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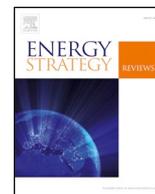
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Preparing for the new oil order? Saudi Arabia and Russia

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ABSTRACT

The COP24 meeting in Katowice, Poland, made clear the divisions between the winners and losers of a low-carbon energy transition. The IPCC's 1.5 °C report shows that climate change mitigation must see an early peak in oil demand and a rapid fall in consumption thereafter. The 'shale revolution' and the falling cost and rapid deployment of renewable energy are laying the foundations of a 'new oil order' that threatens the prosperity of oil exporting economies. A review of forecasts and scenarios reveals significant uncertainty surrounding the dynamics of future oil demand. This provides the backdrop for a comparative analysis of the world's largest oil exporters: Saudi Arabia and Russia. Saudi Arabia is shown to be concerned to maintain oil revenues to finance its '2030 vision' to diversify its economy. Russia, by comparison, shows no such ambition, rather it seems determined to increase its reliance on the oil and gas sectors. The conclusions suggest that fossil fuel exporters must act now to prepare for the low carbon transition and that a failure to do so could result in tensions and conflicts that could undermine the collective action required to address climate change.

1. Introduction

At the COP24 meeting in Katowice in December 2018 clear fault lines emerged between the potential winners and loser of the low-carbon energy transition. A coalition of major fossil fuel producers—the United States, Russia, Saudi Arabia and Kuwait—refused to support a motion to 'welcome' the IPCC's report on *Global Warming of 1.5 °C* [1]. Because unanimous approval was required, the meeting was only able to 'note' the report. Although it may be 'welcomed' at the later date, this action caused great upset amongst many present at the meetings.¹ At the same meeting Saudi Arabia's Minister of Energy, Industry and Mineral Resources Khalid Al-Falih [2] made a statement criticizing the tone of the meeting in relation to the intent of the 2015 Paris Agreement: 'The basis of the Agreement was an intent to strengthen global action on climate change without sacrificing sustainable development and poverty eradication. That was to be achieved through a focus on reducing emissions rather than banning or restricting energy sources, such as fossil fuels we are seeing undue emphasis on energy and particularly oil' In a similar vein, the US National Statement made clear their position: 'The global climate conversation needs to embrace

not only aspiration but today's reality. The U.S. approach incorporates the realities of the global energy mix and uses all energy sources and technologies as cleanly and efficiently as possible, including fossil fuels, nuclear energy and renewable energy' [3]. The US delegation held an event promoting fossil fuels at which Donald Trump's international energy and climate adviser, Wells Griffith, said: 'The United States has an abundance of natural resources and is not going to keep them in the ground. We strongly believe that no country should have to sacrifice their economic prosperity or energy security in pursuit of environmental sustainability.' Not surprisingly, it was reported that this position 'brought scorn from environmentalists and countries that support stronger action to fight global warming.'² However, the US position does reflect the reality that the world's largest fossil fuel 'producer economies' are waking up to the fact that effective climate change mitigation threatens their prosperity and the influence that they are currently afforded [4].

Whether welcomed or not, the IPCC's report made clear the scale of the challenge facing humanity if it is to avoid 'catastrophic climate change'. It documented that 2 °C warming by the end of this Century would bring with it significant damage to the global economy, human

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¹ COP24: US, Russia and Saudi Arabia condemned as 'climate villains' for blocking crucial global warming report, *Independent*, 10 December 2018: <https://www.independent.co.uk/environment/cop24-climate-change-global-warming-us-russia-saudi-arabia-ipcc-report-a8675881.html>.

² 'Trump Team Pushes Fossil Fuels at Climate Talks. Protests Erupt, but Allies Emerge, Too,' *The New York Times*, 10 December 2018: <https://www.nytimes.com/2018/12/10/climate/katowice-climate-talks-cop24.html>.

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health and well-being and the natural environment. However, the pathway to 1.5 °C is daunting and would require a rapid reduction of our reliance on fossil fuels. In October 2018, the International Energy Agency [5] published a study on ‘*Outlook for Producer Economies 2018: What do changing energy dynamics mean for major oil and gas exporters?*’ The study is based on the proposition that ‘a changing energy system is posing critical questions for many of the world’s largest oil and gas producers’ and that ‘more than at any point in recent history, fundamental changes to the development model in resource-rich economies look unavoidable.’ The so-called ‘producer economies’ are a heterogeneous group and some are much more able and committed to making the changes needed to diversify their economies and prepare for a future reduction in the ‘resource rents’ that they have relied upon.

Despite the warnings of the IPCC report and the campaigns to ‘leave it in the ground’ and ‘divest’ from fossil fuels, the reality is that the transition to a low carbon energy system will take time. Just how long is one of the critical uncertainties, but already, we argue, the oil order is changing and unless managed this ‘high-carbon’ transition will become a significant source of geopolitical instability. This is made clear in IRENA’s [6] report on ‘*The Geopolitics of the Energy Transformation*.’³ Although the report focuses on the benefits of an accelerated deployment of renewable energy technologies, it also considers the impact of such a future on the fossil fuel producer economies. A new lexicon is apparent in such discussions that no longer focus on fossil fuel scarcity, but instead talk of ‘carbon budgets,’ ‘unburnable carbon,’ ‘peak demand,’ ‘stranded assets,’ and ‘lock-in.’ At the same time, as the IRENA report documents, the growth of renewable energy is posing new geopolitical challenges around, for example, critical raw materials, grid interconnection and control of clean-technologies [7].

This paper builds on our work elsewhere that makes the case that changes are underway that are laying the foundations for a ‘new oil order,’ in the sense that the shale revolution has granted the US a new position in global oil and gas markets, at the expense of the relative position of OPEC; and that the falling cost and growth of low carbon energy sources and the emphasis on decarbonisation mean the continued dominance on fossil fuels, perhaps sooner than later, will be challenged [8,9]. The next section briefly outlines the contours of our argument and analyses a range of current views on the future role of fossil fuels in the global energy mix. The rest of the paper then presents a preliminary analysis of the preparedness, or not, of the world’s two largest fossil fuel exporters—Saudi Arabia and Russia—to address the challenges that they may face as a result of the new oil order. After a comparison of the status of the two countries as ‘producer economies,’ the two case studies focus on how they have responded to the recent turmoil in the global oil market and whether or not they are seeking to adjust their ‘economic model’ to prospects of a ‘world after oil.’

Why does this matter? The history of these two economies reveals their vulnerability to prolonged periods of low oil prices and oil price volatility. For example, high oil prices in the late 1970s supported a failing economic system, but the fall in the oil price in the 1980s played a major part in the collapse of the Soviet Union. More recently, the rise in the oil price in the first decade of this century played a crucial role in consolidating President Putin’s authority and that of the Russian state. In Saudi Arabia, the availability of significant oil rents is crucial to maintaining the social contract between the ruling elite and the country’s growing and youthful population and significant financial reserves are needed when it is called on to cut production when oil prices are low. Recently, it is only cooperation between Russia and Saudi Arabia that has allowed OPEC to seek to re-balance the international oil market. Thus, the preparedness of these two economies for a world with a lower demand for oil and gas, and hence lower prices, has profound geopolitical consequences, both in terms of internal social and political cohesion and also foreign policy and international relations. The two

cases are also reflective of the wider challenges that all fossil-fuel exporting countries will have to face in the medium-to long-term as the energy transition proceeds, and possibly, accelerates. The paper concludes by considering the wider geopolitical implications of our analysis as a component of the wider geopolitics of the energy transformation.

2. The new oil order

In recent years two fundamental developments have challenged the existing logic of the international oil market that is based on notions of scarcity and a delicate balance between supply and demand: the so-called ‘shale revolution’, and the rapid fall in the cost and growth in the deployment of renewable power generation—solar power and wind turbines. Together, these developments represent countervailing tendencies. On the one hand, the shale revolution has heralded an era of ‘fossil fuel abundance;’ on the other hand, the rapid growth of renewable power generation is challenging the role of fossil fuels in the energy mix—particularly coal and gas—and making possible an electrification pathway to low carbon transportation that will impact on oil demand [10,11]. Here we focus on the causes of the recent volatility in the global oil market and the prospects for future demand [12].

2.1. Fossil fuel abundance

At the turn of the century, the US was preparing to become a major importer of liquefied natural gas (LNG). However, most of the import terminals that were built were never used and many are now being converted into export facilities as the US has become an LNG exporter [13]. The technologies that have enabled the shale gas revolution have also been applied to tight oil (oil produced from shale using horizontal drilling and hydraulic fracturing) with the same dramatic consequences and the US has reduced its reliance on imported oil, the ban on crude oil exports has been lifted, and the economy is now enjoying an industrial renaissance [14]. So far, these developments have been limited to North America—similar developments have taken place in Western Canada—but there is the potential for them to be applied elsewhere in the world [15]. Nonetheless, the shale revolution has already had significant impacts on global oil and gas markets and geopolitics [16].

Since late 2015, when the ban on crude oil exports was lifted, the emergence of the US as an oil exporter and the loss of its domestic market to oil exporters, coupled with fragile oil demand growth, has contributed to the over-supply and falling prices. As we document later, this has led OPEC and Russia (OPEC +) to cooperate to try to balance the market by constricting supply [17]. This has met with some success, but there is now a school of thought that the availability of US light-tight oil is imposing a price-corridor on the market around the \$50–\$60 a barrel level.⁴ While OPEC + have demonstrated solidarity in reducing output, the US oil industry has responded by improving efficiency and reducing costs making more oil available at a lower price. Production in most OPEC counties is controlled by large national oil companies (NOC). This is not the case in North America where private companies of varying sizes operate in competition with one another and respond to market conditions. Thus, when OPEC’s actions succeed in pushing up the price beyond \$60 a barrel it only incentivizes US companies to increase production. At the same time, the post-2014 fall in the oil price forced greater cost discipline on conventional oil producers, and technological innovation and the benefits of digitization mean that there is the prospect of more lower cost conventional oil than was once assumed. It is not that long ago that the oil companies talked about ‘the end of easy oil’ and the need for \$100 a barrel to ensure adequate supply. That is not to say that ‘geopolitical events’ might not result in

³ This Van de Graaf is one of the lead authors of this report.

⁴ ‘Oil’s ‘lower for longer’ reasserts itself.’ Financial Times, 23 November 2018: <https://www.ft.com/content/507b6dce-ed75-11e8-89c8-d36339d835c0>.

the occasional short-term spike in the oil price; but the cost supply curves do reveal that a lot of oil can be produced around the \$60, though there are complications over the grade of that oil as the market is now over-supplied with lighter grade oil and there is a shortage of heavier grades, compounded by the current crisis in Venezuela [18].

2.2. A world of 'radical uncertainty'

Despite regular interruptions by geopolitical factors—such as conflict in producing states or the imposition of sanctions—the oil market tends to conform to the laws of supply and demand. Over-supply results in falling price, while surging demand results in higher prices because it takes time to bring on new production. All too often, new supply comes on line as demand falters, and supply control is required to balance the market, hence the boom and bust cycles [19]. At the moment, there are growing concerns about the robustness of future oil demand prompted by the prospects of slower economic growth as a result of the US-China trade war and the re-balancing of the Chinese economy away from heavy industry and towards the service sector and the knowledge economy.⁵ However, there are clear signs that oil producers are becoming concerned about the longer-term prospects for global oil demand because of increased movement toward action on climate change mitigation, witness the statement by Saudi Arabia at COP24. In fact, shareholders in many of the world's largest companies are forcing them to make formal statements about their long-term prospects, while some are seeking to diversify beyond oil and gas, the majority are focussing on the cost competitiveness of their oil and gas production.

The oil and gas industry have long engaged in forecasting and scenario planning, as have international organisations such as the IEA. In the past these exercises were used to warn of impending shortfalls, providing justification for tax breaks and billion-dollar investments. The climate change community also uses complex energy and climate models to demonstrate the radical changes needed to deliver the required reduction in carbon emissions to limit global warming. The IPCC's 1.5 °C report presents four such scenarios with varying degrees of peak and decline.⁶ For understandable reasons, there is a clear mismatch between the more long-term and gradual decline in fossil fuel demand envisaged by the likes of the IEA and the international oil companies and the necessity of rapid declines documented by the UNDP's (2018) 'Gap Analysis' [20] and by NGOs like Oil Change International [21] and Carbon Tracker [22]. As we are currently on a pathway to at least 3 °C of warming with little sign of the necessary actions required to rapidly constrain emissions, the sobering reality is that the most likely outcome is somewhere between the two, a rate of decline that will pose significant challenges to the fossil fuel producer economies, but too slow to limit warming to 1.5 °C, and—as noted above—the IPCC report makes clear a 2 °C world is one with significant challenges.

As Table 1 illustrates, there is some degree of consensus among the IEA [23] and the international oil companies [24–27] as to a possible range of oil demand trajectories, but no consensus on what is most likely to happen. Rather, as the Head of Shell's Scenarios Team, Jeremy Bentham, has put it, the industry faces 'radical uncertainty.'⁷ As Table 1 makes clear, there is a tendency to develop three possible pathways: first, a reference case that is 'business as usual' that results in continued demand growth through to 2040; but most—with the exception of ExxonMobil—do not believe that this will happen. Second, a gradual

⁵ Amy M. Jaffe, U.S.-China trade issues loom large for oil, Energy Realpolitik, Council for Foreign Economic Relations, 15 January 2019: <https://www.cfr.org/blog/us-china-trade-issues-loom-large-oil> (accessed 10 May 2019).

⁶ An infographic of these scenarios can be found at: <https://www.ipcc.ch/sr15/graphics/> and an interactive model of them can be accessed at: <https://data.ene.iiasa.ac.at/iamc-1.5c-explorer/#/workspaces>.

⁷ 'Inside Oil Giant Shell's Race to Remake Itself for a Low-Price World,' *Fortune*, 24 January 2018: <http://fortune.com/2018/01/24/royal-dutch-shell-lower-oil-prices/>.

reform case—the IEA's 'current policies' scenario—that assumes that the current commitments under the Paris Agreement will be achieved but makes not assumptions beyond that. Third, a reform case whereby international cooperation and commitments lead to the reduction of greenhouse gas emissions in line with the 2 °C world (nobody is thinking about 1.5 °C yet). This is the IEA's 'Sustainable Development Scenario', Shell's 'Sky' scenario that achieves net-zero emissions by 2100, Equinor's 'Renewal Scenario,' and BP's 'Even Faster Transition.' Not surprisingly, these efforts are critiqued by academics [28] and NGOs [29,30] alike, largely on the basis that their underlying assumptions about the rate of growth in low carbon alternative are far too conservative. While there is a consensus about the key fault lines or uncertainties that will shape the pace of transition, as noted earlier, there is no agreement on just how quickly things might change, something that academics cannot agree on either [31]. As Equinor explain in their *Energy Perspective 2018*: 'Oil demand by 2050 is highly uncertain, with scenarios ranging from almost 60 million barrels a day (mb/d) (Renewal) to around 120 mb/d (Rivalry). Among the uncertainty drivers the pace of electrification in transport and in other sectors, the pace of efficiency development and the scope of different macroeconomic and behavioural pathways stand out.'

In sum, there are large uncertainties surrounding the future demand for oil and gas. The world is not currently on a path that will constrain global warming to manageable levels. The critical issue is the pace at which the energy system can decarbonise, but here the only consensus is the fact that the current rate of change is too slow to mitigate climate change.

2.3. Peak oil demand

Of late there has been an increasing interest in the timing of 'peak global oil demand,' as opposed to 'peak oil supply', which is a long-standing issue. The OECD's oil demand peaked in 2005 and many of the world's largest oil consumers have since peaked or are now experiencing slowing in demand. Table 1 presents varying views on the timing of 'peak oil demand,' there are some that see it coming in the 2020s and others in the 2030s, the latter includes the energy consulting company Wood MacKenzie⁸ who see oil demand flatlining from 2030 and peaking by 2036. Again, ExxonMobil is the outlier assuming that it won't have peaked by 2040. In a recent influential discussion, Dale and Fattouh argue that it is not the timing of peak oil that matters, rather: 'the importance of 'peak oil demand' is that it signals a break from the paradigm that has dominated oil markets over the past decades.' That paradigm is that oil producing economies rationed their oil supplies in the belief that a barrel not produced today would be worth more when produced in the future [32]. They suggest that 'peak oil demand' signals an age of abundance with significant implications for the future price of oil and the competitiveness of the oil market. Put simply, they foresee a future of lower oil prices where only the most cost-competitive oil will be produced, notwithstanding the impact of geopolitics. However, Dale and Fattouh are firmly in the camp that 'post peak' oil consumption is unlikely to fall sharply; the world will still need a lot of oil.

The cumulative consequence of the recent changes and growing uncertainties discussed above is that world is now facing an emerging new oil order, based on abundance, not scarcity, that is facing the prospect of a peak in global demand during the next decade or so, and huge uncertainty over the likely trajectory thereafter. Possibly, as Shell's Chief Executive Officer, Ben van Beurden, described, a world of 'lower forever' oil prices,⁹ with obvious implications for the industry

⁸ 'Now near 100 million bpd, when will oil demand peak?' *Reuters*, 20 September 2018: <https://www.reuters.com/article/us-oil-demand-peak/now-near-100-million-bpd-when-will-oil-demand-peak-idUSKCN1M01TC>.

⁹ Shell braces for 'lower forever' as profits soar,' *Reuters*, 27 July 2017: <https://www.reuters.com/article/us-shell-results/shell-braces-for-lower-forever-oil-as-profits-soar-idUSKBN1AC0LO>.

Table 1
Oil Demand Scenarios (Total Liquids in mb/d).

Source	Published	2020	2025	2030	2035	2040	Peak Demand
IEA WEO 2018 (New Policies)	Nov-18	–	102	104	105	106	Not by 2040
IEA WEO 2018 (Sustainable Development)	Nov-18	–	94	87	–	70	Before 2030
IEA WEO 2018 (Current Policies)	Nov-18	–	106	111	–	121	Not by 2040
BP Outlook 2018 (Evolving Transition)	Feb-18	102	106	109	110	109	2030–35
BP Outlook 2018 (Faster Transition)	Feb-18	–	–	101	–	92	By 2030
BP Outlook 2018 (Even Faster Transition)	Feb-18	–	–	96	–	80	Before 2030
Equinor (Low Demand-Renewal) ^a	Jun-18	–	–	94	–	59	Early 2020s
Equinor (Reference Demand-Reform) ^a	Jun-18	–	–	111	–	105	Around 2030
Equinor (High Demand-Rivalry) ^a	June-18	–	–	115	–	122	Not by 2050
ExxonMobil Outlook for Energy ^b	Feb-18	102	108	112	115	117	Not by 2040
Shell Sky Scenario ^c	Mar-18	105	110	106	103	101	By 2025

Source: Updated from BEIS, BEIS 2018 Fossil Fuel Price Assumptions, Department of Business, Energy and Industrial Strategy, London, 2018, pp. 33–34.

^a Final column is for 2050.

^b Data provided in QBTU and converted using a QBTU to md/d conversion factor of 0.54.

^c Date provided EJ and converted using an EJ to mtoe conversion factor of 23.9.

and for oil exporting states [33].

3. The status of Saudi Arabia and Russia as producer economies

In following section, we examine how two major oil exporters, Saudi Arabia and Russia, were affected by the post-2014 downturn in global oil prices, and how they have responded since. The recent lower oil price environment shows how vulnerable both countries are to adverse shocks to their oil revenues. Our focus on Russia and Saudi Arabia is justified as they are currently the two largest oil exporters in the world. Although the US has now surpassed them in total production, its exports remain modest. According to the IEA [34], in 2016 Saudi Arabia net exports were 373 million tons of crude oil (19.9% of global exports) and Russia's were 254 million tonnes (12.2% of the global exports). Both countries have been classified as 'patrimonial market economies' [35], a country classification closely linked to rentier and semi-rentier economies and their potential to distribute rents amongst the members of the networks, clans and families. We look at their behaviour in terms of *short-term strategies* to low oil prices—e.g., implementing austerity measures, tapping into foreign exchange reserves, revaluating the currency, selling assets, turning to debt markets, and vertical integration (i.e., trying to get into the refining game)—as well as possible *long-term strategies*—i.e., diversifying away from oil and thereby also changing their nature as patrimonial market economies.

While the two countries share the status of being the world's largest oil-exporting states, they have different characteristics as 'producer economies.' Their 'vital statistics' are presented in Table 2. Since 1990 the two states have experienced quite different development trajectories.

Saudi Arabia represents the archetypal 'petrostate.' Since 1990 it has experienced rapid economic growth and its population has grown from 16.3 million to 32.9 million in 2017. As a consequence, it has a very young population and a large percentage of its population is of working age. As a model 'rentier state', the social contract between the ruling elite has been financed by oil revenues and the population enjoys a high standard of living. Reliance on oil revenues has presented challenges for the management of state expenditure and the state cannot provide sufficient meaningful employment for the growing workforce. The so-called 'social cost of oil,' the price needed to balance the budget is through to be around the \$80 level, while that for Russia is around \$ 70, but this is a difficult cost to calculate with any certainty.¹⁰ Energy use per capita is high and energy costs have been subsidised. The state is wholly reliant on oil exports to generate revenue. While there are also significant domestic gas reserves, these are increasingly

Table 2

The vital statistics of Saudi Arabia and Russia.

Sources: World Bank Development Indicators Database, <http://data.worldbank.org/data-catalog/world-development-indicators> and BP Statistical Review of World Energy 2018, <https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html>.

2017 Indicators	Saudi Arabia	Russia
Demographics		
Population (Million)	32.94	144.5
Population Growth Rate (%)	2.0	0.1
Under 14 Years (%)	25	18
14–64 Years (%)	72	64
Over 64 years (%)	3	14
Economy		
GDP (Current \$US) (Billions)	683.83	1577.52
GNI Per Capita PPP (Current International \$)	54,770	24,890
Oil Rents as % GDP (2016)	26.4	7.0
Gas Rents as % GDP (2016)	0.7	2.7
Fuel Exports as % Merchandise Exports (2016)	79.14	47.19
Energy & Environment		
Energy Use (Kg of Oil Equivalent per capita)	6937	4943
Oil Reserves (Thousand Million Tons)	36.6	14.5
Oil Production (Million Barrels a day)	11.95	11.26
Oil Consumption (Million Barrels a day)	3.92	3.22
Exportable Surplus (Million Barrels a day)	8.03	8.04
Natural Gas Reserves (Trillion Cubic Metres)	8.0	35.0
Natural Gas Production (Billion Cubic Metres)	111.4	635.6
Natural Gas Consumption (Billion Cubic Metres)	111.4	424.8
Natural Gas Exportable Surplus (Billion Cubic Metres)	0.0	210.8
Carbon Dioxide Emissions from Energy (Million Tons)	594.7	1525.3
Percent Growth per annum in Carbon Dioxide Emission from Energy 2006-16	+4.7	–0.2
Total CO ₂ Emissions (Metric Tons per Capita)	19.53	11.86

used in the domestic power sector, but they have not developed at sufficient pace to keep up with demand growth and a significant amount of oil is still used in the power sector (oil accounted for 41% of power generation in 2017 according to BP's Statistical Review). The net consequence of rapid economic growth and high levels of energy intensity has been a significant growth in carbon emissions. Not surprisingly, Saudi Arabia's Nationally Determined Contribution (NDC) is rather opaque—an ambition of up to 130 million tons of CO₂eq. avoided by 2030—and it ties emissions reduction to successful economic diversification strategy that is also reliant upon sustained revenue from oil exports and domestic use of oil, gas and minerals. Nonetheless, Saudi Arabia did ratify the Paris Agreement in November 2016. The NGO *Action Climate Tracker* has assessed Saudi Arabia's NDC

¹⁰ <http://graphics.wsj.com/oil-producers-break-even-prices/>.

as ‘Critically Insufficient.’¹¹

The collapse of the Soviet Union in 1991 brought severe economic dislocation and a demographic crisis. Russia's population today is smaller than it was in 1990 and it is only recently that the birth rate has recovered, and life expectancy has improved. Much like the rest of the ‘developed world,’ it has an aging population and a low population growth rate. It is only since 2000 that the economy has recovered, but Russia was hit hard by the 2008 global financial crisis. As explained below, although Russia has a diverse economy when compared to Saudi Arabia, it is heavily reliant on oil and gas exports to finance the state. Although nowhere as wasteful as during the Soviet period, domestic energy consumption is high given the size of its economy and the level of income of its population. Nonetheless, it has been able to maintain a sizeable exportable surplus of oil and gas, and oil production in late 2018 hit record post-Soviet levels.¹² The collapse of the economy in the 1990s and the destruction of much of the Soviet-era heavy industry brought with it a significant fall in carbon emissions and although they have increased since 1998, they are not back at the 1990 level.¹³ Russia's NDC sets an unconditional target of emissions at 25–30% below 1990 by 2030. This actually allows Russia to increase emissions 8–27% above 2015 levels by 2020 and 18–25% by 2030; consequently, it does not have robust plans to reduce the carbon intensity of its economy. Its NDC is also considered as ‘Critically Insufficient’ by *Climate Action Tracker*.¹⁴

It is not surprising that both states have been less than supportive of the UNFCCC process, although they supported the Paris Agreement in 2015, Saudi Arabia ratified the agreement in November 2016, but Russia has yet to ratify it.¹⁵ Both of their commitments fall well short of what might be considered a ‘fair share’; furthermore, both see their future economic prosperity tied to the export and domestic use of fossil fuels. However, as we shall see, there are significant differences in the way that they are adjusting their development models to the possibility of lower rents from oil and gas in the future.

4. Saudi Arabia

As the world's largest crude exporter, Saudi Arabia has long been the kingpin of the global oil market. It is the only producer that commands a significant amount of ‘spare capacity’, which is usually defined as the volume of production that can be brought online within 30 days and sustained for at least 90 days.¹⁶ It also benefits from low average production costs of \$ 8–9, Russia's average cost by comparison is more than twice that at \$19.¹⁷ Given that the supply of oil is otherwise quite inelastic to price changes, this low cost reserve capacity has given the Kingdom considerable power to engage in market management, recalibrating its supply in light of changing market circumstances. Saudi Arabia is widely regarded as the informal leader of OPEC [36]. Morris A. Adelman [37], one of the best known energy economists, likened the Saudis to ‘the leading firm in the world oil market’, and another economist, Robert Mabro [38], the founder of the Oxford Institute for Energy Studies, even went as far as to claim that ‘OPEC is Saudi Arabia’. The sheer size of Saudi oil exports makes it futile for other cartel members to curb output without Riyadh's cooperation. It is thus no surprise that OPEC's shifting response to oil price dynamics since 2014 has also been largely shaped by Saudi Arabia. Here we discuss the

different phases in Saudi Arabia's domestic and international oil strategy since the 2014 oil price plunge.

4.1. Flooding the market (2014–2016)

Saudi Arabia surprised the markets in November 2014 by not agreeing to production cuts, as it had done in 1998 and 2008 when oil prices also fell dramatically. Riyadh's unwillingness to make cuts was shaped by its troubled experience in the 1980s [39], when non-OPEC sources of oil and new supplies of other energy sources, especially nuclear and coal, were coming in fast. In response, Saudi Arabia engineered collective production cuts, but many OPEC countries cheated on their quotas. As a result, Saudi Arabia lost market share while the oil price kept falling. Riyadh's patience was exhausted in late 1985, and Saudi Arabia flooded the market with oil. Defending a minimum market share came to take precedence over price maintenance [40].

Moreover, Saudi Arabia had built strong fiscal buffers during the boom years of 2011–2014 and felt confident that it could withstand a lower oil price for longer than rival producers. In 2014, its total reserves (including gold) stood at a comfortable 744 billion US dollars, the third-largest foreign reserve in the world.¹⁸ In 2014, Saudi Arabia still had one of the world's lowest debt-to-GDP ratios, standing at 2% of GDP [41].

Under this ‘leave-it-to-the-market’ strategy, Saudi Arabia substantially increased its production. It added 450,000 barrels of oil to the world's daily production in 2015 and, in 2016, Saudi output reached a historical production record of more than 10.7 mb/d.¹⁹ However, the increased output did not compensate for the decline in the oil price and hence oil revenues fell. Since oil accounts for more than 80% of government revenues, the Saudi government has had to tap its financial reserves. It also needed to borrow money, first through the local bond market and then also through international bonds. Its deficit swelled to a historic 15% of GDP in 2015, and the government began to implement domestic austerity measures, reducing fuel subsidies, raising electricity taxes and cutting public sector bonuses and benefits. These are politically sensitive moves in a country where the social contract is such that the government redistributes oil wealth and the citizens acquiesce to the ruling of the Al Saud family in closed circles of power [42,43]. It is worth noting that the threat was not just bottom-up, but also top-down. Oil revenues are also used for political payments to the extended Al Saud family to pay loyalty in the patchwork structure.

4.2. Announcing bold policy shifts

Faced with this gloomy economic outlook, Saudi Arabia made bold domestic and international policy shifts. In early 2016, Mohammed Bin Salman, then the deputy crown prince of Saudi Arabia, unveiled plans to offer up to 5% of Saudi Aramco, the state-owned oil company, in an initial public offering (IPO) as soon as in 2018. Oil minister Ali Al-Naimi was sacked in May 2016 after holding the post for more than two decades. Just days earlier, Bin Salman had announced bold economic restructuring plans, dubbed ‘Saudi Vision 2030’.²⁰ The aim is to reorient the Saudi economy away from dependence on oil revenues by 2020, and towards a newly conceived private sector. In June 2016, Saudi Arabia approved its ‘National Transformation Program’ (NTP), outlining a number of concrete initiatives to be implemented by various ministries to realize the aspirations of ‘Vision 2030’, including increasing efficiency, diversifying the economy, cutting public spending, reducing subsidies, increasing the role of the private sector, and privatizing major public assets.²¹ One of the interim goals that the NTP has

¹¹ See: <https://climateactiontracker.org/countries/saudi-arabia/>.

¹² See: <https://www.reuters.com/article/russia-energy-production/update-1-russian-oil-output-hits-post-soviet-high-in-september-idUSL8N1WIOOP>.

¹³ See: <https://climateactiontracker.org/countries/russian-federation/>.

¹⁴ See: <https://climateactiontracker.org/countries/russian-federation/>.

¹⁵ See: https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-d&chapter=27&clang=en.

¹⁶ Definition taken from EIA: <https://www.eia.gov/finance/markets/crudeoil/supply-opecc.php>.

¹⁷ <http://graphics.wsj.com/oil-barrel-breakdown/>.

¹⁸ http://data.worldbank.org/indicator/FL.RES.TOTL.CD?locations=SA&year_high_desc=true.

¹⁹ IEA, monthly oil market report, Jan. and Dec. 2016.

²⁰ <http://vision2030.gov.sa/>.

²¹ http://vision2030.gov.sa/sites/default/files/NTP_En.pdf.

set out is to create over 450,000 jobs in the non-government sector by 2020.

Saudi Arabia and other Gulf producers have also been trying to get into the renewables and nuclear business and expand the domestic use of gas. Their drive for alternatives to oil is motivated by several factors. The demographic and economic boom of the Gulf oil producers during the past few decades have also made them major consumers of energy. Hot weather conditions and lack of natural water resources have necessitated the use of increasing amounts of oil and gas for power generation required to air-conditioned homes and offices and desalinate sea water. Replacing these fossil sources of energy with renewables and nuclear, could free up more hydrocarbons for exports [44]. Saudi Arabia is also trying to move into the refining business to reduce fuel imports and capture margins now bequeathed to competitors [45].

4.3. Saudi-Russian rapprochement

Internationally, Saudi Arabia began to loosen its opposition to production cuts in OPEC, especially when several non-OPEC producers signalled their willingness to join a collective effort [46]. Initial talks in April 2016 to come to a production freeze with Russia and other partners failed after Saudi Arabia refused to sign a deal that did not also apply to Iran. Five months later, Iran had regained 80% of the market share it held before sanctions intensified in 2012, and an agreement to cut production was reached among a broad coalition of 24 producer countries, referred to here as 'OPEC+'. Production limits were originally intended to apply for only six months, from January to June 2017, but were later extended until the end of March 2018.

Amidst growing signs of market rebalancing, the OPEC + countries, led by Saudi Arabia and Russia reached an agreement in June 2018 to raise production by 1 mb/d [46]. However, in the second half of 2018, oil prices began to decline on the back of renewed surge in US shale production, concerns about consumption growth and sanctions waivers for Iran's exports. This led OPEC and its allies in December 2018 to agree to extend the production cuts at a level of 1.2 mb/d.

4.4. Challenges to the Saudi social contract

The domestic political agenda is crucial to understand why Saudi Arabia changed course in 2016 and decided OPEC should go back to managing supply after a two-year 'pump-at-will' strategy aimed at defending market share. The sustained period of low oil prices created the urgent need to plug holes in the budget. The plan to sell stakes in the state-owned oil company would also benefit from higher oil prices, which is likely one of the reasons why the IPO has been delayed. To the extent that oil prices continue to stay low, there appears to be no alternative to some form of fiscal retrenchment in Saudi Arabia. Since the Riyal is pegged to the dollar, the kingdom does not have the option to devalue its currency. Saudi Arabia's radical domestic reforms may create demand for exchange rate flexibility in the long term but, in the short term, Saudi Arabia has strong incentives to stick to the currency peg. Abandoning the peg or re-pegging at a lower value could damage investor confidence and spark a capital flight, and any of its purported material benefits are likely to be offset by an increase in import prices [47].

Sticking to the dollar peg in the face of lower oil prices thus creates the need for less public spending, more room for private initiative in the economy, and more transparency.

In 2018, for example, Saudi Arabia for the first time allowed an independent assessment of its crude reserves by independent auditors as part of preparations for the IPO of state oil company Saudi Aramco.²² The company also released its first bond prospectus in April 2019, as it

decided to tap the public debt markets to raise funds for its recent \$69bn purchase of local petrochemicals company Sabic. The prospectus for the first time revealed the financial performance of the state oil giant, which had been kept undisclosed for decades.

More importantly, in January 2018, Saudi Arabia introduced a new value-added tax (VAT) of 5% on consumption of the majority of goods and services, including energy and food, to increase non-oil revenue. The move is all the more striking if one considers that, during the 1986–2004 oil bust period, Saudi Arabia did not raise energy prices or impose a VAT. The price increases were not well received by the population. As Jim Krane writes: "In Saudi Arabia, commentary ranged from outright support to personal attacks on ministers, technocrats and even royal family members. Cautious Saudis began tweeting pictures of King Abdullah unaccompanied by text. The portraits evoked the late ruler's patronage of the poor as commentary on his successor's turn toward extraction." [48].

These are all factors that have the potential to fundamentally change the political economy on which the Saudi state has been based for decades. With Vision 2030, the Saudi leadership is trying to implement fundamental changes to the country's social contract, whereby the government traditionally distributes the oil wealth to the population in exchange for public acquiescence to autocratic rule. If the population can no longer count on the subsidised services that they have grown accustomed to, the government will need to find alternative sources of legitimacy. It could bring greater openness and public involvement in decision-making, or it could lead to an intensified authoritarian model of rule.

A complicating factor is that the economic restructuring plan coincides with a leadership transition. The current ruler, King Salman, is the last in a long line of sons of Ibn Saud to rule the lands his father conquered. The real strong man is Mohammed bin Salman (Mbs), who has rapidly risen to the position of crown prince in June 2017, leap-frogging many other candidates. In November 2017, he further consolidated power by ordering an alleged anti-corruption shakedown, detaining hundreds of Saudi royals and businessmen in the Ritz Carlton hotel in Riyadh and confiscating large portions of their finances. The ongoing crackdown on royals and businessmen could be interpreted as a power shift towards a narrow subset of the royal family, and hence a direct challenge to the patrimonial nature of the state. Since Vision 2030 is strongly associated with MbS, intra-elite animosity—such as the 2017–2019 'anti-corruption' purge—could end up being a distraction from the fundamental need to restructure the economy.

In May 2018, that is, two years after the launch of Vision 2030, the IMF declared that Saudi Arabia was making "good progress" in implementing reforms.²³ The Public Investment Fund (PIF) of Saudi Arabia has been transformed from a sleepy domestic holding company to a very active investment fund. The PIF is central to the country's diversification plans. It made several large investments in new technologies such as ride-sharing (Uber), electric vehicles (Tesla), and solar energy (through an investment in the Softbank Vision Fund). At home, the PIF has plans to help build a \$500 bn city called Neom on the Red Sea and it has set up a \$1.1 bn fund to support small- and medium-sized enterprises.

However, in several respects the reforms have become bogged down. The initial public offering of Saudi Aramco has been postponed several times. It is now scheduled for 2021, although some observers think the plan has been shelved indefinitely. The postponement of the Aramco IPO is a blow to the plan to propel the PIF to the ranks of giant global sovereign wealth funds. Instead, PIF might raise money by selling stakes in Saudi listed companies. While this would allow the PIF to convert part of its holding into cash provided by Aramco, it would make the IPO of Aramco an even more distant prospect [49].

²² <https://www.reuters.com/article/saudi-oil-reserves/update-3-saudi-arabia-announces-rise-in-oil-reserves-after-external-audit-idUSL8N1Z93WO>.

²³ <https://www.imf.org/en/News/Articles/2018/05/22/pr18190-imf-staff-completes-2018-article-iv-mission-to-saudi-arabia>.

In addition, the country's reputation has been tarnished by the catastrophic war in Yemen, the Carlton Ritz crackdown, and the murder of journalist Jamal Khashoggi in October 2018, which scared off some foreign investors from attending an investment conference—dubbed ‘Davos in the Desert’—and led to a short-term capital flight [50]. Inflows of foreign direct investment dropped by more than 80% in 2017 to a mere \$1.4 billion, down from \$7.5 billion in 2016 [51]. In 2018, they recovered to \$3 billion, but this is still less than one-tenth of its 2008 peak [52]. While the economy has returned to growth, at 2.21% in 2018 it remains lacklustre.²⁴ In an effort to boost growth, Saudi Arabia plans to increase state spending by 7% in 2019, slowing the country's efforts to cut the big budget deficit caused by low prices.²⁵ Unemployment rates have been creeping up to almost 13% in 2018, which is the highest in the Kingdom's history.²⁶

Clearly, the challenges and obstacles in implementing the economic diversification plans remain high. The outlined plans to cut oil dependence are bold and require sustained political support from the country's top decision-makers. Yet, factors such as falling oil prices or public discontent could stall or even reverse existing reforms. Importantly, the reforms are as much about changing the patrimonial nature of the state than they are about restructuring the economy.

5. Russia

If Saudi Arabia has bold plans to modernise its industrial base and to diversify its economy, Russia appears to have no such ambition. Although policy-makers in Russia have promoted a number of initiatives to expand non-hydrocarbon industrial capabilities in recent years, these efforts have not received sufficient financial or industrial support to make a real difference [53–55]. Meanwhile, as the leaders of other hydrocarbon-producing countries acknowledge the importance of preparing for a post-hydrocarbon future, official Russian energy strategies continue to emphasise the importance of increasing production and export of oil and gas [56]. As a result, Russia's well-established vulnerability to fluctuations in oil prices is likely to persist.

5.1. Russia's resource addiction

Although Russia was, in 2017, the world's second largest net oil exporter it has historically been a ‘price taker’ on international oil markets. It has never been a member of OPEC and has had a troubled relationship with the cartel, although it shares a need to maximize revenues from its oil industry. Subject to the average price of oil in a given year, revenues derived from the taxation of the extraction and export of oil and gas account for between one third and half of Russia's federal budget receipts [57].

The contribution of oil and gas to the budget does not, however, capture the importance of oil and gas to the wider Russian economy. Revenues generated by oil and gas firms are recycled throughout the economy in the form of either taxes paid to the government, or as demand for other goods and services produced in Russia [58]. According to calculations by Alexei Kudrin and Evsei Gurvich [59], cumulative surplus (cf. the base year of 1999) oil and gas revenues amounted to \$2.1 trillion (in 2013 USD). These revenues ensure that demand for Russia's large manufacturing sector—the tenth largest in the world by value-added in 2014, according to UN data [60]—remains high. State transfers to social welfare recipients (the so-called *byudzhetniki*, which roughly translates as ‘budget people’ in English) maintain domestic

demand, as does state procurement of goods and services, including orders for Russia's large defence-industrial complex, which continues to employ over 2 million people. It is this dependence of Russia's wider economy on oil and gas revenues that explains why Russia is so susceptible to fluctuations in the price of oil [61]. In this respect, Russia differs from the conventional ‘petrostate’ in so far as it has a large non-hydrocarbon sector. The problem is that much of the non-hydrocarbon sector is uncompetitive on global markets (hence the low share in Russia's export basket) and so therefore is dependent on domestic demand, which in turn is driven by the total value of oil and gas revenues [62].

The close links between the hydrocarbons sector and the rest of the economy are evident when looking at the correlation between movements in the volume of oil and gas receipts on the one hand, and movements in key economic indicators like GDP, investment, manufacturing output, on the other hand. Between 2001 and 2015, the statistical correlation between annual movements in total natural resource revenues, on the one hand, and with GDP (Pearson's $r = 0.88$), fixed investment ($r = 0.84$), and industrial production ($r = 0.83$) was extremely strong [61]. Until 2018, the price of oil was also the single most important predictor of the rouble-dollar exchange rate [61]. In the wake of the 2014 collapse in the oil price, the Kremlin allowed the rouble to depreciate, losing 60% of its value against the US dollar. This allowed the Russian Government to balance its books at a lower oil price—around \$ 43 in 2018, and also reduced the relative production costs of domestic oil production.

5.2. A different kind of petrostate

The importance of oil and gas to the wider Russian economy has ensured that state control over the industry is an important feature of the country's system of political economy. Nevertheless, whereas only one company controls oil production in Saudi Arabia, production is more dispersed in Russia [63]. In the 1990s, oil production was largely carried out by private companies, while gas production was monopolised by state-owned Gazprom. However, this changed as oil prices rose between 2000 and 2008, and as Vladimir Putin strengthened the role of the state in the Russian economy, not least to bolster Russia's credentials as an ‘energy superpower’ [64–66]. Private oil companies, such as Yukos, Sibneft, and Bashneft, were renationalised with the management of powerful NOCs like Rosneft and Gazpromneft entrusted to individuals with close personal links to Mr Putin. On the face of it, greater competition was introduced in the gas industry, but this only takes the form of competition between state-owned firms (Gazprom and Rosneft) or by a firm with close links to the Kremlin (Novatek). This relative dispersion of production between several state-owned or state-influenced entities means that there remains considerable scope for disagreement and discord within the oil and gas sectors as rival groups struggle to assert their influence over one another. This has left the Russian energy industry in the rather paradoxical situation in which the state's involvement is a necessary but not always sufficient condition for the implementation of public policy.

The use of state control and influence over the oil and gas sector helped the state to ensure that revenues were redistributed to achieve objectives defined by the state. This resulted in a growth model that worked well enough until 2008 [58,67]. Indeed, between 2000 and 2008, real GDP grew at an average annual rate of close to 8%. In dollar terms, it grew even faster than the Chinese economy over the same period. However, the global recession of 2008–09 hit Russia hard. As oil prices slumped from nearly \$140 p/b in the summer of 2008 to nearly \$30 p/b in early 2009, Russia experienced the worst recession of any of the G-20 economies [68].

Russia's policy elite reacted to this crisis by drawing up a programme of modernisation and diversification. The then-president, Dmitry Medvedev, was associated with what optimists saw as a broad-based ‘modernisation’ agenda. However, the sense of urgency attached

²⁴ General Authority for Statistics, KSA, <https://www.stats.gov.sa/en/823>.

²⁵ <https://uk.reuters.com/article/us-saudi-arabia-budget-instant-view/saudi-2019-state-budget-boosts-spending-idUKKBN1OH1SG>.

²⁶ <https://www.reuters.com/article/us-saudi-budget-energy-industry/foreign-investment-in-saudi-arabia-more-than-doubled-in-2018-minister-idUSKBN1OI0QU>.

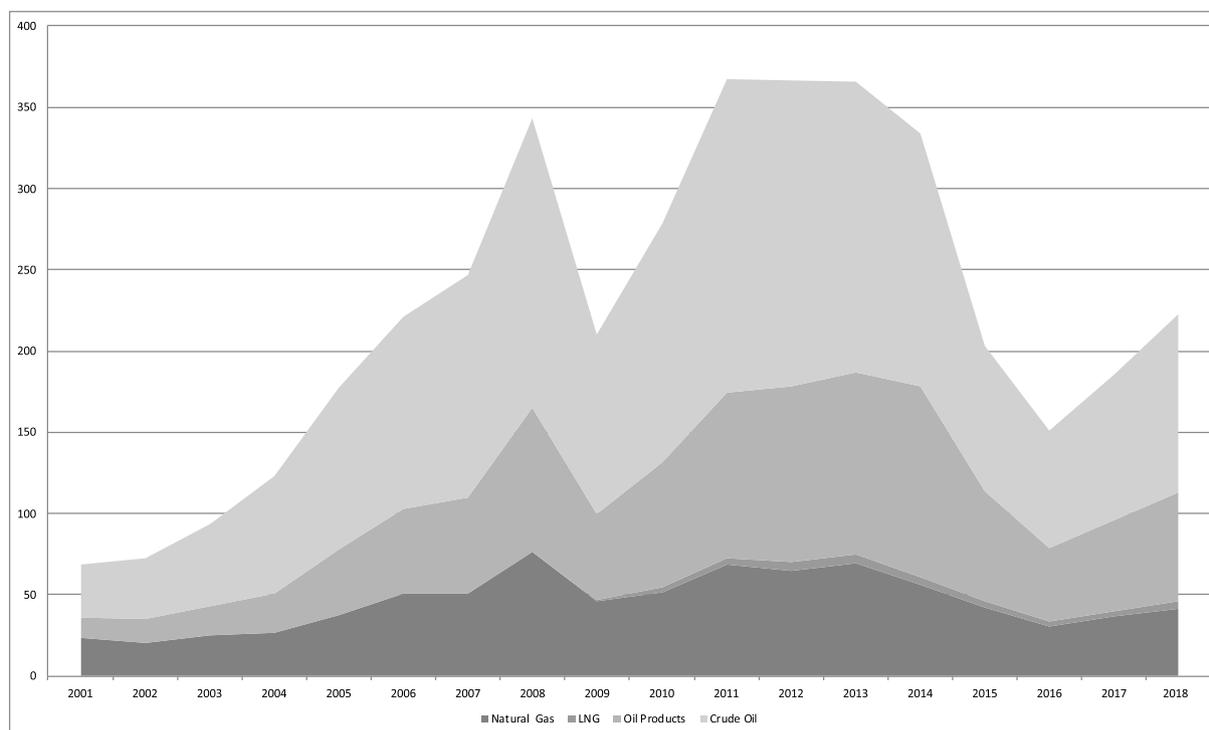


Fig. 1. Oil and gas export revenues, 2001–2018 (constant 2015 USD, billion). Source: Bank of Russia (2019); authors' calculations.

to Medvedev's 'modernisation' agenda quickly fizzled out when oil prices rebounded to over \$100 p/b in 2010. As shown in Fig. 1, the total inflation-adjusted value of Russia's hydrocarbons exports was higher between 2010 and 2013 than before the 2008–9 global financial crisis. As a result, the impetus to undertake the difficult reforms required to reduce hydrocarbon dependence diminished [69]. Instead, rising hydrocarbon revenues were allocated to support an ambitious rearmament programme and a generous social welfare system [70–72].

5.3. Russia under sanctions

The failure to address Russia's hydrocarbon dependence became apparent again in the autumn of 2014 when oil prices again collapsed, causing GDP to decline over the course of 2015–16. This was exacerbated by the imposition of Western sanctions - some of which targeted oil and gas production - in response to Russia's annexation of Crimea and subsequent involvement in the conflict in eastern Ukraine [73]. Once again, policy-makers rushed to formulate a plan to boost industrial capabilities outside the oil and gas sectors, this time under the banner of 'import substitution'. Considerable funds and institutional support were put in place to promote the development of industries of - as defined by Russian state officials - 'strategic' importance [55]. As originally conceived, the import substitution strategy envisaged the implementation of 2059 projects across 19 branches of the economy between 2016 and 2020 [74]. This plan was, according to Vladimir Putin, intended to enhance Russia's "economic sovereignty and the development of [the] economy as a high-productivity and high-technology [economy]" [75]. Once again, the country's senior political leadership seemed serious about economic diversification. There were, however, two fundamental flaws in Russia's chosen policy course.

First, while much of the official rhetoric since 2014 has focused on the development of capabilities outside the natural resources industries, in practice the role of hydrocarbons grew. In most years since 2010, investment in the oil and gas sector grew faster than the overall rate of investment in the wider economy, causing the share of hydrocarbons in investment to rise not decline (see Fig. 2). All things being equal, this was likely to cause the weight of hydrocarbons in the Russian economy

to grow not decline. As a result, new deals to build gas pipelines were signed with China ('Power of Siberia'; planned annual capacity of 38 bcm) and Turkey ('TurkStream'; planned annual capacity of 31.5 bcm) in 2014 and 2016 respectively [76]. In 2015, it was also announced that the Nord Stream gas pipeline linking Russia with Germany would be expanded from 55 bcm per year to 110 bcm. Although the planned project - named Nord Stream II - initially met resistance in Europe, a financing agreement between Gazprom and Uniper, Wintershall, Engie, OMV and Royal Dutch Shell was signed in April 2017 that enabled the project to proceed despite staunch opposition from EU members such as Poland and Sweden [77].

This flurry of deals is indicative of a broader tendency in Russia's foreign economic policy. Designed to open up new sources of trade and investment with non-Western countries after 2014, this policy was primarily based on the expansion of hydrocarbon exports (as well as on the export of nuclear power generation machinery), either from deposits in Russia or through deposits in other countries run with the help of Russia's state-owned firms in the likes of Venezuela and Vietnam [78].

Second, and perhaps even more importantly, plans to develop manufacturing capabilities and ostensibly diversify the country's economic structure are in fact contingent on the existence of a thriving hydrocarbons sector. Twelve of the nineteen non-military areas of the economy identified by the government's import substitution strategy of 2015 were in the oil and gas extraction equipment industry [79]. Ambitious plans estimated to cost nearly Rb. 200 billion (c. \$3 billion at the exchange rate in May 2019), to develop the ship-building industry in Russia's Far East, at the Zvezda complex at Bol'shoi Kamen', near Vladivostok, were predicated on supplying ships and marine equipment to facilitate off-shore oil and gas extraction, as well as vessels to service the emerging Northern Sea Route [80]. Initially, only Rosneft - the major stakeholder in Zvezda - demonstrated any significant interest in buying vessels from the shipyard. This put the future of the project in doubt. However, after strenuous lobbying by Igor Sechin, Rosneft's CEO, the Russian president, Vladimir Putin, intervened, resulting in orders for vessels to rise quickly [81]. It was reported that the vessels produced at Zvezda will be up to 30% more expensive than comparable

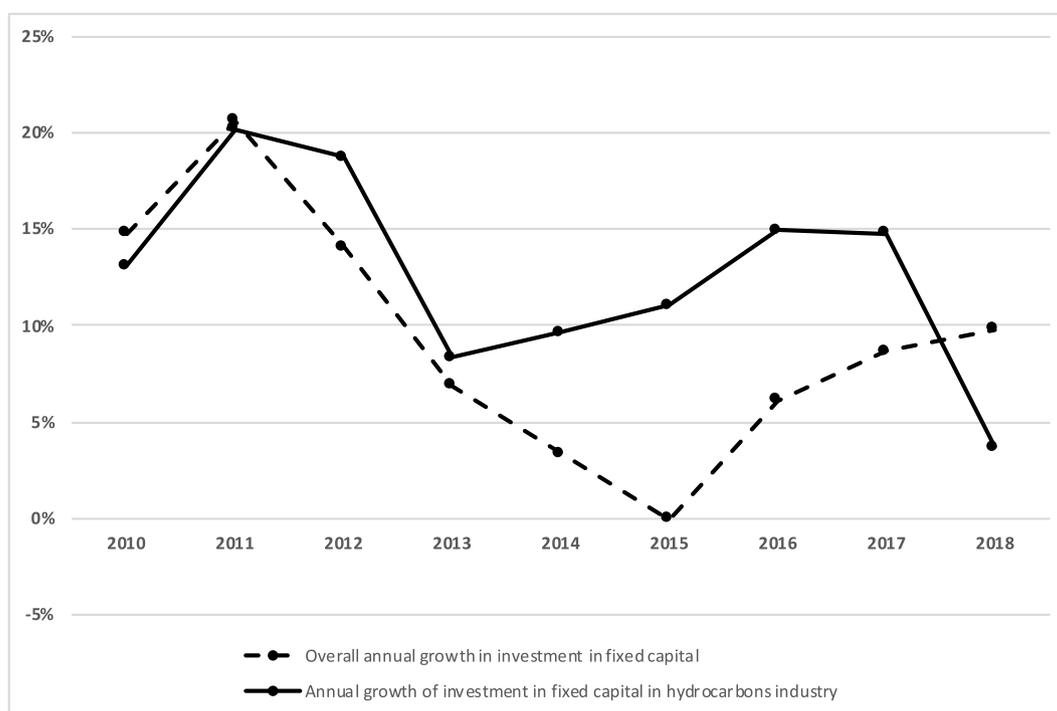


Fig. 2. Investment in Russian oil and gas industries, 2010–2018 (per cent annual change in value of investment, constant 2015 rubles). Source: Federal State Statistics Service (2019); authors' calculations.

vessels built in South Korea, resulting in the Russian state providing subsidies to compensate domestic buyers [82]. To reduce the threat of foreign competition, import substitution legislation was enacted that demanded only Russian-made vessels could traverse the NSR [83].

Put simply, the import substitution plan appeared in important respects designed to perpetuate and not reduce the dependence of the wider Russian economy on the oil and gas sector. After all, if policy-makers in Russia were serious about diversification, why would they invest in industries that require an expansion of future hydrocarbon production? While it is true that exports of agricultural products and nuclear power generation machinery, uranium and nuclear fuels are rising, it remains the case that the financial value of non-hydrocarbon exports is modest when compared with oil and gas exports. To put their value in perspective: in 2018 around \$20 billion of agricultural products were exported, while Rosatom's international revenues in 2017 amounted to \$6.1 billion in 2017 [84,85]. Consequently, in stark contrast to official rhetoric, Russia's current policy course is that of a country doubling down on its bet that hydrocarbons will support economic (as well as social and political) development well into the future. Russia's resource rent addiction looks set to continue [58].

5.4. The role of energy in Russia's wider strategy

There is a simple explanation for the apparent reluctance of Russian policy-makers to prepare for a world in which demand for hydrocarbons either plateaus or declines: they simply do not believe that there is a significant chance of this taking place, at least not in the next few decades. This should not have surprised observers. Russia's most recent draft energy strategy, published in 2014, stressed the need to expand hydrocarbon production and Russia's exports to rapidly-growing non-Western markets with the aim of maintaining Russia's position as one of the world's top-three hydrocarbon exporting countries [78].²⁷ According to the draft strategy, the main threat to Russia

²⁷ Energy strategy documents are required by law to be updated every five years.

will come not from a decline in demand, but instead from greater competition from other suppliers, most notably the US [85]. What is needed to deal with this competition, according to the authors, is to diversify the customer base for Russian hydrocarbon exports, and, more specifically, to expand deliveries to rapidly-growing Asian economies. As the document states, expanding exports will require developing new deposits in Russia, primarily in the Arctic – both off-shore and on-shore – and in Russia's Far East. This corresponds with another oft-stated objective of the Russian government: to develop the Arctic. For Russian officials, climate change and the shrinking of polar ice offers the opportunity to extract more natural resources and to utilise the Northern Sea Route (NSR), both as a transit route in its own right, and to facilitate the more intensive exploitation of the Arctic [86].

It is clear from reading the full range of official strategic planning documents – from those dealing with energy and the Arctic to those dealing with national security and naval strategy – that Russian officials envisage an intensification of competition over natural resources in the years ahead [87]. As a result, it is imperative that Russia exploits its resource base to both survive and thrive in a world that is likely to be characterised by resource scarcity, not abundance. This demonstrates that the reason that policy-makers in Russia do not see the urgency in moving away from hydrocarbons is because they perceive the changing global energy landscape in a very different way to many analysts from elsewhere in the world.

5.5. Consequences for foreign economic policy

The reluctance and subsequent failure of policy-makers to chart a course that might reduce Russia's hydrocarbon dependence was also evident in the sphere of foreign economic policy. After the imposition of Western sanctions on Russia in 2014, Russian policy-makers accelerated efforts to generate a more pluri-directional character to Russia's foreign economic relations. This involved fostering closer links with countries of the 'non-West' [88]. For Russia, most of this effort was directed towards forging closer links with China, but attention was also paid to other Asian countries, including India, Indonesia, South Korea and Vietnam, and to countries in the Middle East and Africa [89]. It was

hoped that this rebalancing of foreign economic relations would give Russian policy-makers more options in their relations with the outside world [90].

This desire to forge closer economic relations with a more diverse range of countries is understandable. However, the primary instrument used by Russia to build these closer ties is energy exports, as signalled in Russian strategic planning documents. In recent years, officials from the Russian government and from state-owned energy companies, such as Rosneft and Gazprom, signed deals to supply gas to Turkey and China, and to acquire downstream assets in, *inter alia*, India and Indonesia [61]. This was done so that new sources of demand for Russian energy could replace plateauing energy demand from Russia's traditional customers in Europe. The risk, as with domestic economic policy, is that if the value of Russia's exports declines, perhaps due to a decline in global demand for hydrocarbons, then a central tenet of Russia's foreign economic policy will be severely weakened.

To sum up: while officials in Russia often speak as though economic diversification is an important policy objective, the actions of the state suggest that oil and gas are, and look set to remain, the most important sectors of the economy. This is of crucial importance because of the high stakes involved. Russia faces many challenges that will require a strong economy to solve, including but not limited to: a deteriorating demographic profile; plans to continue with military modernisation; a need to invest in dilapidated infrastructure; and, of course, the need to promote new industries. However, the current policy trajectory means that if Russia's vast reserves of hydrocarbons do become 'stranded' for the reasons stated earlier in this article, its leaders will find themselves without a plan and without any money. Russia's future generations may well regret that today's policy-makers did not show the same foresight as their Saudi counterparts.

6. Conclusions

We have argued that the combination of fossil fuel abundance as a result of the shale revolution and cost and efficiency improvements in conventional oil production, and future falling demand for oil as a consequence of climate change mitigation is laying the foundations for a new oil order. As Dale and Fattouh [32] argue, that new order will be characterised by lower prices and an emphasis on cost competitiveness. Both they and the IEA [5] suggest that producer economies must do more to reduce their reliance on oil and gas rents to balance their budgets. In this context, just when global oil demand will peak is less significant than what happens thereafter. Clearly the oil industry and the producer economies would hope for a gradual decline, with significant remaining oil demand—and rents—and continued investment in new fields, though only the most cost competitive ones. However, the urgency of the climate change challenge, as illustrated by the IPCC's recent report, demands an early peak and a rapid decline in consumption thereafter. It is clear that there are huge uncertainties here and no one is sure of the eventual pace of change. But what is clear, as demonstrated by the IEA [5] study, is that the old economic model of the fossil fuel producer economies will face fundamental challenges in the future. To avoid economic hardship and political instability, those economies must amplify their efforts to diversify and also pursue the decarbonisation of their domestic energy systems, both as a contribution to climate change mitigation and as a means of maintaining an exportable surplus to finance clean investment and energy access.

It is clear from our preliminary analysis that Saudi Arabia at least has the right intentions in terms of its vision for 2030, but the current turmoil in oil market, and its growing social costs, will make it difficult to finance its ambitious plans. Its recent actions make clear its determination to preserve its market share and it has the benefit of an abundance of some of the lowest cost oil. Furthermore, it understands

the benefit in developing domestic use of natural gas, developing renewables and possibly nuclear power to preserve oil exports. This will bring the added benefit of reducing its carbon emissions in line with its modest commitments to the Paris Agreement. Thus, it is possible to see a synergy between its economic strategy and wider climate change policy, so long as—it would maintain—its near-term oil revenues are not threatened.

Russia, it would seem, has different intentions. Its commitment to the Paris Agreement shows little or no ambition and its energy and economic developments strategies, such that they are, are based on significant increases in oil and gas production and exports. The problem for Russia, when it comes to oil, is that it is running out of cheap production and future production may depend on the development of the Arctic offshore, which is made all the more difficult by sanctions. The problem for gas is finding new markets that are profitable. Furthermore, rather than diversifying its economic base, it is pursuing a policy of import substitution to support the oil and gas industry. In short, there is little evidence that Russia is seeking to reduce its fossil fuel addiction.

Why does this matter? Neither Saudi Arabia nor Russia have been supportive of international efforts to address climate change, now it seems they are being joined by the United States. Together they could cause further mischief that might slow the implementation of the Paris Agreement and blunt ambitions to 'ratchet' up future commitments. However, it is to be hoped that the rest of the world presses ahead—as they did when the US announced its decision to leave the agreement—and delivers on the Paris Agreement and more. Ironically, that poses a different challenge. If the world manages to get on a trajectory that will result in an early peak in oil demand and a significant fall in consumption thereafter, then Russia, and possibly Saudi Arabia, will find themselves in a very difficult situation, perhaps joined by the likes of Nigeria and a few others. This study contributes an emerging discussion, stimulated in part by IRENA's report, that relates to the geopolitical consequences of the energy transformation [91]. The fossil fuel economies are not going to disappear overnight [92], but we would agree with the IEA that now is the time for them to start thinking about the economic development strategies required for them thrive in the 2030s and beyond when demand for oil and gas, and the prices that they command, seem certain to fall. If there is a tight oil market in the early 2020s, as some predict, that results in prices, those revenues should be used to fund economic diversification and decarbonisation at home, rather than being squandered on further investment in fossil fuel production and associated infrastructures that are likely to be stranded in the decades that follow. The irony is that a return to high oil prices will probably fuel permanent demand destruction as consumers move to low-carbon alternatives. This highlights the fact that while the pace of change is the key uncertainty, the 2020s looks to be a challenging decade as the fossil fuel exporters start to face the consequences of the low carbon energy transition and new challenges emerge associated with the growth the low carbon economy. Ultimately, a failure to recognise the geopolitical dimensions of the low carbon energy transition, and in particular the threats that it poses to incumbent industries and economies reliant on fossil fuels, will result in tensions and conflicts that undermine the collective action required to arrest emissions and reduce the impacts of climate change.

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