

by Bob Smith, President & CIO



Photo of Bob Smith in Kungs fjord, Svalbard

It is said that what happens in the Arctic doesn't stay in the Arctic. That is because this region provides essential global climate regulation and substantial ecosystem benefits to humanity outside and beyond its boundaries. Indeed, the Arctic environment, and human society and its economic activities are deeply connected to each other, representing a pivotal link in a complex adaptive global ecosystem. We recently traveled to the high Arctic and the Svalbard to briefly witness this important process in action.

### A Faraway Place

The Arctic is defined as all areas beyond the Earth's northern polar circle at a latitude of 66.5 degrees north. It is an area where the sun does not set for at least one night of the year, where there are no high-growing trees or bushes, and the long-term average temperature of the warmest month is less than 10 degrees Celsius.

Between 74 degrees and 81 degrees north latitude lies the Svalbard. Known as the "Cold Coast" in old Norse, it is a group of islands that form an archipelago with a land mass of 24,000 square miles, making it roughly equivalent to the size of the Republic of Ireland. The Svalbard is located in the Arctic Ocean, about 650 miles from the North Pole, and constitutes one of the northernmost land masses on Earth, as well as the largest area of wilderness in all of Europe. These

islands are 60% glaciated with some of the world's fastest-moving glaciers. The balance of the region is 30% barren ground, and 10% is covered with very low ground vegetation.

In contrast to other Arctic regions, the Svalbard has no indigenous population and there is no historical evidence that the Vikings settled in the area during their time. In fact, it was the 1596 Dutch expedition of Willem Barents who discovered and drew maps of the region before his ship was crushed by freezing sea ice leading to his untimely death. However, the work of this expedition survived, and it led to the exploration of the region by other European countries over the centuries. This eventually gave rise to the exploitation of the natural resources of the region as a destination for whalers, fur trappers, and seal hunters, as well as other animal-based products. With the industrialization of Europe and the arrival of steel-hulled ships in the early 1900s, this region also eventually became a source for industrial minerals and, in particular, coal.



Poolepynten, Svalbard; photo by Bob Smith

Since 1925 the Svalbard has been officially incorporated into the Kingdom of Norway, but it operates as a semi-autonomous region administered by the government. As a result of government treaties with Norway, the Svalbard has remarkably low taxation compared to Norway and the rest of Europe, with an 8% income tax, 10% corporate tax rate, no VAT, and no customs or luxury taxes. It is a veritable "tax haven" for those who prefer cooler climates.

## The Arctic & Coal: An Unlikely Pairing

One of the environmental ironies of this region is its historical and present-day connection to coal mining. The Svalbard is a place rich in mineral resources, such as gold, copper, lead, zinc, iron, and coal. Norway first started coal mining in the Svalbard around 1899 and shortly thereafter, in an effort to further the economic development of the region, invited other interests from Germany, England, Russia, Sweden, and America to pursue commercial mining activities.



Longyearbyen; photo by Bob Smith

The American businessman John Munro Longyear, who founded the Boston-based Arctic Coal Company, established the mining settlement of Longyear City in 1906. This grew to become the main and longest-existing settlement of the archipelago and is today's regional capital of Longyearbyen, the northernmost year-round settlement on Earth, with a population of about 2,850.

Today, coal is still mined in the region on a limited basis (240,000 tons last year) to fuel the community's only power plant and for export to German steel manufacturing facilities in Europe. Seeing the smokestack emissions rise from the Longyearbyen furnace during our visit was incongruous with the natural beauty of its surroundings and truly disturbing from an environmental perspective.

To its credit, the Norwegian government plans to spend \$38 million in 2019 and another \$43 million in 2020 and beyond for the clean up of the former mining sites scattered around the area. We were also told by the local residents that, in keeping with its national alternative energy agenda, the Norwegian government plans to decommission the power plant within the next couple of years once adequate alternative energy

sources have been established. As one might imagine, this will be a difficult technological challenge, given the region's extreme weather conditions and the natural light limitations that engineers will have to overcome. It will be interesting to learn about what they eventually devise to solve this problem.



Energiverket Heat & Power Plant,  
Longyearbyen, Svalbard; photo by Bob Smith

## Global Food Supply's Icy Preserve

In the event of global catastrophes, such as nuclear war, geopolitical disasters, terrestrial impacts, severe climate change, or any planetary life-threatening disasters, Longyearbyen may be the place to go.



Svalbard Global Seed Vault, photo from The Crop Trust <sup>1</sup>

This town, which has more polar bear sightings annually than people, is home to the Svalbard Global Seed Vault – often called the “doomsday seed vault.”

The structure was built in 2008 for \$8 million, and it holds more than 980,000 seed samples representing nearly every crop currently produced on Earth, according to the Crop Trust, a group that oversees the vault in partnership with the Norwegian government. The group calls the vault the “ultimate insurance policy for the world’s food supply.”

The installation is not open to the public and scientists can only access the vault via a 400-foot-long tunnel. To deposit the carefully packaged seeds, they must pass through five large reinforced entries with coded locks.



Svalbard Global Seed Vault, photo by Jim Richardson/NGC/Alamy for The Guardian <sup>2</sup>

Inside, the air is maintained at a temperature below 0 degrees and, in the event of a power outage, the vault was designed to stay frozen for 200 years because it is set 300 feet deep into the side of a mountain and buried in permafrost – a layer of soil that, until recently, remained frozen solid.

A 2018 report by the Norwegian Centre for Climate Services (NCCS) warned that increasing Arctic temperatures were putting the seed vault and the surrounding area at risk.<sup>3</sup> This is because Arctic temperatures have continued to rise due to climate change associated with the effects from escalating levels of CO<sub>2</sub> in the atmosphere, thus causing the permafrost to thaw at an alarming rate.

According to the NCCS scientists’ report, about 120 years ago, Longyearbyen’s annual average temperature was 18 degrees Fahrenheit. Since then, the average has gone up by almost 7 degrees, which, according to

records, is almost three times the global increase of approximately 1.8 degrees Fahrenheit.

Furthermore, these scientists project that the surrounding air temperatures will increase by another 18 degrees Fahrenheit by 2100. As a result, the permafrost near the surface (i.e., anything less than 32 feet deep) in this region is projected to thaw and perhaps completely disappear by the next century.

Due to these dramatic climate changes, in recent years Longyearbyen has had to contend with a growing list of dangerous avalanches, mudslides, and flooding events. Erosion and softening permafrost have also forced some residents from their homes, and various common community structures have been relocated to avoid destruction. As a result, it is no longer as invulnerable an area as scientists initially thought when the seed vault was first established.

Being fully aware of the global importance of the vault and in anticipation of these ongoing climatic challenges, the facility recently received some important modernization upgrades. In 2018 the Norwegian government spent \$13 million on improvements that included the construction of a new concrete access tunnel in addition to a backup service building to house emergency power and refrigeration units.

The importance of maintaining the operational integrity of this facility seems clear as far as environmental priorities go. In our view, the recent upgrades afforded by Norway are a much welcomed expenditure in order to safeguard all the genetic material that is crucial to mankind’s global food security.

## Climate Change Realities

“Everyone who’s on Svalbard can see the huge changes that are underway,” acknowledged Norway’s government minister in charge of climate and environmental issues, Ola Elvestuen of the Liberal Party. “We have to take this seriously and cut (carbon) emissions now.”<sup>4</sup>

Earth’s essential planetary fluids are its atmosphere and oceans, which redistribute heat received from the sun to make our environment habitable. The oceans also act as reservoirs by absorbing what they receive from mankind’s activities and the atmosphere. Man-made (i.e. anthropogenic) CO<sub>2</sub> is created globally in vast quantities from our burning of fossil fuels.



Our atmosphere allows most of the visible light from the sun to pass through to the surface. As the sunlight heats Earth's surface, it radiates part of this energy back toward space as infrared radiation, which is then absorbed by the CO<sub>2</sub> present in the atmosphere, thus raising its temperature. The heated atmosphere in turn radiates infrared radiation back toward Earth's surface.

The Svalbard has been particularly vulnerable to these climatic forces. In fact, sea ice cover, which is crucial to support the region's vital ecological systems, has reached new record lows several times in the past decade. And within a generation, it is projected to nearly disappear in the summer seasons.



Beach at Poolepynten, Svalbard; photo by Bob Smith

while the darker surface of the Arctic ocean and the bare rock of the land mass absorbs most of the radiation, making the environment ever warmer.

Reduced levels of new sea ice also means that there will be less of this protective cold layer over the Arctic's older ice, which then leads to even more melting.

Scientists from the Fram Strait Arctic Observatory report that since 1990 the thickness of sea ice around the Svalbard arctic area has declined by over 30%, from roughly 3 meters to 2 meters. This troubling trend is also illustrated in the Arctic Sea Ice Death Spiral chart provided below.



Prins Karls Forland, Svalbard; photo by Bob Smith

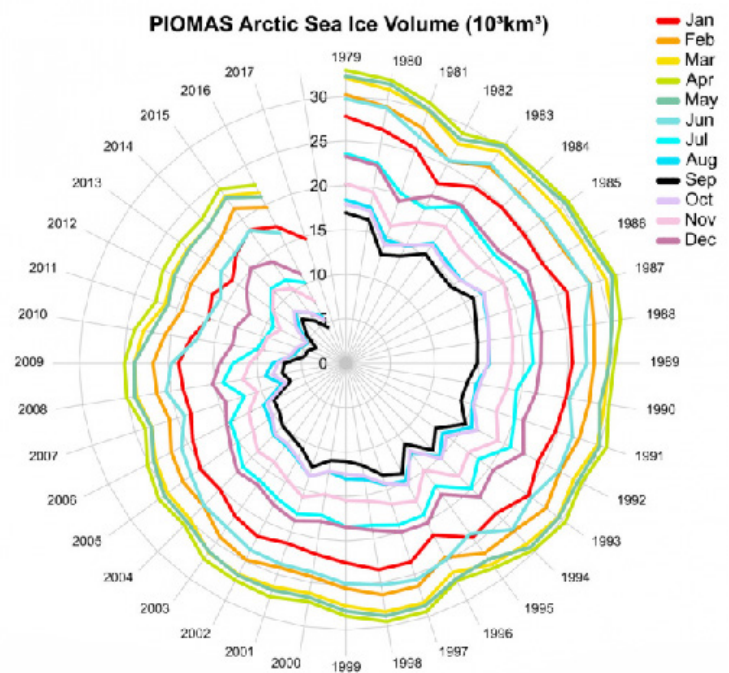
Scientists assert that because of climate change, the Svalbard region's sea ice cover is changing quickly, both in extent and thickness, and shrinking far too rapidly for the indigenous animal species to adequately adapt.

"The sad fact is that climate change has a greater effect the farther north you come," said Hege Hisdal, a hydrologist and division chief at Norway's state waterways and energy agency NVE (Norges vassdrags- og energidirektorat).

Hisdal said the increase in temperatures and precipitation will be higher on the Svalbard than on mainland Norway, and that a reduction in the permafrost and glaciers will have "huge consequences." Among them: an increase in erosion and wildlife under threat for lack of food and the ice over which they've traveled.<sup>4</sup>

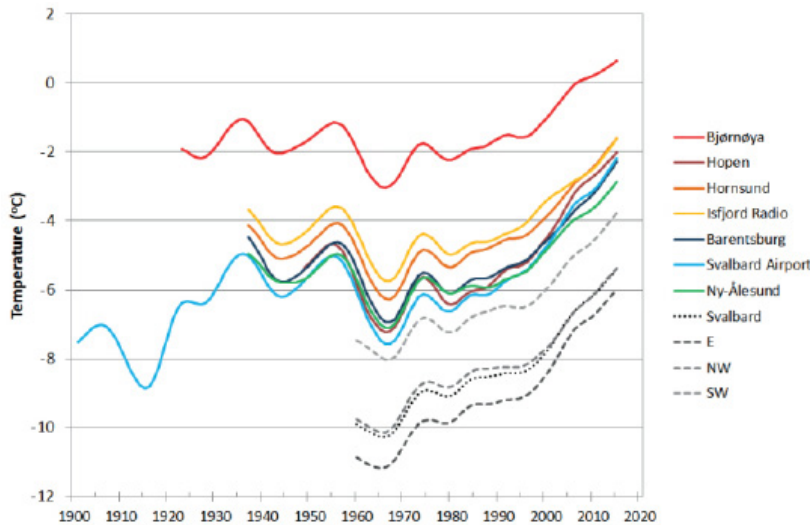
Scientists also believe the loss of sea ice accelerates regional warming, because the shiny ice and snow reflects a high proportion of sunlight back into space,

### "Arctic Death Spiral"



Monthly Averages from Jan 1979 to Jan 2017, Pan-Arctic Ice Ocean Modeling and Assimilation System <sup>5</sup>

In the recent report “Climate in Svalbard 2100,”<sup>6</sup> released by the Norwegian Environmental Agency (NEA), scientists predicted that because of these atmospheric changes, temperatures in the Svalbard will rise 10 degrees by the turn of the century as compared to today. This and other findings identified in the report have been described by experts as very dramatic and some of the most frightening yet to be released to the scientific community.



“Annual mean temperature (degrees Celsius) for weather stations (observations) and regions (Sval-Imp dataset). The series are smoothed by a Gaussian filter to show decadal scale variability.”  
Photo from the Bjerknes Centre for Climate Research.<sup>7</sup>

Major currents such as the Gulf Stream act like conveyor belts within our oceans by transporting warm waters to cool waters and cool waters to warm waters. This process helps to make Earth habitable for life and greatly influences our weather, but it also brings the harmful effects of warmer and more acidic CO<sub>2</sub> waters into direct contact with the Arctic and its marine life.



Bellsund, West Spitsbergen, Svalbard; photo by Bob Smith

Climate scientists estimate that roughly 35% of the CO<sub>2</sub> released into the atmosphere finds its way into oceans, leading to acidification of these waters and a reduction in the pH levels, which is harmful to many important forms of marine life.

The Fram Strait, the sea area between the Svalbard and Greenland, is where these warmer waters arrive via the Gulf Stream to meet the edge of the Arctic ice cap. The vast majority of ice movement in and out of these waters happens through this area. Scientific records show that acidification levels within our oceans, and those entering the Arctic circle in particular, have been rising steadily since the late 1950s, when scientists first began to evaluate this information.

The sea ice that surrounds the Svalbard has historically been very productive when it comes to the building blocks of ocean life. That’s because it is home to a fantastic array of sea ice algae, phytoplankton, and other microscopic organisms that form the early stages of the region’s food chain.

From an Arctic perspective, the climatic challenges presented by higher greenhouse gas emissions are palpable and real. If not aggressively addressed through lower dependency on carbon-based energy, the loss of sea ice will ultimately destroy the cycle of life that starts here.

## Economic Benefits vs. Environmental Initiatives

Climate researchers have been quite alarmed by all of the aforementioned deteriorating conditions, but the Energy Ministry of Norway continues to issue new licenses for offshore oil and gas exploration in and around the Arctic region. For well over the last decade, regardless of political affiliation, its governments have been subject to harsh criticism from environmentalists over their refusal to rein in the country’s large offshore oil and gas industry.

Despite the country’s national commitment to alternative energy, its government has in many respects failed to heed ongoing calls by scientists to reduce emissions by cutting offshore oil and gas activity because of the importance it has for Norway’s strong economy and overall prosperity.



More recently, it has succeeded in halting oil industry plans to drill off northern Norway, and restrictions are now in place to prevent exploration near the Arctic ice cap and around some island settlements. Despite these restrictions and the obvious environmental concerns, oil companies are still interested in the potential reserves that may lie along the Norwegian Continental Shelf, and they continue to press for licenses to pursue more Arctic exploration.



The Goliat oil rig outside Hammerfest, Norway; April 2015. Photo by Thomas Nilsen for The Barents Observer.<sup>8</sup>

The diminished levels of sea ice are also opening up previously inaccessible Arctic shipping routes just north of the Svalbard. In 2013, a large bulk cargo carrier transited through the Northwest Passage for the first time, and in 2018 the first bulk cargo ship transited across the Arctic Ocean north of Russia. Unsurprisingly, with increased Arctic shipping also comes both fuel and cargo spill risk, as well as heavy carbon emissions that help to accelerate the rate of sea ice melting.

The government insists it will meet its ambitious commitments to international carbon emission reduction

goals through its domestic energy consumption and exploration policies. But Norway also has a long record of buying itself out of its internal emission reduction goals through its funding of offsets via global alternatives, such as rain forest protection in other regions, including Indonesia, Africa, and Brazil.

While these are beneficial measures, a more direct and determined approach toward minimizing the further development of Norway's fossil fuel resources would be much preferred and environmentally impactful.

## Final Thoughts

Our exploration of the Svalbard brought us to 80 degrees north latitude and within 600 miles of the North Pole. We journeyed over 1,200 miles in our seven days there and made nine different stops around the region to speak with the settlement residents, observe the Arctic's natural beauty, and evaluate the environmental setting firsthand. Along the way, we were fortunate to see several different species of whales, a few polar bears, walrus, seals, arctic fox, eider ducks, puffins, and even reindeer.

As we learned from the naturalists and scientists that accompanied us, all of these creatures were battling to survive in an increasingly diminished and depleted environment.

Sadly, for the Svalbard, climate change has become all too real and it has turned into, in many ways, a life-threatening condition. We strongly believe that if you come to see it, you will believe it. And if you believe it, you will do something about it. In the interest of the Svalbard, the Arctic, and all life beyond, we invite you to do so.



Far North Pack Ice, Svalbard; photo by Bob Smith



North Greenland Sea, Krossfjorden, Svalbard; photo by Bob Smith

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