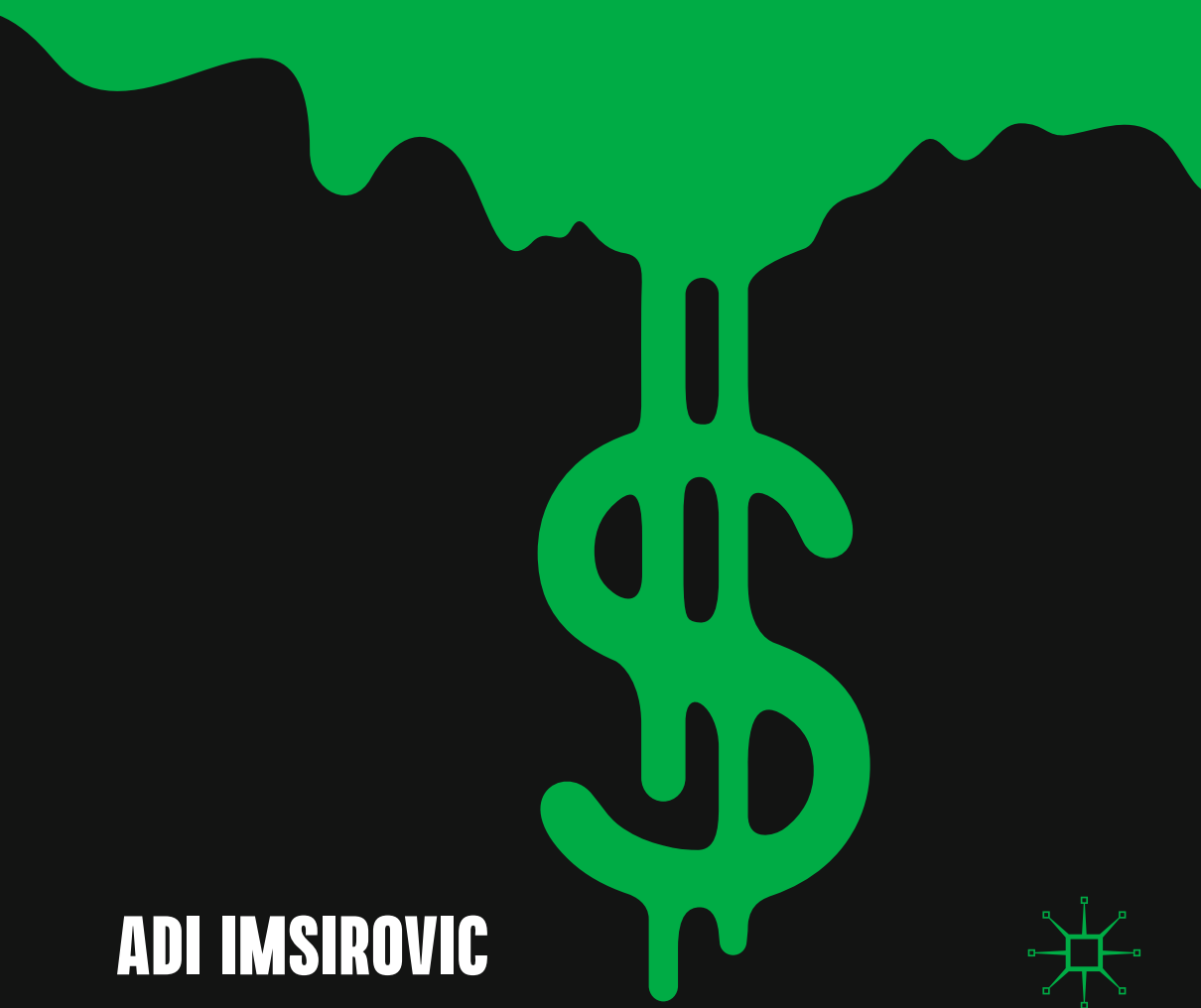
How the Energy Transition Affects the Price of Oil

INTERNATIONAL OIL MARKETS IN THE AGE OF CLIMATE CHANGE



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In writing this book, I've come to realise that I could never have finished it alone. This project has been an example of the power of friendship, guidance, and professional support.

Needless to say, any errors are entirely mine.

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My special thanks go to Tula Weis and Chris Heilpern for helping me get across the line.

I would also like to thank my readers, who embark with me on this journey into a very uncertain climate and energy future.

Only together, we can try to make the world a better place.

Oxford, March 2024 Adi Imsirovic

Contents

List of Figures

CHAPTER 1

Introduction

Trading and Price Discovery

This book is a natural continuation of my first book, 'Trading and Price Discovery for Crude Oils' published in 2021.[1] The first book covers the history and development of oil markets from the early days in the 1860s, Rockefeller and the oligopoly of oil Majors to OPEC and the age of benchmarks. Drawing on my research, learning, and practical knowledge of the oil markets, I tried to explain the genesis as well as the working of the key oil benchmarks.

Around the time of publication of the book, it became very clear that the Brent benchmark needed urgent fixing and I continued work on my 2019 proposal[2] to introduce WTI into the benchmark. This resulted in a number of papers and articles on the subject,[3] culminating in three technical papers which I wrote with my trading colleague and friend, Kurt Chapman.[4]

Realising how important lessons from history were for the future of oil markets, I proposed to a group of 'old hands'[5] who worked in trading in the early days of Brent a joint effort on a book that would coincide with the start of the 'new' Brent contract in June 2023. Palgrave, the publishers of the book, did an outstanding job and 'Brent Crude Oil: Genesis and Development of the World's Most Important Oil Benchmark' came out just in time, on May 30 that year.[6] The book was followed by a series of podcasts on the subject.[7]

This was also a period when liquified natural gas (LNG) was coming of age as a global commodity. Having worked at Gazprom Marketing and Trading for several years, where I cooperated closely with a very active LNG trading team, it became apparent to me that gas markets were developing along the lines of the oil market. Spot activity picked up and pricing hubs and benchmarks such as Henry Hub,[8] Title Transfer Facility (TTF) in Holland,[9] and Japan

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Korea Marker (JKM)[10] stated to resemble West Texas Intermediate (WTI) in Cushing,[11] Brent,[12] and Dubai[13] benchmarks.

I wrote an article about this in the a Petroleum Economist titled: 'Gas readies for its oil moment',[14] and eventually explored the idea in more detail in 'A Comparative History of Oil and Gas Markets and Prices', co-written with Professor Jonathan Stern.[15]

Energy Transition and Oil Markets

Around the same time, I became interested in both voluntary and mandatory carbon markets and how they may impact oil benchmarks. In February 2022, Jonty Rashford of S&P Global and I wrote a paper on the subject.[16] Research for this paper led me to realise that policies needed to facilitate the green energy transition were likely to have a profound effect on the oil market.

The result of this research was a series of articles concerning the lessons from the history of the oil markets for the energy transition, such as: '*Green transition will be less painful if we avoid repeating 1970s policy errors in the oil market'*,[17] '*Climate Change and Oil and Gas Prices'*,[18] '*History Lessons for the Energy Transition*',[19] '*Oil and gas must face climate change head on'*,[20] '*Letter from Europe: Tobacco offers warning for oil*',[21] and others.

It was in these early papers and articles that I developed basic ideas about the policies necessary to facilitate transition. These ideas drew heavily on the material and ideas which I taught in a module in Resource and Environmental Economics at Surrey University.[22]

For example, in 'Oil Market Lessons for the Future', published in June 2021 I write: '*The energy industry and the environment are at an important crossroads. Facing a limited carbon budget, we must stop burning carbon by the middle of this century or find economical ways of removing greenhouse gasses emitted in the process. As a result, oil demand is likely to fall significantly. But oil is unlikely to disappear. Most of the growth in oil demand is likely to come from the petrochemical industry, which is likely to face challenges of its own. In such an environment, the low-cost oil producers in the Middle East are likely to be the "last men standing" in the oil industry. In spite of their low cost, the transition away from oil is likely to be associated with high prices of petroleum products. Only this time, the high price should be a result of the cost of carbon. To achieve this transition, we will need smart policies and more well-functioning international energy markets. The lessons learned from the history of the oil markets will help*'.[23]

Some of these ideas were further developed in articles such as '*Oil Markets in the Age of Energy Transition*' and[24] '*How the Energy Transition Will Reshape Oil Markets*'[25] and some podcasts such as S&P Global '*Oil market history echoes in today's challenge to meet the energy transition*'.[26]

Oil markets never lack excitement and the Russian invasion of Ukraine in February 2022 triggered large gas and oil price increases, leading to a full-blown energy crisis in Europe. All European and UK governments stepped in to protect consumers, subsidising fossil fuel consumption.

These policies and the sanctions on Russia brought to the fore the issue of security as an integral part of the overall energy transition. To address this issue, I wrote: '*Why a Russian oil price cap is unlikely to work*',[27] 'How to tackle the UK cost of living crisis'[28], 'Why are gas prices still high despite oil getting cheaper – and what will happen next?',[29] 'Autumn statement 2022: experts react',[30] 'Global economy 2023: how governments could make the energy crisis worse this year',[31] and 'Russian Oil Price Caps Are Failing a Key Test' (with my CSIS colleague Ben Cahil).[32]

By now, it was clear that I had enough ideas and material for one monograph. My wonderful editor at Palgrave Macmillan, Tula Weis, agreed, and that was how this book started.

The structure of the book slowly emerged during a set of lectures which I presented in December 2023, in the 'Energy conversion' module for the MSc course in Energy Systems, at the Department of Engineering, Oxford University.[33]

The Layout of the Book

Not everyone has read 'Trading and Price Discovery for Crude Oils' so Chapter 2 starts with an introduction to oil price benchmarks, what they are, and how and why they are traded. Most benchmarks have particular characteristics which have evolved over time, and a little bit of history goes a long way to explain and understand them. For this reason, I briefly revisit some key historical developments in the oil markets in the sections: 'How did we get here?' and 'The elephant in the room'.

I am often asked to talk about how oil prices are set. There is a lot of misunderstanding on this point, going as far as the Saudi Arabian Energy Minister Prince Abdulaziz bin Salman claiming that: 'extreme' volatility and lack of liquidity mean the futures market is increasingly disconnected from fundamentals'.[34] In May 2023, I was invited to give a presentation at a joint IEA-IEF-OPEC Workshop in Vienna which focused on energy market volatility. This section of the book includes the main points of this presentations and elaborates on my brief comment on the subject in the Financial Times in June that year.[35]

I wanted to give the reader a little bit more than just elaboration on some important points. I wanted to give a comprehensive picture of how I see the market work. For this reason, Chapter 3 starts with our fundamental understanding of how the oil market works. The Hotelling principle is one of them, using solid economic logic to describe how commodity producers may be expected to behave. For simplicity, Hotelling theory is based on some very restrictive assumptions, but once we understand their limitations, it is a good

tool that we can cautiously use when thinking about the reality of the oil markets.

The chapter explains that different segments of the market are traded by different actors and that there may be some short-term disconnect between prevailing fundamentals and futures prices. This is because the absolute price level for oil is generally set by financial players who act on expected fundamentals over a period of time, and not on the current, prevailing conditions. All financial markets show some alleged or apparent 'irrationality',[36] but all good markets also self-correct by design.

For example, if the financial players support bullish oil futures prices and the physical traders have an opposite view, the latter can always deliver physical oil to the former, for example, through the physical delivery in CME WTI contract in Cushing, or through an EFP mechanism in the ICE Brent contract.[37] There is a lot of money in such low-risk arbitrage and traders will make sure that no such disconnect lasts a long time. Markets work.

I finish the chapter with a discussion about the 'Theory of storage and oil market structure' because I think that it is often poorly understood even by some oil practitioners.

Chapter 4 is designed to introduce some basic concepts of environmental science and economics. These concepts shall help us understand why developed countries worry about pollution more than poorer ones, what is the 'optimal level of pollution', why certain policies such as carbon tax or subsidy are efficient ways of dealing with climate change, and why it is so hard to reach a climate agreement at the international level. Fortunately, there are ways of getting around the problem and many of the academic findings are being applied in the COP climate negotiations. We shall mention important concepts such as public goods, free-riding, and use some simple game theory.

Sadly, climate change is not the only problem we are facing with the way our energy systems are organised at the moment. We shall bring in the concept of planetary boundaries and where we stand in that respect. However, the main topic of Chapter 5 is sustainable living and what it really means in economic terms. When we clean up a lake or river, the work done enters our current economic accounting as a positive figure, even though we have only brought it back to its original, natural state. We explain that the concept of gross domestic product (GDP) is flawed and why we need environmental accounting methods to correctly account for the natural capital that we use (and abuse). We also discuss the problem of future generations and discounting. Once we are familiar with these concepts, we can discuss a very important topic, the social cost of carbon (SCC) and why it is so important in making the climate policy decisions.

The concept of SCC is helpful in making a clear economic case for a speedy energy transition. We calculate that, using an average estimate of the SCC of $240.5/t, the social cost of continued carbon emissions is currently about $8.7 trillion, every year. Taking into account climate feedback loops and the persistence of economic damage, this estimate could be as much as 20 times

higher! These costs compare to $4.5 trillion a year investment that the IEA estimates is needed in clean energy and energy transition. Simple economics are sufficient to accept that we should move away from combusting fossil fuels as soon as possible.

In Chapter 6, we start to narrow down to the subject of energy and climate change. We assess the impact of the oil industry on climate and ask if cleaning up the power sector and electrifying transport can significantly reduce that impact. The key point here is that oil has had a nice, monopolised niche in the transportation sector, which accounts for about 60% of demand, most of it in road transportation (about 45%).

With major improvements in battery technology (largely due to mobile phones), electric vehicles (EVs) are back in vogue. The first EV was built in 1834 and it was an EV vehicle, that was first to break the 100 km/h barrier in 1899. With new batteries offering far greater range and environment-friendly government policies, EVs have made sudden and steep inroads into the transportation sector. Bloomberg NEF projected that EV sales would reach 42% share of all the vehicles sold in Europe by 2026. Some European countries such as Germany may reach almost 60%, while the Nordic countries are projected to reach almost 90% share of EVs in the total new car sales. By eroding the monopoly of oil in transportation, overall price elasticity of demand for oil should increase. This means that any increase in oil price will lead to a fall in demand. Already, there is some evidence from California to support this view.

Another interesting point, poorly researched so far is whether EVs have affected the income elasticity of demand for internal combustion engine vehicles (ICE). Have ICE vehicles become 'inferior' goods (at least in urban areas of rich countries)? For an economist, an 'inferior good' means that, as income rises, people buy less of it. On the other hand, as income rises, people buy more of luxury goods. Have EVs become luxury goods and are ICE vehicles inferior goods now?

Having covered 45% of oil demand in land transport, including the impact of urbanisation and public transportation solutions, we then round up our discussion about the remaining 15% or so needed for aviation and shipping. We also discuss the inevitable continuous use of oil in plastics and possible solutions through recycling.

We start Chapter 7 by discussing various paths to Net Zero emissions by 2050, the only way of meeting the Paris climate goals and avoiding global warming of 2 or more degrees Celsius (2C). We also discuss security and equity issues associated with the energy sector. We conclude that reaching the Net Zero (NZ) goals is the best way to ensure equity and energy security. But reaching NZ will also mean drastically lower demand for oil with major implications for the oil markets.

Chapter 8 is dedicated to oil industry actors in the era of climate change. We start off with the international energy companies (IOCs), probably the most responsive actors to climate change policies and market incentives. We discuss

mergers and acquisitions, especially in the shale patch in the United States (US) and the role of shale in general in the next decades. We also talk about policy misalignment between the US and Europe and resulting behavioural differences between IOCs on different sides of the Atlantic. This discussion is then extended to trading houses and national oil companies (NOCs).

The role of the oil producing countries and their national champions (NOCs) in the age of climate change is especially important and we discuss them in Chapter 9. We do so within the framework of 'resource curse' or 'Dutch disease' literature. We find that the literature offers a number of solutions, sovereign wealth funds (SWFs) being one of the most popular ones. We discuss SWFs and other policies and find that, while some producing countries (such as the UAE and Saudi Arabia) are well on the way to diversifying their economies away from oil, others (such as Algeria, Libya, and Venezuela) have been left behind. We argue that there is no reason for NOCs not to emulate a great success or the IOCs in developing trading activities.

Chapter 10 is almost entirely about OPEC and a wider, but ineffective alliance of OPEC+. We explain why a falling demand for oil will put the OPEC+ alliance under stress very early on. However, the core of OPEC could potentially be stronger than ever. It appears that Saudi strategy is to support prices as high as possible, for as long as possible, delaying any change, while using the proceeds of high oil revenues to diversify its economy as quickly as possible.

The primary tool for 'talking the market up' seems to be OPEC Secretariat, which is using its demand projections and propaganda-like statements to justify very high demand projections and the virtues of oil.[38] While the Secretariat is not denying climate change, all of its statements tend to conflict with the goals of the Paris Agreement.

In this chapter we offer an alternative, positive role for OPEC: The organisation could be promoting what its wealthy members such as Saudi Arabia and the UAE are already doing—working hard on moving their economies away from fossil fuels. Rather than being an obstacle to energy transition, the organisation could be a part of the solution. In doing so it could be a force for good, with a legacy of not only wrestling the ownership of its own resources from the neo-colonial power of the oil Majors, but also in helping its members overcome the hardships of the inevitable energy transition.

Future oil price is also discussed in this chapter. While shrinking demand and increased market power of OPEC would work in the opposing directions, it will be hard for the cartel to support prices much above production costs due to losing of the monopoly power in transportation. The higher the oil prices, the faster the transition to EVs is likely to be. However, this process is unlikely to be linear. The supply side and investments in oil production need to be considered as well. For this reason we revisit some earlier subjects such as shale oil and EVs in the context of OPEC market power. Finally, we discuss the relationship of the oil producers with futures exchanges and discuss some

of their merits in setting the 'official' prices and clearing the produced volumes at market prices.

Chapter 11 starts with a discussion about the three key oil benchmarks; Brent, WTI, and Dubai and how the falling demand and changing flows may impact them. The key demand for oil will continue to be 'East of Suez', giving support to Dubai flows. This is unlikely to change any time soon, especially as Asian traders (two Chinese Majors) dominate the benchmark. With excess refinery capacity and export quotas for refining products, China is also likely to continue to set refinery margins globally.

The Brent benchmark went through a turbulent period of changes, including incorporating WTI Midland as a deliverable grade of oil. After about three years of discussions and consultations, traders need a break to digest what it all means for their trading strategies. Longer-term, with falling demand for oil in Europe, Brent may give way to a new benchmark in the US Gulf Coast. Already, there are plenty of candidates. However, for now, the 'new' Brent seems to be working well and given the industry mood, Brent will continue to dominate as the most important global oil benchmarks.

We then move on to discuss a new attribute of crude oils that will be one of the dominant features in the international trade—carbon content of crude oils. Probably the most interesting feature of the market in future will be the application of blockchain technology, which is already being used in some back-office applications. Distributed ledgers offer far more flexibility and future physical trades may well be executed automatically, based on algorithms containing certain set attributes such as carbon content of oil. Third party, service providers can be included in the technology on a 'need to know basis', having access only to the information relevant to their business. Some aspects of the technology offer verification of certain attributes even without seeing the actual data!

The technology is already available and could be implemented within the next five years, subject to demand. Probably the most exciting feature of blockchains is the possibility of creating tokenised and decentralised exchange for commodities. Subject to regulatory approval and the speed of the infrastructure behind the technology, this could revolutionise as well as democratise trading and bring intense competition in the world of price-reporting agencies (PRAs) and futures exchanges, a handful of which controls the commodity space now.

The last short chapter concludes that the oil markets are here to stay for quite some time. However, they will be forced to converge around the government control mechanisms, such as carbon price, biofuel mandates, or outright bans on ICE vehicles. This is because of a very clear economic and social case for early energy transition. As a result, the Net Zero pathway is the only justifiable one and all the industry actors should prepare for it.

It is often forgotten that we do not need oil. We just need services that oil ultimately provides. With climate scientists screaming for a need to stop global warming and now that we have affordable and clean alternatives, they

will be taken up. Equally, we should not forget that we may never stop using oil either. We just must stop burning it.

Notes

1. https://link.springer.com/book/10.1007/978-3-030-71718-6.
2. 'Changes to the 'Dated Brent' Benchmark: More to Come', https://www.oxfordenergy.org/publications/changes-dated-brent-benchmark-come/. Also see 'Benchmarks Face 2020s Evolution' in https://pemedianetwork.com/petroleum-economist/articles/trading-markets/2019/benchmarks-face-2020s-evolution/.

   I proposed the introduction of WTI at a Platts forum in London a couple of years earlier. The idea came to me at a breakfast meeting with my colleague, David Povey who was, at the time, a senior trader at Occidental petroleum in Houston, when he suggested that: 'When WTI hit the water, it was essentially Brent', meaning that it was trading on Brent-related price.
3. For example: 'CIF Brent Benchmark?' https://www.oxfordenergy.org/publications/cif-brent-benchmark/.
4. The three papers are:

   'The Future of the Brent Oil Benchmark—A Radical Makeover', A. Imsirovic and K. Chapman in Oxford Energy Comment, March 2022. https://www.oxfordenergy.org/publications/the-future-of-the-brent-oil-benchmark-a-radical-makeover/.

   'The Brent Benchmark—Where Do We Stand?', A. Imsirovic and K. Chapman in OIES Energy Comment, July 2022. https://www.oxfordenergy.org/publications/the-brent-benchmark-where-do-we-stand/.

   'The New Forward Brent Benchmark', With Kurt Chapman, Oxford Energy Comment, March 2023. https://www.oxfordenergy.org/publications/the-new-forward-brent-benchmark/.
5. These were: Adrian Binks, Liz Bossley, Colin Bryce, Kurt Chapman, Neil Fleming, David Godfrey, Nigel Harris and David Peniket.
6. Adi Imsirovic ed. 'Brent Crude Oil: Genesis and Development of the World's Most Important Oil Benchmark', Palgrave, 30 May 2023. https://link.springer.com/book/10.1007/978-3-031-28232-4.
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8. https://www.cmegroup.com/markets/energy/natural-gas/natural-gas.html.
9. TTF is a Virtual Trading Point, operated by Gasunie Transport Services (GTS), the transmission system operator in the Netherlands. See: https://www.gasunietransportservices.nl/en/news/dutch-ttf-european-front-runner-in-tradability-index.

10. JKM is the Northeast Asian spot price index for LNG delivered ex-ship to Japan, Korea, Taiwan, and China, assessed by S&P Global Platts.
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