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## MUSINGS FROM THE OIL PATCH

March 5, 2019

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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*

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### Watching While ISO New England Rides Toward A Cliff

**This irritating behavior may become more prevalent in the future as state clean energy targets create a division in how, and at what cost, electricity in New England is going to be provided**

New Englanders are known for their independent streaks. While generally that is an admired trait, it can become an irritant when not everyone is in agreement. The most notable event in this regard was the rejection last year of the planned high-tension power lines traversing New Hampshire to bring hydro-produced electricity to Massachusetts in order to help it meet its clean energy goals. Talk about upsetting a nice plan for Massachusetts residents, at the expense of disrupted visuals, which are a tourist attraction for New Hampshire. This irritating behavior may become more prevalent in the future as state clean energy targets create a division in how, and at what cost, electricity in New England is going to be provided.

The New England power market has changed over the past two decades as clean energy mandates of the various states have led to retirement of oil and coal plants, and now nuclear ones, with natural gas and renewables picking up the slack. However, due to environmental opposition, as well as political opposition from New York Governor Andrew Cuomo, toward construction of new natural gas pipelines, or the expansion of existing ones, the region's ability to meet its power needs is becoming more challenging.

**Prior to the 1970s, local utilities handled everything about power**

As data from ISO New England (ISO-NE), the non-profit charged with making sure electricity flows when people flip on their light switches. ISO-NE oversees the operation of the wholesale power system and transmission lines, generated and transmitted by its member utilities, as well as Hydro-Québec, NB Power, the New York Power Authority and utilities in New York state, when the need arises. Prior to the 1970s, local utilities handled everything about power – from its generation to its transmission and distribution to individual customers. Today, ISO-NE is responsible for 33,000

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**The Northeast Blackout of 1965 marked a turning point for the region's electric power industry**

megawatts (MW) of electricity generating capacity, along with 9,000 miles of transmission lines spanning the six New England states of Maine, Vermont, New Hampshire, Massachusetts, Connecticut and Rhode Island. New England has 14.7 million citizens.

The creation of ISO-NE came after the realization that to ensure the proper functioning of the region's electricity system, there needed to be an organization that efficiently generated and distributed power in such a way as to ensure the proper functioning of the system so no one was without power when they needed it. The Northeast Blackout of 1965 marked a turning point for the region's electric power industry. It shut down power for 30 million customers stretching from Ontario, Canada, through all the New England states with the exception of Maine, and New York and New Jersey. The November 9, 1965, outage lasted for up to 13 hours for some.

In January 1966, the Northeast Power Coordinating Council was formed to improve the region's system's reliability. The Northeast's power companies, concerned about the system's reliability, formed three "power pools" to ensure a dependable supply of electricity. The New England Power Pool (NEPOOL), formed in 1971 by the region's private and municipal utilities, was intended to foster cooperation and coordination among utilities in the six-state New England region. During the next three decades, NEPOOL created a regional power grid of hundreds of separate generating plants and thousands of miles of transmission lines, interconnected and dedicated to ensuring that New England would never again face a region-wide power failure.

**New England's electricity rates were among the highest in the nation, while the region dealt with an antiquated electric power infrastructure**

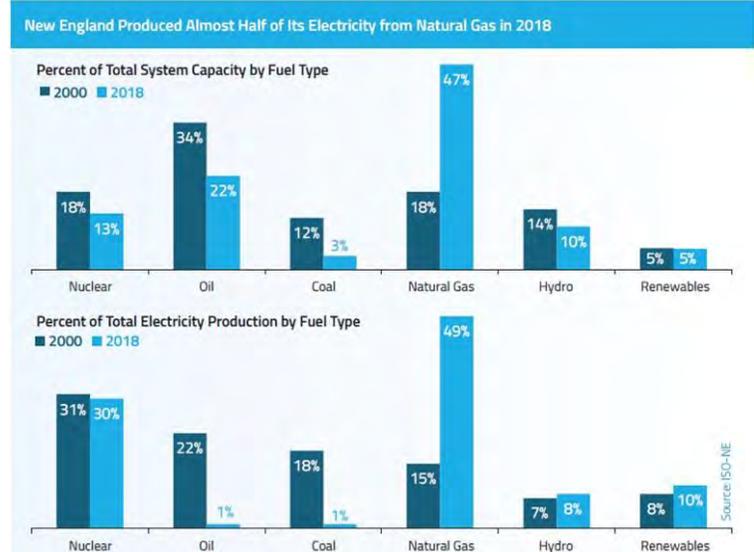
Although regulated power monopolies had worked well for generations, by the 1990s, the lack of competition had done little to improve service, minimize prices, or encourage companies to invest in new facilities and technologies. Additionally, New England's electricity rates were among the highest in the nation, while the region dealt with an antiquated electric power infrastructure. New England's problems were symptomatic throughout the country, prompting Congress and the Federal Energy Regulatory Commission (FERC), which oversees the electricity industry nationally, to begin a process of restructuring the entire wholesale electric power sector. This restructuring was designed to foster competition, which was seen as the way to increase investment in the sector, while improving service and providing a more cost-effective electricity system. However, deregulation had already worked in transportation, telecommunications and financial services, it seemed a logical move. The ultimate goal of FERC's efforts was to level the playing field for the sector, including a guarantee of equal access to transmission lines for independent power providers. Utilities were encouraged to sell off their power plants, which would gradually eliminate the regulator-set rates in favor of market-determined pricing.

**Oil had the leading share of electricity generating capacity in the region in 2000 at 34%**

In 1997, FERC created ISO-NE and designated it to oversee the New England power system for five of the six states. The competitive market structure evolved, and in 2005, ISO-NE was designated to oversee the transmission system for the six-state region, affording it more control over the functioning of the power system for the entire New England region.

As the ISO-NE organization was evolving from the late 1990s, the source of power for the region was also changing. As Exhibit 1 shows, oil had the leading share of electricity generating capacity in the region in 2000 at 34%. Nuclear and natural gas were tied for second place at 18%. However, when it came to the fuels actually generating the region’s power, nuclear was far and away the leader at 31%. Nuclear was followed by oil and then coal. Both nuclear and coal accounted for greater shares of total electricity generated than their share of generating capacity would have indicated.

**Exhibit 1. NE Power Capacity And Output Has Changed**



**Renewables accounted for 10% of electricity generated, twice its share of generating capacity**

Source: ISO-NE

By 2018, only natural gas had increased its share of generating capacity in the region, nearly tripling its 2000 share. When it came to actual power produced, natural gas slightly outperformed its capacity share, and nuclear again significantly outperformed its capacity total. Renewables accounted for 10% of electricity generated, twice its share of generating capacity. The dominance of natural gas for generating power in New England was not completely surprising given the push by politicians to decarbonize state power sectors, but it is also setting up a problem for the future. That problem will be compounded by the continued retirement of oil, coal and nuclear power plants due to economic considerations.

**The market has been ruthless in driving down power costs, making those plants powered by other fuels uneconomic**

The challenge ISO-NE faces is that the power market in the region has been quite efficient. Cheap natural gas backed out a lot of coal and oil generators, and is even undercutting nuclear plants. The market has been ruthless in driving down power costs, making those plants powered by other fuels uneconomic. The problem is that natural gas is a fossil fuel, although with much lower carbon emissions than either coal or oil. Therefore, as natural gas backed out oil and coal, the region's carbon emissions improved. The complicating factor is that politicians are dissatisfied with all carbon-based fuels and have pushed for mandates for more power being produced by renewable fuels.

**Exhibit 2 NE Power Plants At Risk Of Shutting Down**



**Source: ISO-NE**

**Because there is a substantial amount of natural gas generating capacity at cheap prices that can ramp up and down easily and costs less than renewable power, the market won't accommodate the political mandates**

The problem is that the power market can't deal with the economic requirements of renewable power plants. Whether it is an offshore wind farm or hydropower from Canada, there is a substantial upfront cost, which then makes money by having a fuel source that is virtually free. Because there is a substantial amount of natural gas generating capacity at cheap prices that can ramp up and down easily and costs less than renewable power, the market won't accommodate the political mandates. Thus, the states are bringing in the renewables to meet their greenhouse gas emission targets

**What happens when a new technology, cheaper and more environmentally friendly, comes along?**

and dictating they be provided preferential access. At the same time, the power market is working to make sure the lights come on when they are needed.

In the renewable power sector, the mandates are recreating the “utility past” for power generators. Two decades ago, utilities were fully integrated and regulated. Regulators decided what types of power plants would be built and how much customers would pay for them, which was paid through long-term electricity contracts. Now, when Massachusetts decides it needs to have an offshore wind farm to satisfy its clean energy mandate, the developers require a 20-year contract to justify (finance) the investment. What happens when a new technology, cheaper and more environmentally friendly, comes along? The 20-year contract will have to be honored, inflating the cost of electricity from what the market model would produce.

**Due to its economic situation, Mystic’s owner was ultimately forced into a position where retirement was the only financially prudent choice available**

Another problem for ISO-NE is that state governments are providing subsidies to encourage the construction of renewable power sources, which is undercutting power pricing and making it difficult for some generating plants to recover their costs for delivering electricity to consumers. This was the case recently with the Mystic Generating Station, the second largest power plant in New England, despite it being a highly efficient operation. Due to its economic situation, Mystic’s owner was ultimately forced into a position where retirement was the only financially prudent choice available. ISO-NE responded by offering a cost-of-service contract to retain Mystic for fuel security. By not working to preserve competitive pricing, ISO-NE’s action masks the true cost of Mystic and makes the plant a “price-taker” in Forward Capacity Auctions, undermining proper price discovery and harms the economics of other plants in the region.

Critics of ISO-NE’s power plant actions point out that the choice utilities face is to play a game of chicken with their plants by announcing retirement in hopes of being handed a cost-of-service contract to keep them operating. The alternative is for ISO-NE to create a competitive pricing model so each plant can bid against the others to supply electricity services at the least cost for consumers, and at a profit for the owners.

**These contracts are set to exceed 60% of all electricity consumed in New England, with wind representing two-thirds of the planned additions**

Based on announced plans, state-subsidized contracts for thousands of megawatts of new renewable power will be hitting the New England competitive power market over the next several years. These contracts are set to exceed 60% of all electricity consumed in New England, with wind representing two-thirds of the planned additions. The intermittency of renewable power will necessitate generators continuing to operate natural gas plants for backup power. However, due to natural gas supply restrictions in the region, coal and oil power plants will still be needed during the winter when gas is unavailable, except in the form of highly priced liquefied natural gas.

**The availability of adequate and cheap natural gas supplies is at the heart of the problem for ISO-NE**

Recently, during a “State of the Grid 2019” presentation to reporters, ISO-NE’s CEO Gordon van Welie stated: “Industry trends and state policies are driving changes in the system. Nuclear, oil, and coal-fired power plants that operate with fuel stored on-site are retiring in greater numbers and they are being replaced by more natural gas-fired power plants and renewable resources. The new resource mix is cleaner but it is also dependent on the weather or timely natural gas deliveries.” The availability of adequate and cheap natural gas supplies is at the heart of the problem for ISO-NE. It is critical to keeping the lights on, but it may not be readily available, especially at a time when more intermittent renewable energy is pushed into the region’s electricity market heightening the risk of blackouts.

Natural gas pipeline capacity into New England is constrained and there are few prospects of expansion. That has not been a problem this winter, which has been relatively mild. The residential gas market operates on a “firm” delivery contract basis, meaning that deliveries cannot be interrupted. That contrasts with the utility market where gas contracts are subject to interruption, and are usually cut off during cold spells such as last winter when New England experienced over two weeks of extremely cold temperatures, forcing the restarting of idled coal and oil-fired plants. That situation is unlikely to change in the future.

**As more state-subsidized renewable power comes into the market, yet not under the control of ISO-NE, how can the market adjust?**

As more state-subsidized renewable power comes into the market, yet not under the control of ISO-NE, how can the market adjust? With a mandate to keep the lights on, ISO-NE struggles to redesign a market structure that can keep backup generating capacity on line as state-subsidized renewables, outside of the market, potentially hampers its smooth functioning. ISO-NE is working on new plans to be unveiled by year-end.

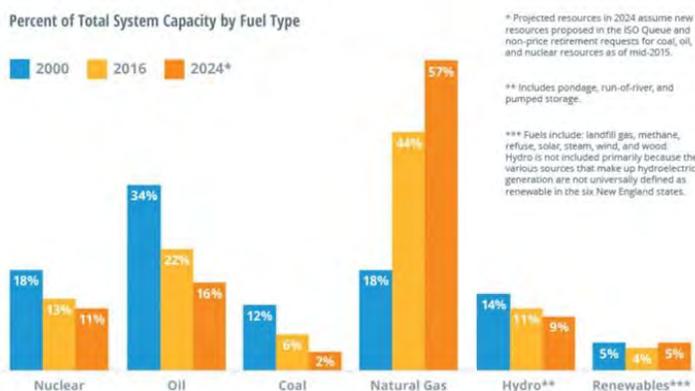
**However, the analysis confirmed the challenge of dealing with wind’s variability, making it difficult to be able to count on wind when power supplies are tight**

With more renewables coming, ISO-NE performed a “what if” analysis at the request of the Massachusetts Clean Energy Center. The analysis examined what would have happened during the two-week extreme cold spell of January 2018 had there been a working offshore wind farm. The analysis hypothesized two wind farms – an 800 MW farm and a 1,600 MW farm. The conclusion was that the smaller wind farm would have supplied 3% of New England’s power needs, while the larger one would have met 7%. Carbon emissions would have been either 5% or 11% lower over that 16-day period, and New England rate payers would have saved between \$40 million and \$85 million in avoided fuel costs. However, the analysis also showed that the wind farms would not have displaced all the coal and oil use during that extreme cold period. Oil use would have been reduced by 4% to 7%, while coal use would have been between 3% and 4% lower. With more wind power hooked up, the impacts on oil and coal use would likely be greater. However, the analysis confirmed the challenge of dealing with wind’s variability, making it difficult to be able to count on wind when power supplies are tight. That means battery storage or some other backup

**People should haircut all the forecasts for the amount of new wind power generating capacity to be brought on line when they project how much power it truly represents**

technology will be needed, adding to the cost of electricity. Demonstrating the variability challenge is that the Block Island Wind Farm, with its maximum capacity of 30 MW, will only be able to supply 6.8 MW during the four summer months and 14.1 MW the rest of the year. That means people should haircut all the forecasts for the amount of new wind power generating capacity to be brought on line when they project how much power it truly represents.

**Exhibit 3. Natural Gas To Carry Power Load In NE**



Source: ISO-NE

**This is not an outlook that will make environmentalists happy because there will not be as much improvement in carbon emissions in the region as they envision**

As ISO-NE looks to the future, it sees a system in 2024 that relies less on coal and oil to produce electricity, but also less on nuclear. At the same time, hydropower and renewables are estimated to provide only 9% and 5%, respectively, of the region’s power supply. That means natural gas will be called upon to generate 57% of New England’s future power. This is not an outlook that will make environmentalists happy because there will not be as much improvement in carbon emissions in the region as they envision. It is also an outlook potentially at risk if there are disruptions to gas supply in the region. It is also possible natural gas prices might be substantially higher five years from now, as LNG exports and other gas demands tighten the domestic supply picture, boosting electricity prices higher. All of these possibilities are unsettling for ISO-NE officials, but also for state politicians who are dictating clean energy mandates without any understanding of the pricing and electric supply turmoil they may be foreordaining for their constituents. Does this remind you of squeezing a balloon? It shrinks in one place, but bulges in another.

**Is The IMO Worried About Its 2020 Fuel Rule Not Working?**

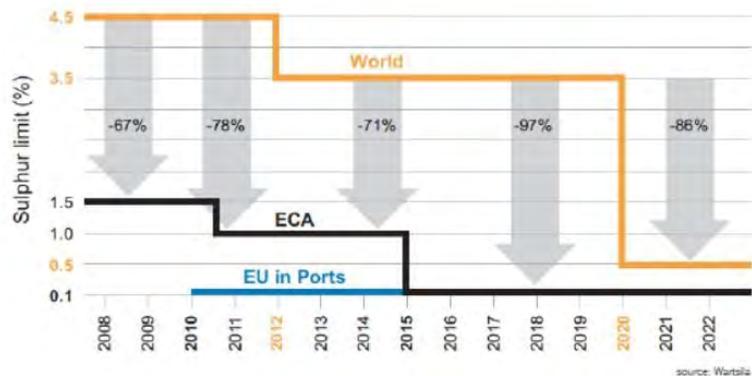
The Clean Shipping Alliance 2020, an organization formed in 2018 and now representing over 30 leading maritime companies representing over 2,000 ships from the commercial shipping and cruise industries, is warning of a proposal submitted by the

**This is a continuation of a sulfur-content reduction effort that commenced over a decade ago**

European Commission (EC) urging the International Maritime Organization (IMO) to change its exhaust gas cleaning system (scrubber) guidelines. Scrubbers have been identified, and are being employed, by shippers as an acceptable technology to comply with the IMO 2020 low-sulfur fuel regulations coming into effect on January 1, 2020. Those regulations require shippers worldwide to switch from bunker fuel oil containing 3.5% sulfur to ones with 0.5%. This is a continuation of a sulfur-content reduction effort that commenced over a decade ago. The purpose of the fuel switch is to reduce greenhouse gas emissions (GHG) from ships that contribute to global warming.

**Exhibit 4. Reducing GHG Emissions In Shipping**

*IMO Marpol Annex VI sulphur limits timeline*



Source: Wartsila

**Various ports around the world have warned shippers using scrubbers on their ships that they will not be allowed to discharge their wash-water in the ports**

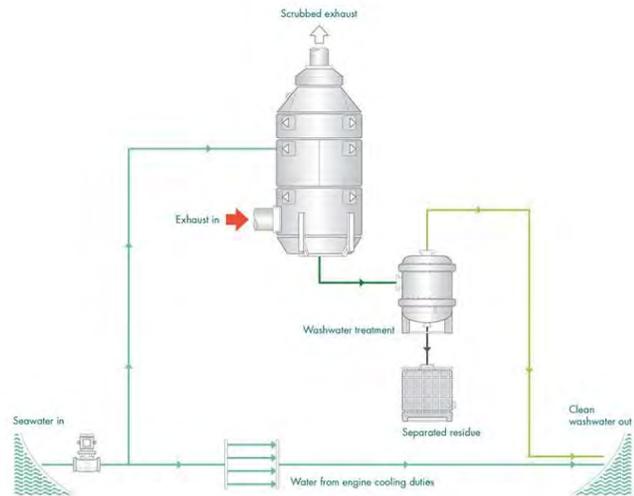
The concern of this group is that the EC proposal calls for “evaluation and harmonization” of scrubber discharges across all ports, worldwide. It is intended to be considered at the 74<sup>th</sup> session of the IMO’s Marine Environment Protection Committee, which meets in May. While we don’t know the exact origin of the proposal, various ports around the world have warned shippers using scrubbers on their ships that they will not be allowed to discharge their wash-water in the ports. For ships impacted by this restriction, they will have to empty their wash-waters once at sea. To better understand the issue, it is helpful to know how scrubbers work, as they are being relied upon by a significant proportion of the global shipping industry to comply with IMO 2020.

The Clean Shipping Alliance 2020 issued a white paper last fall answering 10 questions about scrubbers, many of which dealt specifically with the question of the sulfur discharge and its impact on seawater. The Alliance sees no problem, but somehow some ports believe it might become an issue, as they fear an influx of ships with scrubbers depositing their wash-water with its sulfur content in the port increasing the overall concentration of pollutants. Let’s see what the Alliance says about those concerns.

**The primary difference between the two systems is that the closed-loop system uses fresh water that needs to be chemically treated in order to clean the sulfur residue in exhaust gases**

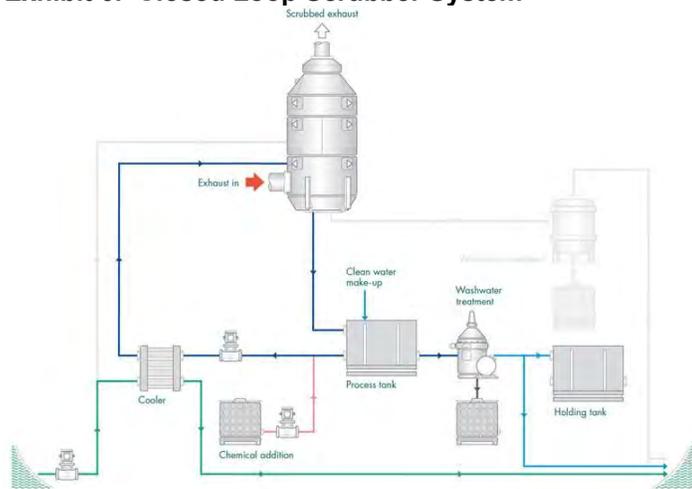
First, it is important to understand how a scrubber works. There are open-loop, closed-loop and hybrid exhaust gas cleaning systems. We have presented schematics of both open-loop (Exhibit 5) and closed loop (Exhibit 6) systems. The primary difference between the two systems is that the closed-loop system uses fresh water that needs to be chemically treated in order to clean the sulfur residue in exhaust gases left after high-sulfur fuel oil is burned. In addition, the closed-loop system has a holding tank for storing the treated wastewater. It can either be offloaded at some point or discharged into the ocean. That contrasts with the open-loop system which uses seawater and is continually dispersing the treated water into the ocean.

**Exhibit 5. How Open Loop Scrubber Works**



Source: EGCSA

**Exhibit 6. Closed Loop Scrubber System**



Source: EGCSA

**Seawater is naturally alkaline, so it largely neutralizes the results of the SO<sub>2</sub> removal before the waste-water is discharged back into the ocean**

Mechanically, a scrubber sprays alkaline water into the vessel's exhaust stream, which removes sulfur dioxide (SO<sub>2</sub>) from the ship's engine and boiler exhaust gases. Seawater is naturally alkaline, so it largely neutralizes the results of the SO<sub>2</sub> removal before the waste-water is discharged back into the ocean. Freshwater, on the other hand, has to be treated with an alkaline chemical such as sodium hydroxide, and is later discharged into the ocean.

The waste-water discharged into the oceans will contain sulfur from the exhaust gas in the form of sulfate. This is the third of the six most abundant ions found in seawater. By weight, these six ions make up about 99% of all sea salts. To illustrate the natural sulfate phenomenon, based on scientific research, the Alliance made the following point:

“If all the sulfur in the oceans were accumulated at the bottom of the ocean the layer would be five feet thick; adding all the sulfur from all the oil and gas reserves in the world would add only the thickness of a sheet of paper. Compared with the quantity of sulfate existing in the oceans, the small amounts of sulfate contributed by exhaust gas scrubbing are insignificant and benign.”

The Alliance also points out that the removal of sulfur from the exhaust gas via scrubbing has the added environmental benefit of reducing the negative impact of emissions to the atmosphere. Atmospheric emissions in the form of SO<sub>2</sub> can add to the formation of particulate matter, which is another pollutant that regulations are forcing to be removed.

**As the scrubbing process proceeds, any decrease in the pH level of the wash-water is largely neutralized by the natural alkalinity found in seawater**

During the desulfurization process within the scrubber, SO<sub>2</sub> gas is absorbed by the seawater (treated freshwater) spray. Through a series of reactions within the wash-water, the SO<sub>2</sub> is converted to an end product of sulfate (SO<sub>4</sub>), water (H<sub>2</sub>O) and carbon dioxide (CO<sub>2</sub>). As the scrubbing process proceeds, any decrease in the pH level of the wash-water is largely neutralized by the natural alkalinity found in seawater. This ensures that the pH of the discharged water is in compliance with the guidelines established by the IMO. The Alliance acknowledges that the resulting discharged wash-water will cause a slight increase in the natural concentration of sulfate in water. The Alliance made the following points:

“Direct measurements on 40 ships monitored by maritime classification societies while the ships were in port have shown that pH levels of scrubber discharge water revert to ambient seawater pH levels within two to four meters of the discharge point – exceeding the IMO requirement. As shown by a 2012 Danish Environmental Agency study, there is negligible acidification effect from scrubbers, even in semi-enclosed ocean areas with high traffic levels of scrubber-fitted ships.”

**Scrubbers on ships using high-sulfur fuel oil remove more than 98% of the sulfur oxides from the exhaust gases, resulting in emissions lower in sulfur oxides than those of marine gasoil**

One of the more interesting points about scrubbers was that based on several studies, scrubbers on ships using high-sulfur fuel oil remove more than 98% of the sulfur oxides from the exhaust gases, resulting in emissions lower in sulfur oxides than those of marine gasoil, which is considered the benchmark for the IMO 2020 low-sulfur regulation. As a result, scrubbers are an approved compliance option for shippers to meet the IMO 2020 regulation by the IMO, European Union and U.S. Environmental Protection Agency. This emissions performance supports why shippers have equipped well over 2,000 vessels with scrubbers and plan to add more. Those decisions are based on the ship's owners estimates of the capital and installation costs of scrubbers, the payback time based on projections of the cost differential between high-sulfur fuel oil and low-sulfur alternative fuels, and the anticipated remaining life of the ship.

**There remain many unknowns about how the shipping industry will deal with the fuel switch mandate, especially since they do not know exactly what fuel options will be available at each port worldwide**

Why is the EC rushing to get their proposal before the May IMO committee meeting? No one seems to know for sure, but within two weeks of the draft proposal surfacing, the commission had taken the proposal to a one-day working party review and then submitted it to the IMO. This speedy process became an end-run around the time that would normally be accorded to impacted parties to hold an open discussion and deliberation of the proposed rule's impact. The policy appears to represent a major departure from the existing rules. Moreover, the policy seems to be based more on speculation than science. All of this drama comes as the shipping and refining industries are in the final 11-month countdown before IMO 2020 becomes effective. There remain many unknowns about how the shipping industry will deal with the fuel switch mandate, especially since they do not know exactly what fuel options will be available at each port worldwide. Therefore, potentially foreclosing an option approved by regulators seems extreme, unless there is a clear health or environmental risk. Whether it is possible for a uniform rule about wash-water disposal in ports, after some have declared that they will be banned, seems unlikely. Therefore, the likely outcome appears to be a global ban on wash-water discharge in ports, further adding to the regulatory nightmare IMO 2020 is creating for the shipping industry, let alone the possibility of safety issues if ships are forced to switch fuels at sea.

A handful of ports have declared that ships may not discharge wash-water from open-loop systems. The list includes:

- Belgium, which allows discharge in coastal and open seawaters when at least three nautical miles off the coast;
- Germany's inland waterways and associated ports;
- Dublin, Ireland;
- All ports in Latvia and Lithuania;
- In the United States, all California ports and coastal waters, the coastal waters and ports of Connecticut, as well as those of Hawaii;

Abu Dhabi ports;  
The port of Fujairah;  
Singapore; and  
China's coastal waters and ports.

Recently, Don Gregory, director of the Exhausts Gas Cleaning Systems Association (EGCSA), expressed concern at the announcement by Fujairah regarding the banning of open-loop exhaust gas cleaning system wash-water discharge. He pointed out the detrimental impact on the shipping industry's efforts to reduce emissions, with scrubbers being one technology helpful in that effort. Mr. Gregory was concerned that the decision works to undermine the credibility of the IMO Marine Protection Environment Committee who spent time weighing all the issues surrounding open-loop scrubbers before deciding to include them as an acceptable compliance technology in regulation 4 of MARPOL Annex VI.

**Seldom are “environmental rules” rolled back, and especially in the current social environment**

We don't know whether the EC is hoping for a uniform ban on wash-water discharge in coastal waters and ports, or a recommendation that the discharge should be allowed. The latter outcome would make it appropriate for those states and ports that have banned the wash-water discharge to reverse their bans. Our guess is that there is little likelihood those who have banned the discharge will reverse them, even after considering the weight of the IMO's scientific research. Seldom are “environmental rules” rolled back, and especially in the current social environment. At this point, we doubt a ban on discharges will set back the employment of scrubbers for sulfur removal to comply with IMO 2020. If scrubber use is discouraged, there will be an impact on the oil market and refinery operations. Mark the month of May on your calendar to check back on the IMO's decision.

## The Climate Gang's Misuse Of Polar Bear News

**No one pulls a polar bear from its lair**

February 27<sup>th</sup> was International Polar Bear Day. We certainly don't celebrate it the same way we do Groundhog Day. No one pulls a polar bear from its lair. Polar bears are huge and dangerous mammals. Adult males can stand 8-9 feet tall and weigh upwards of 900-1,300 pounds. Although they have thick fur, even on their feet, which helps their traction on ice flows where they typically live, they can sprint at over 25 miles per hour. In other words, you don't want to meet one of these monsters on a walk.

Earlier this month, the media was abuzz about a story of 50 aggressive polar bears who had besieged the Russian village of Belushaya Guba, on the Novaya Zemlya archipelago in the southern Barents Sea. The invading bears forced village officials to declare a state of emergency, since these animals are protected and the use of deadly force was not an option. All non-lethal attempts to drive the bears away had failed.

**That, however, did not prevent climate change proponents from jumping on the story**

**The magazine was roundly criticized by experts who proved that the polar bear pictured was actually a victim of cancer and not a lack of food due to the decline in sea-ice**

A media story discussed how the bears were roaming through the village, forcing residents to remain indoors and constantly vigilant, and offered up the view that the bears were driven to invade the community by a decline in sea-ice. This view was the non-scientific opinion of the journalist, who later recanted after talking with polar bear experts. That, however, did not prevent climate change proponents from jumping on the story and pointing out that this scenario will be a recurring phenomenon for the indigenous people of the Arctic region where the polar bears live.

Thankfully, the climate proponents didn't resort to bringing up the *National Geographic* photo of a sick (starving?) polar bear run in a 2017 issue. The magazine was roundly criticized by experts who proved that the polar bear pictured (Exhibit 7) was actually a victim of cancer and not a lack of food due to the decline in sea-ice. *National Geographic*, responding to public criticism about the distorted use of the photo – note the headline: 'This is what climate change looks like' – was forced to officially apologize over publishing the photo.

#### **Exhibit 7. The Misrepresented Starving Polar Bear**



Source: *National Geographic*

So why did this herd of polar bears descend on the village? It seems the village is the site of three garbage pits for trash shipped from Russian cities. A photo of many of the healthy and fat bears roaming through a garbage pit demonstrates why they have taken up residence. It is much easier to rummage through a garbage pit than to hunt seals and walrus for their next meal.

**The idea of 50 polar bears terrorizing the people in a village was just too good a story line for climate change**

Modifying the advice Chicago Mayor Rahm Emanuel gave to President Bill Clinton to “never let a good picture go to waste,” one has to wonder how these “climate experts” did not notice that the bears were fat and healthy. It was likely that the idea of 50 polar bears terrorizing the people in a village was just too good a story line for climate change, so don't let facts, or the truth, get in the way of the narrative.

**This report is the first in what is intended to be a yearly update**

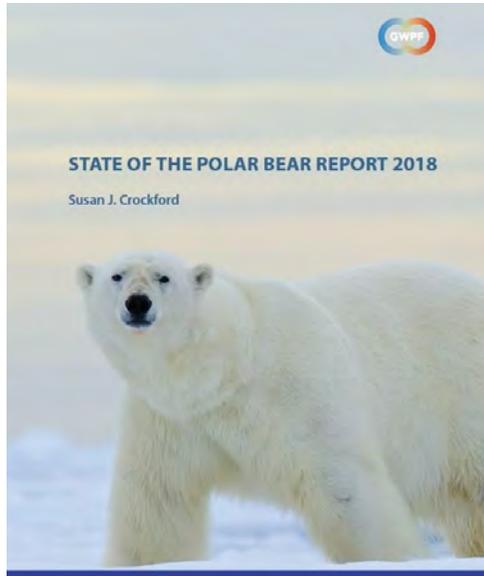
**Exhibit 8. Polar Bears After Food Amid Russian Garbage**



Source: Yale E360

In concert with the polar bear recognition day, the Global Warming Policy Foundation issued a “State of the Polar Bear Report 2018,” authored by Susan Crockford, a zoologist and Adjunct Professor at the University of Victoria and a long-standing (35 years) researcher and expert on polar bears. This report is the first in what is intended to be a yearly update to the occasional meeting reports prepared by the Polar Bear Specialist Group (PBSG) of the International Union for the Conservation of Nature (IUCN) that was prepared every four years between 1972 and 2010. Between 2010 and 2018, the PBSG disseminated information only on its website, which was updated without announcement and at its discretion. The last standalone report was issued in April 2018, based on the organization’s 2016 meeting. This new report will be more analytical and also critical of the short-comings in the data about polar bears.

**Exhibit 9. The True State Of The Polar Bears**



Source: GWPF

**The most recent estimates point to the population being stable or increasing**

What is the health of the polar bear population? The most recent estimates point to the population being stable or increasing, recognizing the imprecise nature of counting animals over huge geographical areas. The report's Executive summary does a good job of summing up the high points about the state of the polar bear population, given the expectation that with sea-ice shrinking faster than anticipated, the population would have declined sharply. For those interested in learning much more about polar bears, we commend the report, which contains 345 footnotes and many pages of scientific paper references.

**“Executive summary**

- Data published since 2017 show that global polar bear numbers have continued to increase slightly since 2005, despite the fact that summer sea ice in 2018 was again at a low level not expected until mid-century: the predicted 67% decline in polar bear numbers did not occur.
- Despite having to deal with the greatest change in sea ice habitat since 1979 of all Arctic regions, according to Norwegian biologists polar bears in the Svalbard area showed no negative impact from the low sea ice years of 2016 through 2018.
- Global sea ice extent was below average in March 2018, as it was in 2017, but this reduction in winter ice had no impact on polar bear health or survival, in part because most of the decline was in regions where polar bears don't live (like the Sea of Okhotsk and the Gulf of St. Lawrence).
- Unexpectedly, for the second year in a row, freeze-up of sea ice on Western Hudson Bay came earlier than the average date in the 1980s; no-one knows why.
- In Canada, where perhaps two-thirds of the world's polar bears live, the Committee on the Status of Endangered Wildlife (COSEWIC) decided in 2018 to continue to list the polar bear as a species of 'Special concern' rather than upgrade to 'Threatened.'
- Despite marked declines in summer sea ice, Chukchi Sea polar bears continue to thrive: reports from the first population-size estimate for the region, performed in 2016, show bears in the region are abundant (almost 3000 individuals), healthy and reproducing well.
- *National Geographic* received such a profound backlash from its widely viewed 'this is what climate change looks like' starving polar bear video, released in late 2017, that in 2018 it made a formal public apology for spreading misinformation.
- Contrary to concerns about threats to polar bears from proposed drilling for oil in the National Wildlife Refuge in Alaska, polar bear females are quite tolerant of disturbances, and oil companies have an excellent track record of dealing responsibly with polar bears.
- Polar bear attacks made headlines in 2018: two fatal

attacks in Nunavut, Canada and a narrowly averted death-by-mauling in northern Svalbard caught the world by surprise.

- The territory of Nunavut, where most polar bears in Canada live, is now poised to make human safety their priority in managing growing populations of bears.”

**What we found interesting about the sea-ice shrinking was that much of it has been occurring where polar bears do not live**

The decline in sea-ice has been much sharper than anticipated, although recent measures show it is now rebounding at a much faster pace than projected. What we found interesting about the sea-ice shrinking was that much of it has been occurring where polar bears do not live, so the impact on the population has been limited. The shrinking sea-ice, measured at the start and end of each season, is shown in Exhibit 10

**Exhibit 10. How Sea-Ice Has Shrunk Over 40 Years**

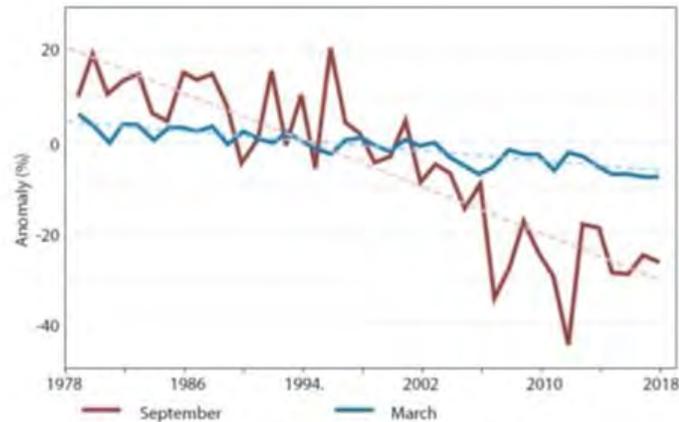


Figure 5: Sea ice extents, 1979-2018. Anomalies against mean for 1981-2010. From NOAA's Arctic Report Card 2018.<sup>143</sup> A recent paper tracking sea ice levels back to 1850 shows a similar pattern.<sup>144</sup>

Source: Crockford

**At this time of the year, they are usually thin and hungry, coming out of winter**

It is also helpful to keep in mind the seasons of the year and how polar bears deal with them. At this time of the year, they are usually thin and hungry, coming out of winter. They are about to begin their aggressive eating period, which gets them so fat that they don't eat much during the summer months. They experience one last eating binge before heading into winter when they again do not eat much. The chart in Exhibit 11 (next page) shows the percentage of their annual food intake that occurs during the seasons of the year.

**Exhibit 11. The Eating Cycle Of Polar Bears**

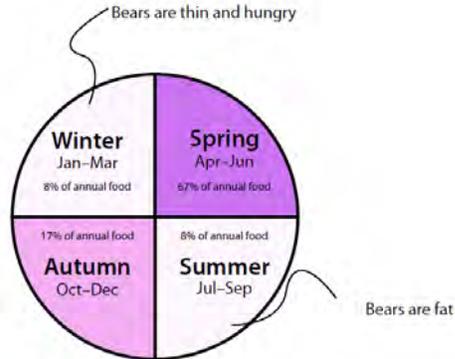


Figure 7: Polar bear feeding activity by season.

The most intensive feeding time is spring, followed by fall. Although some individuals have trouble eating enough in the spring due to inexperience, competition, old age, injury or disease, polar bears are usually hungriest in late winter, not summer as some people believe.<sup>193</sup> Based on data from the polar bear literature, seasons as defined by Pillfold and colleagues in 2015.<sup>194</sup>

Source: GWPF

**The number of bears is increasing in most regions**

The counts of polar bears are done by areas, largely because the Arctic region spans the national boundaries of a handful of countries, making it more difficult to get accurate counts. The latest data on polar bear population trends is shown in Exhibit 12, which shows that the number of bears is increasing in most regions.

**Exhibit 12. Status Of The Polar Bear Population**

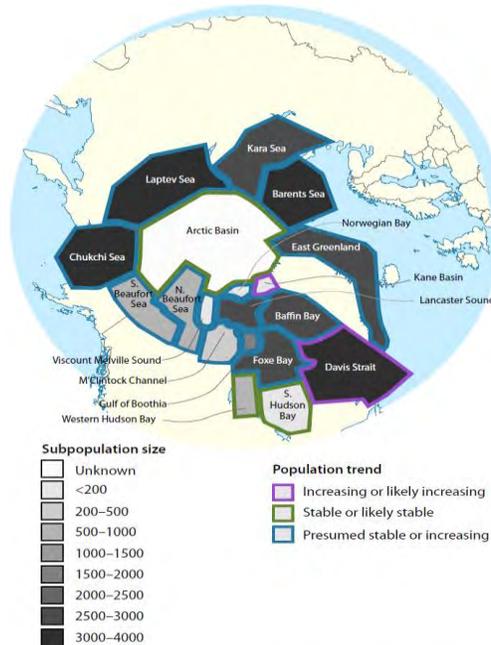


Figure 4: Trends in polar bear subpopulations at 2018. Number of bears per subpopulation. Former 'data deficient' regions are marked 'likely stable or increasing' to reflect current research on studied populations.

Source: GWPF

In 1993, the PBSG estimated the polar bear population at about 21,470–28,370 (rounded to 22,000–27,000 in 1997). The number was ‘adjusted’ to 21,000–25,000 in 2001 and ‘further simplified’ to 20,000–25,000 in 2005. The apparent decline since 1993 is due to the fact that some estimates used prior to 2001 were deemed to be not scientific enough and were dropped from the totals.

In 2005, the U.S. Geological Survey put the global population of polar bears at 24,500, a mid-point estimate used to support the U.S. Fish and Wildlife Endangered Species Act listing in 2008. Nine years later, in 2014, the PBSG mid-point estimate was listed as ‘approximately 25,000,’ with no estimated range provided. The report pointed out that this estimate is still listed on the PBSG website as of late January. That listing is considered odd, given that the 2015 Red List assessment of the IUCN, which was written by PBSG members, used a mid-point estimate of 26,000 bears. The true mid-point estimate based on the stated range of 22,000–31,000 bears would be 26,500. The lower estimate was likely due to concern about potential estimate errors.

**The report pointed out that this estimate, even with its very wide estimate range, is well above the projection that only 7,493 (6,660–8,325) polar bears would exist given the sea-ice levels that have existed since 2007**

Additional survey results published since the 2015 Red List assessment have brought the mid-point total at 2015 closer to 28,500, again with a wide estimate range. In 2018, new estimates for two sub-regions added about 1,000 bears to the earlier population estimate. Subsequently, estimates for another three regions completed in 2017 but not published, suggest that the global mid-point estimate would climb above 30,000 bears. The report pointed out that this estimate, even with its very wide estimate range, is well above the projection that only 7,493 (6,660–8,325) polar bears would exist given the sea-ice levels that have existed since 2007.

**The indigenous population has been frustrated by the claims of polar bear experts about the decline in the population when the Inuit see that it is growing in the large Nunavut region where both populations co-exist**

We were also intrigued to read about the reaction of the Inuit who co-exist with polar bears in the Canadian Arctic. Last year was a newsworthy one for polar bears. Besides the apology from *National Geographic* for running its “starving polar bear” photo, two people were killed by bears. One was a polar bear guard from a cruise ship, which resulted in the polar bear being killed in retaliation. Shortly after that episode, an Inuit hunter was killed by a bear, but the public outcry over the killing of the polar bear drowned out the Inuit death, leading to the citizens questioning the objectivity of polar bear experts. The indigenous population has been frustrated by the claims of polar bear experts about the decline in the population when the Inuit see that it is growing in the large Nunavut region where both populations co-exist.

A Nunavut newspaper named polar bears the “newsmaker of the year” for 2018, but had harsh words for the contentious situation existing between the Inuit and polar bear scientists. The editorial stated:

“But in Nunavut, the damage that environmentalists have inflicted on their cause will likely last for generations. Growing numbers of people in Nunavut not only believe polar bears are a threat to public safety. Growing numbers also believe that scientists and government wildlife managers are their enemy.

“On that last point, the condescending attitudes of some researchers and government officials has been rather less than helpful.

“For example, the federal Department of Environment and Climate Change said last fall, in a submission to the wildlife management board, that the Inuit position is ‘inconsistent with the federal listing of the polar bear as a species of special concern in Canada.’

“That tone-deaf response simply reinforces the Inuit belief that governments value the lives of polar bears more than they value the lives of human beings.”

The Nunavut Polar Bear Co-Management Plan presented last November to the Nunavut Government began with this basic premise:

“Over the last 50 years polar bear management has focused on recovery of polar bear numbers, which has largely been achieved. The focus of polar bear management now shifts to maintaining, or reducing numbers in areas where public safety is a concern and/or where there are detrimental effects on the ecosystem due to increased numbers of polar bears.”

**“Inuit have the political power in Canada to legislate such game-changing polar bear management decisions whether or not scientists and federal (or international) government officials agree**

As Ms. Crockford pointed out in the report, “Inuit have the political power in Canada to legislate such game-changing polar bear management decisions whether or not scientists and federal (or international) government officials agree. This has huge implications for the species because perhaps as many as two-thirds of the world’s polar bears live in Canada and most of them reside in Nunavut.” Last year may have signaled a shift in the struggle over climate change and its presumed impact on polar bears, a visually popular weapon utilized by environmentalists but without a sound scientific basis. The polar bears are doing fine.

## Canada’s Energy Conundrum: Oil Flows But Can’t Leave

The deteriorating oil output situation in Venezuela has opened up a perfect opportunity for Canada’s heavy oil business to capture more global market share. Instead, due to the lack of export pipeline capacity and limited increases in railcar loadings, Canada’s heavy oil producers are left out of this revenue generating opportunity. Saudi

**The U.S. refining industry retooled its plants in the early 2000s to run substantial volumes of heavy crude oils in response to the quality of domestic oil becoming heavier and more sour**

Arabia appears to be the primary beneficiary of the Venezuela oil shortfall. Being left out of that opportunity is reinforced by the delay in the expansion of a major export pipeline due to start up in the fourth quarter of this year, but now delayed a year.

The inability of the U.S. Gulf Coast refining industry to secure further deliveries of Venezuelan heavy oil has forced refiners to scramble to obtain equivalent-quality crude oil. The problem was created by the imposition of U.S. economic sanctions on the Venezuelan oil industry in an attempt to punish the country's government and its leader due to the worsening humanitarian crisis there.

The U.S. refining industry retooled its plants in the early 2000s to run substantial volumes of heavy crude oils in response to the quality of domestic oil becoming heavier and more sour (higher sulfur content). The refinery catalysts were reconfigured for this oil quality shift in order to maximize the product output at the least cost. Today, the U.S. shale revolution has enabled the country to drop its 45-year ban on crude oil exports as the nation's light oil output has swelled. While this oil can be used in refineries, because of how they are currently configured, they will not optimize product output and ensure maximum profitability. Those are extremely important qualities in the refining sector as this part of the oil industry operates on extremely skinny profit margins.

Canadian heavy oil and oil sands output are perfect substitutes for Venezuelan heavy oil, but the egress challenges confronting our neighbor to the north is creating a missed profit opportunity. This export shortfall is a contributing factor for why the Alberta government imposed a mandatory production cutback in order to help close the differential between Western Canadian Select (WCS) oil and West Texas Intermediate (WTI) oil. That differential had widened last fall to upwards of \$50 per barrel due to the growth in Canadian oil production and an inability to export the additional volumes. This led to soaring crude oil inventories and depressed wellhead oil prices.

**As oil prices in Canada continued to trade in the mid-teens, producers mounted major political and media campaigns to pressure the Alberta government to exercise its power to curtail production in order to lift wellhead prices**

In mid-November 2018, WCS sold for \$12.59 per barrel, at the same time WTI was trading for \$55.69, or a \$43.10 per barrel differential. At that wellhead price, most Canadian producers were losing money on every barrel they produced – a ridiculous situation for a finite, highly valued commodity. As oil prices in Canada continued to trade in the mid-teens, producers mounted major political and media campaigns to pressure the Alberta government to exercise its power to curtail production in order to lift wellhead prices. Heavy oil producer Cenovus Energy Inc. (CVE-NYSE) also announced plans for a major expansion of its oil-by-rail program. The company agreed with the Canadian National Railway Co. and Canadian Pacific Railway Ltd. to operate two unit-trains per day, enabling the export of an additional 100,000 barrels per day, beginning with one unit-train from its Bruderheim Energy Terminal near Edmonton

**Concerns were raised by some of Canada's largest integrated oil companies that the differential was now too narrow, making oil-by-rail an unprofitable option and leading to the rebuilding of Canadian oil inventories**

**Oil-by-rail volumes reached a record level of nearly 354,000 barrels per day in December**

**The safety of oil-by-rail has always been an issue, which was magnified by the 2012 runaway oil train that crashed and exploded, nearly wiping out the center of the town of Lac-Mégantic, Quebec, and killing 47 people**

starting in the fourth quarter of 2018, while the second unit-train will load through USD Partners' terminal in Hardisty beginning in the second quarter of 2019. The company estimates that the cost to transport the oil from Western Canada to the U.S. Gulf Coast will be in the \$17-\$20 per barrel range.

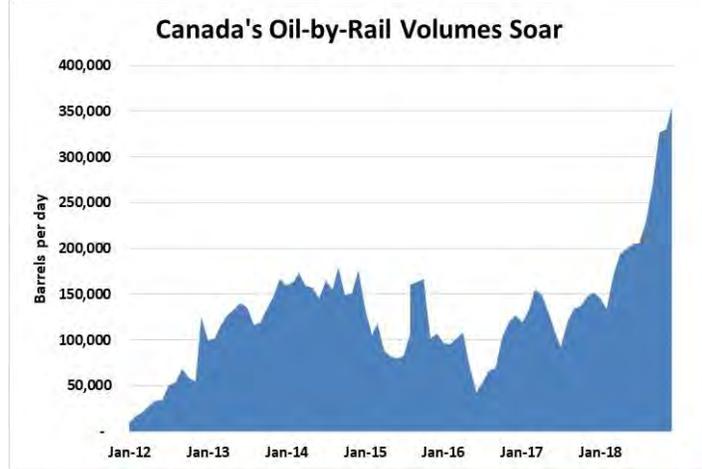
Before electing to impose a mandatory production cutback, Rachel Notley, Alberta's premier, announced that the provincial government was going to get into the oil-by-rail business to help boost exports and lift wellhead prices. The oil market was not very impressed as the wellhead price rose by only a few dollars per barrel following Ms. Notley's announcement.

At the time the Alberta government announced plans to impose a 322,000 barrels per day mandatory cut in producers' outputs at the start of 2019, rumors of that possible action had already caused the oil price differential to shrink to about \$33 per barrel. By the end of 2018, a month following the Alberta announcement, the differential was down to only \$15.65 per barrel, as traders began bidding up prices in anticipation of less oil being available in January. On February 25th, WCS was quoted at \$42.63 per barrel compared to WTI selling for \$55.48. The \$12.85 per barrel differential was one of the narrowest in the past 12 months. Concerns were raised by some of Canada's largest integrated oil companies that the differential was now too narrow, making oil-by-rail an unprofitable option and leading to the rebuilding of Canadian oil inventories.

This differential swing has encouraged the Alberta government to reduce its mandatory production cut from 322,000 barrels per day to only 250,000 barrels for February. A further 25,000 barrels cut is in place for March. A greater production cut may be needed given the inability to resolve the pipeline egress expansion issue. Oil-by-rail volumes reached a record level of nearly 354,000 barrels per day in December, more than a 130% increase over the volumes moved that month in 2017. Rail volumes should rise further as 2019 unfolds. The International Energy Agency (IEA) sees Canada's oil-by-rail volumes averaging 390,000 barrels per day for 2019, which suggests that year-end volumes should be in excess of 400,000 barrels per day, maybe even in excess of 450,000 barrels per day.

The safety of oil-by-rail has always been an issue, which was magnified by the 2012 runaway oil train that crashed and exploded, nearly wiping out the center of the town of Lac-Mégantic, Quebec, and killing 47 people. Earlier this month, Canadian Pacific Railway Ltd. experienced a runaway grain train, which ultimately crashed killing three rail workers. This train crash had similarities to the 2012 Montreal, Maine and Atlantic oil train crash and is prompting increased scrutiny of railroad equipment and operating procedures. Studies have shown that oil traveling by rail is safer than by truck, but nowhere near as safe as in a pipeline. That highlights the need for more pipeline export capacity if the Canadian oil industry is to

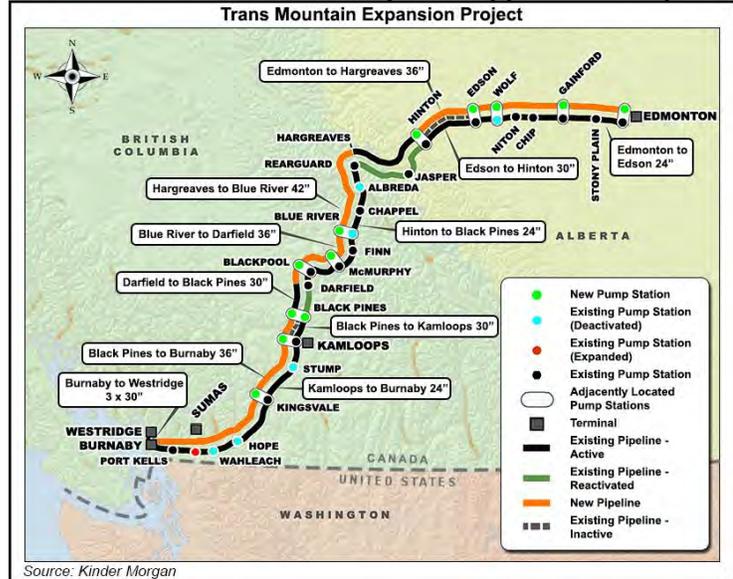
**Exhibit 13. Oil-by-Rail Program Gears Up To Export More**



Source: NEB, PPHB

consider growing safely. Oil-by-rail safety is only one energy topic on the minds of Canadians. They continue to focus on the pipeline approval challenge and its impact on the Canadian energy industry.

**Exhibit 14. Trans Mountain Pipeline Approval Is Step One**



Source: [Naturalgasintelligence.com](http://Naturalgasintelligence.com)

**The recommendation comes despite the NEB stating the project could have “significant adverse environmental effects”**

A week ago, the National Energy Board (NEB) indicated it would recommend approval once again of the Trans Mountain pipeline expansion designed to add 500,000 barrels per day of oil export capacity. The recommendation comes despite the NEB stating the project could have “significant adverse environmental effects” on the West Coast and marine wildlife, but it was judged to be in the national interest. The NEB said the project could more forward

**Ms. Notley remains convinced that the pipeline will be under construction by the fourth quarter of this year**

subject to meeting 156 conditions and 16 new non-binding recommendations. The announcement starts a 90-day period during which the NEB will consult with locals and First Nations members about their concerns with the pipeline project to twin the existing oil export line from Alberta to the West Coast.

The NEB's second approval for the Trans Mountain expansion was not a surprise. The first occurred in 2016, but it was set aside by a Federal Court of Appeals ruling in August 2018. Supporters of the pipeline, including Ms. Notley, say this is a nice first step, but they fully expect lawsuits to be filed to disrupt the approval process. Environmental and First Nations representatives have stated they will file lawsuits, but cannot do so until the project is finally approved. Ms. Notley remains convinced that the pipeline will be under construction by the fourth quarter of this year. In the meantime, Alberta will move forward with its C\$3.7 (\$2.8) billion oil-by-rail program. In a recent press conference, Ms. Notley indicated that the province will lease 4,400 rail cars to ship 120,000 barrels per day over tracks owned by Canadian National Railway Inc. and Canadian Pacific Railway Ltd. The first shipments are scheduled to begin in July. According to the Alberta government, it expects to bring in C\$5.9 (\$4.4) billion through oil sales, royalties and taxes, with a net profit projected at C\$2.2 (\$1.6) billion.

**Mr. Kenney is favored by people within and favoring the natural resource industries of Alberta, the lifeblood of the province's economy**

There is no doubt that the battle over oil export pipeline capacity expansions will be a hot topic during the upcoming provincial election in the spring and the federal election in the fall. In Alberta, Ms. Notley faces a difficult re-election battle with her likely opponent Jason Kenney of the United Conservative Party. Mr. Kenney is already being attacked and smeared by Ms. Notley's allies in the New Democrat Party, in hopes that his image can be damaged sufficiently to weaken him as an opponent when the election is called. That could happen soon, with a very short campaign period, designed to help Ms. Notley leverage any improvement in her favorability rating. Mr. Kenney is favored by people within and favoring the natural resource industries of Alberta, the lifeblood of the province's economy. He has indicated he will be much more combative toward environmentalists and the British Columbia and federal governments over construction of oil and gas pipelines. That is no guarantee any of the proposed pipelines currently being held up by regulatory approvals and/or court cases will be advanced.

**This crisis has weakened Mr. Trudeau's support in his strong Eastern regions**

In Ottawa, the government led by Prime Minister Justin Trudeau is battling a huge political firestorm over supposed pressure brought to bear on former attorney general Jody Wilson-Raybould by his former principal secretary Gerald Butts over the SNC-Lavalin affair. Whether the Prime Minister exerted pressure on his attorney general to help SNC-Lavalin, an engineering firm, avoid criminal prosecution by the Canadian government remains unknown, but the resignation of Mr. Butts indicates that something was amiss. This crisis has weakened Mr. Trudeau's support in his strong Eastern regions, at a

**The possibility of a government flip from the Liberals to a more conservative-leaning one would change both the political and economic landscape of Canada**

time when his political power is at its weakest in the western provinces due to his government's environmental policies and their harm to those provinces' economies. The possibility of a government flip from the Liberals to a more conservative-leaning one would change both the political and economic landscape of Canada. That could be very beneficial for the Canadian energy business, which currently is seeing more capital flow out of Canada as companies and executives abandon the country. This is limiting growth opportunities for the natural resource industries that have been the mainstay of economic development of western Canada.

Last Friday night, Enbridge Inc. (ENB-NYSE) announced it does not expect to receive its Line 3 permits from Minnesota before November 2019, putting the line's construction startup target into Q2 2020. That will put further pressure on the Canadian oil industry to ramp up oil-by-rail shipments even more between now and next year to offset the lack of any pipeline egress expansion beyond small debottlenecking steps.

**Whether Canada will be able to capture any of that investment opportunity remains in doubt as the environmental movement has become stronger**

The expansion of the oil-by-rail program would enable certain Canadian heavy oil producers to capture some of the market opportunity arising from the Venezuelan oil industry's collapse and the current sanctions. Whether Canada will be able to capture any of that investment opportunity remains in doubt as the environmental movement has become stronger and more adept at attacking the underbelly of the oil and gas industry – its pipeline infrastructure. That disruption dynamic will not change soon, regardless of who is premier of Alberta or prime minister of Canada.

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