Peak Oil: A 1950s Concept Reimagined for 2020

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Demand has always been the key driver for oil.

Even in Hubbert's 1956 Peak Oil article, Peak Oil was always a function of what price consumers would support to find, develop and lift. Put more simply, there has always been the expectation that supply will be available, if the price is right.

While there is a likely to be a change in demand for products that come from oil as we move to "net zero," there will still be demand for oil.

Before there is a rush to write an obituary for the oil & gas business, there needs to be a better understanding of where the demand will come from, not least as gas gains greater importance as a fuel.

In this article, we discuss why all is not doom and gloom for oil & gas.

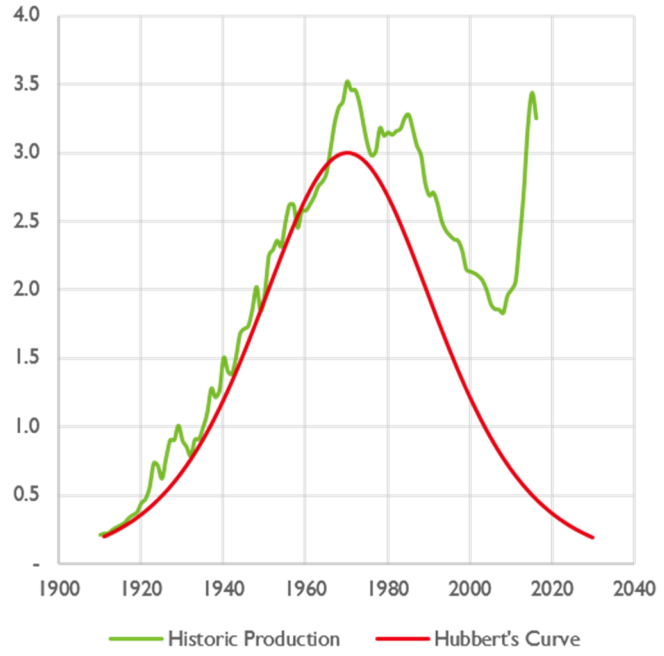
Peak Oil: The 1950s Concept

The term "Peak Oil" was first coined by Marion King Hubbert in 1956, who published a paper postulating that this would only occur when "the cost of oil extraction exceeded the price that consumers were willing to pay."

In the original 1956 paper, Hubbert made allowances for advances in design, some degree of "economies of scale," and limited his assessment to the lower 48 states of the United States, estimating Peak Oil would arrive at some time in the early 1970s.

In respect of the lower 48 states, Hubbert's prediction was surprisingly prescient, given the number of variables (see following chart).

Figure—Hubbert's Data Compared With Historic Production



Source: EIA & OGA data

Since the original article, Peak Oil has been re-estimated and recalculated and continually pushed further towards the right, as updated understanding of the performance of reservoirs and technology, such as fracking and 3D seismic, has enabled improved finding rates and lower costs.

This has meant that for each year after the original 1956 Peak Oil estimate that we have recalculated the Peak Oil year, the revised year's estimated Peak Oil date advanced by at least the same period, if not more.

In BP's latest edition of Energy Outlook (Energy Outlook 2020), however, one of the key takeaways was that:

> *"...Demand for oil falls over the next 30 years. The scale and pace of this decline is driven by the increasing efficiency and electrification of road transportation..."*

which represents a significant shift in thinking, as it implicitly states that peak demand may have already occurred.

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Figure—Frack Spread

Source: OGA data

Peak Oil 2020: Demand, Not Supply, Now Key?

What is highlighted in BP's report is that supply, buoyed by advances in technology unlocking significant additional resources, having once been the key concern in the "supply/demand" balance, has been deemphasised.

To some extent "t'was ever thus."

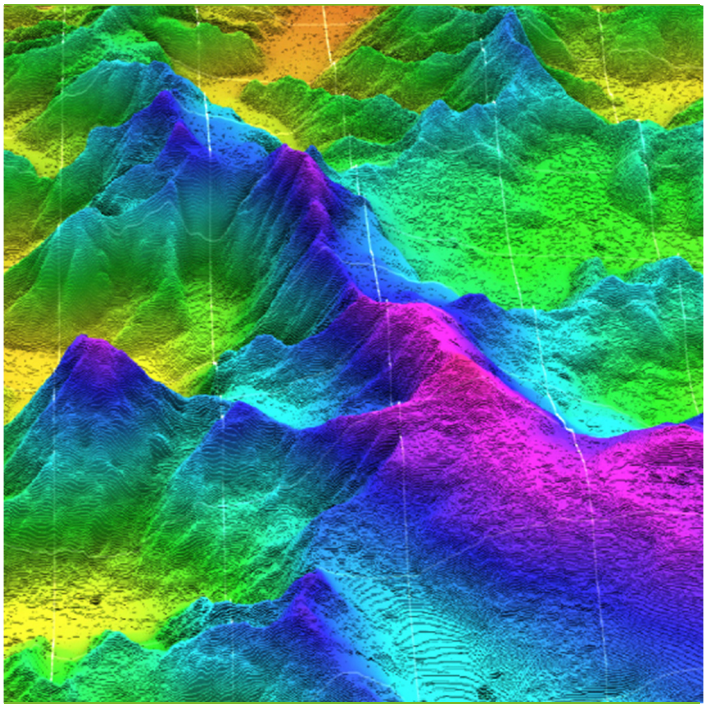
Hubbert's Peak Oil definition in and of itself was defined by demand, or rather the willingness for consumers to pay for the barrels.

Consequently, it's essential to understand what the change in thinking has been. We would argue that since the global financial crisis in 2009, there has been a persistent existential crisis on which direction long-term demand would go.

Commentators (almost universally) have agreed that the gentrification of the developing nations would ultimately continue to drive the underlying growth as developed nations' demand levelled off.

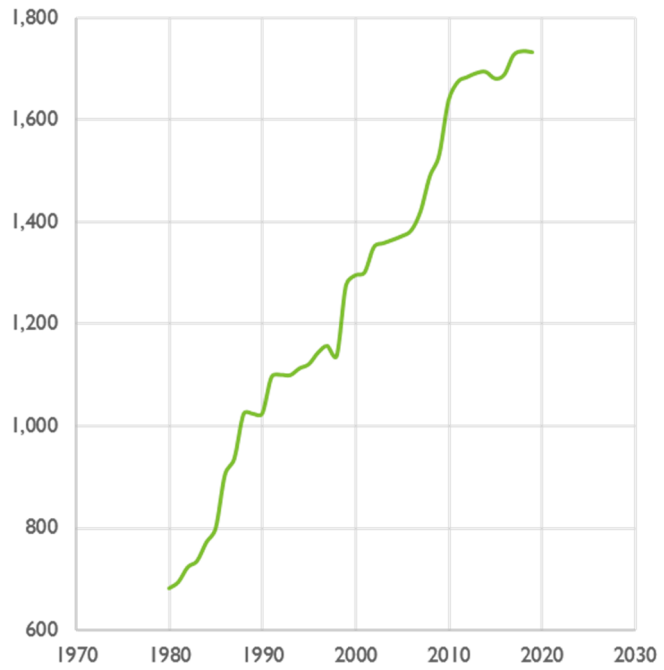
What is intriguing from reading BP's interpretation, is not that the electrification of transportation in developed countries will erode growth in demand, but that given the increase in proven reserves over the last 35 years (see following chart), has meant that supply is no longer an issue, that there are sufficient resources available to meet all demand, including growth.

Figure—3D Seismic



Source: OGA data

Figure Proven Reserves (bn bbl)



Source: FactSet & OGA data

While this is to some extent true, there is still need to get the hydrocarbons out of the ground. In that respect, several factors haven't been given enough weighting or have been downplayed, excessively in some cases.

While some of these factors are related to the underlying petrophysics, others are less tangible and tied up in market psychology; these can be summarised as:

- Oil Price Volatility
- World Scale Project Delays
- Reservoir Performance
- Forward Supply Attrition
- Show Me the Money
- Electrification – A Significant Plus
- Electrification – Dash to Gas Reprised

Oil Price Volatility

Oil price volatility has had a limited impact on the immediate supply/demand balance. However, with volatility comes uncertainty on what the overwhelming direction the oil price will be; will it sawtooth up, down or tread water.

Given this uncertainty, it is inevitable that the larger world-scale projects, which often have longer-term investment and payback horizons, are scaled back to minimise risk capital, or delayed until the last possible moment before sanction.

World Scale Project Delays

World scale projects are those that have a material impact on global production, either due to significantly initial high production rates, or longer-term production volumes, or usually both.

These projects have minimal impact on short-term supply outlook, as investment time horizons are often in excess of 20 years, and a planning development phase of five years.

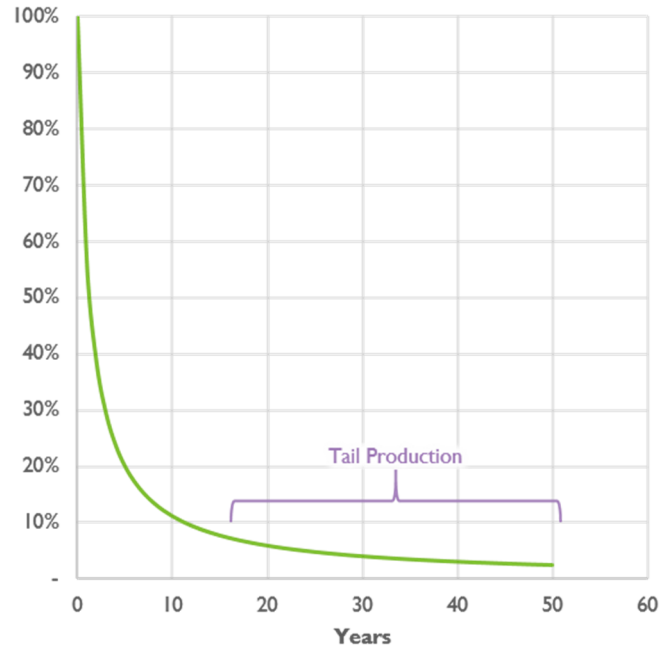
The longer-term uncertainty created by oil price volatility, however, means that the sanction of these projects is nearly always suspended, or delayed until the last possible moment.

Reservoir Performance

The first factor to be considered is the inescapable fact that production from an oilfield naturally declines (on average) more than 15% per annum. The net effect at the global level is less pronounced, averaging between 5 – 9%, but still requires substantial additional barrels per year, just to maintain production.

Annual decline rates from wells producing from shale formations can often exceed 70%, meaning that they have long productive "tails" (see following diagram).

Figure **Tail Production in a High Decline Rate Well (% Initial Production)**



Source: OGA data

In a conventional reservoir, production is optimised to maximise production longevity, which results in higher produced volumes over the respective project's lifetime.

This also means that there are usually "additional" volumes that can be produced, at short notice, without damaging the reservoir, but it does shorten the respective field's life.

Forward Supply Attrition

The net effect of "opening the taps" and the delay and cancellation of world-scale projects, has the effect of eroding the medium to longer-term (5 to 10 years) supply outlook.

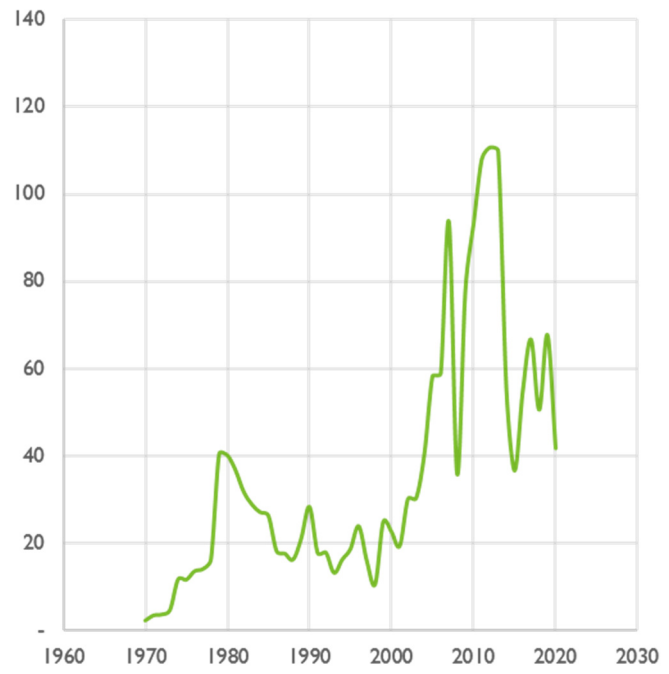
While to some extent this will be offset by the reintroduction of the smaller projects, against the backdrop of the relentless production decline the longer out your time horizon, the less comfort you gain in the surety of supply.

Show Me the Money

One of the critical aspects of the deemphasis of supply has been the explosive growth in US onshore production. This has been driven, in part at least, by the willingness of lenders to lend to US shale operators to acquire and develop their asset base.

The reversal of the oil price (see following chart for recent oil price performance) and ineffective hedging of risk has meant that a significant number of these operators are not profitable, or have gone bankrupt.

Figure Oil Price Since 1970 ($/bbl)



Source: FactSet & OGA data

A recent Rystad Energy report suggests that up to 68 producers are at risk and could be declared bankrupt in 2021, which in turn will place further pressure on US production figures.

In the context of the industry, Rystad's estimated 68 bankruptcies are primarily short-term issues. However, the real impact will be on the lenders' credit committees' outlook and risk perception of oil & gas.

US onshore producers have been a substantial beneficiary of US lenders' largess and rush to cash in on the boom in shale production. However, they are about to face investors' "zero-sum game," as increasingly strict and stringent lending criteria start to result in the withdrawal of credit and become increasingly selective about where they lend.

Anecdotal evidence suggests that this is already happening, with US-based lenders now unwilling to consider projects with values of less than $500mm and to corporate entities with values of less than $1bn.

While the creative destruction ensuing from this phase of bankruptcies will see a leaner more profitable US onshore industry emerge, it is the impact that it has on the longer-term outlook that is more damaging.

It is likely that this will manifest itself in an accelerated decline in shale production as the lack of investment compounds not only the workover of existing well stock but limits the drilling of new production wells.

We do not see a loss in the number of barrels accessed by operators in the US shale segment; it will just be over a longer time scale.

The corollary of this will also see increased lead times for production coming on stream, which again has an impact on the timing of projects.

So what has been to date a significant positive for improving the outlook of supply security, will increasingly be eroded, and add further to the theory of forward supply attrition.

Electrification – A Significant Plus

The vast majority of commentators appear to be binary in their approach to the electrification of the economy, whether discussing the replacement and phasing out of fossil fuels for transport, or the national infrastructure.

Without exception, there appears to be an unwillingness to address or understand the significant increase in demand from oil that will result from the higher usage of oil by-products.

At the basic level, this ranges from electrical insulating materials, but will also include higher complexity molecules which are used for high-performance structures, such as wind turbines and high-performance battery elements.

The increase in demand for composite materials and intermediate compounds that will arise from the need to upgrade the infrastructure will be further boosted by the rise in the use of specialist materials in everyday objects.

To meet higher demand, traditional fractions associated with transportation fuels will be drawn "down the column," which means that any demand that is lost due to

the electrification of transport will be offset, partially at least, by greater demand for chemical building blocks.

Furthermore, the net effect of this increased focus on higher-value molecules in value means that crude oil will become further deemphasised as a cost constituent, and supply chain security will become more critical.

While this may not be sufficient to offset the decline in demand from transportation fuels fully, it will have an offsetting effect on the need for the overall crude oil "barrel."

Electrification – Dash to Gas Reprised

Natural gas (methane) has traditionally been the "go-to" molecule to build larger, more complicated molecules, as it is a relatively simple molecule, and its chemistry is well understood.

As Electrification progresses and we move towards renewables, the need for infinitely variable short notice power generation will accelerate.

This can only really be effectively provided on the size and scale required by gas turbines powered by natural gas.

Consequently, natural gas will become a more important source of energy when the proportion of renewables increases, and as such its use as a chemical building block will be phased out, further boosting demand for crude oil.

What's Next?

National governments are going to continue to drive towards "net zero." We consider that in the transition period, the role of hydrocarbons will become more critical as the crossover between its current status, and the increasing importance as sources of chemical building blocks to support electrification.

This will be further compounded in the case of oil as gas' importance as fuel continues to grow.

While the growth in demand for specialist materials will be important, it will be dwarfed by the gentrification of developing nations, because although they will have access to the most up-to-date technology, these markets will add new demand to the existing portfolio.

We agree with BP's outlook, which we're sure they'll will be pleased to learn. However, we think that the rate of substitution and replacement will be lower in the initial period and modestly higher as the various "net zero" deadlines approach.

Where we differ materially in the structure of where the barrels will go to in the longer-term, is that we believe that the ongoing demand on the whole barrel, either through direct fractionation or chemical alteration, will be far greater than previously thought.

At the point that the rise in the demand for petrochemicals starts to rise, those integrated majors that divested their downstream operations will likely rue the decision to do so, but that is a conversation for the future.

About Us

Oil & Gas Advisors (OGA) is an oil & gas advisory firm. Our experience crosses oil & gas operations and finance, as well as debt and equity capital markets. We provide corporate M&A, asset A&D, debt and equity capital markets access and strategic advisory in the oil & gas sectors.

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