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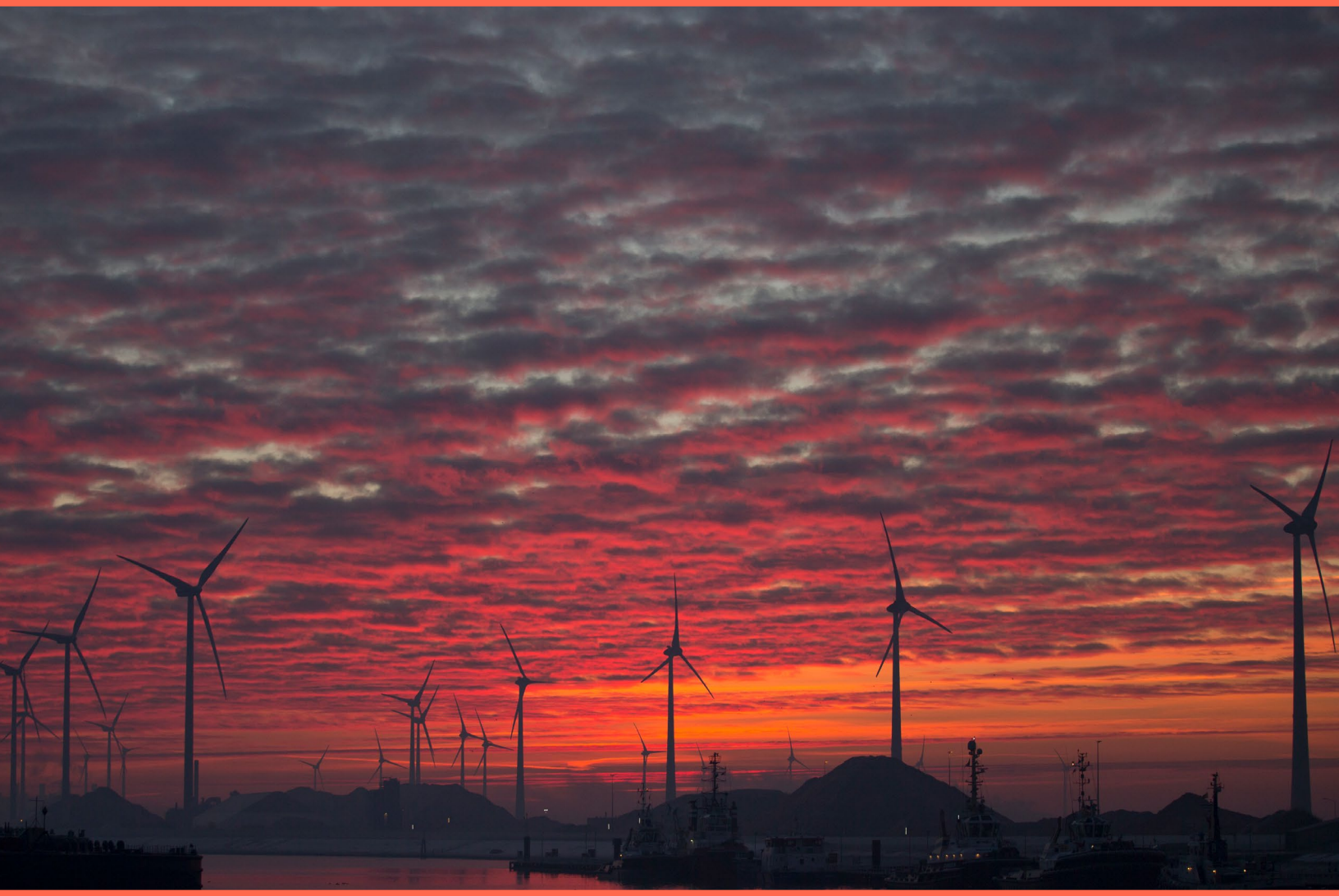
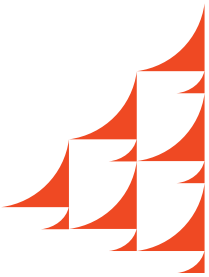


Challenges to the Energy Transition in the Gulf Countries

Kate Dourian



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The Arab Gulf States Institute in Washington (AGSIW), launched in 2015, is an independent, nonprofit institution dedicated to providing expert research and analysis of the social, economic, and political dimensions of the Gulf Arab states and key neighboring countries and how they affect domestic and foreign policy. AGSIW focuses on issues ranging from politics and security to economics, trade, and business; from social dynamics to civil society and culture. Through programs, publications, and scholarly exchanges the institute seeks to encourage thoughtful debate and inform the U.S. foreign-policy, business, and academic communities regarding this critical geostrategic region.

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About Petro Diplomacy

This paper is the scene setter for the 2019 Petro Diplomacy conference. For the fifth consecutive year, AGSIW convenes its Petro Diplomacy conference, bringing together private and public sector stakeholders from the United States and the Gulf Arab countries to discuss emerging trends in energy markets and regional politics.

The world of energy is transforming rapidly and advances in technology are changing the traditional models where oil and gas were the main building blocks. AGSIW leverages its position as a trusted source for analysis on the Gulf Arab states in Washington to provide access to Gulf perspectives on energy markets and politics. In this context, Petro Diplomacy offers a unique forum for industry experts to engage with policymakers and analysts looking closely at how oil and gas producers in the Middle East are preparing for the possibility of a peak in demand for oil, and the region's geoeconomic and domestic political drivers.

About the Author

Kate Dourian is a non-resident fellow at the Arab Gulf States Institute in Washington and the regional manager for the Middle East and Gulf states at the World Energy Council. Previously, she was the programme officer for the Middle East and North Africa in the Global Energy Relations Division of the International Energy Agency. Her role included building relationships between the IEA and the governments of several Middle East and North Africa countries, using the extensive contacts that she accumulated during three decades spent in several Middle Eastern and North African countries as a journalist and energy analyst. She also helped write and edit the Middle East and North Africa sections of several IEA publications and contributed to the supply section of the Oil Market Report. She joined the IEA from the Middle East Economic Survey where she was a senior editor covering energy-related developments in the Middle East from 2013-15.

Executive Summary

A global energy transition is well under way, but the pace of change is uneven across regions and continents. In the Middle East, some oil producing countries, like the United Arab Emirates, have taken the lead in developing a new energy system that incorporates renewable energy and low-carbon technologies. However, the region's oil producers are generally still heavily reliant on hydrocarbon revenue, and for the most part dismiss the peak oil demand theory as premature. The general consensus among the oil producing Gulf Arab states is that oil and gas will continue to make up the largest share of the energy pie for some years to come.

Nonetheless, the demand drivers in decades ahead will change as renewable energy and low-carbon fuels displace oil, particularly in power generation and the transportation sector. Trucks, shipping, aviation, and petrochemicals, a sector in which the Gulf states are investing heavily, will be key drivers of oil demand. It would be prudent for Middle Eastern oil producers to speed up economic reform programs to diversify away from oil export revenue to avoid exposure to oil price volatility and guard against a more rapid transformation of the energy system that could impact their economies. Energy experts agree that demand for oil will continue to grow in the medium term, albeit at lower rates than in the past, but there is new competition from fuel sources that appeal to consumers concerned about the impact of fossil fuels on the environment.

The energy world is entering an era of disruption, where traditional methods of extracting, using, and trading energy are changing rapidly and where old rules no longer apply.

Introduction

An increasingly connected and environmentally aware global population is driving change in how energy is produced and consumed. The sources of energy today are more diverse than ever before. More energy is being harnessed from the sun, wind, and water as technological advances and changes in societal behavior have reshaped the energy world.

Power is shifting along the value chain to data-empowered consumers demanding cleaner energy sources and less reliance on fossil fuels. The transformation of the energy system that powered the Industrial Revolution is under way but cannot be achieved all at once. The accelerated development of increasingly lower-cost renewable energy sources, particularly in the electricity sector, is driving a move away from liquid fuels to more sustainable sources of energy. The myth of peak oil supply has been busted and demand for oil is tapering off.

The consensus among leading energy analysts and international oil companies is that fossil fuels will remain the dominant source of the future energy mix but that demand for oil will peak some time during the next two decades. Just how much demand growth the oil producers will see after a plateau will depend on the speed of the transition to cleaner energy fuels. Paul Stevens, a distinguished fellow at Chatham House, argues that the "energy establishment" has underestimated the rate of the deployment of renewables and questions whether long-term demand for oil is being overstated. "Their forecasts seem to persist with a 'business as usual' view of future demand for hydrocarbons. Yet there is much evidence that the energy establishment has consistently underestimated the rate of deployment of renewables," he

notes, adding that this presents serious challenges to petrostates.[1] "Without meaningful restructuring of their energy sectors and economies, a number of oil-producing countries – especially in the Middle East and North Africa (MENA) region – will face serious consequences in the coming years. The resulting economic, social and political upheaval could potentially result in armed conflict and the emergence of failed states," Stevens warns.[2]

The status quo is no longer sustainable whatever the pace of the energy transition and the need to diversify their economies has never been as urgent as it is now for Middle Eastern producers. Consider the reaction of the oil market to the heightened tensions in the Gulf following the September 14 attack on Saudi Arabia's oil infrastructure, which knocked out half of Saudi Arabia's production. Oil prices soared immediately after reports that some 5.7 million barrels per day of Saudi oil production had been knocked out. Prices rose by 20%, the biggest single increase in one day since trading began in 1988. Yet they eased back to roughly where they had been before the attacks, which the United States has blamed on Iran. The market's knee-jerk reaction was short-lived partly following assurances by Saudi Arabia that it expected to restore full production by the end of September and also because commercial inventories are ample and the market is well supplied. The market's muted response is an indication of the waning power of traditional oil producers in a market where the United States, not Saudi Arabia or Russia, is the world's largest oil producer. While this may be a temporary dislocation of the oil market's structure and Middle Eastern producers will once again be called upon to increase their production to satisfy demand after U.S. shale oil production peaks, they will be ceding market share to greener energy sources that are making inroads into several sectors of the global economy. The challenge for oil producers is how to accommodate these new technologies into their own systems and find ways to produce oil more cleanly.

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Of course, not all fossil fuels are created equal. Natural gas has an important role as a transition fuel and will see demand doubling by 2040.[3] Coal's share of the global energy mix is declining and will shrink further in the future. There has been a dramatic effort to decarbonize in the transportation sector, with electric vehicles chipping away at demand for gasoline as they replace the combustion engine but not yet at levels that will have a big impact on oil demand. Not all sectors can be electrified, and liquid fuels will have to be part of the energy mix for decades if energy demand growth, estimated at 27% between 2017 and 2040, is to be satisfied.[4] There are still close to 1 million people today who lack access to electricity, and the International Energy Agency estimates that by 2040 some 700,000 people, mainly in rural areas of sub-Saharan Africa, will still have no access to electricity.[5]

1 Paul Stevens, "The Geopolitical Implications of Future Oil Demand," *Chatham House*, August 14, 2019.

2 Ibid.

3 International Energy Agency, *World Energy Outlook 2018* (Paris: IEA, November 13, 2018).

4 Ibid.

5 Ibid.

There is no single solution to the energy access challenge. It will take all sources of energy to meet demand in the decades ahead. Smart grids, blockchain, solar, wind, hydropower, hydrogen, and nuclear power are just some of the technologies that will drive this energy transition. The United Arab Emirates is set to have its first operational nuclear power plant in the near future. Hydrogen projects are also being tested in conjunction with vehicle manufacturers in the UAE and Saudi Arabia as part of the effort to decarbonize their transportation sectors.

Population growth, urbanization, and higher incomes will drive energy demand to levels that cannot be met by conventional energy alone in the decades ahead. Governments need to plan ahead to cope with a rapidly transforming energy landscape where disruptive technologies and innovative solutions have upended the traditional systems that are no longer deemed sustainable beyond the current century. Early planning is needed to accommodate alternative energy sources to replace conventional fuels. Existing infrastructure will have to be retired or retrofitted to handle new fuels like hydrogen, while storage solutions are needed urgently to manage intermittent renewable supply. More efficient batteries are being developed to manage the transition from combustion engines to electric vehicles but come at a cost.

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In the four years since the Paris climate conference in December 2015, climate awareness among the public at large has risen. But there are doubts among a number of climate experts as to whether the Paris goal of keeping global warming below an increase of 2 degrees Celsius by the end of the century is attainable. This goal will require an exceptional effort far beyond already pledged commitments. Attaining zero or net zero emissions will need collaborative action from governments, international oil and gas companies, and utilities. A carbon price may help to reduce emissions by encouraging fossil fuel producers to capture and store carbon dioxide, curb methane emissions, and switch to clean coal, but these measures will not end energy poverty or enhance energy security.

A more electrified world will help in the transition to cleaner energy solutions, but electrification alone cannot deliver full decarbonization. Among the fossil fuels, demand for gas will outstrip demand for oil and coal, which will see its share of the energy mix decline dramatically in coming decades. OPEC and the IEA have already made downward revisions to oil demand as geopolitical tensions and trade disputes have taken precedence over fundamentals of the oil market, where psychology and negative sentiment can influence prices. Oil demand will be driven by the petrochemical, heavy transportation, aviation, and shipping sectors for which no alternatives are readily available at present.

The challenge facing policymakers is not in lack of resources but the need for a market design that is flexible and able to accommodate renewable energy and unconventional fuels. The argument that renewables cannot compete with fossil fuels without subsidies is no longer valid since costs have dropped dramatically in the past decade.

The electricity sector is at the forefront of the decarbonization effort and will contribute greatly to the greening of the planet as it is the largest single contributor to energy-related carbon dioxide and sulfur dioxide emissions. On the positive side, more investment is going

into the electricity sector than into upstream oil and gas, which until recently accounted for the lion's share of energy spending. Demand for electricity, led by China and India, is expected to double in the next 30 years and will be met increasingly by renewable energy enabled by battery storage, smart grids, and off-grid installations.

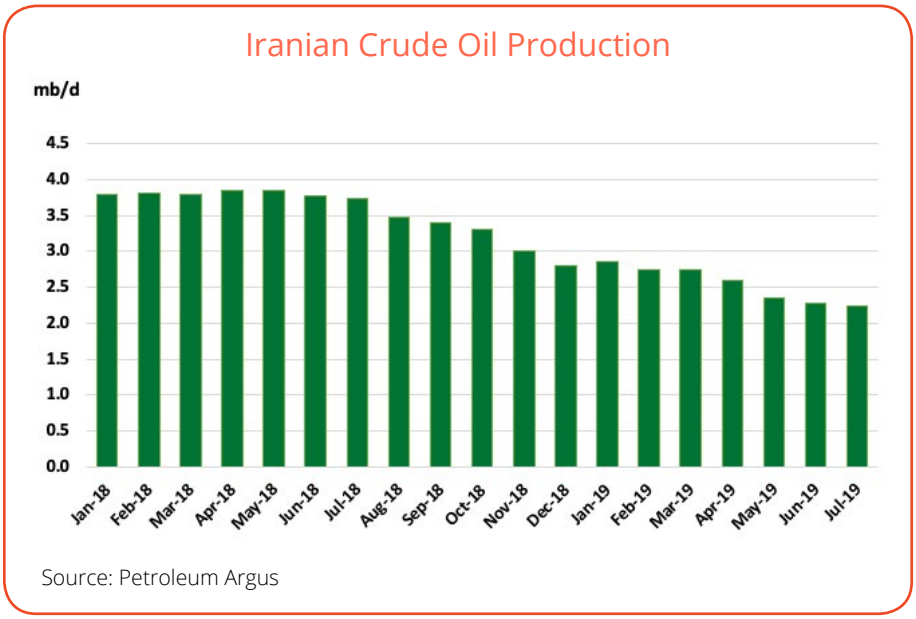
Europe and the northeastern United States experienced some of the hottest days on record in July, extreme weather conditions that may yet be the harbinger of a more challenging environment for future generations. Demand for air conditioning and cooling systems is expected to triple by 2050, according to the IEA, making it one of the main drivers of electricity demand in the future.[6] Nowhere is demand for cooling more vital to human survival than in the Gulf region, where even a slight rise in temperatures could have a devastating impact on the environment. As a region with a high carbon footprint, the need to decarbonize the oil sector is clear. Oil will continue to have a place in a transformed energy system and the challenge is to find ways to produce it more cleanly. A carbon tax on fossil fuels would make this an even more urgent imperative.

A World Without Oil?

The global energy landscape and regional geopolitics have shifted radically in the last year as security of supply from the Gulf region has come into question after the drone and missile strikes on the Abqaiq oil gathering hub and the Khurais oilfield in eastern Saudi Arabia. The attack that struck deep into Saudi Arabia's oil heartland followed a number of incidents involving commercial vessels in the strategic Strait of Hormuz. Iran, which until recently was the second largest producer of oil in OPEC after Saudi Arabia, is under stringent new sanctions that have all but choked off its oil exports. The U.S. administration's policy of exerting "maximum pressure" on Tehran has exacerbated regional tensions and threatened the collapse of the nuclear agreement with world powers – the Joint Comprehensive Plan of Action – which the United States pulled out of in 2018.

Iranian oil production slumped from 3.8 million barrels per day in January 2018 to 2.25 mb/d in July 2019 as the United States tightened sanctions. Oil production outages in Libya and Venezuela and output cuts by the alliance of OPEC and non-OPEC oil producers, OPEC+, have failed to lift oil prices as weaker global demand, unresolved trade disputes, healthy oil inventories, and resilient U.S. shale oil production are exerting downward pressure on the price of oil. Production costs have come down as the U.S. energy industry has become leaner and more efficient, requiring a lower oil price to sustain a healthy level of production. This has complicated efforts by the Saudi- and Russian-led OPEC+ alliance of 24 oil producers to balance markets and drain excess supply that has weighed on oil prices. The dilemma for the Gulf Arab oil producing states is how to manage a market in these changing circumstances in which they are having to slash their production to prop up prices only to see the benefits go to the higher cost oil producers. Further production cuts may be in the cards should prices remain below the level that many of the Gulf oil producers need to balance their budgets.

6 International Energy Agency, *The Future of Cooling: Opportunities for Energy-Efficient Air Conditioning* (Paris: IEA, May 15, 2018).



Source: Petroleum Argus

OPEC kingpin Saudi Arabia and its allies are making deeper and deeper cuts and losing market share without seeing a significant improvement in oil prices that would allow them to make up for lower production and exports. Oil revenue still accounts for the biggest share of state revenue in the major oil producing states of the Gulf and efforts to diversify their economies are moving ahead but not at a pace that will ease reliance on oil export earnings any time soon. All this is happening as the global energy transition away from fossil fuels in favor of environmentally friendly renewable energy technologies like wind and solar is well under way, leading some analysts to predict that peak demand for hydrocarbons is no longer a distant prospect. While it is impossible to say exactly when demand for oil will plateau, the prospect has made international oil companies wary of investing billions of dollars in long-cycle greenfield projects that may take years to come online only to find themselves faced with stranded assets and infrastructure.

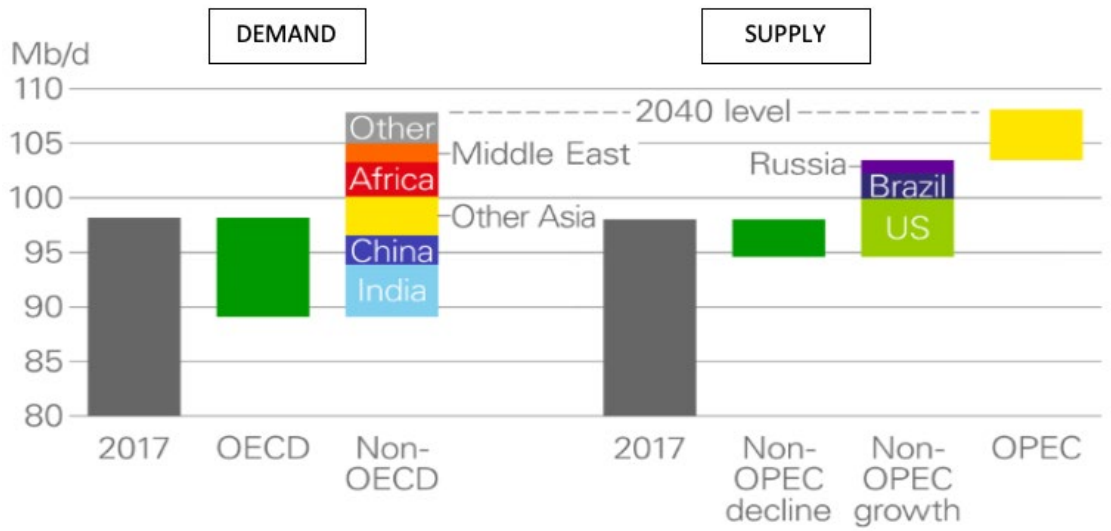
This could impact the security of supply in the future as oil, gas, and coal are expected to make up more than 70% of the energy mix by 2040, according to the IEA. Oil from the United States and some other non-OPEC oil producers, such as Brazil and Norway, will satisfy much of the demand increase for a while but the balance will again shift to the Middle East after U.S. shale peaks and declines – though that timeline has been moved forward as a result of technological advances and better understanding of how shale rock performs over time. Some of the oil fields in the Middle East have been producing for more than 50 years and declining production will need to be replaced to meet growth in demand in coming decades.

The IEA suggests in its 2018 World Energy Outlook that "oil markets are entering a period of renewed uncertainty and volatility, including a possible supply gap in the early 2020s."[7] This is because upstream investments shrank during the two years after the dramatic slump in oil prices in late 2014, when the price fell by more than $100 per barrel from its $147/bbl peak. The IEA sees primary energy demand growing by 25% between 2017 and 2040, which it indicates would require more than $2 trillion a year of investment in new supply. For oil,

7 International Energy Agency, *World Energy Outlook 2018* (Paris: IEA, November 13, 2018).

it predicts a slowdown in the pace of demand growth. The 11.5 mb/d increase in demand between 2017 and 2040 comes from developing economies. "Demand is consistently strong in the Middle East and India, particularly for trucks and petrochemicals," according to the outlook. The IEA's projections show China becoming the world's biggest oil consumer and by 2040 the largest net oil importer in history. This explains the pivot to China and India by the Middle Eastern oil producers like Saudi Arabia and the UAE, which are investing heavily in downstream refining and petrochemical projects in the Asian energy consuming giants to lock in demand for their crudes.

Liquid Fuels: Demand and Supply



Source: BP Energy Outlook

While liquid fuels and coal are being replaced in the electricity sector by renewables and gas, and the electric vehicle fleet is expanding, demand for oil will be driven in the future by heavy vehicles, shipping, aviation, and petrochemicals. This has made for a change in the downstream business models of the Middle Eastern oil producers, many of which are now investing heavily in integrated oil refining and petrochemical joint ventures at home and abroad. The growth in petrochemicals has been one of the main drivers of demand for gas in the Gulf states, where resources are plentiful but were not adequately exploited until recently. Qatar is the exception.

The UAE has also taken the lead in the deployment of renewable energy in the Gulf, accounting for roughly 70% of all renewable energy projects in the region.[8] Saudi Arabia is also planning to switch some of its power generation to renewable sources but is starting from a very low base. Iraq, which has built up its oil production to a level that has made it the second largest producer in OPEC, flares more than half the gas it produces. With Iraq expected to be the largest contributor of all the OPEC producers to new production capacity in the years ahead, its internal stability is of vital importance to global energy security. But that is not a given. Iraq

8 IRENA, "Renewable Energy Market Analysis: GCC 2019," *IRENA*, 2019.

is still recovering from the devastation wrought by the Islamic State in Iraq and the Levant and sectarianism still plagues its government and institutions. Iraq is almost entirely reliant on oil exports for its revenue and has taken little action so far to diversify its economy as it concentrates on providing basic services like uninterrupted electricity supply to its people.

So long as the Gulf economies remain oil dependent, they will need to find a way to reduce carbon emissions to levels that will not harm their fragile environments and that will be attractive to investors for their upstream projects. Climate change is a global phenomenon and has an impact on every aspect of human life. Gulf states are extremely vulnerable to global warming and will need to take urgent mitigating action to prevent extreme weather phenomena and other threats to their desert environments. The energy industry, which has been dominated by oil and gas for decades, needs a new business model. The Gulf oil producers have to adapt by reducing emissions from their oil and gas operations and prove that they can make a positive contribution toward a cleaner and more sustainable energy system.

Part of the problem is the carbon-intensive energy industry in the oil producing countries. Saudi Aramco Chief Executive Officer Amin Nasser has acknowledged that the oil industry faces "a crisis of perception" and has spoken of the need to lighten the footprint of fossil fuels. Aramco has opened its books to public scrutiny as part of its preparations to sell off a 5% stake in the company, which is the world's most profitable. Yet that crisis of perception may act as a deterrent to investment funds under pressure to divest from fossil fuel projects. The initial public offering, which has been delayed for a number of reasons and put on hold while Aramco acquired Saudi petrochemical giant Saudi Basic Industries Corporation, is the key component of the Saudi Vision 2030 economic transformation plan. Saudi Crown Prince Mohammed bin Salman is hoping to raise $100 billion from the sale of a small slice of Aramco to expand the kingdom's investment portfolio, stimulate the non-oil sector of the economy, and create new industries with a larger contribution from the private sector. Yet until that happens, Saudi Arabia and the other Gulf oil producers will need to invest in new oil production capacity to keep up with demand growth and compensate for natural decline from their existing oil fields.

These plans are being complicated by a market shift in the balance of power away from OPEC as its market share has declined, making the Saudi-led group reliant on the continued support of the 10 non-OPEC members led by Russia. The market has turned bearish even as the OPEC+ producers have maintained a high level of compliance with the 1.2 mb/d cut that was extended in July to March 2020. But the market is not convinced. Supply disruption and unplanned outages, largely from Iran, averaged 2.5 mb/d in the first half of 2019, the highest six-month average since the end of 2015, according to the U.S. Energy Information Administration's July "Short-term Energy Outlook."[9] Iran alone accounted for 60% of the total outage while declines in Venezuela and erratic Libyan production also contributed.[10]

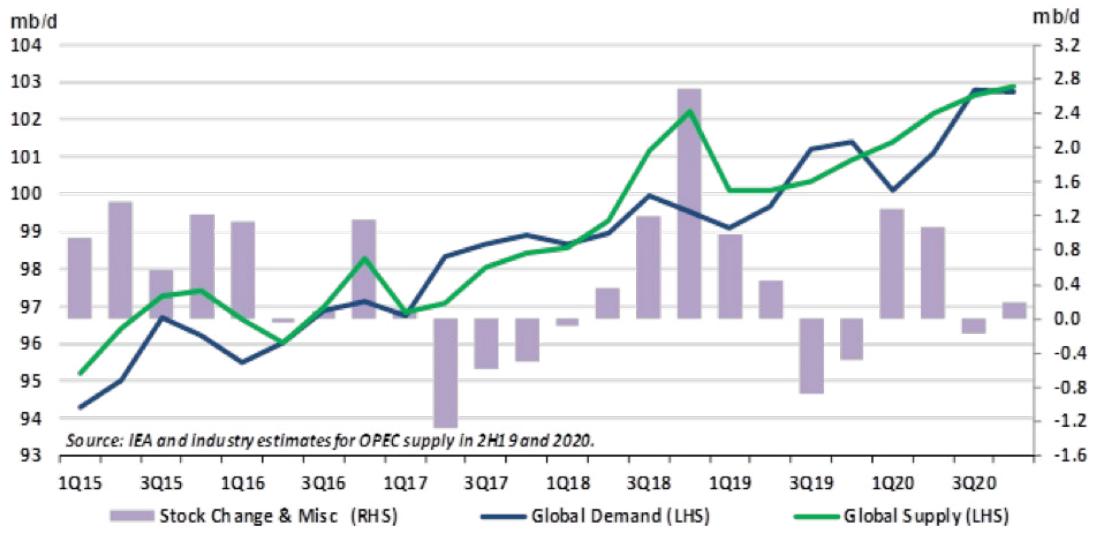
OPEC+ could plan further production cuts should prices remain at current levels. The IEA expects non-OPEC supply to average 2.2 mb/d in 2020, which will more than satisfy demand estimated at a downwardly revised 1.3 mb/d, leaving little room for OPEC+ to regain market

9 "Short-Term Energy Outlook," *U.S. Energy Information Administration*, July 2019.

10 "Iran Drives Unplanned OPEC Crude Oil Production Outage to Highest Levels since Late 2015," *U.S. Energy Information Administration*, July 17, 2019.

share. Russian compliance with the now formalized production cut pact cannot be taken for granted. Much of the decline in Russian production has been due to the lack of pipeline capacity as a result of quality issues with some of its export grades through the Druzhba pipeline. The level of compliance from Russia may yet slip and it remains to be seen whether Riyadh would be willing to make the sacrifice by slashing its output even further for the sake of maintaining the alliance with Moscow. With the Aramco IPO expected in 2020, Saudi Arabia cannot afford a further slide in oil prices.

Supply, Demand, and Stock Balances (2015-20)



The Role of Gas in the Transition

The giant natural gas discovery in Saudi Arabia's Red Sea, stepped up gas production in the UAE, rising gas production in Egypt, and a significant gas discovery off the coast of Cyprus have renewed interest in the concept of integrated gas hubs in the Middle East, North Africa, and East Mediterranean regions. Demand for natural gas is rising rapidly, forcing some Gulf states to import liquefied natural gas at high cost. For its part, the UAE wants to extend its existing Gulf gas network with Saudi Arabia and Oman to Bahrain and Kuwait, and eventually to Egypt, Jordan, Iraq, and Ethiopia. This will help ensure energy security but whether it is achievable depends on both economics and geopolitics.

The IEA predicts a massive rise in demand for gas to 2040 with China accounting for roughly 30% of demand growth, followed by the Middle East, where it sees overall gas demand rising by 60% over 2017 levels.[11] It attributes this growth to a surge in electricity demand as gas replaces oil and other liquid fuels in power generation. But gas resources are not evenly distributed in the region and development of gas resources has lagged behind oil in many Middle Eastern oil and gas producing countries. Iraq, for example, flares more than half the gas

11 International Energy Agency, *World Energy Outlook 2018* (Paris: IEA, November 13, 2018).

it produces in association with oil, releasing an estimated 30 million tons of carbon dioxide into the atmosphere each year, adding to the environmental problems that Iraq faces already. The UAE, Kuwait, and Oman are also gas importers even though they produce gas domestically and the UAE and Oman are also exporters of liquefied natural gas. Saudi Arabia is investing heavily in developing its nonassociated gas fields and has stepped up its gas exploration efforts while considering investments in gas projects in the United States and Russia. Egypt has emerged as a significant natural gas producer in recent years as a result of new developments of offshore gas. More gas fields are being developed by the major oil companies and are due to boost output further; this may lead to a more integrated regional market beyond just the East Mediterranean basin.

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Gas demand across the Gulf Arab countries has increased two-and-a-half times since 2000, with around half of this growth coming from power generation. There is a strong economic case across the Middle East for faster solar photovoltaic deployment to displace gas as well as oil in power generation, which would increase gas availability for use in value-added industries. This underlines the case for strategic thinking about where gas is likely to bring the best value within the energy system, especially in countries where there are strains on the gas balance.

Conclusion

A global energy transition is under way and it will change how energy is produced and consumed. The energy mix of the future and the share of each fuel source in a transformed energy system will be determined by the pace of the transition, which is increasingly consumer driven. Some analysts believe that the move toward more sustainable and environmentally friendly energy sources will bring about peak demand for oil in the next two decades. But this does not mean that the world will be able to do without oil and gas for decades to come. The energy complex will still be dominated by fossil fuels, though the share of natural gas will increase as it replaces oil in power generation and desalination in the Middle East and Gulf region.

With energy demand expected to grow by 25% between 2017 and 2040, all sources of energy will be needed, but oil and gas trade will pivot to the east with China and India accounting for more than half of total demand growth. U.S. shale has been the big game changer of the past decade, upsetting the balance of power in the oil market, which was previously dominated by OPEC. This shift led to the alliance between Saudi Arabia and Russia and the emergence of the OPEC+ group, with the goal to attain market balance and higher oil prices. Despite an agreement by OPEC+ to remove 1.2 mb/d from the market, significant production losses from Iran and Venezuela, and threats to Gulf shipping, the oil market's reaction has been subdued, largely because the United States continues to ramp up its production. But at some point in the next decade, U.S. shale will peak and go into decline, which will bring the Middle East back into focus as the source of low-cost oil supply. Demand for oil in the years ahead will come from heavy vehicles, shipping, and petrochemicals. This has impacted investment trends by

the key Middle Eastern oil producers, many of which have invested in joint oil refinery and petrochemical projects at home and abroad, a strategy that also helps to lock in demand for their oil, particularly in Asia.

The energy landscape is changing and the challenge for oil producers is to find an accommodation with the new technologies like wind and solar that are encroaching on their turf. In a world where climate change is changing perceptions about fossil fuels and their impact on the environment, oil producers will need to clean up their act by adopting technologies and finding solutions that will allow them to continue to produce oil while reducing the carbon footprint of an industry that will continue to sustain their countries' economies for some time to come.