce. Moreover, maintaining such machinery requires service agents and spare parts, which are lacking in most of Africa.

Cabral and Shankland remind us that technocratic approaches to African development focused on technological modernisation have a long history of repeated failures, which begs the question of whether Brazil is likely to repeat such past mistakes in its energy statecraft, trying to replicate its experience and transferring its technology to African countries while ignoring their distinct local contexts.[673] According to a Worldwatch Institute study,[674] it is sometimes difficult to replicate another country's experience merely with technology. Brazil's successful experience with biofuels – which arose under very specific historic, political, and socioeconomic conditions – may not be as replicable as the Brazilian government would have it. Brazil's success with biofuels was partly due to its strong education, research, and development foundations – a context which might not be found in developing countries. This is especially true of African countries, which are the main target states of Brazil's energy statecraft because of their

671 Batidzirai, B., Johnson, F.X., Sobhanbabu, P.R.K., Leal, R.L.V., Seebaluck, V. & Purchase, B., 'Bioenergy for Sustainable Development and Global Competitiveness: The Case of Sugar Cane in Southern Africa – Thematic Report 5: International Experiences and Comparisons', *CARENSA/SEI Special Report Series 2008-05* (Stockholm: Stockholm Environment Institute, 2008), p. 98.

672 Diop, D., Blanco, M., Flammini, A., Schlaifer, M., Kropiwnicka, M.A. & Markhof, M.M., *Assessing the Impact of Biofuels Production On Developing Countries From the Point of View of Policy Coherence for Development – Final Report* (Brussels: European Commission, 2013), p. 55.

673 Cabral & Shankland, *Op Cit.*, pp. 18-19.

674 Worldwatch Institute, *Op cit.*, p. 274.

climactic conditions suitable for biofuel production. Antônio Lício, a former official in Brazil's Ministry of Agriculture,[675] states that the problem with investing in biofuel production in Africa is not one of opportunity costs between agriculture for energy or food production, but the continent's endemic structural problems and lack of proper governance. 'Therefore the [Brazilian] strategy is useless', he says; 'only after Africa becomes a "governable" continent with minimal investment conditions – not only in ethanol, but in many other aspects too – will it be worth pursuing this strategy.'

In light of these limitations hindering Brazil's capacity to reach the objectives of its ethanol diplomacy in Africa, the bilateral and trilateral biofuel cooperation agreements signed by Brazil in the last decade have achieved meagre results.[676] Sudan and Angola are the only two cases where Brazilian companies set up biofuel production facilities, and only around 10 to 20% of the memoranda of understanding on biofuel cooperation signed between Brazil and other African countries resulted in some form of concrete implementation of those agreements.[677] Insufficient investment by the private sector is another major reason behind the negligible success of Brazil's engagement to develop biofuel production in Africa.[678] Neither Brazilian nor European businesses invested the financial resources needed for any significant biofuel production

675 Interviewed in Brasília, Brazil, 3 June 2011. My translation.

676 Amanor, K.S. & Chichava, S., 'South–South Cooperation, Agribusiness, and African Agricultural Development: Brazil and China in Ghana and Mozambique', *World Development*, Vol. 81, May 2016.

677 Afionis, S., Stringer, L.C., Favretto, N., Tomei, J. & Buckeridge, M., 'Unpacking Brazil's Leadership in the Global Biofuels Arena: Brazilian Ethanol Diplomacy in Africa', *Global Environmental Politics*, Vol. 16, No. 3, August 2016.

678 Interview with Renato Domith Godinho, Head of the Renewable Energy Division at the Brazilian Ministry of Foreign Affairs, Brasília, Brazil, 12 May 2017.

capacity to take off in Africa.[679] Consequently, Africa's current share of global biofuel production is irrelevant, representing less than 0.5% of the world's production. It can therefore be concluded, with hindsight, that despite the highfalutin political rhetoric promoting it, Brazil's crusade to disseminate the production and use of biofuels in Africa has been met with very limited success in its practical implementation on the ground.

In addition to the limitations in the target states of Brazil's energy statecraft, there are two important domestic reasons that help explain the disappointing results of Brazil's ethanol diplomacy. First is the discovery of massive offshore oil reserves in the so-called 'pre-salt' layer in late 2007, which has dominated Brazil's energy policy debates in the years since. Second, this shift in Brazil's energy policy priority was even more pronounced after Lula's successor, Dilma Rousseff, was elected in 2010. What was a foreign policy priority during most of the Lula administration was completely deprioritized, if not outright relinquished, in President Rousseff's government, not only in her foreign policy but also domestically. By subsidizing gasoline prices in detriment of ethanol fuel's ability to compete with them, the Rousseff administration clearly indicated a higher interest in fossil fuels than renewables.[680] Moreover, unlike her predecessor, whose active presidential diplomacy was a hallmark of his foreign policy and put Brazil's energy statecraft in the international limelight, President Rousseff was notoriously uninterested in international relations, instead focusing on her domestic agenda while conducting a timid foreign policy. No longer sustained with the political priority afforded by presidential diplomacy, the Rousseff administration

679 Interview with Claudia Santos Vieira, former Head of the Renewable Energy Division at the Brazilian Ministry of Foreign Affairs, via Skype call, 22 May 2017.

680 Dalgaard, K.G., 'The Energy Statecraft of Brazil: Promoting Biofuels to African Countries', *Foreign Policy Analysis*, Vol. 13, No. 2, April 2017, p. 327.

saw Brazil's ethanol diplomacy relegated to the day-to-day bureaucratic continuity of those initiatives that had already been set in motion.[681] With Rousseff's disinterest in promoting biofuels abroad – as well as her notable disinterest in foreign policy in general – Brazil's energy statecraft suffered a serious blow since economic engagement needs sustained and patient commitment by the sender state in order to be effective.[682]

Brazil's ethanol diplomacy also suffered from structural changes to the international energy context, especially the abrupt drop in the price of oil since the second half of 2014. Brazil's strategy to promote biofuels abroad, particularly in developing countries dependent on oil imports, was built on the argument that biofuels were a solution to the multiple threats posed to energy security under the previous exorbitant oil price scenario. No longer faced with hefty oil-import bills, and with some countries even discovering their own fossil fuels – such as Mozambique, Brazil's top foreign aid recipient (including plans to develop biofuel production capacity), which recently discovered significant offshore natural gas deposits – the urgency to substitute oil consumption for biofuels has diminished significantly in such target states. Therefore, the energy security context that made Brazil's ethanol diplomacy attractive to some target states is now less favourable in certain aspects.

However, while the availability, reliability and affordability of petroleum have improved, the remaining element of energy security – namely, sustainability – still favours the adoption of biofuels. For another major game changer to the international

681 Interviews with Claudia Santos Vieira, former Head of the Renewable Energy Division at the Brazilian Ministry of Foreign Affairs, and Emerson Coraiola Kloss, also former Head of the Renewable Energy Division at the Brazilian Ministry of Foreign Affairs, both interviewed via Skype call, 22 May 2017.

682 Mastanduno, M., 'Economic Statecraft, Interdependence, and National Security: Agendas for Research', *Security Studies*, Vol. 9, No. 1, 1999, p. 308.

energy security context is the Paris Accord on climate change signed in December 2015 by all of the world's 195 countries, though President Donald Trump would later pull out the United States of the Accord in June 2017. Nevertheless, the Paris Accord represents the commitment of nearly all sovereign states to reduce their greenhouse gas emissions in order to mitigate the worse effects of climate change, and was made possible by the introduction of Intended Nationally Determined Contributions (INDCs). Instead of the top-down approach adopted by the Kyoto Protocol of 1997 – in which a global emission reduction target was set up, with Annex I (developed) countries responsible for the bulk thereof – the Paris Accord embraced a bottom-up approach, whereby each country makes a voluntary proposal on how it will reduce its carbon emissions. The urgent need to curb GHG emissions on a massive scale coupled with the flexibility offered to countries in determining how they will achieve these reductions provide fertile ground for biofuels to flourish as part of countries' INDCs, given the limited alternatives to petroleum-based fuels available in the transportation sector. This context could potentially provide a renewed impetus for Brazil's ethanol diplomacy.

Indeed, in the wake of the Paris Accord, in the subsequent Conference of the Parties (COP-22) in Marrakesh, Morocco, the Brazilian delegation proposed to launch the Biofuture Platform, an intergovernmental initiative with twenty member states[683] and a flexible government-led, multi-stakeholder structure to 'promote an advanced low carbon bioeconomy that is sustainable, innovative and scalable'.[684] The Biofuture Platform seeks to develop joint actions to stimulate new technologies and improved policies

683 Argentina, Brazil, Canada, China, Denmark, Egypt, Finland, France, India, Indonesia, Italy, Morocco, Mozambique, Netherlands, Paraguay, Philippines, Sweden, United Kingdom, United States of America and Uruguay.

684 Biofutureplatform.org, accessed 24 July 2017.

focusing on transport sector decarbonisation. According to its launch statement, the Biofuture Platform's general goals include:

- *Promoting international collaboration and dialogue between policy makers, industry, academia, and other stakeholders*
- *Facilitating an enabling environment for advanced low-carbon fuel and bioeconomy-related investments*
- *Raising awareness and share analysis about the current status, potential, and advantages of low-carbon fuels and other advanced bioeconomy developments*
- *Promoting research and development and share analysis, policy practices and information on R&D activities and needs*
- *Discussing how to effectively evaluate, share and promote sustainable practices for the production of biomass and the entire value chain life cycles.*[685]

The Platform's scope is quite comprehensive with regards to available technologies to reduce carbon emissions. Part of the underlying reasoning behind the Platform is to broaden the scope of one of the arguments that backed Brazil's promotion of biofuels: namely, that they are a solution to help tackle climate change. In that sense, the Biofuture Platform treats a wide range of decarbonising technologies under the single label of 'bioeconomy' – which includes biopower, bio-refineries, biotechnology, bio-based products and green chemistry – and talks about 'low carbon fuels', rather than emphasising first-generation biofuels, as the fastest

685 Biofuture Platform Launch Statement, signed in Marrakesh, Morocco, 16 November 2016, available at: <http://biofutureplatform.org/launch-statement/>, accessed 24 July 2017.

alternative to reduce the carbon intensity of the transportation sector. Thus, following the flexible approach of the voluntary INDCs introduced by the Paris Accord, what the Platform promotes will have different meanings to different countries, depending on their particular needs and specific contexts. This flexibility and wider definition and scope of solutions make it easier to build a coalition of a smaller number of likeminded countries[686] and a forum for discussions in a less controversial environment.[687] This provides an opportunity for Brazil, through its participation in the Biofuture Platform, to assuage the international community's reluctance toward first-generation sugarcane ethanol, treating it as a low-carbon fuel or 'advanced' biofuel, while actively engaging with other members that include some of the world's major biofuel consumers. In that sense, the Biofuture Platform can be interpreted as an attempt to re-launch Brazil's ethanol diplomacy, made broader and more flexible under the scope of 'bioeconomy' rather than just promoting biofuels as a means to decarbonise the transportation sector and mitigate climate change, as well as including other likeminded countries that support the use of (mostly advanced) biofuels.

However, the Biofuture Platform has been questioned for currently not involving more African countries, which – despite their numerous limitations hindering biofuel development discussed above – still hold the largest untapped geophysical potential for (first-generation) biofuel development.[688] Without more African countries producing biofuels, the ultimate goal of

686 Interview with Renato Domith Godinho, Head of the Renewable Energy Division at the Brazilian Ministry of Foreign Affairs, Brasília, Brazil, 12 May 2017.

687 Interview with Emerson Coraiola Kloss, former Head of the Renewable Energy Division at the Brazilian Ministry of Foreign Affairs, via Skype call, 22 May 2017

688 Interview with José Miguez, Head of the Department of Climate Change Policies at the Brazilian Ministry of the Environment, Brasília, Brazil, 21 June 2017.

Brazil's energy statecraft to consolidate a global biofuels market is less likely to be achieved.

5.3. Market Share

According to theory, economic statecraft is more effective when a sender state has a large market share for a given good or product. This is particularly true when employing negative economic statecraft, where a sender state with a large market share of a good can disrupt the flow of its trade to target states in order to achieve the former's political goals. Insofar as energy statecraft is concerned specifically, rather than general economic statecraft, Adam Stulberg considers a sender state to wield significant market power in the energy sector if it controls roughly 30% of supply and exports to foreign markets.[689] However, the international market for biofuels is a relatively recent phenomenon and so far remains small and volatile, with only about 10% of the world's ethanol production traded internationally,[690] since most biofuel production worldwide is made primarily for domestic consumption.[691] Given the current small size of their international market, biofuels make for poor instruments of foreign policy, which is why building such a market is of paramount importance if they are ever to be fully employed as tools of energy statecraft. But as more countries implement policies that mandate the use of biofuel blends into

689 Stulberg, A.N., *Well-Oiled Diplomacy: Strategic Manipulation and Russia's Energy Statecraft in Eurasia*, (Albany, NY: State University of New York Press, 2007), p. 56.

690 Zarrilli, S., 'Development of the Emerging Biofuels Market', in Andreas Goldthau & Jan Martin Witte (eds.), *Global Energy Governance: The New Rules of the Game*, (Washington, D.C.: Brookings Institute Press, 2010), p. 77. See also: Johnson, F.X. & Virgin, I., 'Future Trends in Biomass Resources for Food and Fuel', in Rosillo-Calle, F. & Johnson, F.X. (eds.), *Food versus Fuel: An Informed Introduction to Biofuels*, (London: Zed Books, 2010), p.186; and Carvalhal, C.M., *Ethanol and the Latin American Great Game*, Cambridge Energy Research Associates Decision Brief, April 2007, p.2.

691 Sullivan, M.P., C.R. Seelke & R.G. Rush, 'Latin America: Energy Supply, Political Developments and U.S. Policy Approaches', in Joanna E. Carlson (ed.), *Latin America: Energy and Politics*, (New York: Nova Science Publishers, 2010), p.6.

gasoline and diesel, international trade in biofuels is steadily growing.

Global ethanol production has more than doubled in the period between 2000 and 2005, and its annual production has grown on average by 12.2% between 2000 and 2007, with the US responsible for 43% of that growth, followed by Brazil with 32% and the EU with 15%.[692] Overall, global biofuel production went through a period of rapid growth between 2000 and 2011, growing only moderately after 2011[693] largely due to the crisis in the Brazilian ethanol sector and the regulatory uncertainty caused the EU's biofuel policy U-turn (described below). Brazil was the world's leading producer of ethanol up to 2005, before being overtaken by the US in 2006. With the collective European Union ranking a distant but significant third place in ethanol production – followed by China, Canada, Thailand, Colombia, India and Australia – Brazil and the US dominate the world's ethanol fuel production, together making up around 85% of it. Although Brazilian ethanol production has grown by a little more than 50% between 2005 and 2014, US production has almost quadrupled over the same period, indicating that the rise in global ethanol production has been led predominantly by the United States rather than Brazil (see Table 2). However, since the vast majority of US ethanol production is consumed domestically, Brazil was the world's leading exporter of ethanol by an extremely wide margin until 2011, consistently responsible for more than half of global ethanol exports to 63

692 Ravindranath, N.H., Manuvie, R. & Lakshmi, C.S., 'Biofuels and Climate Change', in Rosillo-Calle, F. & Johnson, F.X. (eds.), *Food versus Fuel: An Informed Introduction to Biofuels*, (London: Zed Books, 2010), p.142. Zarrilli, *Op cit.*, p. 76. Roett, *Op cit*, p. 120. Spencer, *Op cit.*, p. 8. Freemantle & Stevens, *Op cit.*, p. 4.

693 Beckman, *Op cit.*; Renewable Energy Policy Network for the 21st Century (REN21), *Renewables 2016 Global Status Report* (Paris: REN21 Secretariat, 2016). See also Araújo, K., Mahajan, D., Kerr, R. & da Silva, M., 'Global Biofuels at the Crossroads: An Overview of Technical, Policy, and Investment Complexities in the Sustainability of Biofuel Development', *Agriculture*, Vol. 7, No. 4, April 2017.

different countries,[694] but has since been overtaken by the United States.

Table 2: Global Ethanol Production, 2005-2014

	Ethanol production (billion litres/year)										% of world total (2014)
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
USA	14.81	18.51	24.66	35.27	41.38	49.88	52.47	49.89	50.17	54.31	58.0%
Brazil	16.02	17.75	22.57	27.12	26.12	25.82	21.30	21.92	25.78	24.95	26.6%
EU-27	0.86	1.54	1.82	2.72	3.46	4.14	4.03	4.39	4.83	5.11	5.4%
Rest	2.31	3.72	4.61	5.56	5.85	5.61	6.49	7.27	8.21	9.33	10.0%
World	34.00	41.52	53.66	70.67	76.81	85.45	84.29	83.47	88.99	93.70	100.0%

Source: Energy Information Administration (2017).[695]

Brazilian ethanol exports grew relatively steadily since the start of the millennium, and sugarcane producers as well as the government want this upward trend to continue. Petrobras estimated that world demand for biofuels in 2012 was around 5-6% of all liquid fuels for transportation,[696] but that Brazil alone could potentially produce enough ethanol to substitute 10% of world gasoline consumption by cultivating an additional 25 million hectares of sugarcane, mainly from low-productivity, degraded and pasture lands.[697] However, Brazil would need substantial investments in order to expand both its production and exports of ethanol significantly.

694 UNICA, 'Ethanol Exports – By Country', available at: <http://english.unica.com.br/dadosCotacao/estatistica/>, accessed 28 June 2012.

695 Developed from <https://www.eia.gov/beta/international/data/browser/index.cfm>, accessed 29 July 2017.

696 Senado Federal, Subcomissão dos Biocombustíveis, 'Perspectivas de mercado e as projeções e cenários futuros para o setor de biocombustíveis', *Relatório Anual – 2007*, (Brasília: Senado Federal, Secretaria de Editoração e Publicações, 2007), p.20.

697 Johnson, F.X. & Rosillo-Calle, F., 'Food versus Fuel: Concluding Remarks', in Rosillo-Calle, F. & Johnson, F.X. (eds.), *Food versus Fuel: An Informed Introduction to Biofuels*, (London: Zed Books, 2010), p.197.

Around 2006 and 2007, the Brazilian government and sugarcane industry had ambitious expansion plans for the production of ethanol, particularly exports. In September 2006, Silas Rondeau, Brazil's Minister of Mines and Energy at the time, announced that the country expected to double its annual exports of ethanol to 4 billion litres by 2010.[698] Half a year later, Luis Carlos Guedes Pinto, then the Agriculture Minister, said in an interview with Bloomberg that Brazil planned to double its ethanol production to roughly 34 billion litres while tripling its exports to around 10 billion litres by 2014, requiring US$13.4 billion in new investments to achieve that target.[699] Meanwhile, the construction of 77 new ethanol plants were being planned up to 2012, while some of the 335 existing plants at the time were scheduled for upgrades or expansions.[700] With such expectations of growth in the Brazilian ethanol sector, Petrobras announced its plan to build 1150km-long ethanol pipeline from Brazil's sugarcane producing regions to export terminals on the coast, with the capacity to increase ethanol exports significantly.[701]

Despite the Brazilian government's rhetoric about vast ethanol production and export growth, the fact is that Brazilian ethanol exports stagnated in 2007, growing only 3% from 2006. Though ethanol exports made an impressive 45% leap in 2008 to 5.1 billion

698 STRATFOR, 'Brazil: Plan To Double Ethanol Exports', 12 September 2006, available at: <http://www.stratfor.com/brazil_plan_double_ethanol_exports>, accessed 19 October 2011.

699 STRATFOR, 'Brazil: Ethanol Production Increase', 14 March 2007, available at: <http://www.stratfor.com/brazil_ethanol_production_increase>, accessed 19 October 2011. See also Roett, *Op cit.*, p. 120.

700 Bundy, *Op cit.*, p. 6. See also Senado Federal, Subcomissão dos Biocombustíveis, 'Produção e exportação de álcool e biocombustíveis', *Relatório Anual – 2007*, (Brasília: Senado Federal, Secretaria de Editoração e Publicações, 2007), p.15.

701 Ferolla, S.X., 'Biocombustíveis – a saga de muitos pioneiros, in Hage, J.A. (ed.), *A Energia, a Política Internacional e o Brasil: Conflitos e Propostas no Século XXI*, (Curitiba: Instituto Memória, 2008), p.332.

litres,[702] the global financial crisis led to a cutback in production expansion plans while domestic demand kept rising, thus lowering expectations for future ethanol exports to increasingly modest levels. In September 2008, the Energy Research Company (EPE), a research institution linked to the Brazilian Ministry of Mines and Energy, lowered the Ministry's 2006 projection by half to 4.1 billion litres of ethanol exports in 2010, estimating that Brazil would only surpass the original 2006 projection of 8 billion litres in 2017, taking into account the priority given to domestic demand over export markets:

> *In order to meet Brazilian ethanol consumption, EPE estimates that it will be necessary to build 246 new mills by 2017, adding an average of around 4.5 billion liters to the market a year. This amount of projects represents a boost of 60% over the 400 ethanol mills in operation registered by the Agriculture, Livestock and Supply Ministry (Mapa) in 2008. This prospect, however, is affected by the lack of credit in the market as a result of the economic slump in the US which has driven many projects around the world to a halt. ... According to trade experts, the companies will be put on hold in 2009 and this should delay the forecasts for production expansion by at least five years.*[703]

But even with lowered expectations, Brazilian ethanol exports in 2009 fell below their 2006 level and dropped even further to around 1.9 billion litres in the following two years.[704]

702 Ministério da Agricultura, Pecuária e Abastecimento, Departamento de Cana-de-Açúcar e Agroenergia, 'Exportações Brasileiras de Etanol', available at: <www.agricultura.gov.br/desenvolvimento-sustentavel/agroenergia/estatistica>, accessed 28 June 2012.

703 *Análise Energia* (Anuário 2009), 'Ethanol After the Euphoria', December 2008, pp. 229-230.

704 Ministério da Agricultura, Pecuária e Abastecimento, Departamento de Cana-de-Açúcar e Agroenergia, *Op cit.*

Making matters worse was a period of low ethanol inventories during the 'inter-harvest' period – between late November 2010 and early April 2011 – as a result of poor management and planning, which not only crippled Brazil's market share of global ethanol exports, but also forced Brazil to import ethanol from the United States for a brief period during the first semester of 2011, generating price hikes and pessimistic views about the future of ethanol. Indeed, this crisis persisted during the following couple of years, made worse by the abrupt decline in foreign investment in Brazil's ethanol industry in the wake of the 2008 financial crisis, high levels of debt in the sector as a result of the previous boom, continued droughts leading to poor harvests, rising production costs, rising international sugar prices and a cap on gasoline prices.[705] This led around eighty ethanol mills to go out of business between 2011 and 2015,[706] though it should be noted that these were the least efficient mills, whose inefficiencies were overlooked during the boom of the previous decade.[707] So even if there were an open international market for ethanol unhindered by trade barriers, Brazil would not have produced enough ethanol for significant exports during 2011-2012, a situation that has not improved much since then: while ethanol production expanded 165% between 2000 and 2010,[708] it has not grown significantly since then.

705 Ackrill, R. & Kay, A., *The Growth of Biofuels in the 21st Century: Policy Drivers and Market Challenges* (Basingstoke: Springer, 2014); See also Dos Santos, G.R., Garcia, E.A., Shikida, P.F.A. & Rissardi Júnior, D.J., 'A agroindústria canavieira e a produção de etanol no Brasil: características, potenciais e perfil da crise atual', In Dos Santos, G.R. (ed.), *Quarenta anos de etanol em larga escala no Brasil: desafios, crises e perspectivas* (Brasília: Instituto de Pesquisa Econômica Aplicada, 2016).

706 Empresa de Pesquisa Energética (2016), *Op cit.*

707 Interview with Rodrigo Dolabella, Legislative Consultant on Agriculture Matters to the Brazilian Chamber of Deputies, Brasília, Brazil, 15 May 2017.

708 Dos Santos, *Op cit.*

Table 3: Global Ethanol Consumption, 2005-2014

	Ethanol consumption (billion litres/year)										% of world total (2014)
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
USA	15.38	20.78	26.06	36.66	41.79	47.05	47.57	48.69	50.28	50.90	56.0%
Brazil	10.57	11.27	15.21	19.59	22.83	22.91	17.18	16.34	22.03	23.91	26.3%
EU-27	1.12	1.78	2.30	3.55	4.50	5.53	5.74	5.76	5.44	5.75	6.3%
Rest	1.98	2.72	3.76	4.62	5.17	6.02	7.36	8.24	9.41	10.39	11.4%
World	29.05	36.55	47.33	64.42	74.29	81.51	77.85	79.03	87.16	90.95	100.0%

Source: Energy Information Administration (2017).

Meanwhile, US ethanol production has soared beyond domestic demand to exportable quantities. It was reported in May 2011 that, in addition to meeting internal demand, the US exported 760 million litres of ethanol during the first quarter of 2011 alone, roughly the same figure as its total ethanol exports in 2010 and almost double its 2009 exports. According to the Renewable Fuel Association's vice president of research and analysis, Geoff Cooper, '[a]rtificially constrained markets in the US and fears of instability in the policies that impact domestic ethanol production and use are forcing ethanol producers to seek other markets...until we eliminate artificial barriers to greater ethanol use domestically, export markets present real demand opportunities that our industry will continue to explore.'[709]

709 Cited in *Biofuels International*, 'US ethanol exports reach all-time high', Vol. 5, Issue 4, May 2011, p. 5.

Table 4: Global Biodiesel Production, 2005-2014

	Biodiesel production (billion litres/year)										% of world total (2014)
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
USA	0.34	0.93	1.86	2.56	1.97	1.28	3.66	3.72	5.17	4.82	15.7%
Brazil	0.00	0.07	0.41	1.16	1.62	1.29	2.15	2.72	2.91	3.46	11.3%
EU-27	3.60	5.62	7.09	8.73	10.08	10.79	11.76	11.05	11.84	11.85	38.6%
Rest	0.18	0.63	1.03	2.76	4.47	6.55	6.68	7.87	8.29	10.55	34.4%
World	4.12	7.25	10.39	15.21	18.14	19.91	24.25	25.36	28.21	30.68	100.0%

Source: Energy Information Administration (2017).

Where biodiesel – as opposed to ethanol – is concerned, there is still very little being traded internationally. 'Because of restrictive specifications and national policies for biofuels around the world,' write Kaltner et al, 'the market for biodiesel exports remains rather dispersed, varied and impaired by various trade barriers.'[710] Within the embryonic biodiesel market, the European Union is the undisputed leader, collectively responsible for 56% of the world's production in 2009 (10 billion litres produced in the EU, out of 18 billion litres worldwide, with Germany alone responsible for 28% of the EU's total production, while the US produced 2 billion litres and Brazil is estimated to have produced 1.6 billion litres in 2009).[711] By 2016, however, US and Brazilian biodiesel production have increased to 5.5 billion litres and 3.8 billion litres, respectively, with other major players entering this market such as Indonesia and Argentina.

710 Kaltner, F.J., Azevedo, G.F.P., Campos, I.A. & Mundim, A.O.F., 'Biofuels for Transportation in Brazil', in Worldwatch Institute, *Biofuels for Transport: Global Potential and Implications for Energy and Agriculture*, (London: Earthscan Publications, 2007), p.342.

711 U.S. Department of Energy, 'Fact #662: February 14, 2011 – World Biodiesel Production', available at: <http://www1.eere.energy.gov/vehiclesandfuels/facts/2011_fotw662.html>, accessed 28 June 2012; European Biodiesel Board, '2009 Production By Country', available at: <http://www.ebb-eu.org/prev_stats_production.php>, accessed 28 June 2012; Brazil's Ministry of Agriculture, Livestock and Food Supply, *AgriEnergy Statistical Yearbook 2009*, (Brasília: MAPA/ACS, 2009), p. 123.

Table 5: Global Biodiesel Consumption, 2005-2014

	Biodiesel consumption (billion litres/year)										% of world total (2014)
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
USA	0.34	0.99	1.36	1.20	1.23	1.28	3.66	3.72	5.17	5.80	18.9%
Brazil	0.00	0.06	0.37	1.11	1.57	2.46	2.65	2.71	2.92	3.41	11.1%
EU-27	3.06	5.31	7.69	10.15	12.29	13.75	14.46	15.01	13.46	13.00	42.3%
Rest	0.16	0.48	0.72	1.63	2.76	3.72	4.54	5.83	7.05	8.53	27.7%
World	3.56	6.84	10.14	14.09	17.85	21.21	25.31	27.27	28.60	30.74	100.0%

Source: Energy Information Administration (2017).

Though this is still a modest amount – especially when compared to global consumption of so-called 'middle distillates' (which include jet and heating kerosene, as well as conventional diesel oil) of 1.75 trillion litres in 2009[712] – Zarrilli reminds us that 'the development of the [biodiesel] industry in several regions and ambitious government targets in several countries are expected to lead to more international [biodiesel] trade in the future.... Moreover, the need for a number of non-self-sufficient countries to meet biofuels utilization mandates will also likely contribute to the expansion of international trade', with annual global production of biodiesel potentially reaching 44 billion litres by 2018.[713] Given the limited available land to expand biofuel production significantly in Europe, however, 'Brazil faces an unprecedented opportunity to build market share on the European continent.'[714]

Overall, both the global production and trade of biofuels has remained extremely concentrated in the market's three main players: the US, Brazil and the EU, together accounting for 80%

712 *BP Statistical Review of World Energy June 2011*, p. 13.

713 Zarrilli, *Op cit.*, pp. 77-78.

714 Kaltner et al, *Op cit.*, p. 342.

of global biofuel output in 2016.[715] Where ethanol is specifically concerned, Brazil and the US alone account for 85% of global production and trade. However, it should be pointed out that these two countries have swapped positions in terms of which is the leading exporter: while in 2008 Brazil's ethanol exports represented 90% of the two countries' combined exports, in 2014 US exports represented 70% of their combined ethanol exports.[716] This was made possible, on the one hand, by huge productivity gains in the US, and on the other hand, by the 2011-2012 crisis in Brazil's ethanol sector, paving the way for the US to conquer new export markets after 2010, including Brazil. Since 2013, Brazil has slowly been recovering its ethanol production, becoming a net exporter again.

Table 6: Global Biofuels (Ethanol + Biodiesel) Production, 2005-2014

	Total biofuels production (billion litres/year)										% of world total 2014
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
USA	15.15	19.44	26.52	37.83	43.35	51.16	56.13	53.61	55.34	59.13	47.5%
Brazil	16.02	17.82	22.98	28.28	27.74	27.11	23.45	24.64	28.69	28.41	22.9%
EU-27	4.46	7.16	8.91	11.45	13.54	14.93	15.79	15.44	16.67	16.96	13.6%
Rest	2.49	4.35	5.64	8.32	10.32	12.16	13.17	15.14	16.50	19.88	16.0%
World	38.12	48.77	64.05	85.88	94.95	105.36	108.54	108.83	117.20	124.38	100.0%

Source: Energy Information Administration (2017).

Meanwhile, biofuel production in Asia has grown at a faster pace than the rest of the world. While the Asia-Pacific region accounted for only 4% of global biofuel production in 2006, ten years later that share has risen to 11%, with production growing

715 BP, *BP Statistical Review of World Energy June 2017.*

716 Paranhos, P., Presentation delivered at '2015 NEC: Going Global – Building Ethanol Demand Internationally', available at: <https://www.youtube.com/watch?v=_2JqaPJF5ME >, accessed 24 July 2017.

at an annual rate of 25% over that period, compared to a global annual average of 14% over the same period.[717] In Africa, however, biofuel production rose from 70 million to 135 million litres between 2006 and 2011, of which 40% is consumed domestically. African biofuel production has stagnated since then, representing a mere half per cent of global production,[718] despite being the continent with the greatest potential to develop first-generation biofuels. The failure of Africa to develop the full potential of its biofuel sector can be attributed to poor institutional frameworks, inadequate planning, lack of coordination in national renewable energy programmes, pricing distortions, high investment costs and lack of skilled labour.[719]

Thus, Brazil clearly has the potential to be among the world leaders of biofuels in terms of market share. This is especially true for biofuel exports, or what is traded internationally between countries, as opposed to aggregate worldwide biofuel production, most of which is grown for domestic use. Theory suggests that a significant market share of biofuel exports – above 30% according to Stulberg – will better enable Brazil's energy statecraft to be effective. Achieving and maintaining such a leading global position in that market, however, will require significant and sustained investments in the expansion of Brazil's biofuel production capacity, especially considering the increasing competition coming from the aggressive expansion of US production and export of corn ethanol.

717 BP (2017), *Op cit.*

718 *Ibid.*

719 UNCTAD, *Op cit.*

5.4. Elasticity of demand

Theory dictates that economic – or more specifically in this case, energy – statecraft is more likely to succeed if it is implemented with a good that has low elasticity of demand. This is, in principle, true both in negative and positive statecraft: a target state is more likely to acquiesce to demands made in the face of threats to cut off supply of an inelastic good, as well as to bribes made with such a good. What is interesting about employing biofuels in energy statecraft, on the other hand, is that they are extremely elastic in their demand, so far. Petroleum is not, however, and the crucial advantage of biofuels in this respect is not their own elasticity, but their capacity to substitute – or at the very least complement – oil use, thereby diminishing the inelasticity of oil demand, and therefore increasing their force as a tool of energy statecraft. Hence, biofuels serve as instruments of energy statecraft by manipulating the energy security of a target state in terms of enhancing that state's energy security through the diversification of energy sources as an alternative to petroleum-derived fuels.

While there are many alternatives to petroleum in every sector except transportation – such as electricity generation, heating and manufacturing – approximately 95% of the world's transport fuels are derived from crude oil,[720] indicating highly inelastic demand for petroleum in the transportation sector. The only renewable energy sources that can replace oil directly in the transportation sector on a sufficiently large scale are biofuels.[721] But in order to substitute gasoline for biofuels, a fundamental 'chicken and egg'

720 Klare, M.T., *Rising Powers, Shrinking Planet*, (Oxford: Oneworld Publications, 2008), p. 36. Zarrilli, *Op cit.*, p. 75.

721 Maugeri, L., *Beyond the Age of Oil: The Myths, Realities, and Future of Fossil Fuels and Their Alternatives*, (London: Praeger, 2010), p. 126. See also Hunt, S.C. & Flavin, C., 'Preface', in Worldwatch Institute, *Biofuels for Transport: Global Potential and Implications for Energy and Agriculture*, (London: Earthscan, 2007), p. xvii.

problem must first be overcome: 'Consumers are afraid to buy cars that use a new fuel that may be difficult to find. Service station owners are not interested in investing in a parallel fuel distribution system since the number of potential users is usually very small.'[722] This dilemma was experienced in Brazil in the late 1980s and most of the 1990s, when ethanol supply could not meet demand and pure ethanol-driven car sales plummeted from more than 90% in 1989 to less than 1% in 1996. This is a challenge faced by all countries considering a shift away from oil use, particularly in the transportation sector. For, as Richard Lugar and James Woolsey remind us, '[t]he massive infrastructure developed to support gasoline-powered cars is particularly resistant to modifications. It precludes rapid change to alternative transportation systems.'[723]

Contrary to other potential alternatives to petroleum, however, biofuels have the advantage of being easily integrated within the vast distribution and storage infrastructure already in place for oil-derived fuels,[724] including automotive engines, where concentrations of up to 10% ethanol or 20% biodiesel in gasoline and diesel motors, respectively, are imperceptible and do not require engine modifications.[725] As the International Energy Agency has observed, biofuels 'have the potential to leapfrog traditional barriers to entry because they are liquid fuels largely compatible with current vehicles and blendable with current fuels. In fact, low-percentage ethanol blends, such as E10 (10% ethanol by volume), are already dispensed in many service stations

722 Moreira, J.R., 'Bioenergy and Agriculture: Promises and Challenges – Brazil's Experience with Bioenergy', 2020 *Vision for Food, Agriculture, and the Environment*, Focus 14, Brief 8 of 12, December 2006, International Food Policy Research Institute, p.1.

723 Lugar, R. & Woolsey, R.J., 'The New Petroleum', *Foreign Affairs*, Vol. 78, No. 1, January/February 1999, pp. 89-90.

724 Hunt & Flavin, *Op cit.*, p. xvii. Zarrilli, *Op cit.*, p. 75.

725 Banco Nacional de Desenvolvimento Econômico e Social & Centro de Gestão e Estudos Estratégicos, *Op cit.*, p. 260.

worldwide, with almost no incompatibility with materials and equipment. Thus, biofuels could be used in today's vehicles to reduce global petroleum consumption by 10% or more.'[726] Brazil's case clearly illustrates the possibility of reducing dependence on oil for transport: during the first thirty years of *ProÁlcool*, over one billion barrels of oil equivalent were saved by partially substituting gasoline with ethanol.[727]

According to Antônio Carlos Mendes Thame, a Brazilian congressman representing the sugarcane-growing region of São Paulo state, there are two basic ways to establish a biofuel market, both of which were initially implemented as part of the *ProÁlcool* programme: incentives and mandates. Incentives aim to manipulate the economic rewards of producing a certain good – including fiscal incentives, subsidies and higher taxation of competing goods – but are ultimately voluntary; no one is forced to produce the goods in question. Mandates, on the other hand, are compulsory; if a predetermined amount of a good is not produced, the producer is fined. Though both measures were implemented at the outset of *ProÁlcool*, incentives were completely gone after thirteen years, but the compulsory mandate to blend up to 25% ethanol into gasoline has remained and even increased to 27% more recently. Mendes Thame therefore attributes the establishment of a permanent and competitive ethanol market in Brazil, free of subsidies and other incentives, to these mandates.[728]

The same is true for the creation of biofuel programmes in other countries, where the implementation of compulsory biofuel

726 International Energy Agency, *Biofuels for Transport: An International Perspective*, (Paris: International Energy Agency, April 2004), p. 20.

727 Simões, A.J.F., 'Petróleo, Gás Natural e Biocombustíveis: Desafio estratégico no mundo e no Brasil'.

728 Interviewed in Brasília, Brazil, 22 June 2011.Seealso Mendes Thame, A.C., 'Posfácio: O papel dos biocombustíveis', in Maffeis Neto, J.,*A História do Carro Flex no Brasil*, (Embu, SP: IQUAL Editora, 2009), p. 124.

blend mandates automatically generate a market for biofuels, writes Zarrilli: 'The mandatory use of certain amounts or percentages of biofuels in transportation fuels not only creates a market of a certain size but also ensures stability and predictability for new investments. It also helps ensure the growth of the biofuels sector, sets demand ahead of supply, and induces investments to close the gap.'[729] Thus, in realising the potential advantages of biofuels – be they economic, environmental, social or even political – several countries are seeking to develop significant domestic markets for biofuels through blending mandates, effectively guaranteeing a considerable amount of future demand.[730] According to one analyst, the world witnessed a proliferation of biofuel production targets around 2006, and at least 64 countries had adopted national biofuel mandates or targets by 2007.[731]

The bulk of biofuel mandates comes from the European Union, where the goals of reducing greenhouse gas emissions and dependence on imported petroleum have led to the Biofuel Directive (2003/30/EC), mandating that all transport fuels should include a minimum biofuel blend of 2% by the end of 2005 and 5.75% by the end of 2010 in all 27 EU member states.[732] The 5.75% blend mandate alone represents an impressive demand of 14 billion litres of biofuels a year.[733] But in 2009 the EU went even further, repealing the previous directive with a new Renewable Energy Directive (2009/28/EC), mandating that 20%

729 Zarrilli, *Op cit.*, p. 79.

730 Worldwatch Institute, *Op cit.*, p. 118.

731 Smith, *Op cit.*, p. 66.

732 Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport, available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32003L0030:EN:HTML>, accessed 28 June 2012.

733 International Atomic Energy Agency, *Brazil: A country profile on sustainable energy development*, (Vienna: International Atomic Energy Agency, 2006), p. 187.

of all energy consumed in the EU should derive from renewable sources, including a minimum of 10% of transportation fuels,[734] targets which are well beyond the European agricultural sector's capacity.[735] Under pressure from environmental groups, however, in 2015 the European Parliament made a policy U-turn, imposing an EU-wide 7% cap on biofuels made from edible feedstock, to be phased out over the years in favour of increasing the share of second-generation biofuels,[736] causing a high degree of regulatory uncertainty and wariness in Europe's biofuel industry.

In addition to the EU, the most important countries whose blend mandates will drive global demand for biofuels are the United States; China with 10% by 2020; Brazil, which has a varying blend mandate between 18 and 27% for ethanol in gasoline and 5% biodiesel in regular diesel oil; and India, which mandates a 20% ethanol blend by 2017.[737] As of 2016, thirteen countries in the Americas, twelve in the Asia-Pacific region, eleven in Africa, the twenty-seven EU member states and two additional European countries have biofuel blend mandates or targets in place or under consideration.[738]

734 Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC, available at:<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:EN:PDF>, accessed 28 June 2012.

735 Zarrilli, *Op cit.*, p. 87.

736 Casinge, E. 'Parliament rubber stamps EU biofuels reform amid final controversy', EURACTIV.com, 29 April 2015, available at: <http://www.euractiv.com/section/transport/news/parliament-rubber-stamps-eu-biofuels-reform-amid-final-controversy/>, accessed 20 July 2017.

737 *Biofuels Digest*, 'Biofuels Mandates Around the World', 21 July 2011. Available at: <http://www.biofuelsdigest.com/bdigest/2011/07/21/biofuels-mandates-around-the-world/>, accessed 28 June 2012.

738 Lane, J., 'Biofuels Mandates Around the World 2017', *Biofuels Digest*, 28 December 2016, available at: <http://www.biofuelsdigest.com/bdigest/2016/12/28/biofuels-mandates-around-the-world-2017/>, accessed 24 July 2017.

In the United States, the first major boost in domestic ethanol production came with the Energy Policy Act of 2005, which not only banned the use of methyl tertiary-butyl ether (MTBE), thus forcing ethanol's major competitor as an additive to gasoline off the market, but also mandated a Renewable Fuel Standard (RFS) of 7.5 billion gallons (29 billion litres) of ethanol to be blended into gasoline by 2012.[739] Six billion gallons (22.7 billion litres) of ethanol are required each year merely to replace MTBE as an additive to gasoline, which is being phased out because of its polluting effects on ground water.[740]

However, the US government set much more ambitious targets two years later in the Energy Independence and Security Act of 2007, which raised the RFS to 9 billion gallons (34 billion litres) in 2008 (up from 4.7 billion gallons, or 17.8 billion litres, in 2007), with a phased increase to 36 billion gallons (136 billion litres) of ethanol blended into gasoline by 2022, of which 21 billion gallons (79.5 billion litres) must be 'advanced biofuels' derived from feedstocks other than corn starch, such as sugar or cellulose.[741] According to Daniel Yergin, the 2022 target is equivalent to around 20% of all motor fuel in the United States, or the annual oil production of Venezuela or Nigeria.[742] The difficulty with this target is that the US Environmental Protection Agency (EPA) only allows blends of up to 10% ethanol, because more might corrode the internal surface of engines' fuel rails. But as the American ethanol industry has reached the 'blend wall' – when production meets the

739 Energy Policy Act of 2005, available at: <http://www.gpo.gov/fdsys/pkg/PLAW-109publ58/pdf/PLAW-109publ58.pdf>, accessed 28 June 2012.

740 Runge, C.F. & Senauer, B., 'How Biofuels Could Starve the Poor', *Foreign Affairs*, May/June 2007, Vol. 86, No. 3, p. 44.

741 Energy Independence and Security Act of 2007, available at: <http://www.gpo.gov/fdsys/pkg/PLAW-110publ140/pdf/PLAW-110publ140.pdf>, accessed 28 June 2012.

742 Yergin, *Op cit.*, pp. 644-645.

demand for the maximum 10% ethanol blend into gasoline – thus generating surplus for export, the industry has been lobbying the EPA to raise the cap to 15%, even though only 3% of American automobiles are designed to run on fuels containing more than 10% of ethanol.[743]

The most obvious way to remedy this situation – apart from exporting excess production – according to a study by the Worldwatch Institute, is to introduce flex-fuel vehicles to the market on a large scale:

> *Ethanol use can increase to 10 per cent of non-diesel fuel, possibly more, with minimal changes to current car fleet or infrastructure; biodiesel blends can be higher. To go beyond this, however, governments need to address the 'chicken or the egg' dilemma: vehicles are needed that can run on high blends of biofuels; but consumers will not buy them without a distribution system that ensures access to these fuels. Such a distribution system is not likely to develop without the vehicles to demand/use it. This dilemma can be resolved with technologies such as flexible-fuel vehicles (FFVs).*[744]

Therefore, in order for the US to consume the 36 billion gallons of ethanol mandated by the Energy Independence and Security Act, 'massive investment in flex fuel technologies and infrastructure to increase the capability of cars to run on higher ethanol percentages and expand the supplemental distribution of ethanol' are necessary[745] – a proposition that holds true for all countries with ambitious biofuel mandates.

743 Maugeri, *Op cit.*, p. 127. And *The Economist*, 'The age of ethanol', 3 July 2010, p. 47.

744 Worldwatch Institute, *Op cit.*, p. 318.

745 Bundy, *Op cit.*, p. 3.

The technology known as 'flex-fuel' (flexible fuel) arose from research developed in the US, Europe and Japan during the end of the 1980s, in search of a solution to the problems generated by the uncertainty of international oil prices, whose volatility and periodic spikes are economically detrimental to all oil-importing nations.[746] Its introduction in the Brazilian automotive market in 2003 was a promising development in the country's ethanol market, which had been debilitated by the gradual phase-out of pure ethanol-run cars. Engines powered only by ethanol depended on the permanent availability of ethanol at the pump and at prices competitive with gasoline, which, given the fluctuations in the prices of oil and sugar, could not be guaranteed. By introducing FFVs, the choice of fuel was transferred from the automobile industry to the consumer, thus revolutionising fuel use in Brazil by 'democratising' the choice of fuel in favour of the consumer, forever 'banishing the ghost of ethanol scarcity' and potentially even gasoline shortages, should they happen.[747]

Advocates of flex-fuel technology list several advantages of its adoption. They argue that for consumers, the security of fuel supply engendered by the possibility of fuel choice at the pump is highly attractive, despite Brazil already having a wide ethanol distribution infrastructure in place. It is also attractive for ethanol producers, who are afforded greater flexibility in determining whether their sugarcane crops are turned into ethanol fuel or refined sugar, depending on harvest yields and international sugar prices. Car manufacturers also benefit, saving money by not having to build duplicate models running on either gasoline

746 Maffeis Neto, J., *A História do Carro Flex no Brasil*, (Embu, SP: IQUAL Editora, 2009), p. 24.

747 Meirelles, J.C.S., 'Posfácio: Carro Flex: vitória do consumidor', in Maffeis Neto, J., *A História do Carro Flex no Brasil*, (Embu, SP: IQUAL Editora, 2009), pp. 137-138. My translation.

or pure ethanol.[748] Beyond Brazil, where biofuel markets are not as well-established, they argue that introducing FFVs, in addition to mandatory blends, will stimulate the expansion of ethanol production while bridging the gap between today's biofuels grown from agricultural feedstocks to the advanced biofuels of the future, such as cellulosic (or 'second-generation') ethanol.[749] Moreover, FFVs allow countries that adopt them to use whatever fuel is available domestically, be it gasoline or ethanol, until a national biofuel market is properly consolidated.[750]

Early surveys conducted with new FFV owners indicate that their choice of fuel at the pump is defined primarily by the relative price of the fuel, although some consumers deliberately choose ethanol over gasoline due to environmental concerns.[751] The liberty of fuel choice notwithstanding, flex-fuel engines seem to offer no disadvantage in performance *vis-à-vis* regular ones:

> *The surveys carried out with Brazilian owners of flex fuel vehicles show that they are satisfied with the performance, power and automatic regulation of engines. Most of them have stated that "in the beginning, many different mixtures of alcohol and gasoline are tested, however, it makes almost no difference for the power of the engine, which is easily adapted to the fuel used. Therefore, the best alternative is the chance to fill the tank with the cheapest fuel per kilometre driven." All of*

748 Szwarc, A., 'Posfácio: A opção pelo Flex Fuel', in Maffeis Neto, J., *A História do Carro Flex no Brasil*, (Embu, SP: IQUAL Editora, 2009), p. 140.

749 *The Economist*, 'The age of ethanol', 3 July 2010, p. 47.

750 Maffeis Neto, *Op cit.*, pp. 110-111.

751 *Ibid.*, p. 21.

> *the users interviewed stated that they would buy a flex fuel vehicle again.*[752]

And since no other alternative energy technology is available on a viably large commercial scale in the automotive industry – such as hydrogen fuel cells or electric cars that perform as well as those with combustion engines – it is safe to assume that FFVs are the most practical option to reduce oil dependence in the transportation sector in the short to medium term.[753]

To quote Daniel Yergin, '[t]o say that flex-fuel vehicles "caught on" [in Brazil] would be an understatement.' In 2003, when they were first launched, only 40,000 FFVs were sold in Brazil,[754] comprising merely 4% of new cars sold that year. In 2004, this share skyrocketed to 22%, 50% in 2005, 78% in 2006, over 2 million new FFVs sold in 2007 representing 86% of all new car sales, 87% in 2008 with over 2.3 million units sold,[755] 94% by August 2009 and a total of more than ten million FFVs on the road by March 2010[756] (roughly one third of the entire national car fleet), while the Brazilian Sugarcane Industry Association (UNICA) estimated that FFVs made up as much as 50% of Brazil's automotive vehicle fleet in 2012 and 65% in 2015.[757] 'The rate at which this technology has been adopted is remarkable,' said Barry Eagle, president of Ford do Brasil in 2006, 'the fastest I have ever seen in the motor

752 Szwarc, A., 'New technologies ensure the demand for hydrated alcohol in Brazil', in Mendes Thame, A.C. (ed.), *The History of the Alcohol Car*, (Embu, SP: IQUAL Editora, 2003), p.117.

753 Schneider, J., 'Posfácio: O Sucesso dos Veículos Flex', in Maffeis Neto, J., *A História do Carro Flex no Brasil*, (Embu, SP: IQUAL Editora, 2009), p. 133.

754 Yergin, *Op cit.*, p. 653.

755 Maffeis Neto, *Op cit.*, p.21.

756 Bodman, S.W. & Wolfensohn, J.D. (Chairs); Sweig, J.E. (Project Director), *Global Brazil and U.S.-Brazil Relations*, Independent Task Force Report No. 66, (New York: Council on Foreign Relations, 2011), Endnote 23, p.83.

757 UNICA, 'Light vehicle sales', available at <http://english.unica.com.br/dadosCotacao/estatistica/>, accessed 28 June 2012.

sector, faster even than the airbag, automatic transmission, or electric windows'.[758] In the words of another observer, 'no one, not even the most ardent advocates of ethanol and biofuel-run engines, would have dared imagine that flex-fuel vehicles would, over a very short period of less than five years, mean the end of the era of cars fuelled only by gasoline [in Brazil].'[759] Yet the rest of the world still has a long way to go in terms of adopting flex-fuel technology in automobile manufacture. In June 2009, there were over 16.4 million FFVs in circulation worldwide: 8 million in the US, 7.5 million in Brazil, 600 thousand in Canada, 300 thousand in Sweden and a few thousand spread over other countries like France, the United Kingdom, Germany and Thailand.[760]

The fact that Brazil is at the vanguard of flex-fuel technology represents, in principle, an additional motivation behind the country's goal of commoditising ethanol, in hopes of gaining new export markets for FFVs. Indeed, the increasing use of biofuels in other countries provides an opportunity for Brazilian automobile manufacturers to expand their FFV production beyond domestic demand. However, Brazilian FFV exports have been limited due to a lack of ethanol fuel and distribution infrastructure in potential export markets. In an attempt to remedy this situation, in 2008 the Federation of Industries of the State of São Paulo (FIESP) joined up with the Brazilian Automotive Industry Association (ANFAVEA) and Brazil's Sugarcane Industry Association in a campaign to promote FFV exports, even to countries where they would only run on gasoline for lack of a local ethanol market. This partnership's goal, writes Maffeis Neto, was to popularise FFVs with the view that 'demand always precedes supply' – in other

758 Cited in Rother, *Op cit.*, p. 185.

759 Maffeis Neto, *Op cit.*, p. 20. My translation.

760 Szwarc, *Op cit.*, p. 140.

words, the existence of an FFV fleet could subsequently lead to ethanol production, or at least to ethanol imports when oil prices rise excessively. However, even though Brazil's Foreign Ministry set up its own Energy Department, provisions to incentivise FFV sales are not included in trade agreements for the adoption of compensation mechanisms in automotive trade with other countries – an oversight that FIESP considers a 'failure,'[761] since increased FFV and ethanol use abroad would not only further stimulate demand for Brazilian ethanol, which the country has the long-term capacity to meet, but would also go a long way toward commoditising ethanol globally.

Nevertheless, the commoditisation of ethanol depends less on the adoption of FFVs than on the implementation of biofuel blend mandates worldwide. While flex-fuel technology increases the elasticity of demand for both ethanol and oil, compulsory blend mandates make the demand for ethanol decidedly inelastic by generating a fixed and mandatory demand for it. Given the considerably limited market share of ethanol compared to petroleum, however, biofuels are extremely unlikely ever fully to substitute oil and the relatively inelastic demand for it. But ethanol and other biofuels can, in fact, become a permanent complement to the energy supply in the transportation sector by substituting harmful additives to gasoline such as MTBE. If ethanol ever becomes an established additive to gasoline through compulsory blend mandates in most countries, it will effectively turn into a global commodity[762] with entrenched (and less elastic) demand for it. But ultimately, biofuels' advantage as instruments of energy statecraft lies not in their potential inelasticity of demand – even

761 Maffeis Neto, *Op cit.*, pp. 29-30.

762 Interview with Brazilian Congressman Antônio Carlos Mendes Thame, Brasília, Brazil, 22 June 2011.

if only as an additive to gasoline – but in their capacity to diminish the inelasticity of oil.

5.5. Government control of commercial actors and public-private partnerships

As mentioned in previous chapters, William Norris[763] puts forward the notion that economic statecraft is unlikely to be very effective unless the sender state's government has a large degree of control or influence over the specific private commercial actors that actually implement the measures stipulated by the economic statecraft of that sender state. This is particularly the case with energy statecraft, where most states able to pursue it as part of their foreign policies tend to have national energy companies firmly in the government's control, such as Russia's Gazprom or the national oil companies of most OPEC member states. However, while Brazil does have a national energy giant in Petrobras, its biofuel sector is entirely private, and therefore requires a significant level of public-private cooperation effectively to implement energy statecraft using ethanol and other biofuels. Since the success of biofuels as instruments of energy statecraft hinges on the creation of an international biofuel market – unlike 'traditional' energy statecraft, where there are established markets and consumer dependence on oil and gas – the private commercial actors that carry out the technology transfer that helps build such a market become of paramount importance to Brazil's energy statecraft strategy of promoting biofuels abroad.

According to an extensive study on biofuels by the Worldwatch Institute, bilateral and multilateral governmental agreements play

763 Norris, W., 'Economic Statecraft: The Use of Commercial Actors in Grand Strategy', *Paper presented at the annual meeting of the International Studies Association: 'Theory vs. Policy? Connecting Scholars and Practitioners'*, New Orleans Hilton Riverside Hotel, The Loews New Orleans Hotel, New Orleans, LA, 17 February 2010.

a crucial role in the promotion of biofuels through technology transfer. Notwithstanding governments' vital role in this transfer, the study states that in practice the actual flow of biofuel technology is executed by the private sector:[764]

> *The process of transferring biofuel technology and expertise can be understood as a process of managing technological change. It involves the flows of knowledge, experience and equipment among different stakeholders, including governments, private-sector entities, financial institutions, non-governmental organizations (NGOs), research and educational institutions and labour unions. It encompasses technological cooperation and the diffusion of technologies both within countries, as well as between them. And it involves the process of learning to understand, utilize and replicate existing biofuel technologies – including the capacity to select and adapt them for local conditions and even to sell them back to the original source as improved technologies. …*
>
> *Technology flows are also influenced by government policies and by financial aid and development programmes. The rate of such flows is affected by the motivations of the relevant stakeholders and by the barriers that impede them – both of which are influenced by government policies, including environmental and climate change policies.*
>
> *Most technology flows occur in, or are driven by, the private sector (between commercial parties), although they can also involve the government or community.*[765]

764 Worldwatch Institute, *Op cit.*, pp. 267-268.

765 *Ibid.*, pp. 264-264.

Mendes Thame reminds us that the fact that the Brazilian government detains the technology for agricultural production of biofuels while Embrapa holds the scientific knowledge behind it, could theoretically allow free technology transfer to other countries. However, the industrial sector, which actually operates the production of biofuels once the technology and knowledge are in place, does not belong to the government; it belongs to private enterprise,[766] which encompasses the actors that carry out the government's energy statecraft in practice. In line with this reality, the aforementioned Worldwatch Institute study then goes on to suggest that one way that 'Brazil (and other biofuel leaders) can stimulate biofuel technology transfer abroad is through bilateral technological cooperation, supported by government diplomacy and implemented by the private sector.'[767] This formula of public-private partnership is at the heart of Brazil's energy statecraft, as vouched for by Lula's Foreign Minister, Celso Amorim, who states that the Brazilian government's initiatives to promote ethanol and biodiesel in other countries are aided by the dynamism and competitiveness of Brazilian entrepreneurs.[768] Indeed, it will not be possible to maintain Brazil's international leadership in biofuels unless the interests of the Brazilian state are aligned with those of its private agribusiness sector, according to Arnaldo Jardim, a Brazilian congressman.[769]

In a sector as complex as biofuels – which overlaps the energy, agricultural and industrial sectors, as well as advanced technologies and scientific research and development – it is no surprise that several different commercial actors are involved in the

766 Interview with Brazilian Congressman Antônio Carlos Mendes Thame, Brasília, Brazil, 22 June 2011.

767 Worldwatch Institute, *Op cit.*, p. 275.

768 Amorim, 'Prefácio', *Op cit.*, p. 6.

769 Jardim, *Op cit.*, p. 58.

Brazilian government's promotion of biofuels to other countries, including several ministries (e.g., Foreign, Energy, Agriculture, Environment, Trade) as well as NGOs and the private sector. According to a senior Brazilian Foreign Ministry official, the two actors that have had the greatest responsibility and influence in the government's overall strategy of ethanol dissemination across the world are the Foreign Ministry and UNICA, the Sugarcane Industry Association. UNICA, which represents the interests of the major sugarcane producers in Brazil, mostly in the state of São Paulo, has offices in Washington, D.C. and Brussels, where, along with Brazil's Embassies there, it is very active in lobbying the US Congress and the European Commission, respectively, to drop import tariffs on ethanol and any other form of protectionism that serves as an impediment to the creation of an international market for ethanol.[770] UNICA's representation in Brussels is particularly focused on issues surrounding the environmental sustainability of ethanol production, such as participating in roundtables and debates on certification and standardisation of ethanol fuel as a product, which would represent a significant step toward its commercialisation.[771] Both of these activities are in line with the Brazilian government's goals and strategies pursued in the international promotion of biofuels, as President Lula advised in a speech: 'we will have to arrive [in other countries] speaking a single discourse on ethanol; there is not a discourse by UNICA and one by another group, there is not a discourse by the Government and one by UNICA. We will have to arrive there speaking a single language, a single discourse'[772] – implying the need for Brazilian

770 Interview with senior Brazilian Foreign Ministry official, Brasília, Brazil, 3 June 2011.

771 Interview with UNICA representative, São Paulo, Brazil, 14 June 2011.

772 Lula da Silva, L.I., 'Discurso do Presidente da República, Luiz Inácio Lula da Silva, por ocasião da cerimônia em comemoração ao quinto aniversário do jornal "Valor Econômico", em São Paulo, no dia 2 de maio de 2005', in Ministério das Relações Exteriores: *Resenha de Política Externa: 1º Semestre de 2005*, (Brasília: FUNAG, 2005), p. 137.

non-governmental commercial actors, such as UNICA, to align their public views on biofuels with the government's, if Brazil's energy statecraft is to be effective. Taking this into consideration, it is advantageous for Brazil's energy statecraft that UNICA shares the government's principal goal in that endeavour:

> *One of the main objectives of UNICA is promoting Brazilian ethanol abroad. To this end, UNICA formed a partnership with APEX-Brasil, the Brazilian trade and investment promotion agency [in December 2007]. The project started in January of 2008 and targets the markets of North America, Europe and the South and East of Asia.*
>
> *UNICA formed a partnership with APEX-Brasil to establish ethanol as a global energy commodity. The agreement contemplates shared funding of around R$16.45 million through the end of 2009 [revised to a total of R$18.75 million by the end of that period[773]] to promote Brazilian ethanol as a clean and renewable fuel around the world.*
>
> *Among the activities foreseen under this agreement are improving the ethanol supply structure, commercial intelligence studies and projects to promote ethanol in high-impact events like fairs and seminars, and work to enhance the image of ethanol via a public relations effort aimed at key opinion makers around the world.*
>
> *In addition to having direct benefits for UNICA members and other areas of the sugar-energy sector, this project will benefit the sugarcane ethanol supply chain, which includes biotechnology research for new strains*

773 See UNICA, *Sustainability Report 2010*, (São Paulo: Grafilar, 2011), p. 95.

> *of sugarcane, suppliers of inputs and equipment, rural producers, trading companies, logistical structure and service providers.*[774]

The UNICA partnership with APEX-Brasil has been fundamentally important for Brazil's inclusion in international biofuel debates, and was renewed in 2010 to continue the activities listed above to promote the adoption of biofuels worldwide and increased exports of Brazilian ethanol,[775] aiming to stimulate the demand side of ethanol's commoditisation.

In addition, Brazilian government agencies are also involved in incentivising the supply side of ethanol commoditisation through public-private partnerships. Domestically, the Brazilian development bank, BNDES, is the country's ethanol sector's main source of finance,[776] and in 2007 it even established a department dedicated exclusively to deal with investments in the ethanol sector.[777] From 2006 onward, BNDES dramatically increased the amount of loans it made to the sector, reaching R$ 8.28 billion in 2010, compared to an annual average of one billion reais between 2001 and 2005. In light of the global financial crisis of 2008, BNDES loans were somewhat scaled back, averaging R$ 6.5 billion per year between 2008 and 2012.[778] On the other hand, the ethanol sector is also the principal source of BNDES's losses in the period between 2006 and 2016, amounting to half a billion reais over that

774 UNICA, *Sustainability Report 2008*, (São Paulo: Editora Gráficos Burti, 2009), p. 62.

775 UNICA, *Sustainability Report 2010*, p. 96.

776 Wilkinson, J., *Biodiplomacia brasileira na África: o caso dos biocombustíveis* (Rio de Janeiro: ActionAid, 2014).

777 Interview with Rodrigo Dolabella, Legislative Consultant on Agriculture Matters to the Brazilian Chamber of Deputies, Brasília, Brazil, 15 May 2017.

778 Ramos, P., 'Trajetória e situação atual da agroindústria canavieira do Brasil e do mercado de álcool carburante', In Dos Santos, G.R. (ed.), *Quarenta anos de etanol em larga escala no Brasil: desafios, crises e perspectivas* (Brasília: Instituto de Pesquisa Econômica Aplicada, 2016).

period.[779] Due to the financial constraints suffered as a result of Brazil's ongoing economic crisis, the amount lent to the ethanol sector by BNDES in 2016 was the lowest since 2004. Thus, despite being entirely private, Brazil's ethanol sector is nevertheless highly dependent on the state's financial resources, be they loans or subsidies. In fact, the sector's expansion over the past decade would probably not have reached the same magnitude if it were not for its privileged access to state financing and support. Moreover, the crises the sector went through from 2011 onward – be they financial or climate-driven (e.g., droughts) – might have been even worse if the Brazilian government had not bailed it out through BNDES's losses mentioned above. Indeed, the return of tax breaks and subsidies in 2013 (in order to stimulate the sector's recovery) demonstrates the public-private interconnection between the Brazilian government and the ethanol industry.[780]

Internationally, the Brazilian strategy to spread the production of biofuels has given particular attention to the African continent, where this endeavour has been spearheaded by Embrapa, the government-linked Brazilian Agricultural Research Corporation, which opened a representative office in Accra, Ghana, inaugurated by President Lula himself during an official visit in April 2008: 'In Africa, Embrapa focuses on technology transfer, knowledge diffusion, agricultural and socio-economic development, environmental sustainability and food, fibre and energy security. ... The office in Ghana coordinates the agencies' efforts on the continent, as well as acting as an agent in facilitating linkages between financial organisations and

779 Reuters, 'Açúcar, etanol e bens de capital lideram prejuízos do BNDES', *Exame*, 28 December 2016, available at: <http://exame.abril.com.br/economia/acucar-etanol-e-bens-de-capital-lideram-prejuizos-do-bndes>, accessed 24 July 2017.

780 Empresa de Pesquisa Energética, *Análise de conjuntura dos biocombustíveis – ano 2013* (Brasília: Ministério de Minas e Energia, 2013).

Brazilian companies and African governments and continuing to accelerate the shift towards biofuels across the continent.'[781] As a result, several Brazilian companies are getting financial support and other incentives from Brazilian government agencies taking part in promoting bilateral and multilateral biofuel cooperation, in order to sell and transfer biofuel technologies abroad.[782] The synergy between Brazilian government agencies, such as BNDES and the ABC, and the country's private sector in promoting the development of biofuel technology transfer in Africa has been notable.[783]

The commercial actor over which the Brazilian government holds most control, however, is the national oil and gas company, Petrobras, which also plays an important role in the government's energy statecraft. Sérgio Gabrielli, the former CEO of Petrobras during most of the Lula administration, has written that in view of the prospects of global growth in the biofuel sector, Petrobras seeks to become not only an oil and gas company, but an energy company more broadly, by taking on a strategic role in developing the necessary infrastructure and logistics for increased ethanol exports. Improving the transport infrastructure to deliver ethanol from producers to the market is a fundamental step to help create an international ethanol market with a large share of Brazilian exports. To that end, Petrobras has formed partnerships with private companies to build an ethanol pipeline linking Brazil's ethanol producing regions to export terminals on the coast, with a projected annual capacity of 8 billion litres. Gabrielli made clear, however, that Petrobras does not intend to participate in ethanol production for domestic consumption, but invests in

781 Freemantle & Stevens, *Op cit.*, pp. 5-6.

782 Worldwatch Institute, *Op cit.*, p. 269.

783 Bodman, Wolfensohn & Sweig, *Op cit.*, pp. 60-61.

export capacity in order to contribute to increase the Brazilian private sector's capacity to supply future ethanol demand from around the world, by investing in infrastructure while at the same time increasing the national energy company's participation in ethanol exports.[784] A study by the International Atomic Energy Agency views this strategy as necessary to achieve Brazil's goal of expanding its market share of ethanol exports worldwide, but the strategy is also ultimately dependent on the private actors in the Brazilian sugarcane sector increasing production:

> *The application of this export oriented strategy would necessitate expanding ethanol production capacity in Brazil…. However, this strategy can only be implemented if…additional ethanol supply is reliable and long term contracts are negotiated. Given that sugar cane yields, and hence ethanol production, vary from year to year, an ethanol storage system would be needed in conjunction with ethanol exportation under long term contracts. This is the reason why some specialists argue that Petrobras should participate in this programme, both through its fuel storage system and through its fuel trade divisions. For instance, Petrobras oil pipelines already transport ethanol from the major areas of sugar cane production (São Paulo State) to possible locations of ethanol shipping (Rio de Janeiro and Santos harbours), and Petrobras exports petroleum or petrol products to several markets, including Africa, Southeast Asia and the United States of America.*[785]

784 Gabrielli de Azevedo, J.S., 'A Petrobras e o mercado internacional de etanol', *Revista Opiniões*, Abr-Jun 2007, available at:<http://www.revistaopinioes.com.br/aa/materia.php?id=143>, accessed 28 June 2012.

785 International Atomic Energy Agency, *Op cit.*, p. 187.

In an effort to solidify this strategy, the Brazilian government, aware that the country's biofuel sector lacked regulation, decided through a presidential degree by Lula's successor, Dilma Rousseff, to consider ethanol a strategic fuel rather than an agricultural product. With this new measure, ethanol is now being regulated by the National Petroleum Agency (ANP, the government's regulator of the fuel market). 'But the government didn't adopt this measure thinking of our international projection,' says a senior Brazilian Foreign Ministry official, 'but because of our internal needs. But the measure does have an influence in our actions abroad'.[786] This new measure will regulate the entire productive chain of ethanol and other biofuels and will frame the biofuel industry within the same legal regime defined by Brazil's Constitution for the oil industry. The National Petroleum Agency is now responsible for the regulation of ethanol production, creating stocks and inventories, distribution, as well as determining the amounts reserved for exports or imports. According to one source, this governmental intervention into the private sector has a clear political objective: to favour Petrobras' plan to become an important global player in the fledgling international ethanol market.[787]

It is interesting to observe that the reach and limits of the government's actions in the expansion of the Brazilian ethanol sector are still being defined in practice. Roberto Rodrigues, the former Minister of Agriculture during part of the Lula administration, advocates greater government intervention and even the creation of a National Energy Secretariat, with the goal of attributing strategic treatment to the sector, which it lacks today, in his opinion. Without such strategic coordination for the sector – which, according to Rodrigues, only the government can

786 Interview with senior Brazilian Foreign Ministry official, Brasília, Brazil, 3 June 2011.

787 Casado, J., 'A mão pesada do Estado chega ao setor de álcool', *O Globo*, 26 August 2007, p.39.

offer – it will be impossible to turn ethanol into an international commodity. Without an articulated governance structure, Brazil's strategic objectives for its biofuel sector will find themselves under threat, according to one observer.[788]

However, since the discovery of Brazil's massive pre-salt layer oil reserves in 2007, the actions of the Brazilian government have been increasingly at odds with the interests of the country's ethanol sector. The 2008 financial crisis dealt a serious blow to the booming Brazilian ethanol industry, whose crisis deepened in 2011 and 2012 due to successive droughts that resulted in poor harvests. To make matters worse, since 2010 the government of President Rousseff capped the price of gasoline, which is the direct competitor of ethanol, in an attempt to curb inflation. Already under considerable stress from high indebtedness after the financial crisis, in addition to successive poor harvests, the subsidies given to its main competitor made it extremely difficult for ethanol to compete with gasoline under such market-distorting conditions, with domestic ethanol sales dropping by 16% between 2009 and 2013,[789] thus further deepening the sector's crisis. Taking into account the ethanol sector's substantial dependence on government credit and the poor performance of Brazil's ethanol industry since 2011, investment in the sector has plummeted, undermining its capacity to meet domestic, let alone foreign, demand. With the Brazilian government's actions diverging from the interests of the country's ethanol industry, the long-term objectives of Brazil's ethanol diplomacy have clearly been undermined, especially the expansion of Brazil's production and export capacity. Thus, the intensity of public-private partnerships that sustained the momentum of Brazil's energy statecraft during

788 Abramovay, R., 'Eficiência e contestação socioambiental no caminho do etanol brasileiro', *Politica Externa*, Vol. 17, No. 2, Sept/Oct/Nov 2008, p. 28.

789 Wilkinson, *Op cit.*

President Lula's administration decreased as his successor's interest in promoting biofuels abroad dwindled significantly.[790]

5.6. Concluding remarks

The hypothesis raised by this study states that if the four variables identified in the conceptual literature, listed above, are favourable, energy statecraft should be more likely to succeed. First, the formulation of Brazil's foreign policy goals in its implementation of energy statecraft using biofuels has focused on two key objectives: the creation of an international market for biofuels where ethanol is freely traded as a commodity, and the significant increase of Brazilian ethanol exports therein. While ambitious, this first objective – namely the commoditisation of ethanol and possibly other biofuels as well – is attainable in the longer term, but is ultimately dependent on actions taken by several other actors. This is why the Brazilian initiative during the Lula administration to encourage and assist other countries to produce their own biofuels – both for their own domestic consumption as well as for export – is such an important aspect of the overall strategy pursued to achieve the goals of Brazil's energy statecraft.

The second objective in Brazil's formulation of its foreign policy goals sought through energy statecraft is directly linked to the second conditional variable identified in the literature, namely increasing Brazil's market share of global biofuel production, particularly where exports are concerned. In this respect, Brazil started from a comfortable position of being the world's top ethanol producer, but was quickly overtaken by US production. In what relatively little ethanol is traded internationally, Brazil used to hold a comfortable leading position, but has also been overtaken

790 Dalgaard, *Op cit.*, p. 333.

by the US. As global demand for ethanol and other biofuels keeps growing, Brazil will need to invest heavily in expanding its biofuel production capacity – not only to supply its growing domestic demand, but also to produce increasing amounts for export – if it is to regain its position as the world's foremost exporter of ethanol fuel.

Third, theory suggests that in order to be an effective instrument of energy statecraft, the energy resource employed should have low elasticity of demand. Biofuels, however, are extremely elastic and countries that use them are not dependent on their imports, especially when compared to petroleum use worldwide, which is particularly inelastic in the transportation sector. The elasticity of demand for biofuels nevertheless decreases as more countries implement policies that mandate a compulsory blend of biofuels as an additive to traditional fossil fuels, thus increasing their efficacy as instruments of energy statecraft. Interestingly, though, it is precisely the elasticity of biofuels and their capacity to complement fossil fuels as additives, thereby reducing import dependence on the latter, that make biofuels attractive as alternative fuels. Moreover, the introduction of flex-fuel technology in the automobile industry addresses the elasticity problem raised by petroleum-based gasoline use by allowing consumers freely to choose their fuel at the pump, rather than being restricted to a single fuel source for their cars. This increases the elasticity of ethanol, too, but in doing so counteracts the inelasticity of oil dependence. In that sense, the efficacy of biofuels as instruments of energy statecraft lies more in their ability to enhance a target state's energy security *vis-à-vis* petroleum imports in the form of positive statecraft, rather than as a potential punitive measure exploiting a target state's import dependence on an inelastic good, as would be the case with negative statecraft.

Lastly, Norris[791] suggests that in addition to the three conditional variables delineated above, effective economic statecraft depends also on the degree of control or influence the sender state has over the private commercial actors that actually implement the political measures dictated by the state when formulating its energy statecraft. In that regard, while the Brazilian state does control its national oil company, Petrobras, it is largely the country's private sector that is responsible for the production and commercialisation of biofuels. Carrying out the Brazilian government's energy statecraft strategy of commoditising ethanol and increasing Brazil's market share of ethanol exports worldwide therefore requires a large degree of cooperation between the government and private companies, as well as establishing lasting public-private partnerships. In Brazil's case, the interests of private ethanol producers have, for the most part, been convergent with the government's, while both have often acted in partnership to promote increased biofuel use abroad. However, the Brazilian government's decision to subsidise gasoline prices in detriment of ethanol is clearly divergent from the interests of the Brazilian ethanol sector, thus reducing the strength of this conditional variable for effective energy statecraft.

A major common theme that runs through these four variables – on which, in theory, effective energy statecraft is conditioned – is the still embryonic existence of an international market for biofuels and the goal to create one. Without a fully developed and established global biofuels market, energy statecraft using biofuels cannot be employed in a similar manner to more 'traditional' energy statecraft utilising oil and natural gas – either as a stick (negative) or a carrot (positive). Instead, the instrumentality of biofuels as a form of energy statecraft lies not in their inelasticity

791 Norris, *Op cit.*

and market share dependence, but precisely in their ability to decrease the energy security threats posed by the dependence on other, more traditional energy sources. As such, energy statecraft using biofuels still manipulates the energy security of another state to achieve the sender state's political goals – in accordance with the definition of 'energy statecraft' used herein – but in a more positive manner, enhancing the target state's energy security, rather than increasing its reliance on energy import dependence. Thus, the goal of creating a global market where ethanol and other biofuels are freely traded as commodities is a significant step toward enhancing the energy security of many countries, which is a crucial objective of Brazil's ethanol diplomacy.

CHAPTER 6
CONCLUSION

This book began by acknowledging the relative scarcity of scholarly research on economic instruments of foreign policy (i.e., 'economic statecraft') in general and on positive economic statecraft in particular, and has sought to make a contribution to the literature on these general subjects. More specifically, this study focused its research on a particular subset of economic statecraft, namely energy statecraft – in other words the use of energy resources as a particular and unique type of economic foreign policy instrument – the academic scrutiny of which is fairly new to International Relations and Foreign Policy Analysis. What comparatively little has been published so far on energy statecraft – as is the case with economic statecraft – has tended to focus on the negative uses thereof, in detriment of studies on positive energy statecraft. Moreover, these studies have almost exclusively examined petroleum and natural gas as instruments of foreign policy. Conversely, scholarly inquiry on the use of biofuels as instruments of a state's energy statecraft were completely unheard of at the time the research for this book began. Thus, the goal of this study has been to examine the use of biofuels as an instrument of a state's foreign policy.

To inform this analysis, this book reviewed the literature on economic statecraft and adopted a 'conditionalist' approach to it. This school of thought stipulates that the right question to ask is not *if* economic statecraft works, but *when* and *under what conditions* it is likely to be effective. Within the conditionalist literature on economic statecraft, four conditional variables that determine the efficacy of economic statecraft were identified: 1) the commensurability between the means and ends sought in foreign policy; 2) the magnitude of an economic interaction; 3) the price elasticity of an economic good; and 4) the degree of control a government has over the commercial actors that carry out its economic statecraft in practice. These four conditional variables were adapted to the particular characteristics of energy resources – i.e., the specific economic goods used in energy statecraft – in order to form a theoretical framework with which to test this study's main hypothesis: namely, if all four conditional variables are favourable, energy statecraft is more likely to succeed.

Moreover, a further subcategory of the conditionalist economic statecraft literature – the international conditionalist (as opposed to domestic conditionalist) approach – finds that the international context in which economic statecraft takes place also plays a role in determining its efficacy. A chapter on the international energy security context of the past couple of decades was therefore included to explain how opportunities have surfaced in recent times for energy statecraft in general and energy statecraft using biofuels in particular. Since the focus of this study was on biofuels, rather than other energy resources (like oil and gas), only one case study was available, in terms of a country using its native biofuels as an instrument of its foreign policy: Brazil's ethanol diplomacy. Thus, this study made use of the Brazilian case to test its hypothesis, which sought to answer the question of whether Brazil's energy statecraft using biofuels has been successful.

Adopting biofuels as part of a country's energy mix brings several benefits in terms of the four elements of energy security listed in Chapter 3: availability, reliability, affordability and sustainability. Biofuels have the potential not only to substitute, or at least complement, petroleum consumption, but there is significant land available around the world on which to grow more crops for biofuel production. They also enhance the energy security of countries that consume them by decreasing dependence on costly oil imports from few, unreliable suppliers. Lastly, biofuels help reduce greenhouse gas emissions, which is needed to mitigate the harmful effects of climate change.

However, these benefits will only reach their full potential if a well-structured international market for biofuels is created, writes Antônio Simões, a Brazilian ambassador. In order to develop such a market, it is necessary to increase the number of biofuel-producing countries, establish common standards and norms for biofuels, expand the consumption of biofuels to as many countries as possible, and trade biofuels through mercantile exchanges and futures markets – all of which comprise the Brazilian government's goal of turning ethanol (the world's most widely used biofuel) into a globally traded commodity.[792] To that end, the Brazilian government developed several strategies in the pursuit of its goal, which have been evaluated in the previous chapter.

Brazil's President Lula assumed that as countries around the world started to blend ethanol into gasoline as a measure to curb greenhouse gas emissions, ethanol would become a commodity

792 Simões, A.J.F., 'Biocombustíveis: A Experiência Brasileira e o Desafio da Consolidação do Mercado Internacional', in Ministério das Relações Exteriores, *Biocombustíveis no Brasil: Realidades e Perspectivas*, (Brasília: Ministério das Relações Exteriores, 2007), p. 23.

with an internationally determined price. 'We have to be more responsible,' he said, 'because we have to…guarantee the supply of the Brazilian market and the international market. Therefore, we have to plant more sugarcane and boost the cultivation of ethanol in other countries.'[793] Lula's energy statecraft discourse, however, was more rhetoric than action. The greater part of biofuel agreements Brazil signed with other countries during Lula's administration have not resulted in concrete implementation, according to several Brazilian officials.[794] Moreover, Brazil has had 'no success' in reaching the goals of its ethanol diplomacy, according to one expert: 'Ethanol is far from being a commodity. Europe and the United States still maintain their barriers [to Brazilian ethanol]. The ethanol scarcity in Brazil [in 2011] was very bad not only for its own ethanol industry, but had external repercussions, [suggesting] that Brazil does not have [the capacity to produce] enough ethanol even for its domestic market.'[795] In light of the propaganda built up around Brazil's objective to foster an international ethanol market, the inability to supply its own (let alone external) demand seriously undermines Brazil's credibility as a stable and reliable biofuels supplier, an image that is indispensable to persuade other countries to adopt their use.

The Brazilian congressman Antônio Carlos de Mendes Thame largely agrees with the proposition that the Brazilian government under Lula did not succeed in opening new markets for Brazilian

793 Lula da Silva, L.I., *Op cit.*, p. 565.

794 Interviews with: Paulo César Lima, Legislative Consultant on Energy Matters to the Brazilian Chamber of Deputies, Brasília, Brazil, 2 June 2011; Renato Domith Godinho, Head of the Renewable Energy Division at the Brazilian Ministry of Foreign Affairs, Brasília, Brazil, 12 May 2017; Claudia Santos Vieira, former Head of the Renewable Energy Division at the Brazilian Ministry of Foreign Affairs, via Skype call, 22 May 2017; and Emerson Coraiola Kloss, former Head of the Renewable Energy Division at the Brazilian Ministry of Foreign Affairs, via Skype call, 22 May 2017.

795 Interview with Paulo César Lima, Legislative Consultant on Energy Matters at the Brazilian Chamber of Deputies, Brasília, Brazil, 2 June 2011. My translation.

ethanol exports: 'Lula only talked, called [ethanol] mill owners heroes, brought Bush to Brazil, but did not open a single market.' What few markets have been opened to Brazilian ethanol exports so far, he says, have been opened by Brazilian private actors, including the Brazilian Sugarcane Industry Association's (UNICA) lobbying efforts in Washington and Brussels, rather than by the federal government. On the other hand, he also acknowledges that Lula's incessant promotion of Brazilian ethanol (even if it was mostly through discourse) was a positive thing; that the Foreign Ministry was competent in defending the interests of Brazil's ethanol abroad; and that the Brazilian Agricultural Research Corporation's (Embrapa) technology transfer efforts have, in fact, resulted in the construction of a few Brazilian ethanol plants in Africa – all of which are important steps toward Brazil's goal of commoditising ethanol.[796]

Despite the many advantages conferred by adopting ethanol fuel, and President Lula's 'tireless insistence' that 'the Brazilian experience demonstrates that biofuels will play an increasingly important role' in a 'clean and cheap' global energy mix,[797] most countries have hesitated to follow Brazil's lead in committing fully to the use of biofuels.[798] James Smith attributes this to the unique historical, technical, political and environmental context that allowed the Brazilian experience with ethanol to flourish: 'It is difficult to see how Brazil's recipe for success can easily be replicated elsewhere. Biofuel production is intimately entwined in local agro-ecological contexts, and dependent on local capabilities to shape

796 Interview with Congressman Antônio Carlos Mendes Thame, Brasília, Brazil, 22 June 2011.

797 Lula da Silva, L.I., 'Declaração à imprensa concedida pelo Presidente da República, Luiz Inácio Lula da Silva, em conjunto com o presidente do México, Felipe Calderón, após cerimônia de assinatura de atos – Brasília – DF, Palácio Itamaraty, 17/08/2009', in Ministério das Relações Exteriores, *Resenha de Política Externa: 2º Semestre de 2009*, (Brasília: FUNAG, 2010), p. 83. My translation.

798 Rother, L., *Brazil on the Rise: The Story of a Country Transformed*, (London: Palgrave Macmillan, 2010), p. 185.

socio-technical systems to unlock the potential of bioenergy.'[799] For Leonardo Maugeri, '*Brazil remains an exception*' in managing to provide competitive ethanol due to the country's geographical and climactic conditions, which boasts abundant water for crop irrigation and vast tracts of arable land, all of which is ideally suited for sugarcane cultivation ('the crop that is the most productive for bioethanol and that consumes the least energy to obtain it'), not to mention cheap labour that reduces the cost of producing biofuels. For these reasons, he writes, 'Brazil is to biofuels as Denmark is to wind power, Saudi Arabia is to oil, and the United States is to coal. Nature has endowed these countries with specific resources and features that cannot be replicated.'[800]

Ideal environmental conditions aside, moreover, the Brazilian government's strategy to increase the use of biofuels worldwide by transferring technology to other countries may also be limited by potential target states' underdevelopment in terms of human infrastructure and governance. 'Because technology is typically more than just a piece of hardware or a set of ideas,' according to a study by the Worldwatch Institute, 'it is not always easy to replicate another country's experience with technological change and transfer. One of the sources of Brazil's biofuel success…has been the country's strong foundation of research, education and training, a capacity platform that required sustained effort over time to establish and maintain. This situation may not be easily found in other countries (particularly developing countries)'.[801]

799 Smith, J., *Biofuels and the Globalization of Risk: The biggest change in North-South relationships since colonialism?*, (London: Zed Books, 2010), p. 39.

800 Maugeri, L., *Beyond the Age of Oil: The Myths, Realities, and Future of Fossil Fuels and Their Alternatives*, (London: Praeger, 2010), p. 131. Original emphasis.

801 Worldwatch Institute, *Biofuels for Transport: Global Potential and Implications for Energy and Agriculture*, (London: Earthscan, 2007), p. 274.

This is especially true of African countries, which are the main target states of Brazil's energy statecraft. While similar soil and climate conditions may be necessary preconditions to apply Brazil's biofuel experience in African countries, they are insufficient. More important still are the social, political, and economic characteristics that define the local contexts of countries interested in adopting biofuel programmes. Whether or not specific aspects of the Brazilian biofuel model can be adapted or applied – rather than replicated – in African contexts must be determined on a case-by-case basis in terms of how conducive each target state's social, political, and economic characteristics are to the transfer of experience and technology from Brazil.

A further setback in Brazil's campaign to promote its experience with biofuels abroad was the announcement of enormous oil and gas discoveries in November 2007, whose quantities are continuously revised upwards as more oil is found in the so-called 'pre-salt' layer several thousand metres under the seabed, which the government estimates could be between 70 and 100 billion barrels of oil equivalent.[802] The excitement generated by these discoveries among policymakers and in public debates is one of the major reasons why the 'euphoria behind [biofuels] and the expansion of the foreign market for Brazilian ethanol, which occurred in 2006, declined in 2007 and went cold in 2008.'[803] Since the mammoth pre-salt discoveries, ethanol and biofuels have significantly lost ground to oil in Brazilian public discourse and particularly in political debates, suggesting a shift in priority in Brazil's energy policy, if not in its energy statecraft, as Larry Rother notes:

802 Portal Brasil, 'Novas Reservas', available at < http://www.brasil.gov.br/sobre/economia/energia/pre-sal>, accessed 28 June 2012.

803 *Análise Energia* (Anuário 2009), *Op cit.*, p. 229.

> *Brazil's own priorities…seem to be changing. Before the discovery in the Sub-Salt basin in 2007, the government clearly regarded the ethanol program as the single most important strategic mechanism in its drive to achieve energy self-sufficiency. But the size of the recent oil bonanza is so large and so dazzling that hopes that ethanol will be a magic bullet, admittedly unrealistic, seem to be slipping. Brazil continues to invest in and support the program, but some enthusiasm has now been lost, and with it some momentum. … Already, Brazil's discourse in international forums has also changed: Once the most ardent proponent of renewable green energy, Brazil now has a vested interest in prolonging consumption of fossil fuels…for as long as possible.*[804]

This noticeable shift in priority notwithstanding, President Lula insisted in several speeches and interviews during his last couple of years in office that 'Brazil will not renounce its environmental agenda to be merely an oil giant. We want to consolidate our condition as a world power in green energy.'[805] Despite the discovery of sizable oil reserves in deep waters, Brazil 'will continue advocating the creation of a global biofuels market with a large number of producers in the developing world.'[806] The pre-salt discoveries do not change this, Lula wrote: 'We will not give up our achievement in renewable energy, and will continue

804 Rother, *Op cit.*, p. 189.

805 Lula da Silva, L.I., 'Discurso do Presidente Luiz Inácio Lula da Silva no Debate Geral da 64ª Sessão da Assembléia-Geral das Nações Unidas – Nova York, 23/09/2009', in Ministério das Relações Exteriores, *Resenha de Política Externa: 2º Semestre de 2009*, (Brasília: FUNAG, 2010), p. 104. My translation.

806 Lula da Silva, L.I., 'Entrevista exclusiva concedida por escrito pelo Presidente da República, Luiz Inácio Lula da Silva, ao jornal El Mundo, da Espanha – Brasília – DF, 29/12/2009', in Ministério das Relações Exteriores, *Resenha de Política Externa: 2º Semestre de 2009*, (Brasília: FUNAG, 2010), p. 480. My translation.

to expand it, on behalf of our own interests and of our global responsibilities toward the environment.'[807]

Lula's insistence was not only due to his self-declared passion for biofuels, however, but also because of the moment in time in which his ethanol promotion abroad took place: in 2007, Brazil envisaged producing around 50 billion litres of ethanol as early as 2012, which would have left around 20 to 25 billion litres of surplus export capacity, which did not happen. Then came the global financial crisis in 2008, which significantly reduced investments in the Brazilian biofuel sector, although the government continued to promote biofuel production abroad, but with considerably less drive than before.[808]

But even with Lula's reassurances that Brazil had not changed its energy policy priority, the shift was even more pronounced under his successor, President Dilma Rousseff, who, having previously acted as Lula's Energy Minister and as Chairman of the Board of Directors of Petrobras while serving as Lula's Chief of Staff, seemed much more interested in the pre-salt oilfields, which attracted many more votes for her politically, says one observer.[809] By subsidizing gasoline in detriment of ethanol's cost-competitiveness, President Rousseff demonstrated greater interest in fossil fuels than renewable energy.[810]

807 Lula da Silva, L.I., 'Entrevista exclusiva concedida por escrito pelo Presidente da República, Luiz Inácio Lula da Silva, à Offshore Magazine, da Noruega – Oslo – Noruega, 01/10/2009', in Ministério das Relações Exteriores, *Resenha de Política Externa: 2º Semestre de 2009*, (Brasília: FUNAG, 2010), pp. 441-442. My translation.

808 Interview with Rodrigo Dolabella, Legislative Consultant on Agriculture Matters to the Brazilian Chamber of Deputies, Brasília, Brazil, 2 June 2011.

809 Interview with Paulo César Lima, Legislative Consultant on Energy Matters to the Brazilian Chamber of Deputies, Brasília, Brazil, 2 June 2011.

810 Dalgaard, K.G., 'The Energy Statecraft of Brazil: Promoting Biofuels to African Countries', *Foreign Policy Analysis*, Vol. 13, No. 2, April 2017, p. 327.

Rousseff's domestic indifference toward biofuels was also reflected in her foreign policy, which was generally apathetic in most areas, not just energy statecraft. While Brazil's ethanol diplomacy did not necessarily cease to be a priority under Rousseff, she was nowhere near as incisive as Lula in its promotion abroad. Brazil's energy statecraft during the Rousseff administration was therefore mostly consigned to the bureaucratic continuity of her predecessor's initiatives.[811] Her disinterest in promoting biofuels abroad caused a serious setback in Brazil's ethanol diplomacy, as any foreign economic engagement requires sustained and patient commitment to be effective.[812]

However, the 2015 Paris Accord on climate change – in which nearly all the countries of the world have affirmed their commitment to reduce greenhouse gas (GHG) emissions – has provided an opportunity for biofuels to comprise countries' Intended Nationally Determined Contributions (INDCs), particularly in the petroleum-dominated transport sector. The Brazilian government saw this as an opportunity to re-launch its energy statecraft in a broader and more flexible form, and therefore paired up with nineteen other national governments[813] at the 22nd Conference of the Parties in Marrakesh to inaugurate the Biofuture Platform, a multi-stakeholder initiative to promote a sustainable and innovative low-carbon bioeconomy focused on decarbonising the transportation sector. The Biofuture Platform's flexibility, emphasizing a wider range of decarbonising technologies

811 Interviews with Claudia Santos Vieira, former Head of the Renewable Energy Division at the Brazilian Ministry of Foreign Affairs, and Emerson Coraiola Kloss, also former Head of the Renewable Energy Division at the Brazilian Ministry of Foreign Affairs, both interviewed via Skype call, 22 May 2017.

812 Mastanduno, M., 'Economic Statecraft, Interdependence, and National Security: Agendas for Research', *Security Studies*, Vol. 9, No. 1, 1999, p. 308.

813 Argentina, Canada, China, Denmark, Egypt, Finland, France, India, Indonesia, Italy, Morocco, Mozambique, Netherlands, Paraguay, Philippines, Sweden, United Kingdom, United States and Uruguay.

under the broader label of 'bioeconomy', makes it easier to build a smaller coalition of likeminded countries committed to low-carbon transport fuels.[814] However, whether such a coalition can successfully disseminate low-carbon fuels worldwide (the ultimate objective of Brazil's energy statecraft) without involving more African countries – which make up the world's largest potential for expanding biofuel production – remains to be seen.

This is an important question because it has been widely debated whether this goal – to diversify the world's liquid fuels toward more sustainable ones – is best achieved by incentivising biofuel production for export in tropical countries whose climactic conditions are most suited for their cultivation, or by producing biofuels domestically exclusively to meet local demand.[815] So far, biofuel production worldwide has been spurred predominantly by domestic policies that support indigenous biofuels at the expense of imports from countries better suited for biofuel production, only opening their markets to imports when demand outruns local supply. Such domestically-oriented policies, however, severely limit the expansion of a truly global market for biofuels, delaying the Brazilian government's goal of commoditising ethanol by years, if not decades.[816] This situation has been exacerbated by the fact that the world's most important demand centres, the United States and the European Union, have protected their markets with tariff and non-tariff barriers:

> *Seeing its ethanol exports blocked by the United States and Europe, Brazil is learning that energy security*

814 Interview with Renato Domith Godinho, Head of the Renewable Energy Division at the Brazilian Ministry of Foreign Affairs, Brasília, Brazil, 12 May 2017.

815 Worldwatch Institute, *Op cit.*, p. 155.

816 Hunt, S.C. & Flavin, C., 'Preface', in Worldwatch Institute, *Biofuels for Transport: Global Potential and Implications for Energy and Agriculture*, (London: Earthscan, 2007), p. xix. See also, *Análise Energia* (Anuário 2009), 'Ethanol After the Euphoria', December 2008, p. 230.

> *and climate change were only a part of the reason countries looked to biofuels. Certainly, these arguments were important, but biofuel mandates would not have happened if not for the power of agriculture in both the United States and Europe.*
>
> *Brazil's problem, then, is that it merely solved the problem politicians talked about – it has developed a fuel that reduces greenhouse gas emissions and comes from a place that is politically stable and friendly to both the European Union and United States. In solving the rhetorical problem without offering a political fix, it has placed U.S. environmental activists and EU politicians in a difficult position, and has not necessarily won markets. The larger problem…is that there is little interest in either the United States or Europe in staring down the agricultural interests.*[817]

Thus, while the introduction of compulsory biofuel mandates in potential consumer states creates inelastic demand for biofuels, this does not necessarily translate into demand for imports thereof, nor does it stimulate the development of an international market for them.

This is evidenced by the fact that, over the last couple of decades, 84-91% of global ethanol production and 82-89% of its consumption have been concentrated in only two countries: the United States and Brazil (see Tables 7 and 8). These figures suggest that both countries produced ethanol mostly for their own domestic consumption. This would indicate a 'failure' of the Brazilian government's efforts to commoditise ethanol,[818]

817 Mongoven, B., 'The Biofuel Backlash', STRATFOR, 13 September 2007, available at <http://www.stratfor.com/biofuel_backlash>, accessed 19 October 2011.

818 Dalgaard, *Op cit.*, p. 334.

especially considering that few, if any, of the countless biofuel cooperation agreements signed between Brazil and several African countries have moved forward, with Africa producing less than 0.5% of the world's ethanol today.

Table 7: Market Share of Global Ethanol Production, 2005-2014

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
USA	43.6%	44.6%	46.0%	49.9%	53.9%	58.4%	62.3%	59.8%	56.4%	58.0%
Brazil	47.1%	42.7%	42.0%	38.4%	34.0%	30.2%	25.2%	26.2%	29.0%	26.6%
EU-27	2.5%	3.7%	3.4%	3.8%	4.5%	4.8%	4.8%	5.3%	5.4%	5.4%
Rest	6.8%	9.0%	8.6%	7.9%	7.6%	6.6%	7.7%	8.7%	9.2%	10.0%
(USA + Brazil)	90.7%	87.3%	88.0%	88.3%	87.9%	88.6%	87.5%	86.0%	85.4%	84.6%

Source: Energy Information Administration (2017).[819]

Table 8: Market Share of Global Ethanol Consumption, 2005-2014

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
USA	52.9%	56.9%	55.1%	56.9%	56.2%	57.7%	61.1%	61.6%	57.7%	56.0%
Brazil	36.4%	30.8%	32.1%	30.4%	30.7%	28.1%	22.1%	20.7%	25.3%	26.3%
EU-27	3.9%	4.9%	4.9%	5.5%	6.1%	6.8%	7.4%	7.3%	6.2%	6.3%
Rest	6.8%	7.4%	7.9%	7.2%	7.0%	7.4%	9.4%	10.4%	10.8%	11.4%
(USA + Brazil)	89.3%	87.7%	87.2%	87.3%	86.9%	85.8%	83.2%	82.3%	83.0%	82.3%

Source: Energy Information Administration (2017).

On the other hand, this contrasts with global biodiesel production and consumption, which are considerably less concentrated than ethanol (see Tables 9 and 10), despite the latter's larger volume in both. While the production and consumption of ethanol has consistently remained concentrated in the United

819 Developed from U.S. Energy Information Administration, 'International Energy Statistics', available at: <https://www.eia.gov/beta/international/data/browser/index.cfm>, accessed 29 July 2017.

States and Brazil throughout the years, biodiesel production and consumption have both gone from being entirely concentrated in the European Union – 87% and 86%, respectively, in 2005 – to being much more diversified today. Though the EU still leads the global production and consumption of biodiesel today, other players – including, but by no means limited to, the US and Brazil – have gained considerable market share over the last two decades.

Table 9: Market Share of Global Biodiesel Production, 2005-2014

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
USA	8.2%	12.8%	17.9%	16.8%	10.9%	6.4%	15.1%	14.7%	18.3%	15.7%
Brazil	0.0%	1.0%	4.0%	7.6%	8.9%	6.5%	8.9%	10.7%	10.3%	11.3%
EU-27	87.4%	77.5%	68.2%	57.4%	55.6%	54.2%	48.5%	43.6%	42.0%	38.6%
Rest	4.4%	8.7%	9.9%	18.2%	24.6%	32.9%	27.5%	31.0%	29.4%	34.4%

Source: Energy Information Administration (2017).

Table 10: Market Share of Global Biodiesel Consumption, 2005-2014

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
USA	9.5%	14.5%	13.4%	8.6%	6.9%	6.0%	14.5%	13.6%	18.1%	18.9%
Brazil	0.0%	0.9%	3.6%	7.9%	8.8%	11.6%	10.5%	9.9%	10.2%	11.1%
EU-27	86.0%	77.6%	75.8%	72.1%	68.8%	64.8%	57.1%	55.1%	47.1%	42.3%
Rest	4.5%	7.0%	7.1%	11.4%	15.5%	17.6%	17.9%	21.4%	24.6%	27.7%

Source: Energy Information Administration (2017).

It could be argued that, in addition to national biofuel mandates, the diversification of biodiesel producers worldwide has been driven by demand from the EU (the largest biodiesel producer), which has been unable to produce enough biodiesel to meets its high internal demand, given that 80% of its road transport is fuelled by diesel (which requires biodiesel blends) rather than gasoline (which requires ethanol blends). Europe's increasing gap between its demand for biodiesel and its ability to supply it created opportunities for new producers – such as Argentina, Indonesia and Malaysia – to fill that gap, producing enough biodiesel to export to European markets. Moreover, even though total biofuels production has more than tripled between 2005 and 2014, ethanol output less than tripled compared to biodiesel, whose output increased more than sevenfold over that period. Indeed, as a share of total biofuels produced worldwide, biodiesel has gone from 11% to 25% over those ten years (see Table 11), and the gap between ethanol and biodiesel has continued to narrow since.

Table 11: Share of Global Biofuel Production by Biofuel Type (Ethanol + Biodiesel), 2005-2014

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Ethanol	89.2%	85.1%	83.8%	82.3%	80.9%	81.1%	77.7%	76.7%	75.9%	75.3%
Biodiesel	10.8%	14.9%	16.2%	17.7%	19.1%	18.9%	22.3%	23.3%	24.1%	24.7%

Source: Energy Information Administration (2017).

Two new hypotheses may be inferred from this discussion. First, biodiesel has a better chance than ethanol of becoming a globally traded commodity, given the former's rapidly increasing share of total biofuel production and the greater diversification of its producers and consumers, since a large number of both producers and consumers are needed for commoditisation. Second, insofar as biofuels are being commoditised, it is not Brazil's ethanol diplomacy that is driving it, but market forces led by EU-mandated demand for biodiesel.

However, a preliminary challenge to these hypotheses, especially the second, arises from the European Parliament's recent biofuels policy U-turn, which imposes an EU-wide 7% cap on blends from first-generation biofuels that reduce less than 70% of GHG emissions after indirect land-use change has been accounted for, and a gradual phase-out of all biofuels made from food crops. And herein lies the paradox of biofuels' commoditisation, alluded to above: while demand for low-carbon fuels in the world's great demand centres generates export opportunities for competitive biofuels from developing countries, less efficient biofuel producers in the developed world are protected by agricultural non-tariff barriers that hinder the development of an international biofuels market. The validity of these hypotheses, however, is outside the scope of this book and therefore needs to be addressed in future research, the groundwork for which this study has provided.

To conclude, this study revisits the classical International Relations theory of Hans Morgenthau, who 'acknowledges that the strategies and tactics that leaders used to transform the potential attributes of power into influence are just as important as the attributes themselves.'[820] Given the fact that the Brazilian government has had scant success in opening new export markets for its biofuels, and its even more ambitious foreign policy goal of creating an international market where ethanol is traded freely as a commodity is unlikely to come to fruition, it would seem fair to presume that the strategies pursued under Brazil's energy statecraft have been ineffective. To repeat David Baldwin's quote at the beginning of this book, however, '[t]he utility of a technique of statecraft is a function of the situation and not a quality intrinsic to the particular technique'[821] – a proposition also present in Morgenthau's work, who Ned Lebow mentions when stating that

820 Cited in Lebow, R.N. *A Cultural Theory of International Relations*, (Cambridge: Cambridge University Press, 2008), p. 557.

821 Baldwin, D.A., *Economic Statecraft*, (Princeton, NJ: Princeton University Press, 1985), p. 123.

'power is not so readily transformed into influence because it is heavily context-dependent.'[822]

Thus, the lesson that emerges from this study is that the contexts in which energy statecraft takes place – both the international context and the domestic context of the target states toward which energy statecraft is directed – are of fundamental importance to the likelihood of its success. Energy statecraft using oil as an instrument, for example, tends only to work during periods of tight supply and exorbitant prices in the international petroleum market. The same is true for biofuels, the use of which is most attractive when they are economically competitive with oil, during times when the latter's price is high, and in countries that have suitable conditions for their production. The case of Brazil's ethanol diplomacy illustrates this well:

> *There was a moment between 2006 and mid 2008 that Brazil felt close to becoming a world power in the production of biofuel. The country showed off its credentials of the largest and most efficient ethanol producer on the planet. It seemed to have the solution to help the world face the rising oil prices and global warming. Hefty investments were made to expand the sector and several bilateral agreements were signed. However, in 2008, the environment changed radically. The price of oil collapsed, Brazil announced the discovery of the largest oil reserve found in many years and a few of the countries that warmed up to the idea of ethanol began to cool down. Ethanol production in Brazil is going well and the prospects for the local and foreign market continue promising. Maybe the biggest change was in*

822 Cited in Lebow, *Op cit.*, p. 551.

> *timing. It seems that the world power idea will have to be left for a later date.*[823]

In that sense, the current international energy context – characterized above all by the need to reduce fossil fuel use and curb GHG emissions – still generates demand for renewable energy sources like biofuels, particularly in the petroleum-dependent transportation sector, despite the relatively low oil prices brought on by the shale revolution. Countries that have significant expertise in biofuel production – such Brazil, the United States, and the European Union – can assist other countries to develop their renewable energy potential if the right set of policies can be identified to suit the specific local needs and conditions of target states on a case-by-case basis, provided the sender states are committed to sustained, long-term engagement with the target states.

Whether it be through the use of oil, natural gas or biofuels, the context in which energy statecraft takes place is much more important to determine its probability of success, than any inherent characteristic of energy resources as foreign policy instruments. Therefore, a theory of energy statecraft must consider three main conditions.[824] First, the four variables that determine the efficacy of a sender state's use of its native energy resources as instruments of its foreign policy must be taken into account: whether the sender state's objectives are commensurate with the means with which it pursues the goals of its energy statecraft; whether it has significant market power over the energy resource employed as an instrument of its statecraft; whether the demand for said energy resource is inelastic or able to counter the inelasticity of another energy source it seeks to substitute; and whether the government's

823 *Análise Energia* (Anuário 2009), *Op cit.*, p. 229.

824 Dalgaard, *Op cit.*, pp. 334-335.

interests are aligned with those of the private actors implementing its energy statecraft in practice.

Focusing merely on the conditions of the sender state, however, is an insufficient approach to determine the success of energy statecraft. For it is unlikely that energy statecraft is effective unless the local conditions in the target states can accommodate the sender state's strategies and objectives. Hence, the second main factor that must be considered by a theory of energy statecraft is the domestic context of target states and whether these present favourable conditions to be recipients of the sender state's energy statecraft.

Third, the international energy context should also be taken into account. An attempt at energy statecraft is unlikely to occur in the first place without an international energy context that is conducive toward it, such as a tight global oil market and/or the widely recognized environmental imperative to shift energy consumption toward renewable alternatives. Thus, a comprehensive conditionalist theory of energy statecraft should consider not only the actions and attributes of a state using energy as a tool to change the behaviour of other actors but also the contexts of the targets toward which this policy is directed and the international context in which it takes place.

BIBLIOGRAPHY

Printed books, articles and government publications:

Abdelal, R. & Kirshner, J., 'Strategy, Economic Relations, and the Definition of National Interests', *Security Studies*, Vol. 9, No. 1, (Autumn 1999).

Abramovay, R., 'Eficiência e contestação socioambiental no caminho do etanol brasileiro', *Politica Externa*, Vol. 17, No. 2, Sept/Oct/Nov 2008.

Abramovay, R., *Biocombustíveis: A Energia da Controvérsia*, São Paulo: SENAC, 2009.

Ackrill, R. & Kay, A., *The Growth of Biofuels in the 21st Century: Policy Drivers and Market Challenges* Basingstoke: Springer, 2014.

Afionis, S., Stringer, L.C., Favretto, N., Tomei, J. & Buckeridge, M., 'Unpacking Brazil's Leadership in the Global Biofuels Arena: Brazilian Ethanol Diplomacy in Africa', *Global Environmental Politics*, Vol. 16, No. 3, August 2016.

Aguilera, R.F. & Radetzki, M., 'The shale revolution: Global gas and oil markets under formation', *Mineral Economics*, Vol. 26, Issue 3, January 2014.

Alenxandroff, A.S. & Cooper, A. (eds.), *Rising States, Rising Institutions, Challenges for Global Governance*, Washington D.C.: Brookings Institution Press, 2010.

Al-Faisal, T., 'Don't be Crude', *Foreign Policy*, September/October 2009.

Almeida, A.O., 'Exports, Energy, Food: The Multiple Functions of Brazilian Agriculture', Paper prepared for presentation at the 2009 LASA Congress, Rio de Janeiro.

Alves, A.C., "Brazil in Africa: Achievements and Challenges." In Kitchen, N. (ed.), *Emerging Powers in Africa* London: LSE IDEAS, 2013.

Amanor, K.S. & Chichava, S., 'South–South Cooperation, Agribusiness, and African Agricultural Development: Brazil and China in Ghana and Mozambique', *World Development*, Vol. 81, May 2016.

Amorim, C., 'Prefácio', in Ministério das Relações Exteriores, *Biocombustíveis no Brasil: Realidades e Perspectivas*, Brasília: Ministério das Relações Exteriores, 2007.

Análise Energia (Anuário 2009), 'Ethanol After the Euphoria', December 2008.

Araújo, K., Mahajan, D., Kerr, R. & da Silva, M., 'Global Biofuels at the Crossroads: An Overview of Technical, Policy, and Investment Complexities in the Sustainability of Biofuel Development', *Agriculture*, Vol. 7, No. 4, April 2017.

Baffes, J., Kose, M.A., Ohnsorge, F. & Stocker, M., *The Great Plunge in Oil Prices: Causes, Consequences, and Policy Responses*, Washington, D.C.: World Bank Group, March 2015.

Baldwin, D.A., 'The Power of Positive Sanctions', *World Politics*, Vol. 24, No. 1 (October 1971).

Baldwin, D.A., *Economic Statecraft*, Princeton: Princeton University Press, 1985.

Banco Nacional de Desenvolvimento Econômico e Social & Centro de Gestão e Estudos Estratégicos (eds.), *Sugarcane-Based Ethanol: Energy for Sustainable Development*, Rio de Janeiro: BNDES, 2008.

Batidzirai, B., Johnson, F.X., Sobhanbabu, P.R.K., Leal, R.L.V., Seebaluck, V. & Purchase, B., 'Bioenergy for Sustainable Development and Global Competitiveness: The Case of Sugar Cane in Southern Africa – Thematic Report 5: International Experiences and Comparisons', *CARENSA/SEI Special Report Series 2008-05* Stockholm: Stockholm Environment Institute, 2008.

Baumert, K.A., 'The Challenge of Climate Protection: Balancing Energy and Environment', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, Baltimore, MD: Johns Hopkins University Press, 2005.

Beattie, A., 'Ethanol puts power in Brazil's tank', *Financial Times*, 16 May 2006.

Beckman, J., *Biofuel Use in International Markets: The Importance of Trade*, EIB-144, United States Department of Agriculture, Economic Research Service, September 2015.

Biofuels International, 'Biofuels: 27% of world transport fuel by 2050', Vol. 5, Issue 4, May 2011.

Biofuels International, 'US ethanol exports reach all-time high', Vol. 5, Issue 4, May 2011.

Birol, F., 'The Coming Supply Crunch', *Foreign Policy*, September/October 2009.

Blackwill, R.D. & O'Sullivan, M.L., 'America's Energy Edge: The Geopolitical Consequences of the Shale Revolution', *Foreign Affairs*, Vol. 93, No. 2, March/April 2014.

Blanchard, J.M. & Ripsman, N., 'Asking the Right Question: *When* Do Economic Sanctions Work Best?', *Security Studies*, Vol. 9, No. 1, 1999.

Blanchard, J.M. & Ripsman, N., 'A Political Theory of Economic Statecraft', *Foreign Policy Analysis*, Vol. 4, 2008.

Bodman, S.W. & Wolfensohn, J.D. (Chairs); Sweig, J.E. (Project Director), *Global Brazil and U.S.-Brazil Relations*, Independent Task Force Report No. 66, New York: Council on Foreign Relations, 2011.

Bordoff, J., Deshpande, M. & Noel, P., 'Understanding the Interaction between Energy Security and Climate Change Policy', in Pascual, C. & Elkind, J. (eds.), *Energy Security: Economics, Politics, Strategies, and Implications*, Washington, D.C.: Brookings Institution Press, 2010.

Brazil's Ministry of Agriculture, Livestock and Food Supply, *AgriEnergy Statistical Yearbook 2009*, Brasília: MAPA/ACS, 2009.

Brighi, E. & Hill, C., 'Implementation and behaviour', in Smith, S., A. Hadfield & T. Dunne (eds.), *Foreign Policy: Theories, Actors, Cases*, Oxford: Oxford University Press, 2008.

Bryce, R. 'More Precious Than Oil', *Texas Monthly*, February 1991.

Bundy, D., *The Global Dynamics of Biofuels: Potential supply and demand for ethanol and biodiesel in the coming decade*, Brazil Institute Special Report, April 2007, Issue No. 3, Woodrow Wilson International Center for Scholars.

Burges, S.W., *Brazilian Foreign Policy After the Cold War*, Gainesville: University Press of Florida, 2009.

Burrows, M. & Treverton, G.F., 'A Strategic View of Energy Futures', *Survival*, Vol. 49, No. 3, September 2007.

Butler, N., 'The falling oil price is a lull in the storm', *Financial Times*, 20 August 2008.

Callahan, P., Brady, L.P. & Hermann, M.G. (eds.), *Describing Foreign Policy Behavior*, Beverly Hills, CA: Sage, 1982.

Carlson, J.E. (ed.), *Latin America: Energy and Politics*, New York: Nova Science Publishers, 2010.

Carvalhal, C.M., *Ethanol and the Latin American Great Game*, Cambridge Energy Research Associates Decision Brief, April 2007.

Casado, J., 'A mão pesada do Estado chega ao setor de álcool', *O Globo*, 26 August 2007.

Chalabi, F.J., 'History of OPEC', in Cleveland, C.J. (ed.), *Encyclopedia of Energy*, Vol.4, San Diego, CA: Elsevier, 2004.

Cleveland, C.J. (ed.), *Encyclopedia of Energy*, Vol.4, San Diego, CA: Elsevier, 2004.

Corrêa do Lago, A., 'Entrevista com André Corrêa do Lago', in Tribunal de Contas da União, *A Nova Matriz Energética Brasileira*, Brasília: TCU, 2008.

Coutinho, L., Melo, L. et al, 'Preface', in Banco Nacional de Desenvolvimento Econômico e Social & Centro de Gestão e Estudos Estratégicos (eds.), *Sugarcane-Based Ethanol: Energy for Sustainable Development*, Rio de Janeiro: BNDES, 2008.

Dalgaard, K.G., 'The Energy Statecraft of Brazil: Promoting Biofuels to African Countries', *Foreign Policy Analysis*, Vol. 13, No. 2, April 2017.

Dalgaard, K.G. & Glöck, Å.E.C., 'The Dialectics of Energy Security Interdependence', Paper presented at the 2009 International Studies Association Convention in New York, 16 February 2009.

Daoudi, M.S. & Dajani, M.S., *Economic Diplomacy and World Politics*, London: Westview Press, 1985.

Diop, D., Blanco, M., Flammini, A., Schlaifer, M., Kropiwnicka, M.A. & Markhof, M.M., *Assessing the Impact of Biofuels Production On Developing Countries From the Point of View of Policy Coherence for Development – Final Report* Brussels: European Commission, 2013.

Dodds, F., Higham, A. & Sherman, R. (eds), *Climate Change and Energy Insecurity: The Challenge for Peace, Security and Development*, London: Earthscan Publications, 2009.

Dos Santos, G.R., Garcia, E.A., Shikida, P.F.A. & Rissardi Júnior, D.J., 'A agroindústria canavieira e a produção de etanol no Brasil: características, potenciais e perfil da crise atual', In Dos Santos, G.R. (ed.), *Quarenta anos de etanol em larga escala no Brasil: desafios, crises e perspectivas* Brasília: Instituto de Pesquisa Econômica Aplicada, 2016.

Drezner, D.W., 'The Trouble With Carrots: Transaction Costs, Conflict Expectations, and Economic Inducements', *Security Studies*, Vol. 9, No. 1, (Autumn 1999).

Ebinger, C.K. (ed.), *The Critical Link: Energy and National Security in the 1980s*, Cambridge: Ballinger, 1982.

El-Gamal, M.A. & Jaffe, A.M., 'Subpriming the Pump', *Foreign Policy*, September/October 2009.

El-Katiri, L. & Fattouh, B., 'A Brief Political Economy of Energy Subsidies in the Middle East and North Africa', *International Development Policy | Revue Internationale de Politique de Développement*, Vol. 7, No. 0, 2017.

Elkind, J., 'Energy Security: Call for a Broader Agenda', in Pascual, C. & Elkind, J. (eds.), *Energy Security: Economics, Politics, Strategies, and Implications*, Washington, D.C.: Brookings Institution Press, 2010.

Empresa de Pesquisa Energética, *Análise de conjuntura dos biocombustíveis – ano 2013* Brasília: Ministério de Minas e Energia, 2013.

Empresa de Pesquisa Energética, *Análise de conjuntura dos biocombustíveis – ano 2016* Brasília: Ministério de Minas e Energia, 2016.

Ernst & Young Terco, *Sustainable Brazil: Energy market challenges*, Communication and Brand Management Department of Ernst & Young Terco Brazil, 2011.

Feres, P.F.D., *Os Biocombustíveis na matriz energética alemã: possibilidade de cooperação com o Brasil*, Brasília: FUNAG, 2010.

Ferolla, S.X., 'Biocombustíveis – a saga de muitos pioneiros, in Hage, J.A. (ed.), *A Energia, a Política Internacional e o Brasil: Conflitos e Propostas no Século XXI*, Curitiba: Instituto Memória, 2008.

Gasparatos, A., Lee, L.Y., von Maltitz, G.P., Mathai, M.V., de Oliveira, J.A.P. & Willis, K.J., *Biofuels in Africa: Impacts on Ecosystem Services, Biodiversity and Human Well-Being*, UNU-IAS Policy Report, Yokohama: United Nations University – Institute of Advanced Studies, 2012.

Gause, F.G., 'Saudi Arabia Over a Barrel', *Foreign Affairs*, Vol. 79, No. 3, May/June 2000.

Giddens, A., *The Politics of Climate Change*, Cambridge, UK: Polity Press: 2009.

Gilpin, R., *War and Change in World Politics*, Cambridge: Cambridge University Press, 1981.

Glover, P.C. & Economides, M.J., *Energy and Climate Wars: How Naive Politicians, Green Ideologues, and Media Elites Are Undermining the Truth About Energy and Climate*, New York: Continuum Books, 2010.

Goldemberg, J. et al., 'Ethanol learning curve – the Brazilian experience', *Biomass and Bioenergy*, Vol. 26, No. 3, 2004.

Goldthau, A., 'Energy Diplomacy in Trade and Investment of Oil and Gas', in Goldthau, A. & Witte, J.M. (eds.), *Global Energy Governance: The New Rules of the Game*, Washington, D.C.: Brookings Institution Press, 2010.

Goldthau, A. & Witte, J.M. (eds.), *Global Energy Governance: The New Rules of the Game*, Washington, D.C.: Brookings Institution Press, 2010.

Goldwyn, D.L & Billig, M., 'Building Strategic Reserves', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, Baltimore, MD: Johns Hopkins University Press, 2005.

Hage, J.A. (ed.), *A Energia, a Política Internacional e o Brasil: Conflitos e Propostas no Século XXI*, Curitiba: Instituto Memória, 2008.

Hamilton, L.H., 'Foreword', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, Baltimore, MD: Johns Hopkins University Press, 2005.

Hanson, P., *Western Economic Statecraft in East-West Relations: Embargoes, Sanctions, Linkage, Economic Warfare, and Detente*, London: Routledge & Kegan Paul, 1988.

Hayes, M.H. & Victor, D.G., 'Politics, Markets and the Shift to Natural Gas', in Victor, D.G., Jaffe, A.M., & Hayes, M.H. (eds.), *Natural Gas and Geopolitics: From 1970 to 2040*, Cambridge: Cambridge University Press, 2006.

Heal, G. & Hallmeyer, K., *How Lower Oil Prices Impact the Competitiveness of Oil with Renewable Fuels*, New York: Columbia SIPA Center on Global Energy Policy, October 2015.

Hermann, C.F., 'Instruments of Foreign Policy', in Callahan, P., L.P. Brady & M.G Hermann (eds.), *Describing Foreign Policy Behavior*, Beverly Hills, CA: Sage, 1982.

High Level Panel of Experts (HLPE), *Biofuels and food security: A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security*, Rome: FAO, 2013.

Hill, C., *The Changing Politics of Foreign Policy*, Basingstoke: Palgrave Macmillan, 2002.

Hirschman, A.O., *National Power and the Structure of Foreign Trade*, Berkeley, CA: University of California Press, 1945 [1980].

Holdren, J.P., 'Commentary on Part IV', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, Baltimore, MD: Johns Hopkins University Press, 2005.

Howell, D. & Nakhle, C., *Out of the Energy Labyrinth*, London: I.B. Tauris, 2006.

Hoyos, C., 'China fuel price rise is no quick fix', *Financial Times*, 20 June 2008.

Hoyos, C. & England, A., 'Riyadh set to test its power to move the market', *Financial Times*, 17 June 2008.

Hubbert, M.K., 'Nuclear Energy and the Fossil Fuels', Paper presented before the Spring Meeting of the Southern District Division of Production, American Petroleum Institute, San Antonio, Texas, 7-9 March 1956.

Hunt, S.C. & Flavin, C., 'Preface', in Worldwatch Institute, *Biofuels for Transport: Global Potential and Implications for Energy and Agriculture*, London: Earthscan, 2007.

Intergovernmental Panel on Climate Change, *Climate Change 2014: Mitigation of Climate Change – Working Group III Contribution to the*

Fifth Assessment Report of the Intergovernmental Panel on Climate Change, New York: Cambridge University Press, 2014.

International Atomic Energy Agency, *Brazil: A country profile on sustainable energy development*, Vienna: IAEA, 2006.

International Energy Agency, *Biofuels for Transport: An International Perspective*, Paris: International Energy Agency, April 2004.

International Energy Agency, Office of Global Energy Dialogue, 'The Energy Situation in Brazil: An overview', paper prepared for the Standing Group on the Global Energy Dialogue, in June 2006.

International Energy Agency, Oil 2017: Analysis and Forecasts to 2022, Executive Summary Paris: IEA Publications, March 2017.

International Institute for Strategic Studies, 'The Oil Price Rise: Geopolitical and Structural Issues', *Strategic Survey 2006: The IISS Annual Review of World Affairs*, London: IISS, 2006.

Jaffe, A.M., 'Geopolitics of Energy', in Cleveland, C.J. (ed.), *Encyclopedia of Energy*, Vol.4, San Diego, CA: Elsevier, 2004.

Jaffe, A.M., Hayes, M.H. & Victor, D.G., 'Conclusions', in Victor, D.G., Jaffe, A.M., & Hayes, M.H. (eds.), *Natural Gas and Geopolitics: From 1970 to 2040*, Cambridge: Cambridge University Press, 2006.

Jaffe, A.M. & Manning, R.A., 'The Shocks of a World of Cheap Oil', *Foreign Affairs*, Vol. 79, No. 1, January/February 2000.

Jaffe, A.M. & Soligo, R., 'Market structure in the new gas economy: is cartelization possible?', in Victor, D.G., Jaffe, A.M. & Hayes, M.M. (eds), *Natural Gas and Geopolitics: From 1970 to 2040*, Cambridge: Cambridge University Press, 2006.

Jank, M.S., 'Entrevista com Marcos Sawaya Jank', in Tribunal de Contas da União, *A Nova Matriz Energética Brasileira*, Brasília: TCU, 2008.

Jardim, A., 'Etanol: O Desafio de Marcar Gols com a Globalização', Pronunciamento no plenário da Câmara dos Deputados, 26 de junho de 2007, in Jardim, A., *O Desafio Energético do Brasil: Planejar, Executar e Assegurar o nosso Crescimento*, Brasília: Câmara dos Deputados, Centro de Documentação e Informação, Coordenação de Publicações, 2007.

Jardim, A., *O Desafio Energético do Brasil: Planejar, Executar e Assegurar o nosso Crescimento*, Brasília: Câmara dos Deputados, Centro de Documentação e Informação, Coordenação de Publicações, 2007.

Johnson, F.X. & Rosillo-Calle, F., 'Food *versus* Fuel: Concluding Remarks', in Rosillo-Calle, F. & Johnson, F.X. (eds.), *Food versus Fuel: An Informed Introduction to Biofuels*, London: Zed Books, 2010.

Johnson, F.X. & Virgin, I., 'Future Trends in Biomass Resources for Food and Fuel', in Rosillo-Calle, F. & Johnson, F.X. (eds.), *Food versus Fuel: An Informed Introduction to Biofuels*, London: Zed Books, 2010.

Juckett, D.A. & Foss, M.M., 'Can a "Global" Natural Gas Market Be Achieved?', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, Baltimore, MD: Johns Hopkins University Press, 2005.

Kalicki, J.H & Goldwyn, D.L., 'Conclusion: Energy, Security, and Foreign Policy', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, Baltimore, MD: Johns Hopkins University Press, 2005.

Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, Baltimore, MD: Johns Hopkins University Press / Woodrow Wilson Center Press, 2005.

Kalicki, J.H. & Goldwyn, D.L., 'Introduction: The Need to Integrate Energy and Foreign Policy', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, Baltimore, MD: Johns Hopkins University Press / Woodrow Wilson Center Press, 2005.

Kaltner, F.J., Azevedo, G.F.P., Campos, I.A. & Mundim, A.O.F., 'Biofuels for Transportation in Brazil', in Worldwatch Institute, *Biofuels for Transport: Global Potential and Implications for Energy and Agriculture*, London: Earthscan Publications, 2007.

Kenderdine, M.A. & Moniz, E.J., 'Technology Development and Energy Security', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, Baltimore, MD: Johns Hopkins University Press, 2005.

Kissinger, H., 'Foreword', in Ebinger, C.K. (ed.), *The Critical Link: Energy and National Security in the 1980s*, Cambridge: Ballinger, 1982.

Klare, M.T., *Resource Wars – the New Landscape of Global Conflict* New York: Holt & Co., 2001.

Klare, M.T., *Blood and Oil*, London: Penguin Books, 2004.

Klare, M.T., *Rising Powers, Shrinking Planet*, Oxford: Oneworld Publications, 2008.

Klare, M.T., 'Oil Price Meltdown: The Collapse of the Old Energy Order', Paper presented at the 58th Annual Convention of the International Studies Association, 22 February 2017, Baltimore, MD.

Knorr, K., *The Power of Nations: The Political Economy of International Relations*, New York, NY: Basic Books, 1975.

Kohl, W.L, 'National Security and Energy', in Cleveland, C.J. (ed.), *Encyclopedia of Energy*, Vol.4, San Diego, CA: Elsevier, 2004.

Kuenzler, L.T., 'Latin America', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, Baltimore, MD: Johns Hopkins University Press, 2005.

Lasswell, H.D., *Politics: Who Gets What, When, How*, New York: Whittlesey House, 1936.

Lasswell, H.D. & Kaplan, A., *Power and Society: A Framework for Political Inquiry*, London: Routledge and Keegan Paul, 1952.

Leal, J. & Samaniego, J., 'Environmental Issues in Latin America and the Caribbean', in Weintraub, S. (ed.), *Energy Cooperation and Confrontation in the Western Hemisphere*, Washington, D.C.: Center for Strategic and International Studies, 2007.

Lebow, R.N., *A Cultural Theory of International Relations*, Cambridge: Cambridge University Press, 2008.

Lebow, R.N., 'Culture and International Relations: The Culture of International Relations', *Millennium: Journal of International Studies*, Vol. 38, No. 1, 2009.

Leverett, F., 'Consuming Energy: Rising Powers, the International Energy Agency, and the Global Energy Architecture', in Alenxandroff, A.S. & Cooper, A. (eds.), *Rising States, Rising Institutions, Challenges for Global Governance*, Washington D.C.: Brookings Institution Press, 2010.

Levi, M.A., 'Gas Guzzlers', *Foreign Policy*, September/October 2009.

Lobão, E., 'Entrevista com Edison Lobão', in Tribunal de Contas da União, *A Nova Matriz Energética Brasileira*, Brasília: TCU, 2008.

Losman, D., *International Economic Sanctions: The Cases of Cuba, Israel, and Rhodesia* Albuquerque, NM: University of New Mexico Press, 1979.

Lugar, R., 'In oil's new era, power shifts to countries with reserves', *Wall Street Journal*, 14 June 2006, Opinion Page.

Lugar, R. & Woolsey, R.J., 'The New Petroleum', *Foreign Affairs*, Vol. 78, No. 1, January/February 1999.

Lula da Silva, L.I., 'Discurso do Presidente da República, Luiz Inácio Lula da Silva, por ocasião da cerimônia em comemoração ao quinto aniversário do jornal "Valor Econômico", em São Paulo, no dia 2 de maio de 2005', in Ministério das Relações Exteriores: *Resenha de Política Externa: 1º Semestre de 2005*, Brasília: FUNAG, 2005.

Lula da Silva, L.I., "Join Brazil in planting oil – Only radical solutions will overcome the energy and environmental crises while promoting equality", *The Guardian*, 7 March 2006. Also available in Ministério das Relações Exteriores, *Resenha de Política Externa: 1º Semestre de 2006*, Brasília: FUNAG, 2006.

Lula da Silva, L.I., 'Fuel for Thought', *The Wall Street Journal*, 14 July 2006. Also available in Ministério das Relações Exteriores, *Resenha de Política Externa: 2º Semestre de 2006*, Brasília: FUNAG, 2007.

Lula da Silva, L.I., 'Summit offers chance to gain consensus', *Miami Herald*, 16 July 2006. Also in Ministério das Relações Exteriores, *Resenha de Política Externa: 2º Semestre de 2006*, Brasília: FUNAG, 2007.

Lula da Silva, L.I., 'Palavras introdutórias do Presidente da República, Luiz Inácio Lula da Silva, por ocasião de entrevista coletiva ao final da Reunião de Cúpula África-América do Sul, Abuja, Nigéria, 30 de novembro de 2006', in Ministério das Relações Exteriores, *Resenha de Política Externa: 2º Semestre de 2006*, Brasília: FUNAG, 2007.

Lula da Silva, L.I., 'Declaração à imprensa do Presidente da República, Luiz Inácio Lula da Silva, após visita à Transpetro com o Presidente dos Estados Unidos, George W. Bush, 9 de março de

2007', in Ministério das Relações Exteriores, *Resenha de Política Externa: 1º Semestre de 2007*, Brasília: FUNAG, 2007.

Lula da Silva, L.I., 'Discurso do Presidente da República, Luiz Inácio Lula da Silva, durante cerimônia de descerramento de placa alusiva à visita às instalações do escritório regional da Embrapa na África. Acra, Gana, 20/04/2008', in Ministério das Relações Exteriores, *Resenha de Política Externa: 1º Semestre de 2008*, Brasília: FUNAG, 2008.

Lula da Silva, L.I., 'Discurso na Reunião de Alto Nível da FAO sobre Segurança Alimentar, Mudanças Climáticas e Bioenergia', Roma, Itália, 3 de junho de 2008, in Ministério das Relações Exteriores, *Discursos Selecionados do Presidente Luiz Inácio Lula da Silva*, Brasília: FUNAG, 2008.

Lula da Silva, L.I., 'Declaração à imprensa concedida pelo Presidente da República, Luiz Inácio Lula da Silva, em conjunto com o presidente do México, Felipe Calderón, após cerimônia de assinatura de atos – Brasília – DF, Palácio Itamaraty, 17/08/2009', in Ministério das Relações Exteriores, *Resenha de Política Externa: 2º Semestre de 2009*, Brasília: FUNAG, 2010.

Lula da Silva, L.I., 'Discurso do Presidente Luiz Inácio Lula da Silva no Debate Geral da 64ª Sessão da Assembléia-Geral das Nações Unidas – Nova York, 23/09/2009', in Ministério das Relações Exteriores, *Resenha de Política Externa: 2º Semestre de 2009*, Brasília: FUNAG, 2010.

Lula da Silva, L.I., 'Entrevista exclusiva concedida por escrito pelo Presidente da República, Luiz Inácio Lula da Silva, à Offshore Magazine, da Noruega – Oslo – Noruega, 01/10/2009', in Ministério das Relações Exteriores, *Resenha de Política Externa: 2º Semestre de 2009*, Brasília: FUNAG, 2010.

Lula da Silva, L.I., 'Entrevista exclusiva concedida por escrito pelo Presidente da República, Luiz Inácio Lula da Silva, ao jornal El Mundo, da Espanha – Brasília – DF, 29/12/2009', in Ministério das Relações Exteriores, *Resenha de Política Externa: 2º Semestre de 2009*, Brasília: FUNAG, 2010.

Lula da Silva, L.I., 'Discurso do Presidente da República, Luiz Inácio Lula da Silva, durante almoço oferecido pelo Presidente do Quênia, Mwai Kibaki - Nairóbi, Quênia, 06/07/2010', in Ministério das Relações Exteriores, *Resenha de Política Externa: 2º Semestre de 2010*, Brasília: FUNAG, 2011.

Mackinder, H.J., *Democratic Ideals and Reality*, New York: Holt, 1919.

Maffeis Neto, J., *A História do Carro Flex no Brasil*, Embu, SP: IQUAL Editora, 2009.

Maier, J., 'Bioenergy: Neither Golden Solution nor Prescription for Disaster', in Dodds, F., Higham, A. & Sherman, R. (eds), *Climate Change and Energy Insecurity: The Challenge for Peace, Security and Development*, London: Earthscan Publications, 2009.

Manduca, P.C., 'Energia e meio ambiente na política Sul-Americana', in Hage, J.A. (ed.), *A Energia, a Política Internacional e o Brasil*, Curitiba: Instituto Memória, 2008.

Mares, D.R., 'Natural gas pipelines in the Southern Cone', in Victor D.G., Jaffe, A.M. & Hayes, M.H. (eds.), *Natural Gas and Geopolitics: From 1970 to 2040*, Cambridge: Cambridge University Press, 2006.

Martin, W.F. & Harrje, E.M., 'The International Energy Agency', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, Baltimore, MD: Johns Hopkins University Press, 2005.

Mastanduno, M., 'Economic Statecraft, Interdependence, and National Security', *Security Studies*, Vol. 9, No. 1, 1999.

Mastanduno, M., 'Economic Statecraft', in Smith, S., Hadfield, A. & Dunne, T. (eds.), *Foreign Policy: Theories, Actors, Cases*, Oxford: Oxford University Press, 2008.

Maugeri, L., 'Two Cheers for Expensive Oil', *Foreign Affairs*, Vol. 85, No. 2, March/April 2006.

Maugeri, L., *The Age of Oil: The Mythology, History, and Future of the World's Most Controversial Resource*, Westport, CT: Praeger, 2006.

Maugeri, L., *Beyond the Age of Oil: The Myths, Realities, and Future of Fossil Fuels and Their Alternatives*. Translated from the Italian by Jonathan T. Hine Jr. Santa Barbara, CA: Praeger, 2010.

McNulty, S., 'Domestic needs drive Opec price', *Financial Times*, 10 March 2008.

Meirelles, J.C.S., 'Posfácio: Carro Flex: vitória do consumidor', in Maffeis Neto, J., *A História do Carro Flex no Brasil*, Embu, SP: IQUAL Editora, 2009.

Mendelson, J., 'Testimony of Dr. Johanna Mendelson Forman, Senior Associate, Americas Program, Center of Strategic International Studies, House Foreign Affairs Subcommittee on the Western Hemisphere – "Energy in the Americas"', in Carlson, J.E. (ed.), *Latin America: Energy and Politics*, New York: Nova Science Publishers, 2010.

Mendes Thame, A.C. (ed.), *The History of the Alcohol Car*, Embu, SP: IQUAL Editora, 2003.

Mendes Thame, A.C., 'Apresentação', in Maffeis Neto, J., *A História do Carro Flex no Brasil*, Embu, SP: IQUAL Editora, 2009.

Mendes Thame, A.C., 'Posfácio: O papel dos biocombustíveis', in Maffeis Neto, J., *A História do Carro Flex no Brasil*, Embu, SP: IQUAL Editora, 2009.

Meyer, G., 'US food *versus* fuel debate losing its rage', *Financial Times*, 5 September 2016.

Mills, R.M., *The Myth of the Oil Crisis: Overcoming the Challenges of Depletion, Geopolitics, and Global Warming*, Westport, CT: Praeger, 2008.

Ministério das Relações Exteriores: *Resenha de Política Externa: 1º Semestre de 2005*, Brasília: FUNAG, 2005.

Ministério das Relações Exteriores: *Resenha de Política Externa: 2º Semestre de 2005*, Brasília: FUNAG, 2006.

Ministério das Relações Exteriores, *Resenha de Política Externa: 1º Semestre de 2006*, Brasília: FUNAG, 2006.

Ministério das Relações Exteriores, *Resenha de Política Externa: 2º Semestre de 2006*, Brasília: FUNAG, 2007.

Ministério das Relações Exteriores, *Resenha de Política Externa: 1º Semestre de 2007*, Brasília: FUNAG, 2007.

Ministério das Relações Exteriores, *Biocombustíveis no Brasil: Realidades e Perspectivas*, Brasília: Ministério das Relações Exteriores, 2007.

Ministério das Relações Exteriores, *Discursos Selecionados do Presidente Luiz Inácio Lula da Silva*, Brasília: FUNAG, 2008.

Ministério das Relações Exteriores, *Resenha de Política Externa: 2º Semestre de 2009*, Brasília: FUNAG, 2010.

Ministério das Relações Exteriores, *Resenha de Política Externa: 2º Semestre de 2010*, Brasília: FUNAG, 2011.

Ministério de Minas e Energia, *Plano Nacional de Energia 2030*, Brasília: MME, 2007.

Moreira, J.R., 'Bioenergy and Agriculture: Promises and Challenges – Brazil's Experience with Bioenergy', *2020 Vision for Food, Agriculture, and the Environment*, Focus 14, Brief 8 of 12, December 2006, International Food Policy Research Institute.

Morse, E.L., 'Low and Behold: Making the Most of Cheap Oil', *Foreign Affairs*, Vol. 88, No. 5, September/October 2009.

Morse, E.L. & Jaffe, A.M., 'OPEC in Confrontation with Globalization', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, Baltimore, MD: Johns Hopkins University Press, 2005.

Müller-Kraenner, S., *Energy Security: Re-Measuring the World*, London: Earthscan, 2007.

Nardes, A., 'Entrevista com Augusto Nardes', in Tribunal de Contas da União, *A Nova Matriz Energética Brasileira*, Brasília: TCU, 2008.

National Institute for Defence Studies, 'The Shale Revolution and the International Security Environment', in The National Institute for Defence Studies, *East Asian Strategic Review 2014* Tokyo: The Japan Times, Ltd, March 2014.

Nelson, A.J., *Climate Change and Biofuels*, Washington, D.C.: Woodrow Wilson International Center for Scholars, 2009.

Newnham, R., *Deutsche Mark Diplomacy: Positive Economic Sanctions in German-Russian Relations*, University Park, PA: Pennsylvania State University Press, 2002.

Nivola, P.S with Carter, E.E.R., 'Making Sense of "Energy Independence"', in Pascual & Elkind (eds.), *Energy Security: Economics, Politics, Strategies, and Implications*, Washington, D.C.: Brookings Institution Press, 2010.

Norris, W., 'Economic Statecraft: The Use of Commercial Actors in Grand Strategy', *Paper presented at the annual meeting of the International Studies Association: 'Theory vs. Policy? Connecting*

Scholars and Practitioners', New Orleans Hilton Riverside Hotel, The Loews New Orleans Hotel, New Orleans, LA, 17 February 2010.

Nucci, J.P., 'Fuel to Change the World', *PIB*, Year 1, Number 2, Dec 07/Jan 08

Nye, J.S.: *Bound to Lead: The Changing Nature of American Power*, (Basic Books, 1991).

Nye, J.S., *Soft Power: The Means to Success in World Politics*, New York: NY: Public Affairs, 2004.

Nye, J.S., *The Powers to Lead: Soft, Hard and Smart*, Oxford University Press, 2008.

O'Hara, S.L., 'Great Game or Grubby Game? The Struggle for Control of the Caspian', *Geopolitics*, Vol. 9, Issue 1, Winter 2004.

Organization for Economic Cooperation and Development & Food and Agriculture Organization of the United Nations, *OECD-FAO Agricultural Outlook 2015,* Paris: OECD Publishing, 2015.

Organization for Economic Cooperation and Development & Food and Agriculture Organization of the United Nations, *OECD-FAO Agricultural Outlook 2016-2025*, Paris: OECD Publishing, 2016.

Pascual, C. & Elkind, J. (eds.), *Energy Security: Economics, Politics, Strategies, and Implications*, Washington, D.C.: Brookings Institution Press, 2010.

Pascual, C. & Elkind, J., 'Introduction', in Pascual, C. & Elkind, J. (eds.), *Energy Security: Economics, Politics, Strategies, and Implications*, Washington, D.C.: Brookings Institution Press, 2010.

Pascual, C. & Zambetakis, E., 'The Geopolitics of Energy', in Pascual, C. & Elkind, J. (eds.), *Energy Security: Economics, Politics, Strategies, and Implications*, Washington, D.C.: Brookings Institution Press, 2010.

Pilling, D. & Giles, C., 'G8 sees more squalls on horizon', *Financial Times*, 12 June 2008.

Ping, J.H., *Middle Power Statecraft: Indonesia, Malaysia and the Asia Pacific,* Aldershot: Ashgate, 2005.

Ramos, P., 'Trajetória e situação atual da agroindústria canavieira do Brasil e do mercado de álcool carburante', In Dos Santos, G.R. (ed.), *Quarenta anos de etanol em larga escala no Brasil: desafios, crises e perspectivas,* Brasília: Instituto de Pesquisa Econômica Aplicada, 2016.

Ravindranath, N.H., Manuvie, R. & Lakshmi, C.S., 'Biofuels and Climate Change', in Rosillo-Calle, F. & Johnson, F.X. (eds.), *Food versus Fuel: An Informed Introduction to Biofuels*, London: Zed Books, 2010.

Renewable Energy Policy Network for the 21st Century (REN21)., *Renewables 2016 Global Status Report,* Paris: REN21 Secretariat, 2016.

Roberts, P., *The End of Oil: The decline of the petroleum economy and the rise of a new energy order*, London: Bloomsbury Publishing, 2004.

Rodríguez-Padilla, V., 'Nationalism and Oil', in Cleveland, C.J. (ed.), *Encyclopedia of Energy*, Vol. 4, San Diego, CA: Elsevier, 2004.

Roett, R., *The New Brazil*, Washington, D.C.: Brookings Institution Press, 2010.

Rosillo-Calle, F. & Johnson, F.X. (eds.), *Food versus Fuel: An Informed Introduction to Biofuels*, London: Zed Books, 2010.

Ross, M.L., 'Blood Barrels', *Foreign Affairs*, Vol. 87, No. 3, May/June 2008.

Rother, L., *Brazil on the Rise: The Story of a Country Transformed*, London: Palgrave Macmillan, 2010.

Rühl, C., 'Global Energy After the Crisis', *Foreign Affairs*, Vol. 89, No. 2, March/April 2010.

Runge, C.F. & Senauer, B., 'How Biofuels Could Starve the Poor', *Foreign Affairs*, May/June 2007, Vol. 86, No. 3.

Said, Y., 'Energy', *LSE Magazine*, Vol. 19, No. 2, Winter 2007.

Schaeffer, R. et al., *Mudanças Climáticas e Segurança Energética no Brasil*, Sumário Executivo, Rio de Janeiro: COPPE/UFRJ, 2008.

Schelling, T., *International Economics*, Boston, MA: Allyn and Bacon, Inc., 1958.

Schlesinger, J., 'Foreword', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, Baltimore, MD: Johns Hopkins University Press, 2005.

Schneider, J., 'Posfácio: O Sucesso dos Veículos Flex', in Maffeis Neto, J., *A História do Carro Flex no Brasil*, Embu, SP: IQUAL Editora, 2009.

Sdravelich, C., Sab, R., Zouhar, Y. & Albertin, G., *Subsidy Reform in the Middle East and North Africa: Recent Progress and Challenges Ahead*, Washington, D.C.: International Monetary Fund, 2014.

Seelke, C.R. & Yacobucci, B.D., 'Ethanol and Other Biofuels: Potential for U.S.-Brazil Energy Cooperation', Congressional Research Service Report for Congress, 27 September 2007.

Senado Federal, Subcomissão dos Biocombustíveis, 'Perspectivas de mercado e as projeções e cenários futuros para o setor de biocombustíveis', *Relatório Anual – 2007*, Brasília: Senado Federal, Secretaria de Editoração e Publicações, 2007.

Senado Federal, Subcomissão dos Biocombustíveis, 'Produção e exportação de álcool e biocombustíveis', *Relatório Anual – 2007*, Brasília: Senado Federal, Secretaria de Editoração e Publicações, 2007.

Sennett, R., *Respect: The Formation of Character in a World of Inequality*, London: Allen Lane, 2003.

Sequeira, C.D., 'Energia ganha status diplomático', *Correio Braziliense*, 25 June 2006.

Shaffer, B., *Energy Politics*, Philadelphia, PA: University of Pennsylvania Press, 2009.

Shambaugh, G., *States, Firms, and Power: Successful Sanctions in United States Foreign Policy*, Albany, NY: SUNY Press, 1999.

Sieminski, A.E., 'World Energy Futures', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, Baltimore, MD: Johns Hopkins University Press, 2005.

Silva, J.G., Schuertz, G. & Tavares, L., 'Em busca da produção sustentável de biocombustíveis', *Política Externa*, Vol. 17, No. 2, September-November 2008.

Simões, A.J.F., 'Petróleo, Gás Natural e Biocombustíveis: Desafio estratégico no mundo e no Brasil', paper presented at I Conferência Nacional de Política Externa e Política Internacional: O Brasil no mundo que vem aí, Rio de Janeiro, 6-7 July 2006.

Simões, A.J.F., 'Biocombustíveis: A Experiência Brasileira e o Desafio da Consolidação do Mercado Internacional', in Ministério das Relações Exteriores, *Biocombustíveis no Brasil: Realidades e Perspectivas*, Brasília: Ministério das Relações Exteriores, 2007.

Smart, I. 'Uniqueness and Generality', *Daedalus*, Vol. 104, No. 4, Fall 1975.

Smith, J., *Biofuels and the Globalization of Risk: The biggest change in North-South relationships since colonialism?*, London: Zed Books, 2010.

Smith, S., Hadfield, A. & Dunne, T. (eds.), *Foreign Policy: Theories, Actors, Cases*, Oxford: Oxford University Press, 2008.

Spencer, N., *Energy and Climate Change in Brazil*, Energy Action Group Working Paper Washington, D.C.: Americas Society/Council of the Americas, November 2009.

Spykman, N.J., *The Geography of the Peace*, New York: Harcourt, Brace and Company, 1944.

Stulberg, A.N., *Well-Oiled Diplomacy: Strategic Manipulation and Russia's Energy Statecraft in Eurasia*, Albany, NY: State University of New York Press, 2007.

Sullivan, M.P., C.R. Seelke & R.G. Rush, 'Latin America: Energy Supply, Political Developments and U.S. Policy Approaches', in Joanna E. Carlson (ed.), *Latin America: Energy and Politics*, New York: Nova Science Publishers, 2010.

Szwarc, A., 'New technologies ensure the demand for hydrated alcohol in Brazil', in Mendes Thame, A.C. (ed.), *The History of the Alcohol Car*, Embu, SP: IQUAL Editora, 2003.

Szwarc, A., 'Posfácio: A opção pelo Flex Fuel', in Maffeis Neto, J., *A História do Carro Flex no Brasil*, Embu, SP: IQUAL Editora, 2009.

The Economist, 'Crude measures', 31 May 2008.

The Economist, 'Double, double, oil and trouble', 31 May 2008.

The Economist, 'Recoil', 31 May 2008.

The Economist, 'The future of energy', 21 June 2008.

The Economist, 'The power and the glory', A special report on the future of energy, 21 June 2008.

The Economist, 'Bust and boom', 23 May 2009.

The Economist, 'Charge!', 5 September 2009.

The Economist, 'A bad climate for development', 19 September 2009.

The Economist, '2020 vision', 12 December 2009.

The Economist, 'The age of ethanol', 3 July 2010.

The Economist, 'Vapour trails', 3 July 2010.

The Economist, 'Speak softly and carry a blank cheque', 17 July 2010.

The Economist, 'The 2011 oil shock', 5 March 2011.

The Economist, 'Cleaner, not cooler', 6 August 2011.

The Economist, 'An unconventional bonanza', 14 July 2012.

The Economist, 'The petrostate of America', 15 February 2014.

The Economist, 'Unsustainable energy', 11 October 2014.

The Economist, 'Sheiks v Shale', 4 December 2014.

The Economist, 'After OPEC', 14 May 2015.

The Economist, 'Abnormally normal', 14 November 2015.

The Economist, 'Deal done', 12 December 2015.

The Economist, 'The oil conundrum', 23 January 2016.

The Economist, 'Rigonomics', 18 June 2016.

The Economist, 'Up in smoke?', 26 November 2016.

The Economist, 'Know thy enemy', 18 May 2017.

The McKinsey Global Institute, 'How High Will It Go?', *Foreign Policy*, September/October 2009.

Tolmasquim, M., 'Entrevista com Maurício Tolmasquim', in Tribunal de Contas da União, *A Nova Matriz Energética Brasileira*, Brasília: TCU, 2008.

Tribunal de Contas da União, *A Nova Matriz Energética Brasileira*, Brasília: TCU, 2008.

Tsakiris, T., 'Energy Security Policy as Economic Statecraft: A Concise Historical Overview of the Last 100 Years', *Agora Without Frontiers*, Vol. 9, No. 4, 2004.

UNICA, *Sustainability Report 2008*, São Paulo: Editora Gráficos Burti, 2009.

UNICA, *Sustainability Report 2010*, São Paulo: Grafilar, 2011.

United Nations Conference on Trade and Development, *The State of Biofuels Markets: Regulatory, Trade and Development Perspectives* Geneva: United Nations Publications, 2014.

Victor, D.G. & Eskeris-Winkler, S., 'In the Tank', *Foreign Affairs*, Vol. 87, No. 4, July/August 2008.

Victor, D.G., Jaffe, A.M., & Hayes, M.H. (eds.), *Natural Gas and Geopolitics: From 1970 to 2040*, Cambridge: Cambridge University Press.

Victor, D.G. & Yueh, L., 'The New Energy Order: Managing Insecurities in the Twenty-first Century', *Foreign Affairs*, Vol. 89, No. 1, January/February 2010.

Vieira, M.A. & Dalgaard, K.G., 'The Energy Security-Climate Change Nexus in Brazil', *Environmental Politics*, Vol. 22, No. 4, July/August 2013.

Webb, S., 'Oil consumers and producers to meet', *International Herald Tribune*, 21-22 June 2008.

Weintraub, S. (ed.), *Energy Cooperation and Confrontation in the Western Hemisphere*, Washington, D.C.: Center for Strategic and International Studies, 2007.

Whitmill, C., 'Energy Security More Important than Climate Change', *The Guardian*, 17 September 2010.

Wilkinson, J., *Biodiplomacia brasileira na África: o caso dos biocombustíveis,* Rio de Janeiro: ActionAid, 2014.

Worldwatch Institute, *Biofuels for Transport: Global Potential and Implications for Energy and Agriculture*, London: Earthscan Publications, 2007.

Yergin, D., *The Prize: The Epic Quest for Oil, Money, and Power*, New York, NY: Simon & Schuster, 1991.

Yergin, D., 'Energy Security and Markets', in Kalicki, J.H. & Goldwyn, D.L. (eds.), *Energy and Security: Toward a New Foreign Policy Strategy*, Baltimore, MD: Johns Hopkins University Press, 2005.

Yergin, D., 'Ensuring Energy Security', *Foreign Affairs*, Vol. 85, No. 2, March/April 2006.

Yergin, D., 'What does "energy security" really mean?', *The Wall Street Journal*, 11 July 2006, Opinion Page.

Yergin, D., 'Energy independence', *The Wall Street Journal*, 23 January 2007, Opinion Page.

Yergin, 'It's still the one', *Foreign Policy*, September/October 2009.

Yergin, D., *The Quest: Energy, Security and the Remaking of the Modern World*, London: Allen Lane, 2011.

Zarrilli, S., 'Development of the Emerging Biofuels Market', in Andreas Goldthau & Jan Martin Witte (eds.), *Global Energy Governance: The New Rules of the Game*, Washington, D.C.: Brookings Institute Press, 2010.

Speeches:

Amorim, C., Lecture delivered at the University of Brasília, Brasília, Brazil, 24 April 2007.

Amorim, C., Speech delivered at Seminário do TCU Sobre Política do Comércio Exterior Brasileiro, in Brasília, Brazil, 28 August 2007.

Dale, S., ‘New Economics of Oil’, speech delivered at Society of Business Economists Annual Conference, London, 13 October 2015, available at: <http://www.bp.com/content/dam/bp/pdf/speeches/2015/new-economics-of-oil-spencer-dale.pdf>, accessed 3 August 2017.

Ethanol Summit 2011, São Paulo, Brazil, 5-7 June 2011, available at <www.ethanolsummit.com.br>, accessed 28 September 2011.

Lula da Silva, L.I., Speech given at the 2nd Top Ethanol Award Ceremony, Sao Paulo, Brazil, 6 June 2011, available at: <http://www.youtube.com/watch?v=L23Y2-GSyF4&feature=autoplay&list=PLBB2BCE9E5EB2637D&playnext=2>, accessed 28 June 2012.

Paranhos, P., Presentation delivered at ‘2015 NEC: Going Global – Building Ethanol Demand Internationally’, available at: <https://www.youtube.com/watch?v=_2JqaPJF5ME >, accessed 24 July 2017.

Solana, J., ‘Towards an EU External Energy Policy’, keynote speech delivered at the EU Energy Conference in Brussels, 20 November 2006.

Websites:

Online articles

ArabNews.com, ‘Attack on Abqaiq Oil Facility Foiled’, 25 February 2006, available at: <http://archive.arabnews.com/?page=1&section=0&article=78354&d=25&m=2&y=2006>, accessed 28 June 2012.

Biofuels Digest, ‘Biofuels Mandates Around the World’, 21 July 2011, available at: <http://www.biofuelsdigest.com/bdigest/2011/07/21/biofuels-mandates-around-the-world/>, accessed 28 June 2012.

Cabral, L. & Shankland, A., “Narratives of Brazil-Africa Cooperation for Agricultural Development: New Paradigms?” China and Brazil in African Agriculture (CBAA) Project, Working Paper 051, 2013, available at: <http://www.future-agricultures.org/publications/search-publications/political-economy-conference-2013/conference-papers-political-economy-2013/brazilian-and-chinese-engagement/1677-narratives-of-brazil-africa-cooperation-for-agricultural-development-new-paradigms-1/file/>, accessed 4 February 2015.

Casinge, E. ‘Parliament rubber stamps EU biofuels reform amid final controversy’, EURACTIV.com, 29 April 2015, available at: <http://www.euractiv.com/section/transport/news/parliament-rubber-stamps-eu-biofuels-reform-amid-final-controversy/>, accessed 20 July 2017.

Freemantle, S. & Stevens, J., ‘Brazil weds itself to Africa’s latent agricultural potential’, Standard Bank Group Economics, BRIC and Africa, 1 February 2010, available at: <http://www.blog.standardbank.com/blog/standard-bank-team/2010/02/brazil-weds-itself-africa-s-latent-agricultural-potential>, accessed 28 June 2012.

Gabrielli de Azevedo, J.S., ‘A Petrobras e o mercado internacional de etanol’, *Revista Opiniões*, Abr-Jun 2007, available at: <http://www.revistaopinioes.com.br/aa/materia.php?id=143>, accessed 28 June 2012.

Husain, A.M., Arezki, R., Breuer, P., Haksar, V., Helbling, T., Medas, P., & Sommer, M., *Global Implications of Lower Oil Prices*, IMF Staff Discussion Note, July 2015, available at: <https://www.imf.org/external/pubs/ft/sdn/2015/sdn1515.pdf>, accessed 3 August 2017.

Kelso, M. '1.7 Million Wells in the U.S. – A 2015 Update', Fracktracer Alliance, available at: < https://www.fractracker.org/2015/08/1-7-million-wells/>, accessed 19 July 2017.

Lane, J., 'Biofuels Mandates Around the World 2017', *Biofuels Digest*, 28 December 2016, available at: <http://www.biofuelsdigest.com/bdigest/2016/12/28/biofuels-mandates-around-the-world-2017/>, accessed 24 July 2017.

Mongoven, B., 'The Biofuel Backlash', STRATFOR, 13 September 2007, available at: <http://www.stratfor.com/biofuel_backlash>, accessed 19 October 2011.

Perry, M.J., 'Some charts and updates on America's amazing shale revolution, it's not over yet…', AEIdeas, 1 March 2016, available at: <http://www.aei.org/publication/some-charts-and-updates-on-americas-amazing-shale-revolution-its-not-over-yet/>, accessed 30 July 2017.

Razzouk, N., Rascouet, A. & Motevalli, G., 'OPEC Confounds Skeptics, Agrees to First Oil Cuts in 8 Years', Bloomberg, 1 December 2016, available at: <https://www.bloomberg.com/news/articles/2016-11-30/opec-said-to-agree-oil-production-cuts-as-saudis-soften-on-iran>, accessed 3 August 2017.

Renewable Fuels Association, *2016 Ethanol Industry Outlook: Fueling a High Octane Future*, 2016, available at: < http://www.ethanolrfa.org/wp-content/uploads/2016/02/RFA_2016_full_final.pdf>, accessed 24 July 2017

Reuters, 'Açúcar, etanol e bens de capital lideram prejuízos do BNDES', *Exame*, 28 December 2016, available at: <http://exame.abril.com.br/economia/acucar-etanol-e-bens-de-capital-lideram-prejuizos-do-bndes > , accessed 24 July 2017

STRATFOR, ‘Brazil: Plan To Double Ethanol Exports’, 12 September 2006, available at: <http://www.stratfor.com/brazil_plan_double_ethanol_exports>, accessed 19 October 2011.

STRATFOR, ‘Brazil: Ethanol Production Increase’, 14 March 2007, available at: <http://www.stratfor.com/brazil_ethanol_production_increase>, accessed 19 October 2011.

U.S. Energy Information Administration, ‘When was the last refinery built in the United States?’, available at: <https://www.eia.gov/tools/faqs/faq.php?id=29&t=6>, accessed 30 July 2017.

Wikipedia.com, ‘History of Ethanol Fuel in Brazil’, available at: <http://en.wikipedia.org/wiki/History_of_ethanol_fuel_in_Brazil>, accessed 28 June 2012.

Wikipedia.com, ‘Primary Energy’, available at: <http://en.wikipedia.org/wiki/Primary_energy>, accessed 6 May 2011.

Government legislation and declarations

Biofuture Platform Launch Statement, signed in Marrakesh, Morocco, 16 November 2016, available at: <http://biofutureplatform.org/launch-statement/>, accessed 24 July 2017.

Brazil-EU-Mozambique Joint Declaration on the Partnership for the Sustainable Development of Bioenergy, signed at Brasília, 14 July 2010, available at: <http://www.itamaraty.gov.br/sala-de-imprensa/notas-a-imprensa/declaracao-conjunta-brasil-uniao-europeia-mocambique-relativa-a-parceria-para-o-desenvolvimento-sustentavel-de-bioenergia>, accessed 28 June 2012.

Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport, available at: <http://

eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32003L0030:EN:HTML>, accessed 28 June 2012.

Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC, available at: < http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:EN:PDF>, accessed 28 June 2012.

Energy Independence and Security Act of 2007, available at: <http://www.gpo.gov/fdsys/pkg/PLAW-110publ140/pdf/PLAW-110publ140.pdf>, accessed 28 June 2012.

Energy Policy Act of 2005, available at: <http://www.gpo.gov/fdsys/pkg/PLAW-109publ58/pdf/PLAW-109publ58.pdf>, accessed 28 June 2012.

U.S. Department of Energy, 'Origins & Evolution of the Department of Energy', <http://www.energy.gov/about/origins.htm>, accessed 19 May 2011.

Statistics

BP, *BP Statistical Review of World Energy June 2011*

BP, *BP Statistical Review of World Energy June 2017*

European Biodiesel Board, '2009 Production By Country', available at: <http://www.ebb-eu.org/prev_stats_production.php>, accessed 28 June 2012.

International Energy Agency, 'Share of total primary energy supply in 2008', available at: <http://www.iea.org/stats/pdf_graphs/29TPESPI.pdf>, accessed 6 May 2011.

Ministério da Agricultura, Pecuária e Abastecimento, Departamento de Cana-de-Açúcar e Agroenergia, 'Exportações Brasileiras de

Etanol', available at: <www.agricultura.gov.br/desenvolvimento-sustentavel/agroenergia/estatistica>, accessed 28 June 2012.

Portal Brasil, 'Novas Reservas', available at: <http://www.brasil.gov.br/sobre/economia/energia/pre-sal>, accessed 28 June 2012.

UNICA, *Brazilian Sugarcane Ethanol: Get the facts right and kill the myths*, November 2009, available at: <http://www.unica.com.br/downloads/folhet_MITHYS&FACTS.pdf>, accessed 28 June 2012.

UNICA, 'Ethanol Exports – By Country', available at: <http://english.unica.com.br/dadosCotacao/estatistica/>, accessed 28 June 2012.

UNICA, 'Light vehicle sales', available at: <http://english.unica.com.br/dadosCotacao/estatistica/>, accessed 28 June 2012.

U.S. Department of Energy, 'Fact #662: February 14, 2011 – World Biodiesel Production', available at: <http://www1.eere.energy.gov/vehiclesandfuels/facts/2011_fotw662.html>, accessed 28 June 2012.

U.S. Energy Information Administration, *Annual Energy Review 1997*, DOE/EIA- 0384(97). Washington, DC, July 1998, Table 11.4, available at: <http://www.eia.doe.gov/emeu/25opec/sld003.htm>, accessed 17 May 2011.

U.S. Energy Information Administration, 'International Energy Statistics', available at: <https://www.eia.gov/beta/international/data/browser/index.cfm>, accessed 29 July 2017.

U.S. Energy Information Administration, 'Technically Recoverable Shale Oil and Shale Gas Resources: An Assessment of 137 Shale Formations in 41 Countries Outside the United States', June 2013, available at: <https://www.eia.gov/analysis/studies/world shalegas/archive/2013/pdf/fullreport_2013.pdf >, accessed 30 July 2017.

U.S. Energy Information Administration, 'U.S. States – State Profiles and Energy Estimates', available at: <https://www.eia.gov/state/rankings/#/series/46>, accessed 29 July 2017.

U.S. Energy Information Administration, 'Who are the major players supplying the world's oil market?', 15 March 2012, available at: <http://tonto.eia.doe.gov/energy_in_brief/world_oil_market.cfm>, accessed 27 March 2012.

Interviews:

Ambassador Antônio de Aguiar Patriota, Brazil's former Minister of Foreign Affairs, interviewed in Brasília, Brazil, 22 June 2011.

Ambassador Antônio José Ferreira Simões, the first Head of the Department of Energy at the Brazilian Ministry of Foreign Affairs, interviewed in Brasília, Brazil, 20 September 2007.

Antônio Carlos de Mendes Thame, Brazilian Congressman (of the opposition Brazilian Social Democracy Party, PSDB-SP) representing the sugarcane-growing region of São Paulo state, interviewed in Brasília, Brazil, 22 June 2011.

Antônio Lício, former official in Brazil's Ministry of Agriculture, interviewed in Brasília, Brazil, 3 June 2011.

Claudia Santos Vieira, former Head of the Renewable Energy Division at the Brazilian Ministry of Foreign Affairs, interviewed via Skype call, 22 May 2017.

Cristina Maria Monteiro Machado, Researcher at the Brazilian Agricultural Research Corporation, interviewed in Brasília, Brazil, 10 June 2011.

Emerson Coraiola Kloss, former Head of the Renewable Energy Division at the Brazilian Ministry of Foreign Affairs, interviewed via Skype call, 22 May 2017.

Habib Jorge Fraxe Neto, Legislative Advisor on Environment Matters to the Brazilian Senate, interviewed in Brasília, Brazil, 15 May 2017.

Helena Claudia Cantizano, International Affairs Advisor to the Minister of Mines and Energy, interviewed in Brasília, Brazil, 15 September 2006.

Henry Groppe, oil and gas analyst, Groppe, Long & Littell, interviewed in London, United Kingdom, 6 February 2007.

José Miguez, Head of the Department of Climate Change Policies at the Brazilian Ministry of the Environment, interviewed in Brasília, Brazil, 21 June 2017.

Paulo César Lima, Legislative Consultant on Energy Matters to the Brazilian Chamber of Deputies, interviewed three times in Brasília, Brazil, 12 September 2006, 2 June 2011 and 15 May 2017.

Renato Domith Godinho, Head of the Renewable Energy Division at the Brazilian Ministry of Foreign Affairs, interviewed in Brasília, Brazil, 12 May 2017.

Rodrigo Dolabella, Legislative Consultant on Agriculture Matters to the Brazilian Chamber of Deputies, interviewed twice in Brasília, Brazil, 2 June 2011 and 15 May 2017.

Sílvia Cupertino, Legislative Advisor on Energy Matters to the Brazilian Senate, interviewed in Brasília, Brazil, 15 May 2017.

* Junior official at the Ministry of Foreign Affairs, interviewed in Brasília, Brazil, 6 February 2012.

* Representative of the Brazilian Sugarcane Industry Association (UNICA), interviewed in São Paulo, Brazil, 14 June 2011.

* Senior official at the Ministry of External Relations, interviewed in Brasilia, Brazil, 3 June 2011.

NOTE: '*' indicates interviewees who wished to remain anonymous.

Films/documentaries:

Yves Billon (producer), *The Epic of Black Gold – Episode 3: Oil as a Weapon*, (2005).

Formato	**15,5 x 22,5 cm**
Mancha gráfica	**10,9 x 17cm**
Papel	**pólen soft 80g (miolo), cartão supremo 250g (capa)**
Fontes	**AaronBecker 16/22, Warnock Pro 12 (títulos);** **Chaparral Pro 11,5 (textos)**