
MUSINGS FROM THE OIL PATCH

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Note: *Musings from the Oil Patch* reflects an eclectic collection of stories and analyses dealing with issues and developments within the energy industry that I feel have potentially significant implications for executives operating and planning for the future. The newsletter is published every two weeks, but periodically events and travel may alter that schedule. As always, I welcome your comments and observations. Allen Brooks

BP Sees Record Renewables Growth In 2017, But Costly

Renewable power grew by 17% in 2017, a higher rate than its 10-year average, as reported by Spencer Dale, economist for BP plc (BP-NYSE) at the introduction of the 2018 edition of the [BP Statistical Review of World Energy](#) on June 13, 2018. At 69 million tons of oil-equivalent energy, renewables posted its largest annual increase on record. This was one of the key conclusions from the company's 67th edition of the Statistical Review.

Renewables accounted for almost half of the growth of power generation

The discussion of renewables' growth was an important aspect of the presentation, not only because of the remarkable growth last year, but its importance as a primary energy source grows. For example, renewables accounted for almost half of the growth of power generation, but the downside was that most of the remainder came from coal. Therein lies one of the most interesting disclosures coming from the 2017 statistics.

The materials discussion and the power fuel mix statistics reflect the changing energy world

Mr. Dale, and his boss, Robert Dudley, CEO of BP, who introduced the conclusions from the data, highlighted two new data series being provided – the fuel mix of the power sector and supply and demand conditions for the key materials for batteries for electric vehicles and energy storage. As Mr. Dudley put it, the materials discussion and the power fuel mix statistics reflect the changing energy world in which BP operates. Importantly, it is also the changing energy world in which politicians must operate and set policies if the world is going to comply with the temperature rise goal of the Paris Agreement.

BP, like most of its peer international oil companies, especially those based in Europe, has recently made investments in renewable energies and certain technologies facilitating them. These investments have been driven by the shifting energy market in response to the climate change push by governments. They have

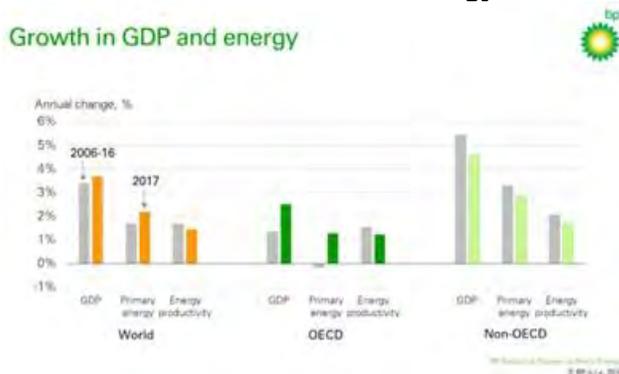
BP's favored policy solution is pricing carbon

provided financial subsidies to reduce the cost of expensive renewables, as well as mandates for their use. Falling renewable costs have also helped. BP is also a member of a peer group dedicated to reducing its carbon emissions and promoting carbon emissions policies that they believe are less economically-disruptive. BP's favored policy solution is pricing carbon to level the economic playing field for all energy fuels.

Global energy growth last year was 2.2%, up from 1.2% in 2016, and above the 10-year average of 1.7%

To appreciate how the energy world is changing, two charts presented by Mr. Dale set the stage. Global energy growth last year was 2.2%, up from 1.2% in 2016, and above the 10-year average of 1.7%. That robust growth came as a result of strong global economic growth, but also due to a decline in energy productivity. While the International Monetary Fund is warning of potential dark clouds on the horizon for global economic growth, its forecast remains robust, meaning energy growth is likely to remain high.

Exhibit 1. The 2017 Drivers For Energy Demand



Source: BP plc

China saw energy demand grow by 3%, nearly three times its growth rate of the past several years

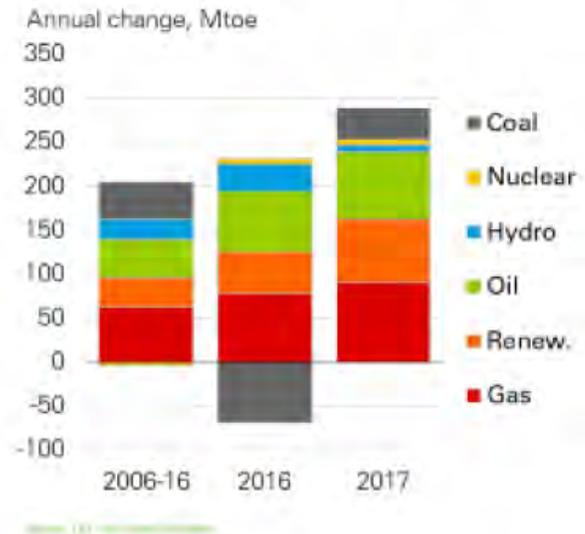
Also important is the difference in where energy growth originated. The driver for the above-average growth was the strength of the developed economies of the OECD, but also some deterioration in energy productivity. However, nearly 80% of the total energy growth came from the non-OECD or developing economies of the world. That is not surprising as they benefit from the global economic recovery, especially China. China saw energy demand grow by 3%, nearly three times its growth rate of the past several years. That higher growth was driven by recoveries in numerous high-energy sectors such as iron, crude steel and non-ferrous minerals. Still, the high growth rate was well below China's 10-year average rate, even though it was helped by a decline in energy intensity that was more than twice that of the global economy.

The picture of primary energy fuel mix highlighted the title of Mr. Dale's remarks – Two Steps Forward and One Step Back. He pointed to the dramatic growth in natural gas and renewables as the two steps forward. Combined, those two fuels accounted for 60% of the total growth in energy fuels.

Exhibit 2. How The Fuel Mix Has Changed

Primary energy fuel mix

Consumption growth by fuel



Source: BP plc

The backward step was the growth in coal usage

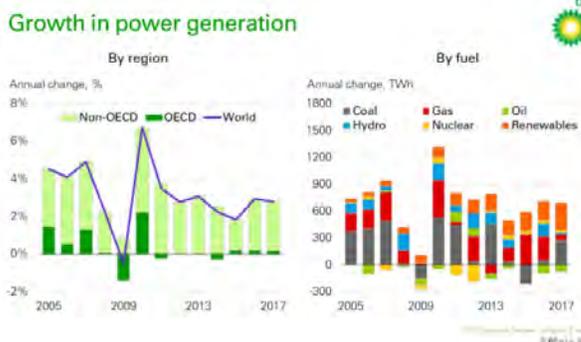
There has been almost no growth in electricity in developed economies since 2007

The backward step was the growth in coal usage. In 2017, global coal use rose by 1.0%, or 25 million tons of oil-equivalent, marking the first annual increase since 2012. The increase was driven by India, although China's consumption also rose after declines in the three prior years.

When the focus turns to the electricity sector, the importance of renewables cannot be dismissed. Its share was the most of any year since 2005 and was essentially equivalent to the increase in coal use. What was most interesting was the difference in growth of electricity between the developed (OECD) and developing (non-OECD) economies. As seen in Exhibit 3, (next page), there has been almost no growth in electricity in developed economies since 2007, or before the Great Recession, if one nets the annual changes experienced in the recession and its immediate bounce-back year. The sharp growth in electricity in developing economies helps explain why coal use grew. It was cheap and available.

An interesting and alarming chart presented by Mr. Dale dealt with the power generation market fuel mix over the past 20 years. This chart prompted a discussion about why there has been no meaningful fuel mix change given the strong public policy focus on boosting the use of renewables. A questioner in the audience wondered whether Mr. Dale had "cherry-picked" the time period. He responded that in shorter time periods there has been improvement in the fuel mix, but he felt the dramatic impact of the 20-year chart

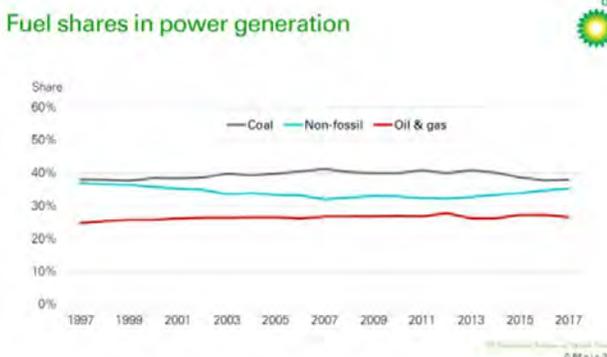
Exhibit 3. How Power Generation Market Changed



Source: BP plc

showing no change in fuel mix was important. For the first decade of the time span renewables share declined, but then remained essentially stable until about 2012, at which point their share began growing. This increase coincided with a stable share for oil and gas (likely primarily due to natural gas) and a falling share for coal use.

Exhibit 4. Disappointing Power Fuel Mix Record

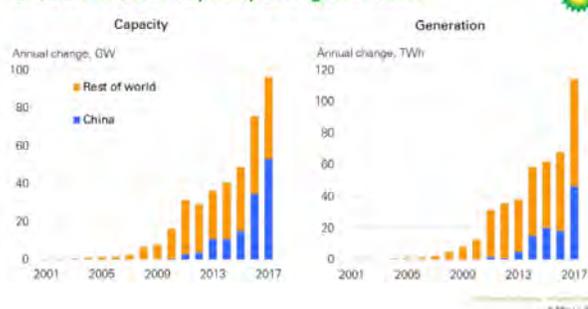


Source: BP plc

China’s new solar generating capacity accounted for half the global growth experienced in 2017

This power generation fuel mix chart contrasts with the strong growth in solar power generation, which is being driven by China’s regulatory push and the falling cost of solar panels. The country’s new solar generating capacity accounted for half the global growth experienced in 2017. Solar electricity output in China has also grown significantly in the past two years, driven by concern over air pollution in the country’s major cities. China has become the leader in the global solar panel business, but the recent move by the Trump administration to levy tariffs on these panels will slow the growth of solar power in the United States, and potentially globally.

The flat fuel mix lines within power generation for the past 20 years led to commentary about the impact on carbon emissions. The 1.6% growth in emissions in 2017, following three years with no increase, was due to GDP growth and its concentration in the

Exhibit 5. Solar Power Has Been Energy Star**Growth in solar capacity and generation**

Source: BP plc

Mr. Dale pointed out that in India, natural gas is very expensive, especially relative to coal

manufacturing sector. That growth was the prime driver for energy demand and the increase in coal consumption. Mr. Dale pointed out that in India, natural gas is very expensive, especially relative to coal. What should the government do, asked Mr. Dale? He went on to say that the toughest argument for governments acting to limit carbon emissions in order to meet the 2° temperature rise goal of the Paris Agreement means that politicians need to raise the cost of energy for everyone today in hopes of improving the future for an unborn child. He thinks that is an extremely difficult argument for politicians to make.

“If consumers knew what the true cost of renewable energy was, they would be surprised.”

Mr. Dudley commented that “renewables are highly subsidized around the world.” This may not be the best strategy, he suggested. He said “if consumers knew what the true cost of renewable energy was, they would be surprised.” This led him into a discussion of emissions and carbon pricing, something BP backs. While the United States has reduced its carbon emissions to 1990 levels, in the UK, which levies an £18 (\$24) per ton tax on carbon in fuels, emissions are down to 1890 levels. This achievement has come from increased use of low carbon natural gas and no consumption of high carbon coal. However, the UK’s volume of imported power from France is up by 20-25%, meaning it is exporting its carbon emissions. The U.S. improvement, Mr. Dudley said, has come from increased use of gas and less use of coal. His concluding observation about the UK emissions improvement was that success has come from a small shift in prices.

While acknowledging how expensive renewables are and preferring the use of carbon pricing to alter consumption patterns as the better way to work on limiting carbon emissions, Mr. Dudley failed to comment on the need for power companies to have to use coal-fired power plants in the winter to assure electric power stability. If carbon pricing is adopted, and subsidies for renewables eliminated, companies may be able to better adjust their fuel use to ensure the stability of electric power year-round and reduce emissions. A good year for renewables growth should not obscure the distorted

economics for electricity and the resulting risk to electric grid stability. There is still a lot of work to do to solve the challenge of a stable electric grid with low carbon emissions and power prices.

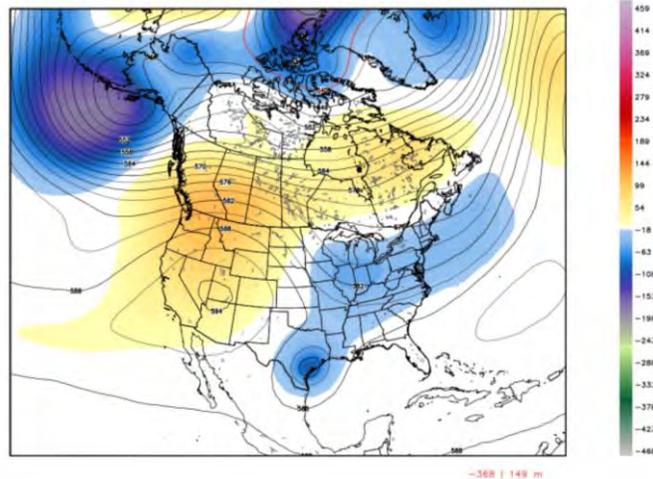
Politicizing Hurricanes Is Dangerous In Year Of Less Activity

The rainfall amount was aggravated by the storm being blocked from moving north by a cold front that formed a large trough over the eastern half of the U.S.

The flooding of Houston and the upper Texas Gulf Coast during Hurricane Harvey last year prompted the environmental community to claim that the heavy rain was caused by climate change. That argument was refuted by meteorologist Joe Bastardi of *Weatherbell* in an online presentation. He, as well as other meteorologists, had predicted the looping pattern Harvey traveled once it came ashore, bringing it back over the Gulf of Mexico and then into the upper Texas Gulf Coast after soaking up substantial moisture it deposited on the region. As a result, he had warned about extremely heavy rain from the storm. The rainfall amount was aggravated by the storm being blocked from moving north by a cold front that formed a large trough over the eastern half of the U.S. The trough and abnormally cool temperatures that created the blockage can be seen in the following charts.

Exhibit 6. Cold Front That Blocked Harvey Progress

ECMWF 500 hPa Geopotential Height [dm] & Anomaly [m] fx: [120] hr --> Thu 12Z31AUG2017
INIT: 12Z26AUG2017 5-day Mean between 12Z26AUG2017 & 12Z31AUG2017 Day 0 - Day 5

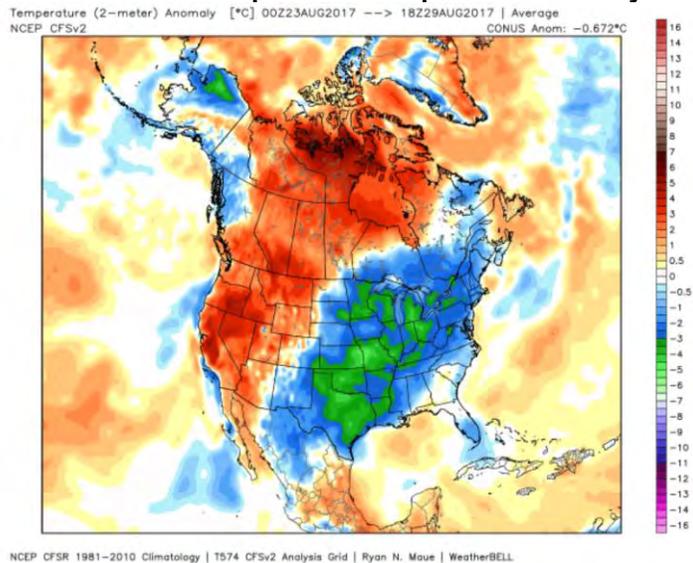


Source: *Weatherbell*

Mr. Bastardi asked: If Harvey was due to climate change, how do you explain 92L not becoming a hurricane?

These charts came from Mr. Bastardi's presentation. The most telling chart he showed listed land-falling Category 4 and 5 hurricanes ranked by intensity. Mr. Bastardi's presentation began with citing that disturbance 92L, a sister storm to Harvey, traveled across the Atlantic and, in a classic arcing pattern, crossed Florida before moving north up the East Coast, but never developed into a hurricane. Mr. Bastardi asked: If Harvey was due to climate change, how do you explain 92L not becoming a hurricane?

Exhibit 7. Cold Temperatures Helped Block Harvey



NCEP CFSR 1981-2010 Climatology | T574 CFSv2 Analysis Grid | Ryan N. Maue | WeatherBELL

Source: *Weatherbell*

Which storm would be more likely to dump lots of rain?

Hurricane Harvey was tied for 14th in terms of wind speed and pressure. Mr. Bastardi pointed to Hazel, the storm ahead of Harvey on the list, and asked, which storm would be more likely to dump lots of rain – a storm hitting North Carolina in mid- October or one hitting the Gulf Coast in late August? Seems like a no brainer.

Exhibit 8. Strongest Hurricanes To Land On U.S.

| U.S. Landfalling Category 4-5 Hurricanes Ranked by Pressure (1851-2017) | | | | | |
|---|-----------|-------------------|--------------|---------------|-------------|
| Rank | Year | Storm Name | Wind (Knots) | Pressure (mb) | SS Category |
| 1 | 1935 | Labor Day | 160 | 892 | 5 |
| 2 | 1969 | Camille | 150 | 900 | 5 |
| 3 | 1992 | Andrew | 145 | 922 | 5 |
| 4 | 1886 | Indianola | 130 | 925 | 4 |
| 5 | 1919 | Florida Keys | 130 | 927 | 4 |
| 6 | 1928 | Lake Okeechobee | 125 | 929 | 4 |
| T-7 | 1926 | Great Miami | 125 | 930 | 4 |
| T-7 | 1960 | Donna | 125 | 930 | 4 |
| 9 | 1961 | Carla | 125 | 931 | 4 |
| 10 | 1916 1916 | Texas Hurricane | 115 | 932 | 4 |
| 11 | 1989 | Hugo | 120 | 934 | 4 |
| 12 | 1932 | Freeport | 130 | 935 | 4 |
| 13 | 1900 | Galveston | 120 | 936 | 4 |
| T-14 | 1898 | Georgia | 115 | 938 | 4 |
| T-14 | 1954 | Hazel | 115 | 938 | 4 |
| T-14 | 2017 | Harvey | 115 | 938 | 4 |
| T-17 | 1915 | Galveston | 115 | 940 | 4 |
| T-17 | 1948 1948 | Florida Hurricane | 115 | 940 | 4 |
| 19 | 2004 | Charley | 130 | 941 | 4 |
| 20 | 1947 | Fort Lauderdale | 115 | 943 | 4 |
| 21 | 1893 | Chenier Caminanda | 115 | 948 | 4 |
| 22 | 1945 | Homestead | 115 | 949 | 4 |
| 23 | 1959 | Gracie | 115 | 951 | 4 |
| 24 | 1949 1949 | Florida Hurricane | 115 | 954 | 4 |
| 25 | 1950 | King | 115 | 955 | 4 |

Source: *Weatherbell*

“So the question becomes, if those same storms, almost all stronger, from many years ago hit today, would they be a sign of climate change?”

He then went on to examine the various Texas hurricanes on the list, including the 1915 Galveston one that was ranked immediately behind Harvey. Ranked ahead of Harvey in 13th place was the 1900 Galveston hurricane that killed 6,000-12,000 people, caused by the lack of warning. Immediately above in 12th place is the 1932 Freeport hurricane. Further above Harvey is the 10th ranked 1916 Texas hurricane, a year after the 1915 Galveston hurricane, and in 9th place, Carla that landed in 1961. Lastly, in 4th place is the 1886 Indianola hurricane. Importantly, all of these stronger storms hit the same area as Harvey and occurred more than 50 years earlier. In his analysis, Mr. Bastardi asked, “So the question becomes, if those same storms, almost all stronger, from many years ago hit today, would they be a sign of climate change?” He also asked about the number one storm on the list – the 1935 hurricane – that went from a tropic storm to a Category 5 storm in 35 hours, and why a similar storm would be caused by climate change but not that one? His questions go to the comments typical of young reporters and others in the media proclaiming that the latest storm, or other weather event they are experiencing, has never happened before. Their claims are usually destroyed when an examination of historical data shows that the event had happened before, or even worse. What is correct is for these reporters to acknowledge that they have never experienced such an event before and acknowledge the difference between historical and historic.

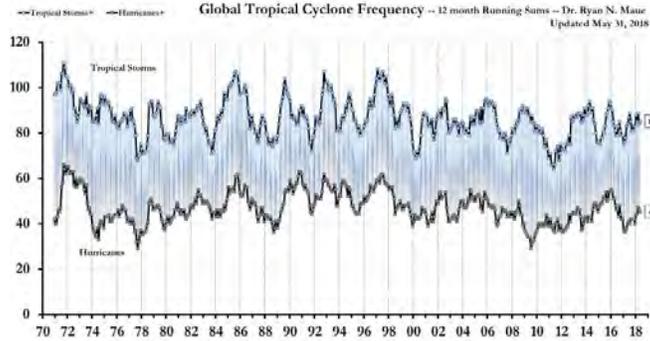
The latest contentious climate change debate was stimulated by an *NBC* interview with National Hurricane Center Science and Operations Officer Chris Landsea. Mr. Landsea is one of the world’s leading experts on hurricanes. He resigned from the UN’s Intergovernmental Panel on Climate Change (IPCC) in 2004 in a dispute with another climate scientist, Kevin Trenberth, who was in charge of the study’s chapter dealing with hurricanes. Their argument was over linking increases in the number and intensity of storms to climate change. Mr. Trenberth was adamant that was the case, while Mr. Landsea claimed the data did not support it.

“There’s periods where it’s busy and quiet and busy and quiet, but no trend”

Mr. Landsea told the reporter that he becomes concerned when hurricanes are used “as a poster child” for global warming. He went on to point out that “There’s periods where it’s busy and quiet and busy and quiet, but no trend.” Mr. Landsea has performed numerous studies of hurricanes. He stated, “There’s no statistical change over a 130-year period. Since 1970, the number of hurricanes globally is flat. I haven’t seen anything that suggests that the hurricane intensity is going to change dramatically. It looks like a pretty tiny change to how strong hurricanes will be. It’s not zero, but it’s in the noise level. It’s very small.”

Research by meteorologist Dr. Ryan Maue confirmed Mr. Landsea’s statement. There have been fluctuations in storm activity, but clearly no trend when one considers Dr. Maue’s presentation of the data in 12-month running totals of storms.

Exhibit 9. Storm History Shows No Pattern Of Strength



Source: Dr. Maue

An argument made by environmentalists is that hurricanes are becoming stronger now, or retain their strength longer than was the case several decades ago

An argument made by environmentalists is that hurricanes are becoming stronger now or retain their strength longer than was the case several decades ago, which was a point Mr. Bastardi was responding to in his analysis. Mr. Landsea questioned whether that conclusion is due to modern technology, which allows meteorologists to immediately detect the full strength of a hurricane even when it is far out at sea. This is due to the use of satellite observations. Prior to their introduction, knowledge of tropical storms came from ships in the area. This is why we knowingly do not have an accurate count of storms in the pre-satellite era. If ships didn't encounter storms, then they developed, existed and dissipated without anyone knowing of their existence.

For the following 12 years, we experienced the longest streak of the United States not being hit by a Category 3 or greater hurricane

The 2004 spat between Messrs. Landsea and Trenberth was followed by 2005, the most active tropical storm year in recorded history. That year fed the view that climate change was playing a key role in the increase in tropical storm activity. The only problem was that for the following 12 years, we experienced the longest streak of the United States not being hit by a Category 3 or greater hurricane. That string ended last year when the U.S. was hit by three Category 4 storms – Harvey, Irma and Maria. Last year ranked in the top 10 seasons for tropical storms.

Exhibit 10. How 2017 Storm Season Developed



Source: The Weather Channel

The consensus was it would be a “slightly above normal” one

After subtropical storm Alberto made its way to the Gulf Coast in May, the focus has shifted to when the next storm will develop and where it may land. In the early assessments of this storm season, the consensus was it would be a “slightly above normal” one. A normal season sees 12 named storms, six hurricanes, with two achieving major status of Category 3 or above.

Key to the forecast is whether an El Niño will develop

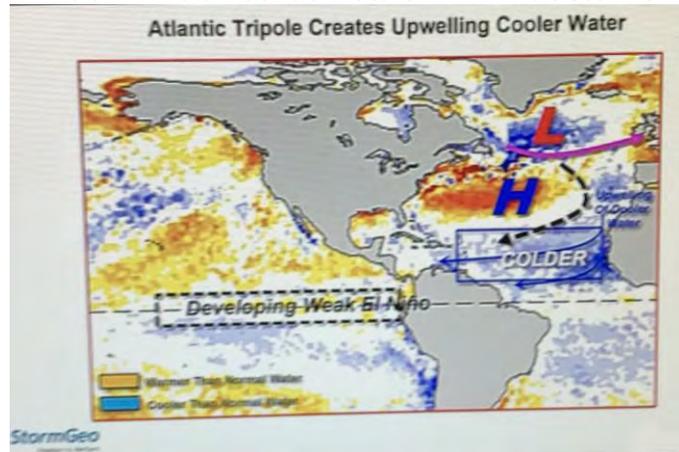
Stormgeo, a global meteorological firm, said in its first season forecast that it expected a “slightly higher than normal” season, and predicted 12 named storms, six hurricanes and two major storms. At the end of May, Stormgeo updated its forecast. Due to climate conditions, primarily the very cold waters existing in the far northern Atlantic and in the tropical Atlantic regions, Stormgeo believes it will likely be reducing its storm forecast when it revisits it later this summer. Key to the forecast is whether an El Niño will develop. El Niños in the Southern Pacific Ocean cause shear wind conditions in the Atlantic Basin, which acts to inhibit storm formation and their strengthening. Based on all the meteorological models, it appears storm formation conditions will be neutral this year. That eliminates an inhibitor to storms forming.

Another contributor to active storm seasons is warm Gulf of Mexico and Eastern Caribbean Sea waters, which now exist. But countering that positive are the cold waters of the Northern and Eastern Atlantic regions, which extends into the Southern Atlantic off the western coast of Africa where tropical storms form. Another negative for an active storm season is the absence of high storm activity in the various analog years used to predict the current season.

While contributing to fewer Atlantic tropical storms for North America, this pattern drives more storms hitting Europe and the UK

The Atlantic Tripole condition is the arrangement of water sea surface temperatures across the basin. Currently, this is negative, meaning there is a cold-water region at the top, with a warm one below, and another cold region below that one. This is seen in the blue and red color arrangement of the Atlantic. This pattern causes an upwelling of northern cold water into the storm development area off West Africa. While contributing to fewer Atlantic tropical storms for North America, this pattern drives more storms hitting Europe and the UK.

Exhibit 11. Cold Atlantic Waters Will Inhibit Storms



Source: Stormgeo, Allen Brooks

Stormgeo sees the prime landing areas to be the eastern Gulf of Mexico coastline and the Florida peninsula

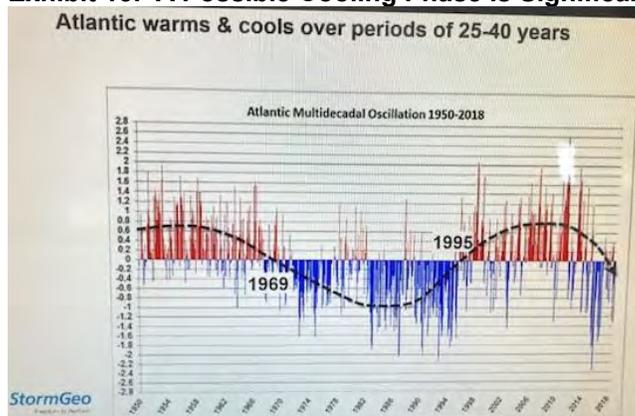
The Stormgeo forecasters expect hurricanes to form largely in the Eastern Caribbean Sea and off the coast of Mexico, helped by the warm waters of the Gulf of Mexico. This reduces the time forecasters have for discovering a developing storm and projecting its track to the U.S. coastline. Stormgeo sees the prime landing areas to be the eastern Gulf of Mexico coastline and the Florida peninsula. This would actually be good news for the oil industry as it means fewer evacuations of offshore producing platforms and rigs, and disruptions of the petroleum production, shipping and refining businesses.

Exhibit 12. How Stormgeo Sees Current Storm Season



Source: Stormgeo, Allen Brooks

What we found most interesting from the Stormgeo presentation was its data suggesting the Atlantic basin may be moving into a cooling phase. This would be a significant development. It would mean reduced tropical storm activity for possibly the next two decades, based on the history of temperature cycles and the number of tropical storms.

Exhibit 13. A Possible Cooling Phase Is Significant

Source: Stormgeo, Allen Brooks

The significance of a possible cooling phase is reduced storm activity

The significance of a possible cooling phase is reduced storm activity. Stormgeo listed seven years as analogs for its 2018 storm forecast. They commented that there is no past year with the exact set of sea surface temperatures, El Niño status and other key meteorological conditions existing today. It is interesting to consider the analog years and the fact that six of them fall within the prior cooling phase of the Atlantic Basin. Those years were 1968, 1977, 1986, 1992, 1993, and 1994. The only analog year outside the cool phase was 1959. The average storm activity for all seven analog years is eight named storms, 4.4 hurricanes and 0.6 major storms. By excluding 1959 from the calculation, the averages fall to seven named storms, four hurricanes and 0.5 major storms.

The likelihood of storms forming close to the U.S. coast this year due to the very warm waters could magnify the potential damage given the shorter time available to prepare for its impact

Despite the reduced number of storms during a cool phase, it is important to remember that a dangerous storm can develop at any point. Moreover, the likelihood of storms forming close to the U.S. coast this year due to the very warm waters could magnify the potential damage given the shorter time available to prepare for its impact. History is replete with examples of rapidly forming and strengthening storms developing close to the coast that did considerable damage. People should always be prepared, but the data refutes that tropical storm activity is being driven by climate change.

Is Canada's Oil Industry Nightmare Heading For An End?

Is that landscape in the process of changing?

The 2014 downturn in global oil prices coincided with the first of several political shocks in Canada that claimed the oil business as a victim. Is that landscape in the process of changing? OPEC met in late November 2014 and Saudi Arabia pulled the rug out from under the organization's pricing structure, sending prices crashing to the \$20s a barrel. For Canada's oil business, largely centered in the province of Alberta, the nightmare OPEC delivered was previewed with the early October election of Rachel Notley as premier. Ms.

The triple whammy of sharply higher taxes, a carbon tax on its product, and decimation of global oil prices took a huge toll on the Canadian petroleum industry

Notley headed up the New Democratic Party (NDP) that campaigned on policies of increased social spending funded by sharply higher taxes, and a distinctly anti-fossil fuel agenda. Enacting that agenda led to installation of a carbon tax that raised the cost of energy for all Albertans, adding to their financial pain caused by higher taxes.

The triple whammy of sharply higher taxes, a carbon tax on its product, and decimation of global oil prices took a huge toll on the Canadian petroleum industry. The Canadian nightmare was amplified a year later with the election of Justin Trudeau of the Liberal Party as the nation's prime minister. The shift from a Conservative-led government that favored moderate taxes and limited government spending to Mr. Trudeau's promotion of increased government spending, higher taxes and an aggressive environmental protection and anti-fossil fuel agenda, signaled that the future for Canada's oil and gas industry would be more challenging.

Downsizing, deleveraging and dismembering companies became the preoccupation of company managements

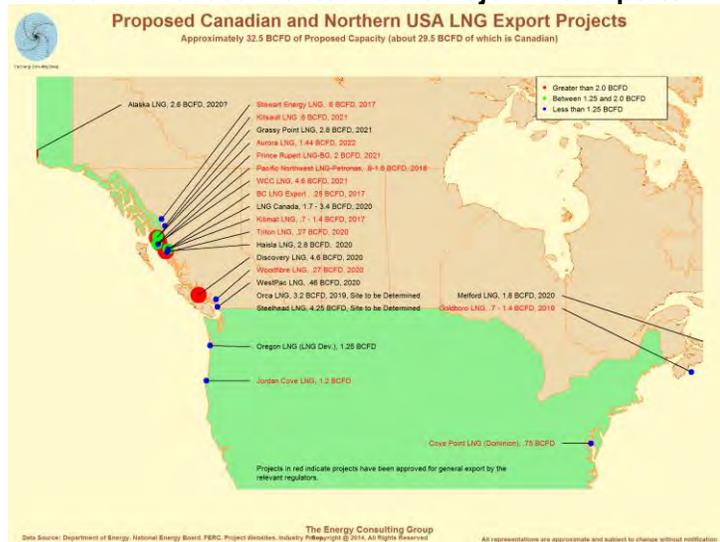
Mr. Trudeau's election came about the same time the petroleum industry was hoping OPEC's pricing discipline might be restored, which would have provided some financial balm. OPEC failed to improve pricing, sending them lower. For Canadian oil producers and oilfield service companies, the landscape was bleak. Downsizing, deleveraging and dismembering companies became the preoccupation of company managements. The rise of anti-fossil fuel governments in Alberta and Ottawa, coupled with a Liberal government in British Columbia challenged petroleum companies struggling to move major energy projects forward, particularly liquefied natural gas (LNG) export terminals, which would have stimulated petroleum industry activity.

Since 2011, 20 LNG terminal projects had been approved for federal 30-year export licenses – 14 in British Columbia, three in Quebec and three in Nova Scotia. The challenges from local governments, indigenous native tribes and environmentalists delayed most of them from moving forward. These delays, coupled with rising costs and shifting Asian LNG market conditions began pushing project sponsors to abandon them.

Pipeline proposals for shipping oil from Western Canada to both coasts were routinely fought by provinces controlled by liberal politicians and environmental protesters

Then there were the hurdles facing oil sands producers seeking approvals for new and expanded export pipelines to move increased output to the U.S. and world markets. The most politically-sensitive project, TransCanada Inc.'s (TRP-NYSE) Keystone XL Pipeline, to move oil from Alberta south through the U.S. and on to the Gulf Coast, became the poster child for the anti-fossil fuel movement, including President Barack Obama as a supporter. Pipeline proposals for shipping oil from Western Canada to both coasts were routinely fought by provinces controlled by liberal politicians and environmental protesters. The stranglehold on the Canadian oil industry drew tighter.

Exhibit 14. Canada Wanted To Be Major LNG Exporter



Source: The Energy Consulting Group

The approval was the product of a plan by the Trudeau administration to allow some pipeline projects to go ahead while stopping others

Recently, the political and legal battle over construction of an expansion of the Trans Mountain oil pipeline from Alberta to an export terminal on the British Columbia coast. The project was approved by the federal government's National Energy Board, as well as the Alberta and British Columbia governments. The approval was the product of a plan by the Trudeau administration to allow some pipeline projects to go ahead while stopping others. It was how the federal government decided to walk the line between keeping its environmental supporters happy, while appeasing citizens in the western provinces dependent on the energy industry.

Both the NDP and Green parties had campaigned on fighting oil and gas industry growth in the province

In 2017, the Liberal Christy Clark government in B.C. was defeated in a spring election. With no party gaining an outright majority of seats in the province's new parliament, Ms. Clark worked hard to forge a coalition government, which was rejected by the provincial leadership. It turned to John Horgan of the NDP to try to form a minority government. He succeeded in reaching an agreement with Green Party representatives to gain a majority of seats in the new parliament and thus create a new government.

Both the NDP and Green parties had campaigned on fighting oil and gas industry growth in the province, including blocking the Trans Mountain Pipeline expansion, even though it had been approved at both the federal level, which should have governance control, and by the previous B.C. government. So far, every legal challenge mounted by the Horgan government to the project has been rejected by the courts. Now, it is blocked by B.C.'s push for a new investigation of the environmental issues of oil sands spills and cleanups, even though an earlier extensive study had been performed and approved. This B.C. obstructionism unleashed a political battle with Alberta, which initially blocked the shipment and

Canadian energy stocks have underperformed their U.S. counterparts

sale of B.C. wine in the province, but which has now escalated to threats to turn off the shipment of oil to B.C. The Trudeau government has been unsuccessful in resolving this political war. The Trudeau solution, following the project's owner stopping all investment and delivering an ultimatum of a political resolution needing to be reached, was for the Canadian government to purchase the project for C\$7.4 (US\$5.6) billion.

The reason for detailing this history is to explain why Canadian energy stocks have underperformed their U.S. counterparts for years. The adverse political environment has contributed to huge discounts to U.S. oil prices, and Canada's natural gas prices have also been severely depressed. Low commodity prices have hurt the cash flows of energy companies and the economics of new drilling. This led to weak Canadian producer profits, and low levels of oilfield activity that impacted the profitability of those companies, too. Conditions may be reaching a bottom.

This was the first Conservative victory in Ontario in 20 years

In Ontario, the recent provincial election on June 7th resulted in a rout of the Liberal Party government and the election of Doug Hall, a Progressive Conservative, to head the new government. This was the first Conservative victory in Ontario in 20 years. The Liberal Party wound up with the fewest seats in the new parliament ever, and with its low vote percentage costing it party status. The new government is likely to move to reduce taxes and moderate the clean energy mandates that have cost consumers and hamstrung industry in the province.

Lastly, this thesis foresees the possibility Prime Minister Trudeau's government might be ousted in the next federal election scheduled for 2019

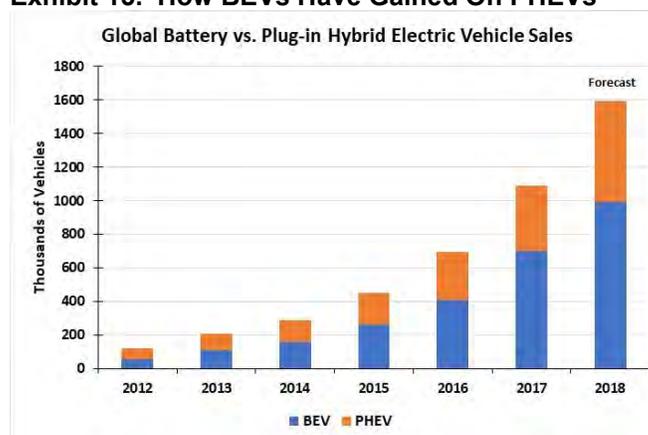
A new investment thesis for Canada is emerging. The thesis was sparked by the Ontario election. The shock of the Liberal government's massive rejection by voters was unexpected. It got investors thinking. They are now seeing polling data in Alberta suggesting that Ms. Notley's NDP may be ousted and replaced by a conservative government promoting lower taxes, supporting pro-growth initiatives to boost the local economy, and especially its energy business. Lastly, this thesis foresees the possibility Prime Minister Trudeau's government might be ousted in the next federal election scheduled for 2019. With the end of various Liberal leaders' tenures, prospects for a more capitalistic Canadian economy and lower taxes, investors can foresee improved company cash flows and higher stock valuations. This would be true for Canada's oil and gas industry, too. Combined with higher commodity prices, energy companies are likely looking at significantly better earnings, cash flows and share prices. Like every investment thesis, investors are placing bets on significant future events happening that improve the financial outlook for companies that is not recognized in stock valuations. Maybe Canada's energy industry outlook is poised for a better future.

EV Forecasts Continue Rising Due To Government Spending

The driver of EV growth is the expectation of further battery pack price declines

The latest forecast for electric vehicle (EV) sales was released by Bloomberg New Energy Finance (BNEF). BNEF provided high level conclusions from the forecast but restricted the details of the 2018 outlook to clients. Those details did provide sufficient data to demonstrate how BNEF's projections for future EV sales have increased from prior forecasts. As expected, the driver of EV growth is the expectation of further battery pack price declines, which will eventually place the upfront cost of an EV in direct competition with internal combustion engine (ICE) vehicles. With reduced fuel and maintenance costs, BNEF sees EV sales accelerating rapidly once that cost-equivalency without a subsidy is reached starting in 2024, which is one year earlier than in its 2017 forecast. BNEF believes most vehicle market segments will be at price parity by 2029, as battery prices continue to fall.

Exhibit 15. How BEVs Have Gained On PHEVs



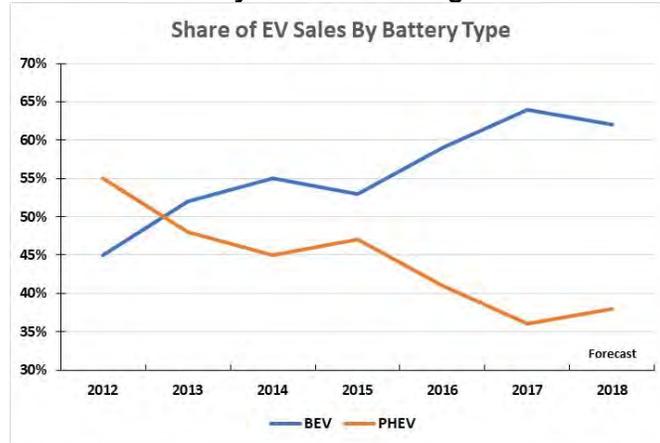
Source: BNEF, PPHB

The number of EVs sold has risen each year

BNEF provided its estimate of EV sales divided by battery type for 2012-2017, along with a forecast for 2018. As can be seen, the number of EVs sold has risen each year and for each class of vehicle. Of significance in the data and forecast is the rising share battery EVs (BEV) represent.

As often happens with annual forecasts, there is a desire to keep them fresh, which often leads to shifting the focus to different dates and different topics. This makes it difficult to adequately compare them. With access to the full report, we would have been able to see some of yearly data enabling a more detailed comparison of the various forecasts. Until we see the full report, we must focus on what BNEF emphasizes, which is 2040. BNEF does report its EV sales forecast for 2025 and 2030 because of the dramatic jump over that time frame.

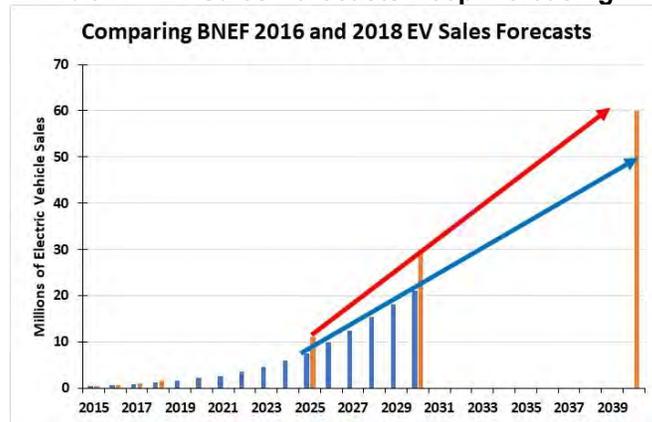
Exhibit 16. Battery EVs Are Gaining Market Share



Source: BNEF, PPHB

When you examine BNEF’s 2040 EV sales forecast, you find that the growth after 2030 slows from the faster rate of 2025-2030. That difference is demonstrated by the red arrow in Exhibit 17 showing that the 2025-2030 rate of increase, if continued, would lead to more EVs being sold in 2040 than BNEF currently forecasts. The chart also shows how much faster EV sales will grow in BNEF’s latest forecast compared to its 2016 outlook by comparing where the blue arrow, extending the earlier 2025-2030 growth rate, reaches on the current 60 million EV sales column.

Exhibit 17. EV Sales Forecasts Keep Increasing



Source: BNEF, PPHB

BNEF pointed to battery pack prices falling by 79% between 2010 and 2017

The key to the accelerated EV sales growth is the projected improvement in battery economics. BNEF pointed to battery pack prices falling by 79% between 2010 and 2017. During that time frame, average battery pack prices fell from \$1,000 per kilowatt-hour (kWh) to \$209/kWh. BNEF expects average battery pack prices to fall to \$70/kWh by 2030. They also pointed out how average battery energy density has been improving at 5-7% per year, a trend that

BNEF pointed out that in 2017, 21% of global EV sales occurred in just six Chinese cities that happen to have anti-fossil fuel policies in place

should continue for a while, although one should expect that rate of improvement to slow due to physical limitations.

Another key driver behind the EV market growth has been the government sales incentives used to spur the development of the market. This is coming at the same time tightening fuel efficiency standards will force increased electrification of the global vehicle fleet. BNEF, given its EV focus, ignores the potential for ICE fuel efficiency improvements through new engine technology. BNEF does, correctly in our view, point to China's New Energy Vehicle mandate, which is modeled after California's requirement for EV sales quotas for auto manufacturers to be able to sell their entire range of vehicle models, as a key market driver. BNEF pointed out that in 2017, 21% of global EV sales occurred in just six Chinese cities that happen to have anti-fossil fuel policies in place. According to BNEF, Chinese EV sales will account for 50% of global EV sales in 2025, and 39% in 2030, showing how important this market is for the success of the EV industry. With more cities around the world adopting ICE restrictions and/or outright bans, EVs will become the only choice available for consumers.

These forces are helping drive EV sales and will continue driving them in the future. EV sales will also be helped by the increase in the number of choices available for buyers. At the end of 2017, according to BNEF, there were 155 models available globally. That number is expected to increase to 289 EV models by 2022.

BNEF projects that their estimate of the number of EVs in the global fleet by 2040 will eliminate 7.3 million barrels a day of fuel from the transportation market

Assuming a more rapid growth rate for EV sales, BNEF now sees 559 million EVs in the 2040 global vehicle fleet, an increase of 31 million from its 2017 forecast. This is one of the highest market share forecasts, approximately 33% of the global fleet. With that many EVs on the road, there will be an impact on transportation fuel consumption. BNEF projects that their estimate of the number of EVs in the global fleet by 2040 will eliminate 7.3 million barrels a day (mmb/d) of fuel from the transportation market. They also estimate that 94% of the lost volume will be gasoline, with diesel at 5% and liquefied petroleum gas (LPG) the balance. Initially, the lost fuel will be diesel as electric buses cut demand and the emissions testing scandal impacts diesel vehicle sales. After 2023, the fuel loss shifts toward gasoline. BNEF forecasts EVs and transportation mobility options will cut 6.9 mmb/d of gasoline demand and e-buses will eliminate 400,000 barrels of diesel fuel use.

ExxonMobil states that every 100 million EVs sold would cut about 1.2 mmb/d of fuel consumption

When we examine the long-term energy market forecast from Exxon Mobil Corp. (XOM-NYSE), it foresees only a slight erosion in current light duty vehicle fuel demand between now and 2040. Their forecast suggests a decline from roughly 21 mmb/d to about 20 mmb/d, which assumes 160 million EVs in the fleet. ExxonMobil states that every 100 million EVs sold would cut about 1.2 mmb/d of fuel consumption. With BNEF forecasting roughly 560 million EVs, the additional 400 million EVs over the ExxonMobil forecast would

While EVs are the most visible disrupter in the transportation fuels market, the other social and economic factors should also be assessed when predicting future oil demand

result in an additional 4.8 mmb/d lost. Given the existing 1 mmb/d reduction in ExxonMobil's base case forecast, 560 million EVs would reduce their fuel market forecast by 5.8 mmb/d, which is about 1.5 mmb/d below the fuel displacement forecast of BNEF.

BNEF is on the optimistic end of the spectrum predicting the relationship of energy consumption and EV sales. ExxonMobil would be on the pessimistic end, in which optimism and pessimism are ranked from larger to smaller volumes of fuel lost as EV sales shrink. While ExxonMobil may be considered pessimistic, it does recognize that increased EV sales will impact its basic business. The fact that ExxonMobil sees light duty fuel consumption to be relatively stable out to 2040, assuming no EVs, then it sees other considerations, such as mobility services, improved ICE vehicle fuel efficiency, lower miles-per-vehicle traveled, etc. reducing fuel consumption. While EVs are the most visible disrupter in the transportation fuels market, the other social and economic factors should also be assessed when predicting future oil demand. All signs are that the oil business is facing a less robust future than in the past. That should be the sobering message from EV market forecasts.

It's Not Even Earth Day, But Pope Is Lecturing Oil Companies

The decision by President Donald J. Trump to withdraw the United States from the agreement was seen as a "huge slap in the face" for the Vatican

On June 8-9, Pope Francis summoned leaders of the global oil and gas and renewables industries, as well as leading asset managers, to a conference at the Vatican to discuss the response to climate change. The conference, titled "Energy Transition and Care for Our Common Home" was intended to explore how to deal with the carbon emissions responsible for climate change, something supposedly resolved with the Paris Agreement of 2015. The decision by President Donald J. Trump to withdraw the United States from the agreement was seen as a "huge slap in the face" for the Vatican, according to Bishop Marcelo Sanchez Sorondo, the chancellor of the academy where the conference was held.

The meeting was scheduled to coincide with the third anniversary of Francis delivering his encyclical, "Laudato Si (Praise Be), On the Care of Our Common Home" at St. Peter's in Rome. As the first pope to come from a developing nation, Argentina, Francis advocated a change of lifestyle in wealthy countries committed to a "throwaway" consumer culture and "obstructionist attitudes" that often place profit ahead of the common good.

In the encyclical, Francis dealt with both climate change doubters and those who say it is not man-made

In the encyclical, Francis dealt with both climate change doubters and those who say it is not man-made. Francis said there was a "very solid scientific consensus" that the planet was warming. He went on to state that people had to "combat this warming or at least the human causes which produce or aggravate it" because greenhouse gases were "released mainly as a result of human activity." Francis advocated that technology based on fossil fuels

Francis acknowledged that possibly more than one billion people lack access to electricity

“needs to be progressively replaced without delay” and sources of renewable energy developed to supplant them.

Continuing that theme in his speech to the roughly 50 executives assembled in Rome, Francis acknowledged that possibly more than one billion people lack access to electricity, one of the critical ingredients in people being able to lift themselves from poverty. He then chastised the executives that strategies to provide energy to those without access must employ a long-term global strategy that addresses the climate change problem, while encouraging “economic stability, public health, the protection of the environment and integral human development.”

BP data has shown no change in the three broad energy supplies for electricity – coal, oil and gas, and nuclear and renewables – after two decades

While bemoaning the fact that after two and a half years since the Paris Agreement, carbon emissions remain high. Although he was not aware at the time of his speech, BP data has shown no change in the three broad energy supplies for electricity – coal, oil and gas, and nuclear and renewables – after two decades. Francis must be shocked by that data. In response to the lack of progress in addressing carbon emissions, Francis told the executives that “it is important that serious efforts be made to transition to a greater use of energy sources that are highly efficient while producing low levels of pollution.” Unfortunately, this objective is failing to solve the climate change problem as the cost and availability of energy are driving country choices.

Leading energy forecasters, including the IEA, are warning of the problem that is emerging from the under investment in seeking new energy supplies

One subject Francis did admonish his audience about was “the continued search for new fossil fuel reserves.” He said that the Paris Agreement “clearly urged keeping most fossil fuels underground.” This edict underlies much of the environmental pressure being brought to bear on oil and gas companies, but even more against investors and financiers of energy companies. The problem is that every responsible long-term energy forecast acknowledges that fossil fuels will need to play a meaningful role in meeting global energy needs. And, in fact, leading energy forecasters, including the International Energy Agency (IEA), are warning of the problem that is emerging from the under investment in seeking new energy supplies. They see this emerging future supply shortfall causing significant problems for the global economy.

He said that everyone in attendance agreed that climate change needed to be addressed, which could be accomplished by putting a price on carbon

Michael Garland, chief executive officer of renewables company Pattern Energy Group Inc. (PEGI-Nasdaq), was in attendance at the Rome conference, along with several other renewables executives. In an interview with *Bloomberg*, he said that everyone in attendance agreed that climate change needed to be addressed, which could be accomplished by putting a price on carbon. This is a strategy that more and more of the major international oil companies are embracing. He also cautioned that the oil and gas companies need a way to disclose their efforts to combat climate change without being subject to lawsuits if they cannot deliver on every part of their plans.

What was striking was Mr. Garland's comment that there wasn't any discussion of coal, the prime contributor to carbon emissions

What was striking was Mr. Garland's comment that there wasn't any discussion of coal, the prime contributor to carbon emissions. He views coal as the critical short-term problem for solving climate change. He said, "If we could eliminate coal quickly and replace it with renewables and gas, it gives the oil guys a better transition and it gives us more room in our carbon budget. We've got to get rid of this coal." The problem is that projections show coal use in the rapidly growing Asian region will ensure that its role in the global energy market will remain robust for a long time.

Cheap energy has been the agent for lifting billions of people out of poverty

The speech Francis delivered at the conference highlighted the challenge of curbing carbon emissions, while at the same time delivering electricity to the billion-plus people living without it, which condemns them to a difficult and shortened life. His call for limiting oil and gas exploration as a way to address climate change may prove socially damaging. Cheap energy has been the agent for lifting billions of people out of poverty. Without more oil and gas, those still in poverty may be condemned to remain there. Broadening the global energy mix while improving the carbon quality of that mix are the true solutions to a cleaner world.

A Surprising Thing About Australia We Recently Learned

Exxon Mobil Corp. announced it is looking at constructing an LNG import terminal in eastern Australia to be operational in 2022

Exxon Mobil Corp. (XOM-NYSE) announced it is looking at constructing a liquefied natural gas (LNG) import terminal in eastern Australia to be operational in 2022. Currently, ExxonMobil is southeastern Australia's largest gas supplier and this move, coupled with plans to step up exploration off the coast of Victoria and consider developing a gas field, West Barracouta, near another producing gas field, would help it sustain that role. The proposed terminal would compete with two other projects – one being considered by Australia's number two gas energy retailer AGL Energy to start importing LNG by 2021 and a consortium involving Japan's JERA to start imports from 2020.

In March, Australia's energy market operator warned that Victoria, the nation's largest gas consuming state, could face supply shortage beginning after mid-2021

We have written before about the twisted gas market in Australia, which is heading to become the world's largest LNG exporter in the next several years, while locals are starved for cheap natural gas. Because the country has promoted LNG projects and kept domestic gas prices low, inhibiting development of more indigenous supplies, consumers are facing supply shortages. In March, Australia's energy market operator warned that Victoria, the nation's largest gas consuming state, could face supply shortage beginning after mid-2021. The shortage results from a rapid decline in supply from the Gippsland Basin Joint Venture, owned by ExxonMobil and BHP Billiton (BHP-NSE).

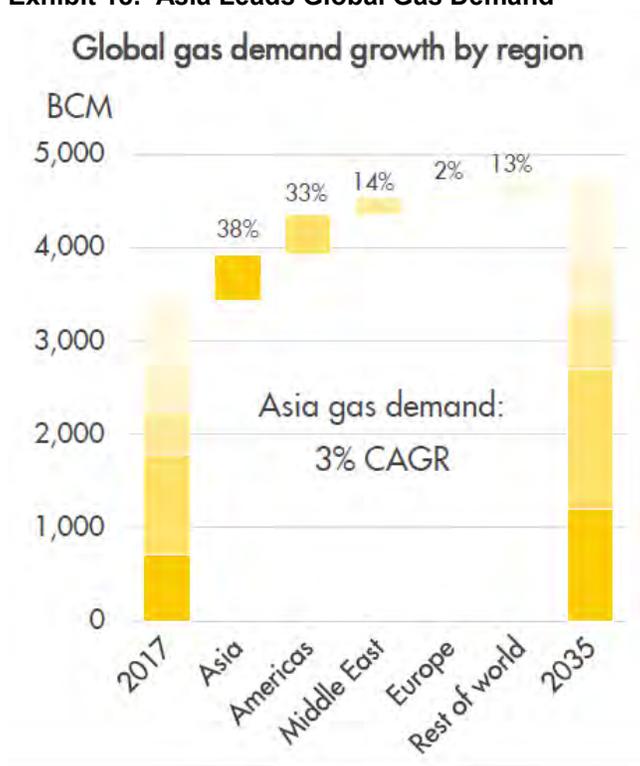
With the completion of several new Australian LNG export terminals, the country is expected to boost its capacity to 88 million tons per year (mmt/y), surpassing Qatar's 75 mmt/y current nameplate capacity. Australia's leading position will likely be short-lived as

At least six countries in the region have coal shares above 50%, with China and India nearly off the chart

projections point to the U.S. ultimately becoming the world’s largest gas exporter at 115 mmt/y by 2040. Qatar has also decided to end its cap on exports, and is working on plans to lift export capacity to 100 mmt/y.

The LNG opportunity can be summed up in three graphs from Royal Dutch Shell’s (RDS.A-NYSE) LNG Outlook 2018. The major growth market for LNG remains Asia, and a graph shows gas demand growing in that region by 3% per year. That growth is driven by the change in energy demand from 2017 to 2035 and the role of coal in that market. At least six countries in the region have coal shares above 50%, with China and India nearly off the chart. The poor air quality in those two countries is driving government policies for cleaner energy to displace dirty coal.

Exhibit 18. Asia Leads Global Gas Demand

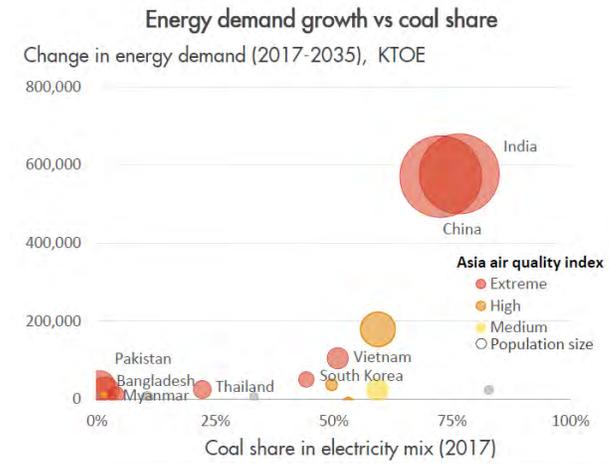


Source: Shell Oil

Since LNG projects require government approval, companies are cautious about moving too fast on new terminals

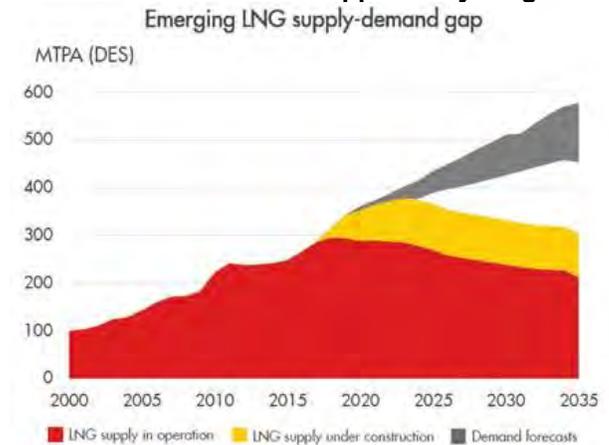
The most important chart is the one projecting a future supply gap that global gas producers, especially LNG exporters in the U.S. are targeting to close. While the gap exists, closing it will take both time and money. Since LNG projects require government approval, companies are cautious about moving too fast on new terminals. They also seek long-term offtake agreements to gird the economics and financing for these new terminals.

Exhibit 19. LNG Will Help Replace Asian Coal Use



Source: Shell Oil

Exhibit 20. LNG Growth Opportunity Targeted



Source: Shell Oil

The proverb’s message is that one should not neglect himself and those around him while caring for others

The story of ExxonMobil, and others, developing LNG import terminals for Australia, one of the world’s leading LNG exporters, reminded us of the shoemaker’s family proverb. The shoemaker who worked so hard to satisfy his customers that he forgets his wife and children who went shoeless. The proverb’s message is that one should not neglect himself and those around him while caring for others. Australia may be the nation proving the truth of that proverb.

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