Editors: Paul Rivlin and Joel D. Parker

Vol. 11, No. 2, March 21, 2021

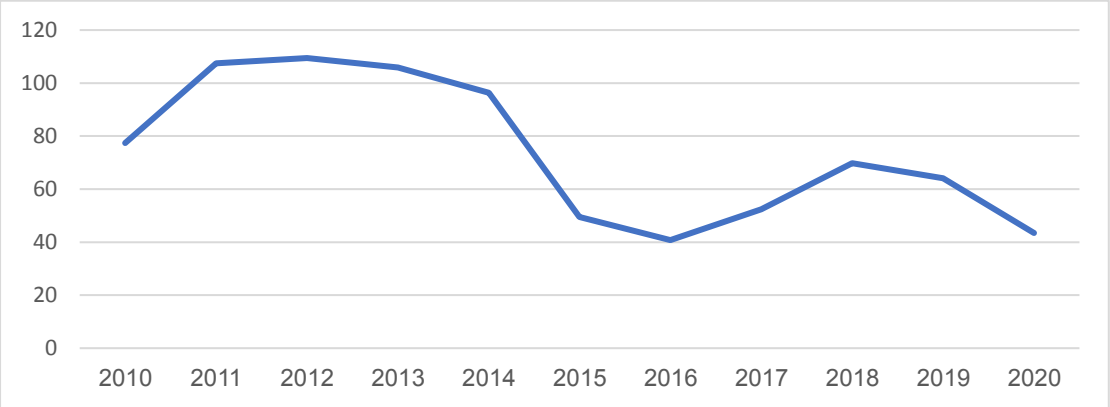
Changes in Oil Markets and New Technology:

The Effects of COVID-19 and Climate Change

Paul Rivlin

In the first two months of 2021, the price of oil rose by almost 38 percent to just over $65/barrel. Was this because of rising demand, supply constraints or increased confidence? All these factors were relevant, but a glance at the OPEC basket price of oil over the past decade puts the rise in prices into perspective. At the end of February, the oil price was well below its 2011-2014 and 2018 highs both nominally terms and even more so when inflation is considered.[1]

Chart 1: The OPEC Basket price ($/barrel) 2010-2020



Source: OPEC Annual Statistical Bulletin, various editions

During the second quarter of 2020, the outbreak of COVID-19 brought about a massive decline in global oil demand as lockdowns brought large parts of the world economy to a halt.

According to the International Energy Agency, global oil demand fell from 100 million barrels per day (mb/d) in the fourth quarter of 2019 to 83 mb/d in the second quarter of 2020. This sharp decline, along with the breakdown of talks among OPEC and its partners in March 2020, resulted in an oil glut that caused unprecedented volatility and the collapse of prices. During the second half of 2020, as lockdowns were eased and economic activity restarted, oil demand began to recover, but remained well below 2019 levels. The overall decline in oil demand during the year was 8.8 mb/d.[2]

Following this shock, what are the prospects for oil prices? Higher prices in January-February 2021 largely reflected the Saudi announcement at the beginning of the month that it would unilaterally cut one million barrels per day (b/d) of crude oil production in February and March. That was in addition to the reduced production levels previously agreed upon by the Organization of the Petroleum Exporting Countries (OPEC) and partner countries, referred to as OPEC+, that is, OPEC plus Russia and nine others. The U.S. Energy Information Administration (EIA) expects that the Brent* crude oil price will average $56/b in the first quarter of 2021 and $52/b during the rest of the year. It forecasts that oil prices will fall later in 2021 as a result of rising oil supply that will slow the drawdowns of global oil inventories. It also expects that high levels of global oil stocks and the availability of spare production capacity will limit upward pressure on prices. The EIA forecasts that Brent prices will average $55/b in 2022.[3]

Can suppliers push up prices by restricting supply? The ability of OPEC+ producers to push oil prices higher is very limited. The history of OPEC suggests that attempts to maintain oil prices higher than warranted by demand and supply for any length of time have failed. This is because higher prices encouraged the development of new sources of oil outside OPEC (the North Sea, US fields in the Gulf of Mexico and more recently shale oil, largely in the US). As a larger and less homogenous group than OPEC, OPEC+ will have a harder time enforcing production cuts on its members.[4]

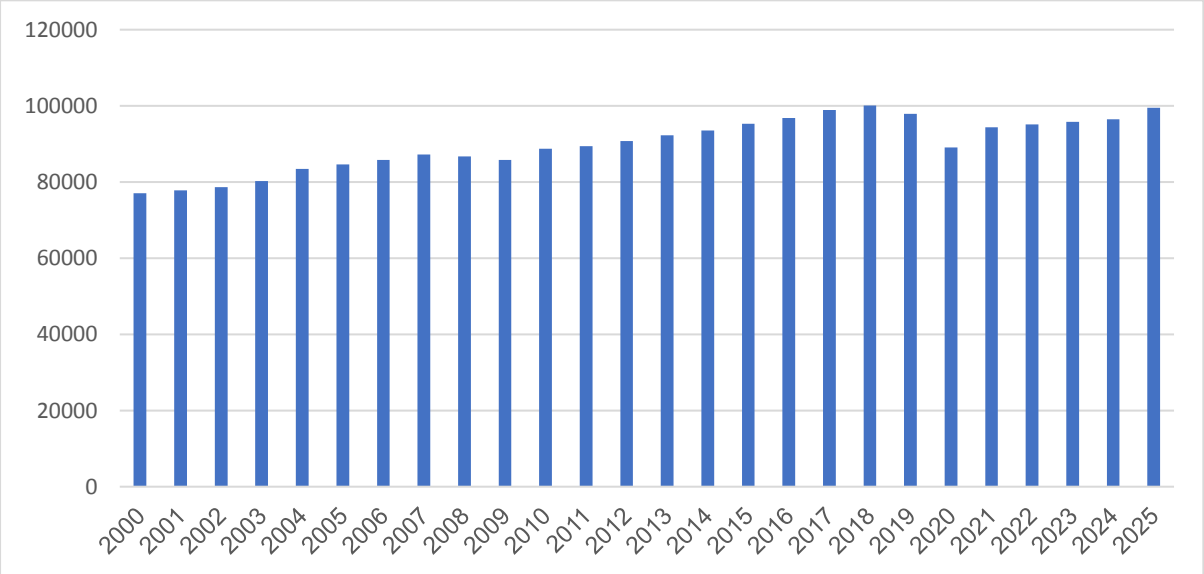
Given increasing concerns about global warming, the ability and willingness of non-OPEC countries to develop new sources of oil will be limited. Does this mean that OPEC or OPEC+ will have greater flexibility to raise prices? Changes in demand are likely to prevent this. A

* Brent is the leading global price benchmark for Atlantic basin crude oils. It is used to set the price of two-thirds of the world's internationally traded crude oil supplies.

year ago, the IMF stated that global oil will peak in the next two decades. It estimated that in 2041 the peak of 115 mb/d will be reached and then oil demand will fall as a result of increased energy efficiency and substitution away from oil. These factors will outweigh the effects of rising incomes and population growth. Changing the assumptions regarding improvements in energy efficiency (by 0.6 percent), would result in the peak coming in 2030. The introduction of carbon taxes would bring the peak earlier than 2030 and accelerate the decline in demand thereafter.[5]

That was the analysis before the COVID-19 global pandemic. What is the current thinking? In October 2020, the IEA published its World Energy Outlook 2020 with forecast based on different assumptions. The first is based on policies stated up to the date of publication. Under this scenario, global oil demand grows by 5 mb/d in 2021 and returns to it pre-crisis level by 2023. From then demand increases by 0.7 mb/d each year, on average until 2030. After 2030, demand remains very slow at about 0.1 mb/d and as a result world oil demand in 2040 will be about 105 mb/d, about seven percent above its 2019 level. This is the scenario shown in Chart 2. If what the IEA calls "sustainable development" – in which policies designed to reduce global warming are followed – then oil demand falls to about 66 mb/d in 2040, about 32 percent less than its 2019 level.[6]

Chart 2: World Oil Consumption, 2000-2025 (million barrels a day)



Source: 2000-2019 EIA; 2021-2025 = IEA forecast based on policies until October 2020

The Economist has stated that the slowdown in growth or the fall in oil demand presents large risks for the transition of petrostates. As oil demand declines, they will face a fight for market

share which will be won by those countries that have the cheapest and cleanest crude. Even as they try to cope with the need for economic and political reform, public resources required to fund it may decline. In the second quarter of 2020, government revenue in Saudi Arabia fell by 49 percent.[7]

Oil producers will be able to maintain their oil exports for the long term. In so far as tougher climate policies focus not just on the greenhouse gases emitted by burning a fuel, but also on the carbon intensity of the production cycle, this will favor the Gulf Arab states that are the most efficient producers: Kuwait, Saudi Arabia, and the United Arab Emirates. With easy-to-extract oil, less methane leakage, and lower flaring rates, they have some of the lowest life cycle emissions. Therefore, even as the demand for oil declines, OPEC's and the Gulf's share of global production could rise as a result of its members' lower costs and emissions. This may strengthen OPEC's position within a market that will remain sizable for years.

Will shrinking demand for oil and gas will mean lower prices? Will this mean that, even if petrostates gain market share, they would suffer falling revenues? The answer is not clear. Without continued investment, production from existing fields will decline by about eight percent per year. According to the IEA, demand will not fall that quickly, even if the Paris climate goals are met. As a result, additional investment will be needed. Once oil demand peaks with the sector in disfavor among investors, there may be a shortage of capital. As a result, supply may fall faster than demand, leading to a shortage of oil. The resulting higher prices would boost the revenues of the oil producing states.

Another development is that some of today's petrostates may become "electrostates". Electrostates will not only be manufacturing giants like China, but others that produce cheap and clean energy for export, either as electricity supplied to neighboring countries or as hydrogen and ammonia, which can be used to power factories, buildings, and transportation. Saudi Arabia which has abundant, low-cost solar power, has announced a $5 billion project to turn renewable energy into hydrogen. It has also started to export the world's first blue ammonia to Japan.[8] Blue ammonia is a new potential source of energy that is created from byproducts of current fossil fuel production and use. Ammonia is made up of 18% hydrogen which is enough fuel to be used as a clean energy source. Blue ammonia is created by harvesting hydrocarbons and converting them into hydrogen and ammonia which can then be burned in power generation plants. Blue ammonia does not emit carbon dioxide when burned and

ARAMCO claims that it traps nearly all CO2 generation during the conversion process, making this fuel one of the first carbon free options for mass use.[9]

In July 2020, by Air Products & Chemicals, the U.S. industrial gas giant, announced that it would build a $5 billion green hydrogen plant in Saudi Arabia powered by 4 gigawatts of wind and solar power, the world's largest project of its kind announced so far. The plant will be jointly owned by Air Products, Saudi Arabia's ACWA Power and will be built in Neom, the new mega-city planned near Saudi Arabia's borders with Egypt and Jordan. The plan is to produce 650 tons of green hydrogen daily, enough to run about 20,000 hydrogen-fueled buses. The fuel will be shipped as ammonia markets globally where it will be converted back to hydrogen. Ammonia production is planned to start in 2025.[10]

Another technology is affecting the demand for oil: electric vehicles. This has been given a major boost by the Biden administration that wants to make the entire federal government fleet, estimated at 645,000 vehicles, electric with zero carbon emissions as they drive. The fleet includes light cars, postal delivery trucks and many other types of vehicles.

In January 2021, General Motors the largest US automaker, announced that it will phase out all combustion engine models by 2035. Volkswagen, Nissan and Ford have already pledged to be carbon-neutral by 2050. Daimler, owner of Mercedes-Benz, will only sell carbon-neutral models by 2039. Honda intends two-thirds of sales by 2030 to be electric or hydrogen.

National commitments for carbon-neutrality by mid-century, increasingly broad corporate goals, and bans on sales of new combustion engine vehicles in the UK by 2030, France by 2040, will increase the use of electric vehicles. It has been estimated that electric cars will reach price parity with combustion engines when the cost of batteries falls to $100 per kilowatt-hour. GM aims to achieve that in a new plant soon, and eventually reach $70 per kilowatt-hour. As carmakers turn to electrics, they will cease improving combustion engine models. That in turn will hasten petrol and diesel cars' obsolescence. They will not be able to meet ever more stringent clean air and fuel economy standards and will increasingly look dated. Of course, the net effect on oil demand will depend on how electricity is generated.

Ironically, that could be an opportunity for oil firms. Saudi Aramco has for at least ten years been developing advanced combustion engine technologies. These include a partnership with Mazda on compression ignition engines that run on gasoline rather than diesel, with a potential

improvement in fuel economy from 6.9 liters per 100 km falling to 5.2 liters per 100 km. It is also working with two start-ups, Achates Power and INN engine, on opposed pistons for a lorry engine that runs on petrol or diesel with almost twice the mileage of a conventional rig, smaller, lighter and easier to manufacture.

In December 2019 Aramco unveiled an experimental heavy truck, with on-board capture of carbon dioxide, which could capture 40 percent of its emissions. The market for long-range goods carrying vehicles, which batteries will find harder to conquer, will remain a source of oil demand for some time.

The conclusions implied in this analysis are that reliance on oil and other fossils fuels will gradually decline because of environmental considerations. Less reliance on oil means that the economy and political clout of oil producers will weaken, but the position of those producers with cleaner and or cheaper oil will be enhanced, at least in the medium term. Their ability to manipulate oil markets will, however, be weaker than in the past.

These strong oil producers, assuming they maintain political stability, will diversify and may potentially become electrostates. The weaker oil states will get left behind because the foreign investment, technology and markets needed for transformation will be hard to acquire. The latter include Iran and Iraq, and Libya and Algeria that are all being held back by political factors and military conflicts.

For previous issues of *Iqtisadi*, go to our website, http://dayan.org/journal/iqtisadi-middle-east-economy.

[1] See the official OPEC Basket Price.
[2] *International Monetary Fund*, "Prospects and Policy Challenges for the GCC Countries," December 10, 2020; IEA, "Oil Market Report (OMR)," December 2020.
[3] *US Energy Information Administration (EIA),* "Short Term Energy Outlook," February 2021, full report can be downloaded here, https://www.eia.gov/outlooks/steo/archives/Feb21.pdf.
[4] Djavad Salehi-Isfahani and Udval Batbayar, "Crude lessons: what history teaches about the future of oil prices," *Economic Research Forum*, January 11, 2021.
[5] *International Monetary Fund*, "Prospects and Policy Challenges for the GCC Countries," February 6, 2020.
[6] *International Energy Agency (IEA),* "World Energy Outlook, 2020," October 2020.
[7] *Economist*, "Is it the end of the oil age?" September 17, 2020.

[8] Jason Bordoff, "Everything You Think About the Geopolitics of Climate Change Is Wrong," *Foreign Policy*, October 5, 2020.
[9] Grant Piper, "It's Time To Get Excited About Blue Ammonia," *Medium*, September 28, 2020.
[10] John Parnell, "World's Largest Green Hydrogen Plant Unveiled in Saudi Arabia," *Green Tech Media*, July 7, 2020.