

Beyond Fossil Fuels

Sustainable Development
Opportunities in Eastern Nunavut

Prepared by the Center for Sustainable Economy
for Greenpeace Canada

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Fog rolling into Arctic Bay

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Beyond Fossil Fuels

Executive Summary

Nunavut's future is an unprecedented opportunity for demonstrating what sustainable development looks like in the post-fossil fuel era.

Eastern Nunavut is one of the few places in the world where the fossil fuel industry's inexorable thirst for more land and resources can be halted in favour of economic development that is more responsive to human needs and more compatible with preservation of Arctic ecosystems and the local Inuit economy. As author Larry Simpson concluded, "Nunavut will never see Ford plants and other big manufacturers. Yet the new territory may remain one of the few places on Earth where people successfully straddle tradition and innovation, 'the land' and the Internet." Despite this potential, pressure is mounting to continue down the road of resource development, fully embrace the globalized formal market economy, and leave traditional ways of living behind.

In 2014, Canada's National Energy Board approved a Geophysical Operations Authorization (GOA) application by three seismic companies to conduct offshore seismic surveys in Baffin Bay and Davis Strait. At the same time, extractive mining industries are also seeking to develop Nunavut's natural resources. The mining company Baffinland just opened a major new open pit iron mine on the west side of Baffin Island. Federal and territorial officials are seeking ways to exploit Nunavut's rich endowment of base metals, diamonds, gold, iron, uranium, copper, nickel, lead and silver.

While these activities do bring with them formal sector jobs and incomes, history has shown that building an economy around extraction of fossil fuels or any other nonrenewable resource often brings on the "curse" of dependency on global markets that inevitably lead to economic insecurity and, at worst, the miserable economic conditions now facing resource-based economies like Venezuela once market conditions turn for the worse.

Resource extraction is also often accompanied by a host of social ills. In an honest assessment of the costs and benefits of mining activity near Qamani'tuaq (Baker Lake), a report by the Canadian Women's Foundation found that mining activity had led to an increase in the use of alcohol, language conflicts, more money being spent on alcohol and drugs, a loss of traditional/cultural practices, racism, sexual harassment, an increase in sexually transmitted infections

and more prostitution. And should oil and gas extraction become important, it will simply add to the global climate disaster unfolding in Nunavut in the form of rising sea levels, disappearing sea ice, changes in animal and fish migration patterns, melting permafrost, and erosion of traditional ecological knowledge.

In this report, we have highlighted some of the development solutions being advanced by leaders within Nunavut's government, by researchers, and by community and environmental organizations who recognize Nunavut's potential to leapfrog past a resource extraction focus and demonstrate to the world what sustainable development looks like in the era beyond fossil fuels and other types of resource extraction.

But any path forward must respond to a litany of social and economic ills that plague Nunavut's Local or Traditional Inuit culture.

Any alternative development path embraced by decision-makers in Nunavut must embody effective solutions to a number of economic and social challenges caused by hundreds of years of colonization, resettlements, and erosion of the Inuit economy. These include poverty, food security, housing shortages, illiteracy, cultural alienation, suicide, and poor health. These conditions are worse in Nunavut than they are anywhere else in Canada.

Tuberculosis is one of several prevalent diseases among Inuit populations in Canada, with incidence rates measured at 157.5 per 100,000 in 2008 and rising, compared with 2 cases per 100,000 in Canada in general.

At ground zero for climate change, solutions must also help Nunavut adapt to rising seas, vanishing ice, and drastic changes in ecosystems.

Nunavut is at ground zero for climate change. While global temperature projections under a "business as usual" scenario range up to 6° C, in the Arctic, this is more likely to be 13° C or more. And the disruptions caused by climate change are already unfolding as evidenced by a dramatic rise in the frequency and severity of wildfires, glacial retreat, melting permafrost, rising seas, warmer waters, and shifts in the abundance and distribution of key wildlife and fish species. In Nunavut, climate change poses a major threat to livelihoods.

Climate change adaptation plans proposed by various communities of Nunavut share many common concerns, including: (1) water and food insecurity; (2) public health, safety and emergency management concerns due to changing temperatures and extreme weather patterns; (3) infrastructure and housing concerns due to sea level rise, flooding and permafrost melt and subsidence; (4) changes in animal, fish, insect and bird migrations and their effects on hunting, fishing, and disease vectors, and (5) potential loss or dramatic change in traditional knowledge and culture.

A prosperous path forward can be guided by the framework for sustainable development embraced at Rio+20 and reflected in the UN's Sustainable Development Goals.

Given the worrisome economic, social, and environmental issues associated with resource extraction as a focus for development, there is a growing chorus of voices calling for an alternative path consistent with the principles of sustainable development embraced by Canada and 191 other nations at the Rio+20 Conference on Sustainable Development, global Sustainable Development Goals, global climate agreements, and other compatible frameworks.

All these frameworks call attention to development solutions that are targeted directly at those least well-off, preserve Indigenous People's rights and culture, help solve the global climate crisis, and promote production and consumption patterns consistent with maintenance of biological diversity, healthy oceans, and productive ecosystems.

Building human capital, renewable energy, Indigenous tourism and sustainable fisheries present opportunities to fully explore.

Key sustainable development sectors that could provide a focus for policy interventions include human capital, renewable energy, culturally sensitive Indigenous tourism, and global leadership in sustainable fisheries management.

- **Human capital:** From a socio-economic standpoint, human capital consists of the knowledge and skills present in a given population as well as states of mental and physical health that facilitate its use in the pursuit of individual and social wellbeing. Promising solutions that build human capital include those that protect and restore traditional ecological knowledge, improve formal educational attainment, protect public health, build food security, and provide high-speed Internet connectivity for all.
- **Renewable energy:** Nunavut lags significantly behind both the Yukon and Northwest Territories in renewable energy production and investment. Recent research cites financial, capacity, and

bureaucratic challenges as the main barriers to renewable energy development in Nunavut. But renewable energy has great potential, and successful case studies abound. Strategies for scaling up renewable energy solutions include renewable energy projects in the schools, wind, solar, energy efficiency, and more widespread dissemination of renewable energy industry training and skills.

- **Indigenous tourism:** Indigenous tourism is responsible tourism activity in which Indigenous people are directly involved through control, ownership and guidance over economic, cultural and natural resources, and where it is part of a larger strategy of reinforcing or revitalizing political and cultural autonomy through intercultural encounters. Indigenous tourism offers a stark contrast to cruise ships and other forms of invasive tourist activities that pollute and disempower Indigenous peoples. The demand for Indigenous tourism is skyrocketing across North America and Europe, and strategies for scaling this industry up in Nunavut could include investment in quality tourism products and services, education and training to build a skilled Indigenous workforce, strategic public investments in attractions (like protected areas), other infrastructure (like cultural centers), and financial assistance for community and cultural tourism projects.
- **Sustainable Arctic fisheries:** Fishing has always been a part of traditional Inuit lifestyles, but local consumption of seafood is more important than ever in a time when food prices are high, and nutritious food options are limited. To increase the livelihood benefits of sustainable fisheries in Nunavut, several policy options are proving effective, including scientific research, support for Indigenous-owned and operated companies and cooperatives, and changes in fishery management such as "fish locally" initiatives to maximize the benefits of fishing for local economies, the environment, and marginalized racial and ethnic populations.

While the four sectors we discussed in detail — human capital, renewable energy, Indigenous tourism, and sustainable fisheries — are fruitful areas of innovation, they represent just a handful of solutions that can help Nunavut maximize benefits of both the formal market economy and the Inuit economy while avoiding the resource curse that plagues nations and regions that have been hooked by the illusion of prosperity created by developing oil, gas, and mineral extraction for export. We hope this report energizes the discussion of sustainable alternatives.

Beyond Fossil Fuels

Foreword

We are at a crucial time in earth's history. Humans have transformed the surface of the planet, sought out its veins, diverted and dammed its life-giving waters, whilst criss-crossing the land and seas with highways of petroleum. We now hold the whip hand, able to change the entire atmosphere at will, potentially catapulting the biosphere into another realm; a realm characterized by danger, by extreme and unpredictable weather, by rising seas and a threat not just to vast numbers of other living species but foreboding the continuance of an interconnected global human society. Globally, 2016 is characterized by “completely unprecedented” high temperature records, precipitous drops in sea-ice extent, enormous drought in India, giant floods elsewhere, rampant forest fires from Fort McMurray to California and massive coral bleaching of the Great Barrier Reef.^[1]

The extraction, refining, transportation and burning of 80 million barrels of oil every 24 hours, along with vast quantities of coal and natural gas, is now reshaping the biogeochemical pathways and lifecycles of the planet. By not addressing the extraction and production of fossil fuels, the Paris Climate Agreement signed by 195 nations in December 2015 puts the world on track for an average of 3.6°C of warming, not the 1.5°C agreed upon as a safe upper limit by the world's climate scientists. Even in the historically unprecedented event that the plan is fully implemented, it allows the elimination of vast swathes of biota and calls into question the integrity of communities across the globe.

The threats to the Arctic are particularly dire as it is the region that most quickly and most severely feels the impacts of climate change — not at some future time, but



Resolute Bay.

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right now. If average temperatures increase by only 2°C, the Arctic will experience a rise of six degrees. Which is why, despite only 1°C of warming so far, over the last five decades sea ice in the Arctic has decreased by an area twice the size of Alaska and left the remaining ice 50% thinner, leading to a cascade of negative consequences.^[2]

Arctic sea ice fell to record lows in May: “The impacts on the Arctic ocean and land systems are transformational, creating huge problems for [people who live there] who on the basis of their traditional knowledge confirm that the climate system has already shifted well outside the bounds they have previously experienced. The situation is [also] changing the circulation patterns and behaviors of the atmosphere and oceans,” said Chris Rapley, professor of climate science at University College London.^[3] Marco Tedesco, who studies Greenland at the Lamont-Doherty Earth Observatory at Columbia University noted at a recent conference on the Arctic, “I see the situation as a train going downhill...And the feedback mechanisms in the Arctic [are] the slope of your hill. And it gets harder and harder to stop it.”

For several hundred years, Indigenous communities across the world have been at the forefront of resistance to ecological degradation, racism, colonial conquest, economic exploitation and the development priorities of government agencies that have done their utmost to destroy independent cultures and the integrity of the land. Despite the desperate lateness of the hour, there is a way out highlighted by the rise of new resistance movements, such as Idle No More and the fight to stop seismic blasting by the Inuit of Clyde River. The struggles of Nunavut communities against Canadian government policies that have caused inequality and the levels of poverty, unemployment, and lack of access to education so devastatingly recorded in this report, are a microcosm of struggles around the world. Contrary to persistent and racist myths, Nunavummiut and other Indigenous communities across Canada are not living off government programs but it is the Canadian government that owes Indigenous communities trillions of dollars in reparation for stolen land and broken promises, according to economist Fred Lazar.^[4]

In concert with broader struggles for cultural and ecological defense, some Indigenous communities are attempt-

ing to rebuild economies with alternative priorities to those of the dominant economic and social system hell bent on the destruction of life for the many, to benefit the few. This report highlights possible paths for Inuit communities in Nunavut plagued by historical injustices. One indication of the commitment to an alternative path was the recent plebiscite on land privatization. Though affordable, quality housing is in desperately short supply, Nunavummiut voted overwhelmingly to prevent the sale and privatization of municipal property, allowing them to retain collective control over their own land.^[5]

Another essential pillar of extending community control and a safe and healthy future is to find a way forward that isn't based on fossil fuels, unending growth and extractivism, but on genuinely democratic control of resources. This is a task we must all take up and this report suggests some ways of doing so in Nunavut, where the objective is to prioritize those who benefit least from the existing system. As activist and writer Winona LaDuke has written, “Native people [have] an opportunity to recover land and culturally based traditions in the context of a new set of technologies and a new millennium...by democratizing power production, Native nations are providing the solutions that all of us will need in order to survive.”^[6]

With 37,000 inhabitants, the autonomous territory of Nunavut is perfect for demonstrating the practicality of microgrids made up of solar energy collection and wind and water generation of power. Distributed energy systems for remote populations such as Nunavut can be used as a test case and symbol of hope for rural communities elsewhere in North America and around the world to demonstrate the viability of clean power over expensive and polluting fossil fuels. The benefits of such a change are laid out in detail in the pages that follow, along with the need to acquire greater resources for the retention of Indigenous language, cultural and ecological knowledge and to honor the desire of the overwhelming majority of Inuit to continue with subsistence meat and fish harvesting, the sharing of food and other traditional practices.

Professor Chris Williams

Educator, Activist, Author: *Ecology & Socialism: Solutions to Capitalist Ecological Crisis*

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[2] Chris Mooney, “The extraordinary years have become the normal years: scientists survey radical Arctic melt,” Washington Post, July 13, 2016.

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[6] Winona La Duke, “Recovering the Sacred: The power of naming and claiming,” (Haymarket Books, Chicago. 2005) 251-253

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Fossil Fuels

Summary

Eastern Nunavut is one of the few places in the world where the fossil fuel industry's inexorable thirst for more land and resources can be halted in favour of economic development that is more responsive to human needs and more compatible with preservation of Arctic ecosystems.

But any economic development pathway must prioritize the needs of marginalized communities and embody effective solutions to poverty, food security, housing shortages, illiteracy, cultural alienation, suicides, toxic residues from afar and other ills that are plaguing Nunavut's Indigenous Inuit culture.

A wise path forward must also respond to the deepening climate crisis. At ground zero for climate change, economic opportunities must help Nunavut's people adapt to rising sea levels, vanishing sea ice, melting permafrost, and collapsing fish and wildlife populations.

A prosperous path forward can be guided by the framework for sustainable development embraced by the Canada and other nations in the context of the Rio+20 vision of "The Future We Want" and the UN's Sustainable Development Goals.

Key sustainable development sectors include human capital, renewable energy, culturally sensitive Indigenous tourism, and global leadership in sustainable fisheries management.

Creating the enabling conditions for these sectors to grow will require preservation of traditional ecological knowledge, education and training for formal sector jobs, strategic investments in solar, wind, energy efficiency and tourism infrastructure, greater protection for at-risk ecosystems and landscapes, and new international partnerships for sustainable development of Arctic fisheries.



Nunavut's future is an unprecedented opportunity for demonstrating what sustainable development looks like in the post-fossil fuel era.

Carved out of the eastern portions of Canada's Northwest Territories in 1993 as part of the Nunavut Land Claims Agreement Act and formally separated from the Northwest Territories on April 1, 1999, Nunavut is a vast expanse of 2,038,722 square kilometers of mostly treeless Arctic land and adjacent waters.^{1,2} While it remains federal Crown lands, managed and supported financially by the Canadian government, Nunavut is largely self-governing with a unicameral, consensus-based governance structure.³ Its population of roughly 37,000 people is primarily Inuit, the traditional peoples of the Arctic.⁴ They occupy an area as large as Western Europe. If Nunavut were a country, it would be the 15th largest by area but its population density would be one of the lowest in the world.⁵ This section provides an overview of Nunavut's cultural history and a profile of two economic systems — the Indigenous Inuit economy and the formal market economy — that provide a unique opportunity for a symbiotic development path that transcends fossil fuels and other extractive industries in the decades ahead.

Cultural History

Nunavut has supported a continuous Indigenous population for over four thousand years, dating back to what is referred to by anthropologists as the Paleo-Eskimo culture of 2500 BC. Archaeological history suggests that Proto-Inuits, the Thule culture, migrated to the Eastern coast of Canada and Greenland about one thousand years ago.⁶ According to Inuit Tapiriit Kanatami, the national voice of 55,000 Inuit living in 53 communities across Canada, Inuit up until the 1600s lived lives very similar to those of their Thule predecessors, relying heavily on hunting and gathering, and migrating with the seasons. Both cultures harvested large whales, seals, caribou, muskox, fish and birds, and wandered by foot and dog team over large distances. During the winter months, Inuit lived in igloos (snow dwellings), which were often quite large. During the summer, they lived in tents (tupiqs) made of animal skins, or sod houses (qarmaqs). Work was divided along gender lines: while men hunted for

food, women made warm clothing from caribou and seal skins suitable for the harsh Arctic climate.⁷

Contact with European explorers began in 1576, when the English explorer Martin Frobisher met local Inuit during a failed expedition to discover the Northwest Passage.⁸ Other explorers, including Henry Hudson, William Baffin, and Robert Bylot, charted the region in the 17th century, and paved the way for the first immigrants and fur traders. Massive demand back in Europe for furs, especially the arctic fox and seal pup fur, led to the creation of the Hudson Bay Company in the late 17th century, and trade posts were established throughout the territory. Inuit hunters and fishermen were encouraged to bring their catches and trade for goods such as guns and ammunition, tea, sugar, cloth, and other tools and items.⁹

The natural equilibrium maintained by traditional hunting practices dissolved, as Inuit began hunting animals to the point of market saturation—and collapse — as a result of European interference. In the 18th century, European and American whaling ships arrived. The Inuit were hired as guides, helping foreign whalers to track down the animals. The Inuit began to wholesale give up their traditional migratory hunting practices, and began to congregate around the ports where trade became a new way of life. This new more sedentary life meant better hunting grounds were further afield, and so the Inuit came to depend even more on the food products the newcomers brought with them, like flour, and indulgences like liquor and tobacco. The whaling industry lasted for almost two centuries, and led to the near extinction of the bowhead whale. As whale populations dropped, the Inuit traditional way of life eroded even further, as whale meat ceased to be used for local consumption, and as whale oil (which had been used to light Inuit lamps called “qulliqs”) became scarce. By the early 1900s, the fur trade replaced whaling as the main source of commerce between the Inuit and whites. When one looks back on history, one trend becomes painfully clear: What was once a fiercely independent, migratory, and self-reliant people had become a sedentary people dependent on Western goods, food and ammunition.

With each wave of newcomers came new diseases for the Inuit, and many Inuit died from things such as measles and tuberculosis. But in addition to physical disease, Europeans and Americans turned the Arctic into a spiritual battleground, stationing Christian missionaries near the highly trafficked trading ports. The Moravians in the late 18th century, followed by the Catholics and the Anglicans in the late 19th century, provided social services such as shelter and food, but they were also very aggressive in challenging traditional beliefs and practices.¹⁰ From 1831 all the way until 1969, close to 150,000 Inuit children were sent to residential religious and government schools for their education, a deeply scarring practice that aimed to “civilize” generations of Inuit and accommodate them to modern life.¹¹ Sexual abuse of children in these schools was a shockingly routine occurrence. At least 6,000 children died while attending the residential schools of disease and malnutrition. In some cases, children were subjected to science experiments and deprived essential nutrients and dental care. According to reports compiled in the Canadian Truth and Reconciliation Commission¹², the evidence suggests that the Canadian government tried for over 100 years to eliminate the culture and language of the Indigenous people of Canada; residential schools were a key component of this indoctrination and deliberate cultural shaming—a type of cultural genocide.¹³

In 1870, the Eastern archipelago of Nunavut was formally transferred from the Hudson Bay Company to Canada, and the Northwest Territories were created.¹⁴ Seventy-five years later, in the mid-1940s, Canada and the U.S. began to establish weather stations and military basins in Nunavut, in part in response to what they perceived as the communist threat from Russia.¹⁵

One of the most painful epochs of Nunavut history surrounds the forced migration of 86 Inuit to a remote island in the Arctic far north, in 1953. Inuit were told they were being moved for their own good, in order to ensure their survival in the face of food shortages and other problems in Inukjuak, Quebec and would be provided housing and better hunting grounds in Grise Fiord on Ellesmere Island and Resolute on Cornwallis Island.¹⁶ However, many suspect the Cold War was the

ulterior motive for the move: Inuit were being played as chess pieces in Canada’s Cold War games with Russia. In order to assert their sovereignty and claim this terrain, they needed to ensure their citizens inhabited it so that other countries (including both the U.S. and Russia) beginning to eye the territory could not claim it as theirs. It took over 60 years for the Canadian government to apologize for this forced migration.¹⁷

The forced migration of the 86 Inuit was a precursor of things to come. From 1955 to 1965, the Canadian government expanded its role in the Arctic and began moving families off of the land into permanent, centralized settlements¹⁸. This program provided modern homes for Inuit families, and promoted health care, education, and social services, but it also resulted in the Inuit becoming almost completely dependent on government assistance programs. To this day, 68% of residents in Nunavut live in government-subsidized housing. In the absence of sufficient employment and economic security, many Inuit rely on government assistance, which is insufficient to meet their basic needs for food, heating, and other basic necessities.¹⁹

A Tale of Two Economies

Like most regions of the world where Indigenous lifestyles persist, Nunavut reflects a tale of two economies — sometimes in conflict, but with great potential for symbiotic development. The first is the Indigenous Inuit economy, which still prevails in Nunavut despite its gradual assimilation of modern technologies and globalization. The second is the formal market economy, which is becoming more dominant over time. The contrast is stark — the two systems differ in almost every important way. Nonetheless, as author Larry Simpson points out, “Nunavut will never see Ford plants and other big manufacturers. Yet the new territory may remain one of the few places on Earth where people successfully straddle tradition and innovation, ‘the land’ and the Internet.”²⁰

The Indigenous Inuit economy

In the Indigenous economy, economic activity (provision of goods and services) is not based on exchange for profit and competition but the sustenance of individuals,

“ Nunavut will never see Ford plants and other big manufacturers. Yet the new territory may remain one of the few places on Earth where people successfully straddle tradition and innovation, ‘the land’ and the Internet.”
– Larry Simpson

families and the community. The land and water provide all of the resources needed for survival. Harvesting of natural resources provides Inuit with food, nutrition, clothing, fuel, harvesting equipment and income.²¹ Surplus is shared at numerous festivals and ceremonies that maintain the social cohesion of the community but also bring prestige to those who give and share their wealth.²² The concept of private land ownership does not exist: “In the nomadic times of our grandfathers, the land belonged to everybody, yet belonged to nobody.”²³

Work responsibilities are generally assigned based on traditional gender roles, but are pliable and not as rigid as commonly perceived.²⁴ Men engage in hunting, fishing, and construction of equipment, kayaks and shelter.²⁵ Women have a crucial position in looking after resources and in ensuring access to food and other subsistence materials while sustaining and taking care of their extended families. Women’s activities also focus on healing and health in their communities.²⁶ The ethic of sustainability is woven into the Inuit’s cultural fabric, as it is with many Indigenous economic systems worldwide.

*The key principles of Indigenous economies— sustainability and reciprocity— reflect land-based worldviews founded on active recognition of kinship relations that extend beyond the human domain. Sustainability is premised on an ethos of reciprocity in which people reciprocate not only with one another but also with the land and the spirit world. Indigenous economies are thus contingent upon a stable and continuous relationship between the human and natural worlds.*²⁷

In traditional Inuit societies, “sustainability is the guiding principle that allowed the Inuit to survive individually and grow as a culture in the harshest environment on the planet.”²⁸ Table 1 provides some key figures that underscore the importance of the Indigenous economy in Nunavut.²⁹ Most of those contacted by the Survey of Living Conditions in the Arctic (SLiCA) program prefer a mix of subsistence activities and wage and salary work. Only 15% prefer wage and salary employment alone. Traditional foods are a mainstay of almost every household.

The formal market economy

The formal market economy differs from the Indigenous economy in almost every fundamental aspect.

Table 1: Prevalence of the Indigenous economy in Nunavut³⁰

Attribute	% of population
Prefer a mix of subsistence and wage work	75%
Prefer wage and salary employment alone	15%
Share traditional foods with other households	96%
Majority of fish and meat from subsistence harvesting	80%

Exchange is not about providing for local needs, but maximizing profits in an increasingly global marketplace. Private ownership of land and exclusive access to resources is viewed as essential for economic activity and growth is assumed to be virtuous and unending. Advocates for privatization recently sponsored an historic referendum that would have allowed Nunavut hamlets and city councils to sell municipal lots to individuals or companies. The goal was to stimulate private investment in real estate markets, bolster economic development and create jobs.³¹ The measure went down in a resounding defeat — over 80% voted against it. This underscores how sensitive the issue of privatization will be.

The formal market economy brings goods and services produced anywhere in the world to all Nunavut households to supplement what is obtained through subsistence. Food, diesel fuel, building materials and transportation equipment are among its chief imports. Almost every Nunavut community now has retail trade infrastructure. In 2015, the value of retail trade was CAN \$388.2 million. Food and beverages accounted for 77% of this value — an indication of the relatively high price of these basic commodities.³² In a formal market context, the role of work is fundamentally altered. Labor is not something determined by community needs or traditional gender roles but considered an input into the production of goods and services that may or may not have direct bearing on community wellbeing depending upon what is produced and where it is consumed. For example, mining represents the largest private (non-governmental) share of Nunavut’s gross domestic product (Table 2), but production from the two active mines (gold and iron ore) is not for any local use but for international export markets.³³

Table 2: Nunavut real gross domestic product 2015 by sector³⁴

Sector	Gross domestic product (CAN \$2007 millions)				
	2011	2012	2013	2014	2015
Mining, quarrying, oil and gas extraction	\$248.6	\$286.7	\$333.9	\$345.2	\$337.4
Construction	\$186.1	\$133.6	\$207.5	\$285.1	\$261.0
Retail trade	\$75.2	\$71.9	\$73.0	\$72.9	\$76.1
Educational services	\$147.5	\$153.1	\$154.7	\$156.8	\$159.2
Health care and social assistance	\$104.8	\$106.7	\$109.8	\$112.6	\$113.4
Public administration	\$371.5	\$369.3	\$365.9	\$368.5	\$375.7
All other sectors	\$602.8	\$664.0	\$717.80	\$691.4	\$704.4
Total	\$1,741.9	\$1,785.3	\$1,962.6	\$2,032.5	\$2,027.2

Of Nunavut's 19,300 Inuit working age (15+) population, 59% choose to participate in wage and salary employment.³⁵ Total employment in spring 2016 for Inuit and non-Inuit was 13,300. Median income for all tax filers is roughly \$30,000 per year. For the 19 largest communities, the largest share of the workforce (49.5%) is employed in government — public administration, health, and education. The second largest share of employment (12.9%) is in retail and wholesale trade. Table 3 provides a snapshot of Nunavut's wage and salary employment by sector in 2013 — the latest year for which reliable data are available. One important fact to note is that while mining makes up the largest private (non-governmental) share of Nunavut's GDP (17%) it provides less than 4% of its employment. This has largely to do with the high value of one of Nunavut's principal mineral products — gold — and underscores the fact that high-value production does not necessarily translate into broad-based opportunities for livelihoods. In Nunavut, this is

especially the case since only 6% or less of the mining sector workforce is Inuit.³⁶

Leapfrogging Beyond Fossil Fuels and Resource Extraction

History shows us that single-source resource-led development has consistently failed to bring about widespread increases in standards of living and is inherently unsustainable. Venezuela, with more proven oil reserves than Saudi Arabia, Russia, Iran or the US, built its economy around oil exports, but now stands as “one of the world's most miserable economies” as the oil price crash takes its toll.³⁸ Venezuela is now trapped in a grim cycle of poverty, public debt, and deteriorating social and economic conditions. South Africa, long assumed to be relatively affluent, continues to battle entrenched poverty, high inequality, and emergence of a rentier state — all attributable to the “resource curse” of overdependence on mineral extraction.³⁹ Nigeria, which, before its dependence on

Table 3: Nunavut employment 2013 by sector³⁷

Sector	Employment	Percentage
Fishing, Hunting, Trapping, Mining and Quarrying	442	3.6%
Construction	683	5.5%
Retail and Wholesale Trade	1,608	12.9%
Transportation and Warehousing	950	7.6%
Accommodation and Food Services	442	3.6%
Government, Health and Education	6,158	49.5%
Other Industries	1,783	14.3%
Total Employment	12,433	100%



© Timkal

Arctic Bay.

oil and gas, had a diverse economy and was once a net exporter of food, now relies on oil and gas revenues for 90% of its export earnings and 70% of its government revenues⁴⁰ and must import much of its food⁴¹. Violence, social turmoil, environmental devastation and underdevelopment are hallmarks of the oil-rich Niger Delta. Generally, extracting natural resources and exporting them allows a small minority of people to grow incredibly wealthy and results in environmental and public health catastrophes when companies and governments cut corners.

Resource extraction is knocking on Nunavut's door. The territory is considered richly endowed with base metals, diamonds, gold, iron, uranium, copper, nickel, lead and silver. According to a recent transportation infrastructure assessment, "Federal and territorial officials see resource development in Nunavut as an important opportunity to promote the economic development of Inuit communities and the fiscal health of the territory."⁴² Mineral exploration investments peaked at \$535.7 million in 2011 and

have hovered in the \$100 – \$200 million range since that time.⁴³ The mining company Baffinland just opened a massive new open pit iron mine on the west side of Baffin Island. Oil and gas reserves remain untapped in the territory. However, they could be significant. According to a recent report, Nunavut could hold up to 25% of Canada's oil and 35% of its natural gas resources.⁴⁴ In 2014, Canada's National Energy Board approved a Geophysical Operations Authorization (GOA) application by three fossil fuel companies to conduct offshore seismic surveys in Baffin Bay and Davis Strait.⁴⁵

Despite these threats, in Nunavut, it is not too late to avoid pitfalls of the resource curse and opt instead for a different path. Sustainable, genuine development is within reach for the mostly Inuit population seeking to maintain and preserve its heritage, and to rekindle its longstanding symbiosis with the natural environment. There is still time before multinational corporations and extractive industries lead Nunavut and its people down the road of broken promises and false hopes.

Maktaaq delicacy

© Ansgar Walk





But any path forward must respond to a litany of social and economic ills that plague Nunavut's Indigenous Inuit culture.

Across the globe, 192 nations, including Canada, have firmly embraced a development path that eradicates poverty and raises standards of living for all while being grounded in sustainable patterns of production and consumption. This commitment has been articulated in numerous United Nations declarations and resolutions, including the outcome document from the Rio+20 Conference on Sustainable Development in 2012.⁴⁶ In Nunavut, sustainable development demands a focus on a number of social and economic ills that plague the region's largely Inuit population – poverty, lack of wage and salary employment, the high cost of goods and services, erosion of subsistence-based lifestyles, illiteracy, lack of educational attainment, food insecurity, homelessness, poor health, suicide and cultural alienation. These social and economic ills, in turn, are traceable to two underlying drivers: (1) the formal market economy not delivering on its promises, and (2) the erosion of the Indigenous Inuit economy.

The Formal Market Economy Is Not Delivering On Its Promises

In Nunavut, the transition from an Indigenous to a formal market economy has left many behind. While it has certainly raised living standards for some, for most, the promise of prosperity has yet to be fulfilled. The 2013 Nunavut Economic Outlook provides a succinct summary of the economic situation: “Unemployment is high, incomes are low, and, as a result, many families are suffering from financial poverty, unable to afford the basics of life by their own means.”⁴⁷

One reason for this situation is that growth of the formal market sector has been highly uneven. Income inequality is “more extreme in Nunavut than elsewhere in Canada.”⁴⁸ Median income for non-Aboriginals in Nunavut is \$86,600 a year; for the Inuit, it is \$19,900.⁴⁹ But inequality is not just about income – it also manifests in the form of vast differences in employment, education, energy consumption, food security, leisure time, health risks and housing.⁵⁰

“ Median income for non-Aboriginals in Nunavut is \$86,600 a year; for the Inuit, it is \$19,900.” Peritz, Ingrid

Taken together, deprivations across this spectrum in Nunavut are serious, keeping 50% or more of Nunavut households locked into a cycle of poverty.⁵¹

Poverty and economic insecurity

A 2012 assessment prepared for the Nunavut Roundtable for Poverty Reduction provides some key statistics about the scope of deprivations:

*The Income Support Program in Nunavut exists to help those unable to access a minimum standard of living. In Nunavut, half of the population needs this help for at least a portion of the year, and almost 60% of the population lives in public housing. Nearly 70% of Nunavut's children live in households rated as food insecure and 15% of children will experience at least one day in the year when they do not eat. In Nunavut, poverty is not a fringe or special interest issue.*⁵²

The irony is that poverty is, in many ways, a product of the formal market economy. In the Indigenous economy, financial insecurity, food insecurity and substandard housing did not exist. Joji Carino, Director of the Forest Peoples Program, maintains that Indigenous peoples “do not like to be labeled as poor because of its negative and discrimina-

tory connotations highlighting instead the process of impoverishment caused by dispossession of their ancestral lands, loss of control over their natural resources and

Indigenous knowledge, and their forced assimilation into mainstream society and integration in the market economy.”⁵³ And while the market economy has brought many new goods, services, and opportunities to Nunavut, it has also created dependencies that wreak havoc when disrupted by price or supply shocks.

The absurdly high cost of market foods is a graphic illustration. The key driver here is the market-created dependence on expensive, culturally inappropriate



Dependence on food and energy imports has left Nunavut vulnerable to price shocks and shortages.

foods from afar. A recent Nunavut government survey found food in the territory cost anywhere from 20 percent more (for eggs) to 287 percent more (for celery) than the rest of Canada.⁵⁴ This has left nearly half the population exposed to food insecurity. In Nunavut, the rate of food insecurity is 45.2 percent, by far the highest in the country.

Energy presents another market-induced dependency. Forced relocations into households dependent on diesel-fired electricity have resulted in Nunavut residents paying electricity rates ranging from \$0.52/kWh to \$1.02/kWh at least five times the rates paid by residents in Southern Canada. The Government of Nunavut spends 20% of its annual budget on energy—about \$50 million per year.⁵⁵ In both cases – food and energy – dependency on formal markets has created economic insecurity. This underscores the need for a blended approach towards future development that combines the best attributes of the Indigenous economy with those of markets and technology so that livelihoods can be enhanced by both systems.

Lack of wage and salary employment and requisite skills

As previously noted, roughly 59% of Nunavut's Inuit population participates in the workforce. But by many conventional measures, wage and salary employment is failing to deliver adequate incomes or keep people employed long enough to make ends meet. The official unemployment rate stands at over 20% — the highest rate in all of Canada.⁵⁶ Nearly half of Nunavut's jobs are supported by public expenditures, while for Canada as a whole the share of publicly supported jobs is less than 20%.⁵⁷ The lack of private sector jobs leaves the Nunavut

economy lacking in a number of important skill areas. For example, because there are nearly zero manufacturing jobs, few people possess the skills to build goods and technologies now purchased from afar.

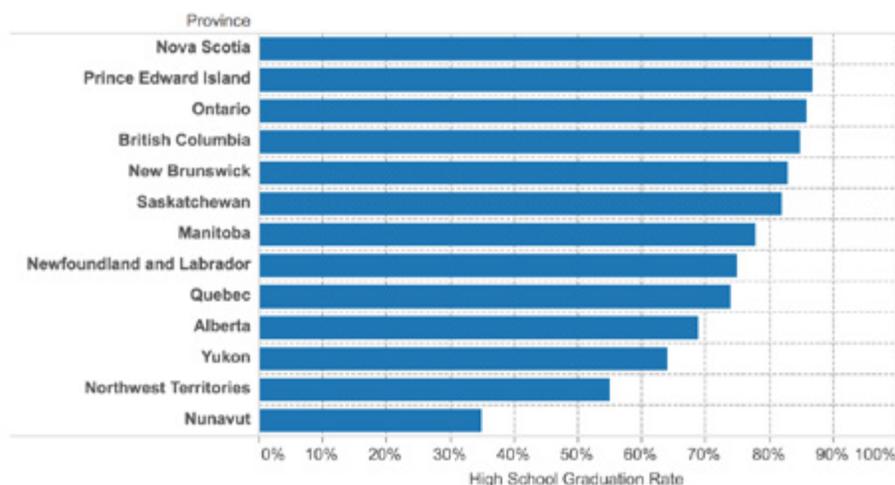
Lack of formal market skills inhibits public sector employment as well. In 1994, The Royal Commission on Aboriginal Peoples (RCAP) noted that the low numbers of formally educated Inuit was alarming given the fact that most government jobs will require some form of postsecondary training in areas like accounting, financial management, organizational development, planning and business development.⁵⁸ This problem persists today. In 2015, the secondary school graduation rate for the 17 and 18 year-old age groups stood at 35% – dead last among provinces and far below the Canadian average of 85% (Figure 1). Nunavut's literacy rate is also the lowest in Canada. Literacy is measured on a scale of 1-5, with 1 representing the lowest proficiency level and 5 the highest. Level 3 represents an “adequate” literacy level for being able to function in society. In 2012, performance at Level 3 literacy or above ranged from a low of 16.9% in Nunavut to a high of 55.6% in Yukon.⁶⁰

Public health and suicide

Poverty, high unemployment, and substandard housing are often associated with or accompanied by a host of public health risks – both physical and mental. In Nunavut, this is clearly the case. Public health issues are of utmost concern. Poor nutrition, overcrowding, and below standard ventilation coupled with emissions from wood-burning stoves, gas space heaters and kerosene heaters are risk factors that contribute to unusually high rates of lower respiratory tract infections such as respiratory syncytial virus (RSV) and bronchiolitis, with children and infants being the hardest hit group. Second-hand cigarette smoke is also a known risk factor for bronchiolitis, and as of 2009, 95% of homes with Inuit infants had elevated airborne nicotine levels, compared with just 9% of homes with children in Canada overall.⁶¹

In Nunavut, almost 25% of Inuit babies are hospitalized because of a lower respiratory tract infection, compared to less than 4% of babies hospitalized in the Northwest Territories.⁶² The Kitikmeot region had the highest rate of lower respiratory tract infection hospitalizations in Nunavut, standing at almost 40%. Often, Inuit infants experience repeated severe RSV infections in the same season, which is highly unusual, and often-times, local medical care is not sufficient. One study

Figure 1: High School Graduation Rate by Province⁵⁹



found that nearly 12% of infants admitted to Qikiqtani Region's hospital in Iqaluit for bronchiolitis (caused by RSV) required air transport to pediatric intensive care units in southern Canada.⁶³ Tuberculosis is another prevalent disease among Inuit populations in Canada, with incidence rates measured at 157.5 per 100,000 in 2008 and rising, compared with 2 cases per 100,000 in Canada in general.⁶⁴ Risk factors are also related to overcrowding and poor ventilation.

Hunger creates its own health risks. According to a 2007-2008 Inuit Child Health Survey, seven out of 10 Inuit preschoolers in Nunavut did not have enough healthy food to eat.⁶⁵ In 2014, research published in the Canadian Journal of Public Health found that the problem of hunger is so severe that school-aged Inuit children at the northern tip of Quebec are on average 2 cm shorter than the average child in Canada who eats three square meals a day.⁶⁶

But these are not the only health issues facing infants. Nunavut leads the country in adverse early child health outcomes such as infant mortality, congenital anomalies, prematurity, and low birth weight. The infant mortality rate in the territory (14.6/1,000 live births) is three times higher than the national average (5.2/1,000 live births) and twice that of the Northwest Territories (1999–2009).⁶⁷

The prevalence of mental health disorders is also unusually high, and a key factor in Nunavut's suicide crisis. In 2013 alone, 45 people in Nunavut took their own lives. Between 2000 and 2014, the rate of death by suicide for Nunavut was 111.4 per 100,000 population – 9.8 times the rate for Canadians as a whole (11.4 per 100,000 for the period 2000 to 2011).⁶⁸ The rate for Inuit men during that period was 185.8 per 100,000, for

Inuit women 47.9 per 100,000. In the case of Inuit boys aged 15 to 19, the suicide rate is 40 times higher than those of their peers across Canada.⁶⁹ The astronomical suicide rate is unprecedented in Inuit history. As late as 1972, the Inuit suicide rate was well below the Canadian average. According to the Nunavut Suicide Prevention Strategy, the primary explanation for the greatly elevated suicide rate is the trauma associated with loss of Indigenous culture and economy. In particular:

Southern values were imposed in these new communities: the wage economy was introduced; formal schooling of children was made mandatory; Inuit traditional justice was replaced by the Canadian justice system; inadequate and substandard southern-style housing was erected; and non-Inuit administrators tightly controlled the operations of each community. Inuit associate this transitional period with an overarching loss of self-reliance.⁷⁰



Overcrowded housing is linked to serious lung infections among children. Source: Nunatsiakq Online.

The Indigenous Inuit Economy Continues To Be Eroded

The limitations of what the formal market economy can offer are made more worrisome by the fact that many aspects of the Indigenous economy are being eroded. Climate change, pollution, loss of ecological knowledge and over-exploitation of fish and wildlife provide examples. The effects of climate change are far reaching, and will be addressed in Section III.

Pollution

In addition to the public health risks caused by severe indoor air pollution (discussed above) are concerns over persistent organic pollutants (POPs) and mercury in wildlife and ecosystems. Their presence has put the subsistence food base at risk.⁷¹ POPs are synthetic chemicals produced in the post World War II era that were used in pest and disease control, crop production, and various industrial functions, but which had unforeseen effects on human health and the environment. Examples of POPs include PCBs, DDT, and dioxins.⁷²

POPs are carried by wind currents from southern latitudes further north, and PCBs stick to the surface of tiny suspended particles in water, air and soil, where they are eaten or otherwise ingested by animals of all sorts, and lodge in their fatty tissue⁷³. PCB and POP concentrations

are higher in animals higher up the food chain. POP concentrations were first discovered in the Arctic in the 1970s, and once the correlation between production of POPs at lower latitudes and transport of POPs via air currents was established, POPs have become highly regulated and use has been reduced or eliminated.⁷⁴

But climate change may increase human exposure to contaminants. A shifting climate can change air and water currents that bring contaminants into the Arctic. Also, changes in ice cover and thawing permafrost appear to have contributed to increased mercury levels in some northern lakes. This results in more contaminants making their way into plants, animals, and ultimately humans.⁷⁵

Loss of traditional ecological knowledge

Traditional ecological knowledge is the knowledge obtained by a population living in close contact with native ecosystems on which it depends for survival. Traditional ecological knowledge (TEK) is a form of human capital – a set of knowledge and skills that makes harmonious and sustainable use of fish, game, medicinal and edible plants, and materials for dwellings, tools, boats, and other community infrastructure possible. It not only provides the foundation for livelihoods but also the inspiration for cultural and spiritual rituals and practices that honor nature as a provider.



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Sharing of frozen, aged walrus meat among Inuit families.



Factory supertrawlers are threatening the sustainability of Arctic fisheries.

As in most Indigenous regions of the world, growth of the formal economy is eroding Nunavummiut's TEK. A report by the Dene Cultural Institute provides a succinct statement of the problem: "The process of colonization has been of such intensity and duration in Canada that it is a source of wonder and inspiration that First Nations and Inuit have managed to maintain their distinct cultures and retain any Traditional Knowledge."⁷⁶ While hard to measure quantitatively, the loss of TEK is highly correlated with loss of Indigenous languages. Of Canada's 53 Indigenous languages, only three, Cree, Inuktitut and Ojibway are strong enough to be ensured survival into the next century.⁷⁷ According to the Assembly of First Nations, other aboriginal languages are at risk (66%), endangered (30%), declining (25%), or in a critical situation (11%).⁷⁸ Among the other factors that erode TEK is the fact that it is not included in formal education programs, and made irrelevant as Indigenous populations are removed from their lands and forcefully integrated into non-traditional forms of housing and economy.⁷⁹

Overexploitation of resources

Shortages of traditional fish and game loom tall as climate change unfolds, as commercial exploitation is ramped up, and as population grows in a development pattern that is inconsistent with the Inuit's more nomadic past. In an effort to conserve wildlife populations, the governments of both Canada and Nunavut

have imposed hunting limits on species like the narwhal. After a dramatic drop in the caribou population, the territorial government recently banned the caribou hunt on Baffin Island.

There are renewed concerns over unsustainable fisheries. A recent study published in the journal *Polar Biology* claims that the amount of fish caught in the

Arctic has been dramatically under-reported for decades. According to the research, 50,000 metric tons of fish were caught in Russian, Canadian, and US Arctic waters between 1950 and 2006 – 75 times higher than reported by the Food and Agriculture Organization of the United Nations.⁸⁰ A significant portion of this catch was made by factory trawlers, considered the most unsustainable form of commercial fishing ever

devised. Their presence undermines the perception that the Arctic is still a pristine frontier when it comes to fisheries.⁸¹

All this is exacerbated by the fact that Nunavummiut now mostly live in concentrated settlements — a development pattern that has resulted in over-exploitation of nearby hunting grounds and fisheries and made them more susceptible to changes in the distribution of species on the landscape. Iqaluit residents report that until about 15 years ago, "you could easily hunt caribou at the edge of the town." But a combination of factors including climate change and shifts in the populations of wild animals mean hunters now have to engage in costly travel in order to find the animals they need.⁸²

“ The process of colonization has been of such intensity and duration in Canada that it is a source of wonder and inspiration that First Nations and Inuit have managed to maintain their distinct cultures and retain any traditional knowledge.”
 – Aggie Brockman,
 Dene Cultural Institute



At ground zero for climate change, solutions must also help Nunavut adapt to rising seas, vanishing ice, and drastic changes in ecosystems.

Nunavut is at ground zero for climate change. While global temperature projections under a “business as usual” scenario range up to 6° C, in the Arctic, this is more likely to be 13° C or more.⁸³ And the disruptions caused by climate change are already unfolding as evidenced by a dramatic rise in the frequency and severity of wildfires, glacial retreat, melting permafrost, rising seas, warmer waters, and shifts in the abundance and distribution of key wildlife and fish species. In Nunavut, climate change poses a major threat to livelihoods. Climate change adaptation plans proposed by various communities of Nunavut share many common concerns, including:⁸⁴

- Water and food insecurity
- Public health, safety and emergency management concerns due to changing temperatures and extreme weather patterns
- Infrastructure and housing concerns due to sea level rise, flooding and permafrost melt and subsidence
- Changes in animal, fish, insect and bird migrations and their effects on hunting, fishing, and disease vectors
- Potential loss or dramatic change in traditional knowledge and culture

Water and food are among the top daily concerns for everyone. Without water or food security, survival is not assured. Water accessibility and quality is a serious concern for the Nunavummiut as the climate changes. Once impermeable sewage lagoons are thawing, potentially releasing contaminants into the water supply. Water infrastructure—piping and other methods of water delivery—is also at risk of damage due to permafrost melt.

The Nunavummiut habit of burying meat in frozen caches underground is a time-tested method of food preservation that is now no longer reliable. As the Arctic warms, these once permanently frozen caches are thawing, with the potential for an increase in food-borne diseases, botulism in particular. There are three adaptation strategies that are discussed in the various government reports to address this concern. One is to allow communities to continue to bury their meat, but with additional resources provided to allow for travel to destinations

further afield. The second is to provide for community freezers that all community members can access. And the third is to ensure a ready supply of medication and access to medical treatment to treat food-borne illnesses like botulism so that they don't become fatal.

Warm temperatures have other adverse consequences as well. Telephone and electrical poles are leaning precariously in the melting permafrost, risking power outages and reliable access to communications. Housing foundations are increasingly at risk of structural damages with changes in soil stability. Once frozen surfaces that undergirded roads and dumps are buckling and giving way to pooled water beneath. With greater precipitation caused by climate change comes more flooding. Better drainage from heavy downpours—once not a serious concern—has taken on a greater urgency.

Sea level rise is a concern with regard to existing wharves and other infrastructure near coastlines. Erosion from higher sea levels and stronger storms is causing the Nunavummiut to rethink where structures should be built and possibly relocating others.

The Nunavummiut are in need of different housing structures as well for several reasons. Housing that was once safe is no longer so—as it now lies within flood plains or near eroding coastlines. Higher temperatures mean the need for cooling and better ventilation is greater than before.

The extremely volatile weather means traditional ways of reading the weather are unreliable. The Nunavummiut are getting lost in storms, and no longer able to read the once permanent landmarks that marked their territory.



Heavier precipitation and rapid melting are taking their toll on Nunavut's infrastructure.

Changing weather patterns mean there is a greater need for education on extreme weather, how to prepare for it, and an increased need for urgent weather alerts and emergency responses. More precipitation has meant higher snowdrifts in Nunavut than before. With these snowdrifts come increased damages to manmade structures and greater expense in plowing to combat them.

As sea ice warms unpredictably, hunters and others are at greater risk of drowning accidents in the thinning ice. One adaptation measure that has been suggested for the Nunavummiut is greater access to floating snowmobile suits, and more life jackets, to better prepare for such accidents. Another adaptation measure: greater use of ice picks to test the ice. Some have suggested a local employment opportunity to address this risk – the manufacturing of ice picks from caribou antlers.

Climate change is also undermining the Nunavummiut's traditional ecological knowledge (TEK). As the once permanently frozen landscape thaws, markings that hunters and other Nunavummiut used to navigate their way have been lost or changed. Inuit elders, who traditionally used their skills to predict the weather, have observed changing cloud and wind patterns. Their weather and climate-related knowledge does not fit with today's weather conditions and patterns.⁸⁵ Unpredictable weather and climate has increased the risk of travelling on the land. This has made it very difficult for elders to pass along their weather prediction skills to younger generations. With changing weather patterns comes a greater need for wider dissemination of information on weather conditions, particularly emergency snow and ice conditions, and greater access to search and rescue equipment for all local communities to better care for themselves.

The changing landmarks mean there is a greater need for training around how to use GPS for hunters in order to avoid getting lost. Similarly, the Nunavummiut will need better access to high technology such as Radarsat images to better understand snow and ice conditions, as well as satellite phones for emergency situations.

Given the changing migration patterns of caribou and other traditional sources of meat, hunters are in need of better hunting tools—some of which may prove out of reach for individuals. However, access to hunting tools, such as pontoons for snowmobiles, and other expensive hunting equipment could be shared and used cooperatively. Insects are also increasingly expanding their range in Nunavut. Among the disease vectors that are growing with climate change are parasites that are increasingly

being found in caribou, which require greater awareness and new medical treatments for the community. All of this underscores the need to protect and restore TEK in order to maximize the chances of successful adaptation. In particular, there is a need for elders and other keepers of traditional culture to develop new stories to pass on practices of adaptation, to remind the youth and other Nunavummiut how they have survived in the past, and how they will continue to survive with new approaches to a changing climate.

Cultural identity is also being threatened by climate change as archaeological sites and cultural artifacts are exposed and lost. According to Nunavut's Climate Change Centre:

Heritage and special places in Nunavut are being affected by permafrost degradation and increased coastal erosion caused by the late freezing of sea ice. The cold Arctic climate helps preserve organic material frozen in permafrost. If the permafrost changes, it will ruin cultural remains and archaeological artifacts that were previously preserved. Ongoing freeze-thaw cycles promote the decay of artifacts such as sod houses (many of which hold their form because of permafrost) and other historical resources, such as sites relating to European exploration of the Arctic. Naturally occurring coastal erosion is expected to get worse as sea levels rise. This will threaten historic sites on southern Baffin Island, northern Victoria Island and the western high Arctic islands, where little archaeological surveying has been done.⁸⁶

Despite these adverse effects, climate change may present new opportunities as conditions become more favorable for certain species and for economic uses such as tourism and navigation. Change in migration patterns of caribou and other animals, and the introduction of new mammals, birds, and fish coupled with better ice-free access may mean new economic opportunities for hunting and fishing and for expanded hunting-related tourism, while also requiring new and expanded licensing for hunting these new species. As sea ice has shrunk, polar bear activity has increased across Nunavut, with bears seeking food from community dumps. The close proximity of bears presents both a risk in terms of the safety of residents, and an opportunity for tourists to witness these large mammals that once were rare in these communities.

IV

A prosperous path forward can be guided by the framework for sustainable development embraced at Rio+20 and reflected in the UN's Sustainable Development Goals.

For decades, the international community of nations has coalesced around a vision for sustainable development that remedies inequities of the past, provides all people with access to the resources they need to thrive, and reverses the degradation of ecosystems and the global climate. The most recent iteration of this vision is embodied in “The Future We Want,” the outcome document from the Rio+20 United Nations Conference on Sustainable Development.⁸⁷ The Rio+20 process also set in motion a process to articulate a set of Sustainable Development Goals (SDGs) to implement the Rio+20 vision and replace the Millennium Development Goals, which expired in 2015. In September of 2015, the UN General Assembly adopted resolution 70/1 — “Transforming our world: the 2030 Agenda for Sustainable Development” — that enumerated 17 SDGs as well as targets and indicators to track progress. The Canadian government has firmly embraced the outcomes of both the Rio+20 and SDG processes, and because of this, they provide a rich framework for guiding future development of Nunavut.

Rio+20: The Future We Want

The outcome document itself was negotiated over a 3-year period and contains over 283 numbered paragraphs organized into six broad sections that (I) articulate a common vision; (II) renew commitments to previous frameworks; (III) define a green economy in the context of poverty eradication; (IV) identify institutions needed to advance sustainable development; (V) provide a framework for action and follow up, and (VI) discuss means of implementation. A list of the thematic elements included in section V are among the most important results of the Rio+20 process because they identify where interventions are likely to be most beneficial. The thematic elements most relevant for Nunavut's situation include:

- Poverty eradication
- Food security, nutrition, and sustainable agriculture
- Clean and stable water supplies
- Access to sustainable modern energy services

- Sustainable tourism
- Universal access to quality health care
- Promoting full and productive employment, decent work for all and social protection
- Conservation and sustainable use of the oceans
- Reversing deforestation and forest degradation
- Disaster risk reduction
- Adaptation to climate change
- Conservation of biological diversity
- Sustainable consumption and production
- Universal access to quality education
- Gender equality and women's empowerment

This lengthy list of thematic areas is most useful for evaluating the success or failure of economic development policies, programs, and projects. In particular, a successful intervention would simultaneously advance goals and targets developed for as many of these thematic elements as possible.

The outcome document also acknowledges the imperative of preserving and restoring Indigenous cultures, lifestyles, and economy. For example, an important condition placed on policies to promote the green economy is that they should:

Enhance the welfare of Indigenous Peoples and their communities, other local and traditional communities and ethnic minorities, recognizing and supporting their identity, culture and interests, and avoid endangering their cultural heritage, practices and traditional knowledge, preserving and respecting non-market approaches that contribute to the eradication of poverty.⁸⁸

Preserving and enhancing traditional Indigenous knowledge is critical, and is viewed not only as a tool for maintaining cultural cohesion but also for protecting a knowledge base that can help the rest of the world conserve biodiversity and its benefits for human wellbeing. In particular, the outcome document recognized that “the traditional knowledge, innovations and practices of Indigenous Peoples and local

communities make an important contribution to the conservation and sustainable use of biodiversity, and their wider application can support social well-being and sustainable livelihoods.”⁸⁹

Sustainable Development Goals

The 17 SDGs adopted by the UN closely track the thematic areas addressed by the Rio+20 outcome document.⁹⁰ Goals were developed for poverty, hunger, health, education, gender equity, clean water and sanitation, energy, employment, infrastructure, inequality, cities, production and consumption, climate change,

oceans, terrestrial ecosystems, peace and justice and global partnerships. But unlike the Rio+20 outcome document, the SDGs provide a quantitative basis for monitoring progress. Most SDGs contain several quantitative targets and a date for achieving them.

Table 4, below provides an illustrative list of sustainable development goals and sample targets. As made clear by Table 4, many of the goals and targets are of direct relevance to the social and economic challenges facing Nunavut and, as such, are extremely useful as a way to screen and prioritize sustainable development policy interventions.

Table 4: Illustrative Sustainable Development Goals and Sample Targets

<p>Goal 1: End poverty in all of its forms everywhere</p> <ul style="list-style-type: none"> ■ Target 1.1: By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than \$1.25 a day. ■ Target 1.2: By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions.
<p>Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture</p> <ul style="list-style-type: none"> ■ Target 2.1: By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round. ■ Target 2.3: By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, Indigenous peoples, family farmers, pastoralists and fishers.
<p>Goal 3: Ensure healthy lives and promote well-being for all at all ages</p> <ul style="list-style-type: none"> ■ Target 3.2: By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births. ■ Target 3.3: By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases. ■ Target 3.8: Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all. ■ Target 3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.
<p>Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all</p> <ul style="list-style-type: none"> ■ Target 4.3: By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university. ■ Target 4.4: By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship. ■ Target 4.6: By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.

V

Building human capital, renewable energy, Indigenous tourism and sustainable fisheries present opportunities to fully explore.

Future sustainable development in Eastern Nunavut can draw on successful case studies throughout the Arctic and in other places of the world where Indigenous communities and the global economy coexist. The Arctic Council, for example, has established a Sustainable Development Working Group (SDWG) whose goal is to propose steps Arctic States can take to advance sustainable development in the Arctic, including opportunities “to protect and enhance the environment and the economies, culture and health of Indigenous Peoples and Arctic communities, as well as to improve the environmental, economic and social conditions of Arctic communities as a whole.”⁹¹ The SDWG maintains a rich library of case studies that can provide a blueprint for success in Nunavut.

While the SDWG and other organizations have identified many discrete sectors to consider, below, we concentrate on four that address the thematic elements identified during the Rio+20 process, help achieve goals and targets of the SDGs, and are otherwise responsive to the social, economic, and climate challenges facing Nunavut. We hope that the sector-specific recommendations we make in this report also become part of the greater “blueprint for success in Nunavut.” The sectors include human capital, renewable energy, Indigenous tourism, and sustainable fisheries. The following sections discuss opportunities in each of these sectors along with examples of policy interventions that help establish the enabling conditions for these sectors to thrive.



© Aaron M Lloyd

Iqaluit from Joamie Hill

Key Sector 1: Building Human Capital

From a socio-economic standpoint, human capital consists of the knowledge and skills present in a given population as well as states of mental and physical health that facilitate its use in the pursuit of individual and social wellbeing. In the modern economy computer skills, for example, are an important manifestation of human capital:



Reading patterns in the ice is becoming more difficult as climate changes.

Your ability to work with computers is one of your individual productive capabilities. These capabilities depend not only on your knowledge, education, training, and skills; they also include useful behavioral habits as well as your level of energy and your physical and mental health. All of these aspects of human capital have some component of inherited characteristics, but they must also be created and enhanced through nurturance, education, and other aspects of life experience.⁹²

In many Indigenous societies, important forms of human capital include traditional ecological knowledge (TEK) acquired over thousands of years and skills associated with preparation and consumption of foods, medicines, and building materials hunted, fished or gathered in the wild. Human capital in both the formal market and traditional spheres are critical to Nunavut's future. Nunavut's 2010 Economic Outlook underscores this point:

Human capital is the overall capacity in terms of health, knowledge, education, and skills of people to be productive whether they are participating in the wage economy, active in the land-based economy, volunteering or supporting the family, or pursuing education (traditional or western) or training opportunities.⁹³

Among strategies for eradication of poverty and reducing inequality, investment in human capital is essential. As noted by Thomas Piketty, “[k]nowledge and skill diffusion is the key to overall productivity growth as well as the reduction of inequality both within and between countries.”⁹⁴ Acquiring human capital through either formal or traditional educational systems can be “the most effective way for able young people of poor backgrounds to rise in the economic hierarchy, because human capital is the main asset of 90% of the population.”⁹⁵ Strategies to build human capital in Nunavut can take several forms, including:

Protecting and restoring traditional ecological knowledge (TEK)

As noted in Section I, research shows that the vast majority of Nunavummiut prefer a mix of formal sector employment and subsistence activities and depend on subsistence meat and fish for their primary protein source (Table 1). But the requisite TEK and skills needed to keep subsistence as an important source of livelihood must be deliberately protected and restored as a matter of public policy rather than ignored or — worse yet — ostracized. Otherwise, active TEK may slip into dormancy (persisting in memories, written texts, or oral traditions but not used), and, eventually extinction,⁹⁶ especially as climate change alters the landscape in unpredictable ways. Protecting and restoring TEK is not only critical for sustaining livelihoods, but can be an important tool for reversing cultural alienation and its attendant effects on mental health, and suicide.⁹⁷ Policy interventions that could be considered include:

TEK 1

Knowledge inventory.

The need to preserve and utilize TEK in Nunavut has been well established, for example, as a strategy for sustainable management of wildlife.⁹⁸ TEK could be comprehensively inventoried as soon as possible at the community level throughout Nunavut through onsite interviews with willing informants and other best practices including questionnaires, facilitated workshops, collaborative field projects, and review of historical documents. Protocols for these are well developed.⁹⁹ It should be clear that the inventory is not being conducted for any purely academic or historical purpose; rather, it should be collected primarily for the purposes of facilitating its dissemination to Nunavut's Inuit youth.



Arctic char are among country foods prioritized in Nunavut's food security initiatives.

TEK 2

Dissemination and training.

Inuit societies, as others in the Indigenous world, rely on oral transmission for passing on TEK to the next generation. However, a more deliberate system designed to preserve and enhance TEK could include online resources, curricula, and educator training. The Alaska Native Knowledge Network presents a working model by providing resources for compiling and exchanging information related to Alaska Native knowledge systems and ways of knowing.¹⁰⁰ They provide cultural atlases and talking maps, cultural resources (such as dictionaries and study guides), books and other publications, curricula and links to native educator associations.

TEK 3

Technological enhancements.

One strategy for preserving and restoring TEK is to enhance its use with technology. For example, in 2006 researchers initiated The Iglinit Trails project to gather records of weather conditions and other observations made by Inuit hunters and travellers. The project used this information to study changes in ice cover and how these changes affect Inuit communities. The project mapped travel routes using integrated snow machine-mounted GPS/mobile weather station/palm pilot technology.¹⁰¹

Improving formal educational attainment (ED)

As discussed earlier, Nunavut ranks last nationwide in many measures of formal education such as graduation rates and literacy. For those who participate in the formal market economy and need the skills and training embodied in formal education, tackling the barriers to greater educational attainment is critical. But formal education in Nunavut needs to be respectful and complementary to traditional educational systems. There have been many proposals and programs initiated to maintain this balance while dramatically improving educational status overall. Many of these are reflected in programs administered by Nunavut's Department of Education pursuant to the Education Act of 2008. A 2013 Auditor General of Canada analysis included a series of recommendations for bolstering effectiveness of the Department's programs.¹⁰² Three of the most salient from the perspective of human capital and sustainable development and which provide a potential role for policy interventions and by NGOs are paraphrased here:

ED 1

Teacher training on differentiated instruction.

An important component of Nunavut's formal education strategy is differentiated instruction – instruction that ensures each individual student's learning style, strengths, and needs are met through adapting what is learned, how it is learned, or how learning is assessed. But training for this type of approach is lacking, and so the Auditor General recommended that the Department provide mandatory training on differentiated instruction and related ongoing assessments to all Nunavut teachers and student support assistants. Achieving this goal could involve outside organizations, such as education-oriented NGOs.

ED 2

Bilingual resources.

The 2008 Education Act sets a goal of bilingual education for all students by the 2019-20 school year, including an Inuit language and either English or French. The goal is to produce graduates who are able to use both an Inuit language and English or French competently and thus take maximum advantage of economic opportunities in both the Indigenous and formal market sectors. But bilingual education goals are not being met, and so the Auditor General made a series of recommendations to address this gap, including the production of adequate bilingual

teaching resources. The Department is committed to adapting teaching resources from other jurisdictions to meet Nunavut's cultural and linguistic priorities. This could represent another area of fruitful intervention from NGOs and educators in other regions. The Nunavut Bilingual Education Society provides a working model.¹⁰³

ED 3

Student support

Individual student support is provided through individual student support plans (ISSPs) and a Student Information System (SIS) to monitor progress towards achieving goals. Monitoring this information has been difficult, however, and so the Auditor's report emphasized the need to track progress and assess effectiveness of the ISSPs. The Department recognizes that students also need support at home, given the numerous social and economic challenges Nunavut households face. To this end, the Department will be collaborating with the provincial departments of Health and Family Services to create guidelines for addressing issues and services for students requiring additional support that the school system cannot provide.

Protecting public health and promoting food security (PH)

Investing in community health and food security in Nunavut is one of the most important strategies for enhancing education and skills because poor health and hunger impede their uptake. The major health threats associated with indoor air pollution, persistent organic pollutants (POPs) and hunger were discussed in Section II. Some recommendations for addressing these concerns include:

PH1

POP outreach and education.

The Canadian Government began working with Aboriginal groups through the Arctic Environmental Strategy and the Northern Contaminants program in the early 1990s to inform them of the risks of POP contaminants in the environment, but messaging has been mixed and many inhabitants are still confused as to what they should do to limit POP consumption. Overall, knowledge about the effects of POPs is still spotty at best in many Inuit communities throughout Nunavut, and greater efforts must be made to clarify what residents should do to minimize exposure and transmission of contaminants to their children.

PH2

Home health options.

By restricting smoking to outdoors, sealing wood stoves, increasing immunization against influenza viruses, and improving indoor ventilation, risk of lower respiratory infection can drop significantly in Nunavut households. Health education (including tobacco use) and financial assistance to households for retrofits are important policy interventions to consider. In addition, a report by Dr. Anna Banjeri of St. Michael's Hospital in Toronto recommends administering a vaccine proven to reduce RSV infections, palivizumab, to infants at six months of age.¹⁰⁴ The vaccine is prohibitively expensive, costing nearly CAN \$7000 per child, but as Dr. Banjeri argues, public financing for these vaccinations is cheaper than paying for medevac and hospital costs when children get sick from RSV in their first year.

PH3

Nunavut Food Security Coalition recommendations.

In May 2014, after more than two years of research, the Nunavut Food Security Coalition released its action plan for reducing hunger and promoting food security. Seventy percent of all Inuit households are food insecure and Nunavut's food strategy promotes sealing, caribou hunting, and other traditional Inuit foods in order to more successfully address the food security crisis in Nunavut.¹⁰⁵ The recommendations were comprehensive, ranging from broad country food initiatives (more infrastructure for hunters; sustainable commercialization of traditional foods) to specific local changes (improving grocery store layouts to promote healthy choices; reintroducing home economics in schools so students can learn how to prepare healthy food). In another report on the Nutrition North program, released in March, the coalition's 15 recommendations included raising the subsidy for cooking staples like flour and oils and adding a subsidy for nutritious dehydrated options in all four food groups.



© Ansgar Walk

Connectivity for all (CA)

There are widespread deficits in access to modern telecommunications infrastructure throughout Nunavut creating a digital divide with the rest of the country.¹⁰⁶ This deficit, in turn, impedes the delivery of education services to remote Northern communities. The territories' limited broadband telecommunications facilities restrict their citizens' ability to participate in the digital economy or take advantage of innovative applications such as E-learning. Given that new human capital skills, such as problem solving in technology-rich environments, depend on access to adequate computing infrastructure and connectivity, many remote Northern and Indigenous communities continue to lag behind.



The necessary response to Nunavut's connectivity challenges has been outlined in a strategy developed by Nordicity Group Ltd. for the Northern Communications Information Systems Working Group of the Government of Yukon in 2014. Policy recommendations, which are relevant not only in Nunavut but throughout the Arctic include (1) setting a target broadband speed; (2) calculating the cost of backbone upgrades; (3) developing a sustainable financial model to attract service providers; (4) measuring the economic and socio-economic impact of investments, and (5) implementing an action plan for change.¹⁰⁷

Of these, we believe recommendation "4" may be the most important initial step from a sustainable development perspective since it will allow the government of Nunavut to evaluate the broad socio-economic returns associated with public investments in communications infrastructure regardless of whether for-profit service providers take an interest. We thus recommend it as a human capital development policy intervention to explore:

CA1 Socio-economic impact of achieving connectivity for all.

As described by Nordicity, this analysis would "quantify the economic and socio-economic impact of delivering increased megabits per second (mbps) to underserved communities, by examining the impact of increased GDP and jobs resulting from better services, and additional income from an increased tax base and consumer surplus."¹⁰⁸

CA2 Training programs for information and communication technology professionals (ICT).

We also endorse public and private partnerships to scale up training for information and communication technology professionals, which are in short supply throughout Nunavut at all levels ranging from entry-level support to senior network administrators.

Key Sector 2: Renewable Energy

Nunavummiut are suffering from a wide array of social, economic, and public health problems, problems with cumulative consequences, particularly for teenage males, where suicide rates are highest. Indoor air pollution and poor diet is causing high rates of morbidity and mortality for infants. As researchers have noted, with these problems at the forefront, dealing with whether or not to install renewable energy in a community seems superfluous. As one Nunavummiut put it: “The major challenges [in Nunavut] are not related to renewable energy. The major challenges are related to the fact that the overall challenges in the communities are so significant for the most part that you have to get through a pretty long list of pressing priorities before energy is going to rise to the top of the heap.”¹⁰⁹

Yet these issues are intertwined. The high price of diesel means other government subsidies for priorities — such as education and public health — are short-changed. With little opportunity for gainful employment in their communities, still reeling from the cascading consequences of cultural genocide inflicted on generations of their forebears, with sexual and physical abuse playing out in their lives, and suicide a regular occurrence in their communities,¹¹⁰ the youth of Nunavut are understandably hopeless. Their parents

spend a disproportionate amount of their income paying for food and paying to heat their homes.¹¹¹ The way to break apart these intertwined issues is to focus on energy and food sovereignty. By focusing on greater food sovereignty, Nunavummiut could reduce the amount of money they spend on food. By focusing on energy self-reliance, Nunavummiut could become energy independent. By simultaneously addressing both issues, and by empowering the Nunavummiut to help themselves, the biggest single expenditures for residents could be lessened, allowing for more disposable income.

The best place to start implementing these changes is with the youth of Nunavut. Nunavummiut youth will require educational resources to learn how to best empower themselves and their communities. And to empower the youth, one must empower the schools and the teachers in those schools with the training, the technology and the tools to teach the next generation of electrical engineers, technicians, and architects how to build a clean, safe, healthy energy future for all people of Nunavut.

As Chris Henderson writes in his book, *Aboriginal Power: Clean Energy and the Future of Canada's First Peoples*, “Power” is relevant in many ways. It refers to the power we need to light our homes and heat our schools.



Workshop on Solar Panels Installation in Clyde River. Lootle Arreak (in red) and Esa Quillaq (in camouflage) speak with Vancouver Renewable Energy Coop Solar Installer, Duncan Martin about solar panels, at Clyde River community centre. Greenpeace has come to deliver solar panels and offer a series of lectures and workshops in Clyde River.

© Greenpeace

It recognizes the power of governments, businesses and utilities to advance sustainable energy. Meanwhile, it demonstrates the power held by First Nations, Métis and Inuit communities to develop the power embedded in our rivers and forests, and in the wind that ruffles an eagle's feathers. It acknowledges the power these communities are gaining as their confidence is spurred on with the success of each new aboriginal clean-energy project. Furthermore, Indigenous Power addresses the power that comes when a nation's progress is truly based on the ideals of fair play, justice and equal opportunity for all."

This section reviews challenges Nunavut has faced deploying renewable energy in the past as well as exciting prospects for the future.

Renewable Energy Challenges, Past and Present

Nunavut lags behind both the Yukon and Northwest Territories in renewable energy production and investment. Recent research¹¹² cites financial, capacity, and bureaucratic challenges as the main barriers to renewable energy development in Nunavut. There is a distinct lack of access to the capital required to invest in large-scale renewable energy projects that could provide power to multiple communities in Nunavut. The initial costs of many renewable technologies are beyond the capacity of the Government of Nunavut (GN), which is restricted in its ability to borrow for capital projects beyond a debt cap imposed by the federal government.¹¹³ Nunavut has also struggled to win federal funding for renewable energy projects, partially because it is unable to meet national funding requirements. For example, some Canadian grants require an energy audit and there are no licensed auditors in the territory.¹¹⁴ Renewable energy is also hampered by lack of training. Nunavut has some of the highest unemployment in Canada at 17.4%. And because Nunavut communities are small, many people do more than one job and fill more than one role. This makes it difficult to add new technologies that require training and personnel for routine maintenance.

“The major challenges [in Nunavut] are not related to renewable energy. The major challenges are related to the fact that the overall challenges in the communities are so significant for the most part that you have to get through a pretty long list of pressing priorities before energy is going to rise to the top of the heap.”

– McDonald, Nicole C.
and Joshua M. Pearce

Nunavut's lack of renewable energy projects can also be attributed to recent history. During the 1990s, when Nunavut was still part of the Northwest Territories (NWT), investment in renewable energy projects was directed toward the most densely populated regions—all of which were in the NWT. Therefore, when Nunavut became its own territory in 1999, there were no active projects and no renewable energy investments in the territory. While renewables in the Yukon and the NWT comprise well over 80% of those territories' energy profiles, Nunavut relies on diesel fuel for 99.94% of its energy, including electricity and transportation.¹¹⁵

Dependence on diesel comes at a high price. Nunavut residents pay electricity rates ranging from \$0.52/kWh to \$1.02/kWh, or at least five times the rates for residents of southern Canada.¹¹⁶ The Government of Nunavut spends 20% of its annual budget on energy — about \$50 million per year.¹¹⁷ Energy in Nunavut is generated by the Qulliq Energy Corporation (QEC), a regulated public monopoly, which operates 26 diesel power plants, one in each Nunavut community throughout the territory. QEC is owned and operated by the Government of Nunavut and regulated through the Ministry of Energy. QEC supports a number of energy efficiency programs, which are vital to reducing electricity costs to consumers, but the corporation has not made any significant progress in displacing the territory's fossil fuel use, which totals almost 200 million liters annually.¹¹⁸ Diesel for Nunavut is purchased in bulk in the summer to be used for the entire year.

While the cost of energy in Nunavut is far higher than elsewhere in Canada, and the consumption of diesel roughly twice that of other regions of Canada, “the Nunavut government pays roughly 80 percent of all energy costs in the territory, much of this through direct or indirect subsidies.”¹¹⁹ Most of Nunavut's housing stock is owned or leased by the Nunavut Housing Corporation (NHC), which provides roughly 70% of the housing in Nunavut.¹²⁰ Nearly all housing expenses are covered by the NHC. As a recent report for the Standing Committee on Energy, Environment and Natural Resources points out: “The average annual

operating cost per unit is \$24,800, of which electricity accounts for 20% and heating fuel (diesel), is 15%, of total cost per unit... NHC's social housing clients pay 6 cents per kWh, a highly subsidized rate for electricity that is not enough to influence energy efficiency or conservation behavior. Also, many NHC clients are on social assistance and, therefore, the government ultimately pays the power bill.¹²¹

Should the QEC shift to less polluting renewable forms of energy, their hefty subsidy for diesel-fired power would suddenly disappear, with no subsidy for maintenance and energy efficiency of renewable energy.¹²² A better approach, experts suggest, would be to engage both the government of Nunavut and Nunavummiut in a cost-sharing approach: Rather than subsidies targeted only at diesel, the Canadian government should incentivize greater energy efficiency and renewable energy by providing a flat subsidy, regardless of the energy option chosen, allowing both end consumers and the government of Nunavut to calibrate how best to ensure the energy needs of Nunavut are met at a fair price and sustainably.

Though current figures are not available, the Government of Nunavut spent approximately 20% of its annual budget on energy in 2005-06. Over two-thirds of Nunavut's energy use is consumed in transportation and heating. A September 2007 report from the Nunavut Minister of Energy found that 40% of petroleum products are consumed for transportation, 37% for heating (including hot water), and 23% for electricity.¹²³ Should Nunavut produce more than enough renewable energy, however, it could begin to make a dent in the region's consumption of diesel for transport and heating, the lion's share of its diesel consumption.

McDonald and Pearce (2012) contend that Nunavut requires a full life cycle economic analysis of renewable energy before sound investments in particular technologies can be made. In 2016, the World Wildlife Fund produced a report that takes significant steps toward this goal of a greater life cycle analysis of Nunavut's renewable energy potential.¹²⁴ Analyses of this kind might help persuade QEC to invest in renewable energies, even though they are currently in the process of updating most of Nunavut's mature diesel power plants, 17 of which have reached the end of their initial lifespans.¹²⁵

A pre-feasibility study, *Renewable Energy Deployment in the Canadian Arctic*, was released in May 2016 by the University of Waterloo (UW) and the Waterloo Institute for Sustainable Energy (WISE) on behalf of

the World Wildlife Fund – Canada.¹²⁶ In the pre-study, authors Das and Canizares employed a rubric which included criteria such as: reduction in CO₂ emissions; aerial access; operations and maintenance cost saving compared to renewable energy installation costs; maximum renewable energy penetration; and diesel generators which require updating. The results of the UW/WISE study are both promising and ground-breaking. Das and Canizares indicate that substantial reduction in CO₂ emission can be achieved at relatively low initial investment costs, and at least 35% renewable energy penetration can be achieved for at least four communities in Nunavut at a minimum cost of \$7.8 million each, while avoiding the purchase of a new diesel generator.

Promising solutions are already in the works. For example, Indigenous and Northern Affairs Canada supports the ecoENERGY program, which was funded 2011-2016 to distribute grants to Aboriginal and Northern communities to develop renewable energy projects that reduce GHG emissions. The ecoENERGY program only supports proven and commercialized technologies and prioritizes off-grid communities. Community-wide projects must project to offset at least 4000 tons of GHGs over 20 years to qualify.¹²⁷ There are five active grants in Nunavut under this program including two solar projects (Iqaluit and Kugluktuk); one hydro pre-feasibility study (Pangnirtung); QEC's wind feasibility study; and a building retrofit project in South Baffin.¹²⁸ So the potential has been clearly demonstrated. The challenge now is to take these solutions to scale.

Strategies for Scaling Up Renewable Energy Solutions

The renewable energy potential in Nunavut is limitless—the only constraints are capital investment and the ability of local communities to construct, repair and maintain the equipment. Hydropower potential is enormous in Iqaluit, for example, yet the cost of constructing a large dam for a population of less than 7,000 people, the largest city and the capital of Nunavut, is prohibitive. Wind power in Iqaluit could provide for at least 35 percent of the capital city's energy needs¹²⁹. Yet the Canadian government is currently investing in a waste-to-energy scheme in Iqaluit, despite Iqaluit's impressive potential wind resources. Solar, too, could provide a significant portion of every home and building's heating and electrification. Solarwalls® on large municipal buildings should be a part of every school and every community center. Strategic areas of focus for renewable energy policy interventions should include:

Renewable energy in the schools (RS)

A recent report by the U.S. Department of Energy reveals the many ways in which schools can save money with renewable energy and energy efficiency, and how to secure the financing to do so.¹³⁰ A similar program exploring options from a Nunavummiut perspective could prove extraordinarily useful for the students, teachers and people of Nunavut. As of 2007, the GN was developing and planning to introduce a curriculum to introduce children in kindergarten through grade 12 to an Arctic-specific energy and energy efficiency curriculum.¹³¹

Determining which communities are the most promising for wind, tidal and solar power, a program to bring these technologies and appropriate curriculum to the schools of Nunavut would ensure teachers have the materials to train the next generation to become more energy self-reliant. Two replicable strategies for integrating renewable energy into the schools include:

RS1

Teacher training and curricula.

A program called “Kidwind,” was developed by a sixth grade science teacher in Minnesota, who wanted to teach his kids about wind energy but couldn’t find anything affordable to do so. He started with tinker toys, and grew from there. He now has a program that trains teachers around North America, reaching out to tens of thousands of school kids each year. Another program called “Wind for Schools” has produced similarly successful results in the U.S. A similar program for solar power in the schools, run by Bonneville Environmental Foundation, works to both install solar power in schools and train teachers in how to teach kids about solar power.

RS2

Achieving food and energy security together.

Hydroponic food is an emerging industry in the Arctic. Whether grown in floating harvesters in the sea or on land, or in large repurposed shipping containers lit with growlights, this emerging technology shows great promise for greater food self-reliance for the Nunavummiut.¹³² Four schools in Alaska have begun to use the waste heat generated by biomass burners to heat schools to heat greenhouses, thereby producing both food and jobs in the greenhouse for school children, while training students in proper nutrition and providing them with useful skills. Another ten schools are considering following suit.¹³³ Excess food is sold to the local community, as part of a student-led business. In addition to vegetables, some schools are beginning to experiment with raising chickens,

whose droppings fertilize the crops, while providing an important source of food—eggs and meat. Some students are even beginning to manage their own restaurants for the local community.¹³⁴ When coupled with renewable energy, developing curricula and providing resources for schools to teach students to grow hydroponic food in Nunavut communities could result in both greater health as well as important food sovereignty skills and overall economic wellbeing for Nunavut. Given the rates of hunger, poor nutrition and ill health for Nunavummiut, determining the most economically viable path toward greater energy and food sovereignty and self-reliance is a promising way forward out of an otherwise bleak future for the region. In the interim, the Canadian government must ensure that it lives up to the Rio+20 goals of ending hunger and ensuring access to safe, nutritious and sufficient food all year round for the Nunavummiut by 2030, with an immediate focus on providing adequate nutrition to infants, children and youth in schools.



Kugluktuk High School, Nunavut.

Wind power projects and prospects (WD)

Nunavut's early endeavors into wind generation were not met with great success but prospects for wind development have recently improved significantly due to better design of turbine technologies to withstand arctic conditions. Several wind turbines were installed throughout Nunavut in the late 1990s and connected to the local grid. However, the turbines were each decommissioned in the early 2000s after falling into disrepair.¹³⁵ A 50kW wind turbine in Rankin Inlet, for example, displaced 40,000 liters of diesel each year,¹³⁶ but the installation was difficult to maintain and didn't reduce electricity costs for customers as expected nor offset its initial construction costs during its lifetime.¹³⁷ Future prospects are encouraging, however. A few promising case studies:

WD1

Wind-hydrogen-diesel.

In the coming years, QEC is hoping to upgrade the diesel facility at Cape Dorset by installing a wind-hydrogen-diesel generation plant, in which wind energy could be stored in hydrogen fuel cells and diesel would serve as the emergency back-up system. The plant would be used to heat water and buildings in the community and as of February 2016, the site for this plant has been selected.¹³⁸ Now sited, the new plant is in the planning stages and was two years out from breaking ground as of February 2016.¹³⁹ Taufik Haroon, chief engineer for energy management at QEC, explained that while the hybrid system for the Cape Dorset plant is not going to be included in the initial construction upgrade, the plant is being designed in such a way that a wind-hydrogen component could be added as part of a retrofit in the future.¹⁴⁰

WD2

Wind energy study.

Additionally, QEC released a wind energy study of Nunavut communities in May 2016, which estimates that equity payback is feasible within a 25-year span for 17 out of 25 Nunavut communities, including a payback period of less than 10 years for five communities.¹⁴¹ The study, *Potential for Wind Energy in Nunavut Communities*¹⁴², was funded with a \$100,000 grant to QEC from the Canadian government.



WD3

Low temperature turbines.

In the QEC wind study, the authors cite two manufacturers that make wind turbines capable of operating at temperatures as low as -40°C: Enercon (based in Germany) makes large turbines, 2.3 MW and up, and Northern Power Systems (based in USA) makes a 100 kW wind turbine suitable for smaller villages. Models built by both manufacturers are being successfully maintained in numerous Arctic locations, including Enercon's 2.3MW E70 turbines at the Diavik Mines in Yellowknife, NWT installed in September 2012.¹⁴³

Solar energy

Today, Nunavut has a small number of solar installations. Given that populations are arranged in communities ranging in population from 148 (Grise Fiord)¹⁴⁴ to approximately 6,700 (Iqaluit)¹⁴⁵, the Territory is ideally positioned for the development of micro-grids supported by renewable energy resources. In 2007, Nunavut developed an energy strategy with a focus on clean and renewable energy solutions, but never followed up with an implementation plan.¹⁴⁶

The U.S. Department of Energy has found that low ambient temperatures improve the efficiency and increase the lifespan of solar modules and that the reflection of sunlight by snow also increases the output of solar installations.¹⁴⁷ It is projected that Chesterfield Inlet, Nunavut (on Hudson Bay) has an annual solar photovoltaic potential of 1158 kW-h/kW, which is more than many larger southern communities in Canada.¹⁴⁸

Solar projects in Nunavut have the potential to displace a significant amount of summer diesel use. Solar prices are falling to record lows. Solar energy has the advantage of being easily scalable so that small arrays can be installed with a relatively low capital investment. When communities collectively conduct solar assessments and purchase and ship solar equipment, solar power becomes even more affordable. Given Nunavummiut cultural biases in favour of collectives, such an approach to purchasing and disseminating solar power may be both more culturally appropriate and economical for a community. Because solar energy is versatile, it also lends itself to larger centralized projects such as the 136 kW solar/battery/diesel project in Colville Lake.¹⁴⁹ Here are a few promising kinds of solutions that could serve as templates for the future:

SL1

Solar schools.

A community solar project installed 20 years ago at the Arctic College in Iqaluit, Nunavut produces 3kW and is able to power one classroom each year. The aging panels are still operating at 75% efficiency.¹⁵⁰

SL2

Power plant conversion.

Earlier in 2016, QEC installed 11 solar panels on their own plant in Iqaluit and connected the 3kW installation to the grid.¹⁵¹

SL3

Community buildings.

In late 2015, Vancouver Renewable Energy Co-Op conducted a solar assessment in Clyde River on behalf of Greenpeace Canada. Four options for grid-tied, distributed solar pilot projects were advanced. The final project selected was a 6.6 kW, 27-panel solar array on the Clyde River Community Hall to be completed in August 2016.¹⁵²

SL4

Solarwalls®:

Solar thermal applications have also been installed in Nunavut. In 2010, the Nunavut government (GN) developed four pilot projects in Iqaluit: a Solarwalls® system which uses the sun's energy to preheat ventilated air, and solar domestic hot water systems at three government facilities in the area. A Solarwalls® project at a high school in Rankin Inlet was installed in 2002 and continues to cut the school's energy bills to this day.¹⁵³



Iqaluit's Arctic Winter Games arena complex gets solar panels.



Qikiqtani General Hospital

Hydropower potential

The Canadian Hydropower Association estimates that Nunavut has the technical potential for 4,300 MW of hydropower. However, the territory has no currently installed projects.¹⁵⁴ QEC was seriously considering a hydro project near Iqaluit, but the costs of a feasibility study and the capital costs of the project forced QEC to abandon the project.¹⁵⁵ The costs of building hydroelectric dam facilities have proven prohibitive for Nunavut. The territory is in talks to extend a transmission line from Churchill, Manitoba to the Kivalliq region of Nunavut, which would deliver cheaper hydropower electricity to the region. The project is expected to cost \$900 million and save GN \$40 million annually in diesel costs.¹⁵⁶ Outside of Nunavut, hydroelectric power is the most productive source of energy in Canada.

Ocean and tidal energy

Nunavut has some of the highest tidal energy potential in the world: projected at 30,000 MW across 34 potential sites.¹⁵⁷ Tidal energy has struggled to get off the ground outside of Europe, where a number of pilot projects are already in the water. Permitting, high construction costs, and technological uncertainty have hindered further development throughout North America. Nunavut has some of the largest tidal ranges in North America and many of its communities are located on bays, inlets, and along the coast — close to tidal resources. The Iqaluit City Council issued a formal support letter in 2014 for a tidal energy project in Frobisher Bay. However, the costs and uncertainty regarding the technologies available have deterred further investment in the project.¹⁵⁸

Energy efficiency (EE)

Canada supports a number of nationwide energy efficiency initiatives, some of which are specific to Northern communities. Achieving energy efficiency in Nunavut will help reduce the territory's extremely high energy costs and help make maximum use of new renewable energy resources. There are many policies and programs to achieve this end. A few examples of effective energy efficiency initiatives that could be scaled up include:

EE1

Personnel training.

The Distributed Generation for Remote Communities program at the University of Toronto is a federally funded program to train personnel (students) to integrate clean energy technologies into systems that serve remote Canada.¹⁵⁹ The Strategic Investments in Northern Economic Development (SINED) program is supported by the Canadian Northern Economic Development Agency and supports projects such as feasibility studies, technology enhancements, and personnel training. SINED was funded for \$40 million over 2014 to 2016.¹⁶⁰

EE2

Eco-efficient housing.

Nunavut's housing authority organized a competition for sustainable and efficient housing design. The winning design by Kott North provided maximum thermal efficiency, ease of construction, and the durability required to meet the climate and energy-efficiency challenges of Nunavut.¹⁶¹ Since the majority of housing in Nunavut is public, this project was an opportunity for the government to tap into private innovation and use it for the public good. In total, 142 of these housing units were built in 19 communities across the territory. Other energy efficient housing designs in Nunavut cut energy use by almost 50%, reducing oil costs by \$2,600/year per household. However, these designs have a hefty upfront cost of \$10,000.¹⁶²

EE3

Lifestyle changes.

SAVE 10 is an education program to train building managers, employees, and tenants to reduce their energy and water consumption. The program encourages employees and students to reduce their individual consumption of resources by as much as 10% by making small changes in their daily routines. This program has contributed to a cumulative savings of 62% in electricity consumption, 8% in water, and 28% in fuel oil. Over \$1.1 million in savings have been recorded via this program.¹⁶³

EE4

Eco-efficient public buildings.

The Nunavut Energy Management Program (NEMP) is an eco-efficiency program intended to reduce fossil fuel dependence as well as energy and water consumption, and increase energy awareness and community involvement. The first NEMP funded project is a pilot in Iqaluit, which included building upgrades and energy development for the government's 39 facilities in the capital. The pilot project is saving Nunavut \$1.2 million annually (a total savings of \$10.6 million over ten years) and employed local contractors and laborers – and at least 10% Inuit labor as required by Nunavut policy. The pilot project also installed two renewable energy projects: solar air heating and solar domestic hot water heating in a number of residential and commercial buildings.¹⁶⁴

Key Sector 3:

Indigenous Tourism

Indigenous tourism can be defined as a responsible tourism activity in which Indigenous people are directly involved through control, ownership and guidance over economic, cultural and natural resources, and where the tourism is part of a larger strategy of reinforcing or revitalizing political and cultural autonomy through intercultural encounters. Within this framework, several factors are paramount, which include respect for local cultures and their decision-making processes as well as community or local control over the social and natural resources involved.¹⁶⁵ Indigenous tourism shares much with responsible tourism, ecotourism, sustainable tourism and other forms of alternatives to destructive mainstream, mass tourism activities like cruise ships except it is in full control of Indigenous Peoples and enhances their culture and human rights. Some examples of Indigenous tourism in Canada include:

- Cape Dorset, Nunavut, is a center for Inuit sculpture, and with an enthusiastic and talented local community of artists — the population of Cape Dorset remains under 1,500 — created what became a worldwide market for Inuit art.
- Pangnirtung, Nunavut is famous for printmaking. With a population slightly larger than Dorset, but still under 1,500, Pang, as it's known, is on Pangnirtung Fjord, making it especially scenic, particularly in winter.
- Aurora Village, Northwest Territories is owned by Métis businessman and former premier Don Morin. Aurora Village operates tours to see the northern lights at its camp in Cassidy Point, just outside Yellowknife, NWT, that includes a restaurant and several heated tipis.
- Membertou Heritage Park, Nova Scotia — The Mi'kmaq are Nova Scotia's dominant band, and Membertou, which includes a museum on five acres, is the best place to learn about the people and their culture, past and present.
- Yukon River Time Out Tours is owned by Pat Van Bibber who is a mix of the region's two histories (gold prospector and Selkirk nation). Cruises run in June and July and cost \$1,000 per person.

The demand for Indigenous tourism is skyrocketing, and thus provides an important sustainable development option for Nunavut. Indeed, the Rio+20 process recognized that well-designed and well-managed tourism could contribute to the three dimensions of sustainable development, to job creation and to trade.¹⁶⁶ The United Nations General Assembly has approved the adoption of 2017 as the International Year of Sustainable Tourism for Development. The resolution recognizes “the importance of international tourism, and particularly of the designation of an international year of sustainable tourism for development, in fostering better understanding among peoples everywhere, in leading to a greater awareness of the rich heritage of various civilizations and in bringing about a better appreciation of the inherent values of different cultures, thereby contributing to the strengthening of peace in the world.”¹⁶⁷ Indigenous tourism fits cleanly within this vision.

Due in part to the work of Indigenous tourism organizations, tourism is becoming a major economic and cultural driver for Indigenous communities across Canada. The first major study of Indigenous (aboriginal) tourism in more than a decade points to the increasing importance, growth and sophistication of Indigenous tourism across Canada. According to the National Aboriginal Tourism Research Report for 2015, “Aboriginal tourism accounts for \$2.5 billion in gross economic output, \$1.34 billion in national GDP, \$817 million in wages and salaries and more than \$63 million in tax revenue to municipal, provincial and federal governments. The sector employs roughly 32,000 people, two percent of the entire Canadian travel sector workforce. The United Kingdom, Germany, United States and China are key markets for aboriginal tourism, with France, Indonesia and India showing positive growth.”¹⁶⁸ The report confirms economic impact is growing while investing in infrastructure, training and marketing remains critical.

Nunavut is sharing in this growth. According to the current Nunavut tourism strategy and the latest statistics (2011) tourism-related businesses generated more than \$40 million in revenue, and represented



Two narwhal surface to breathe within the proposed Lancaster Sound Marine Protected Area.

3.2% of the overall Nunavut Gross Domestic Product that year.¹⁶⁹ Accommodation and outfitting businesses alone employed 1,258 Nunavummiut. Of total travelers to Nunavut, 84% visited the Qikiqtaaluk region. The percentage of travelers visiting Qikiqtaaluk has increased steadily since 2006. Average spending among all travelers on a per-person/per-trip basis in a 2011 exit survey shows that the average traveler to Qikiqtaaluk spent \$4,558. For all travellers to Nunavut in 2011, 51% of spending was on airfare, 17% on accommodations, and 10% on food.

The most popular tourist destination among arrivals to Nunavut was Qikiqtaaluk (Baffin Island), home to the territory's capital, Iqaluit. Visitors to Baffin Island comprised 63% of all travellers to Nunavut while 11% visited the Kivalliq Region, 7% travelled to the Kitikmeot Region and the remainders were cruise ship passengers who visited a number of Nunavut towns during their journeys. Among the top activities in 2011 were cultural activities (shopping for art, visiting a museum or cultural centre and cultural experiences); business activities (attending meetings, conferences, educational or research activities); hard and soft adventure activities

(hiking, camping, kayaking or skiing); and visiting a park, heritage river and viewing wildlife.¹⁷⁰

Expanding Indigenous tourism is of significant interest to growing numbers of Inuit communities in Nunavut. If developed in a thoughtful and sensitive manner, it can have potential positive economic, cultural, and social impacts. But in order for this to happen, several barriers to future growth need to be overcome. According to the 2010 Nunavut Economic Outlook, the territory lacks quality tourism products, insufficient training for tourism operators, inadequate investment, and a lack of organizational capacity and coordination among tourism organizations.¹⁷¹ Therefore, policy interventions to achieve consistent, sustainable growth in the tourism industry include (1) supporting the creation of quality tourism products and services; (2) increasing education and training for tourism operators; (3) establishing effective models and support for community business development, and (4) strengthening the legislative and regulatory environment. It will also require sustained public investments in tourism infrastructure. Three of these strategies and sample policy interventions are discussed below.

Quality tourism products and services (QTP)

Nunavut Tourism is promoting its products as an Authentic Experience and is focusing its promotion on niche markets. But quality is key. As the tourism strategy notes, “[i]f Nunavut is to succeed as a destination of choice among travellers, our attractions, services and products must meet or exceed the standards of our domestic and international competitors, while retaining the qualities that make Nunavut a unique destination, including our Inuit culture and Arctic land.”¹⁷² Two categories of products and services fit this bill and are otherwise consistent with sustainable development criteria. They are thus included here as priority solutions to explore:

QTP1

Nature based tourism products and services.

Nunavut’s vast natural landscapes and marine ecosystems provide a stark contrast with the crowded and polluted environments found elsewhere in North America and Europe. As such, nature-based Indigenous tourism options are important to nurture through marketing, incentives, market research, and support for innovation. Arctic-wide, there is demand for a wide range of nature-based experiences including whale watching, northern lights/star viewing, dog sledding trips and trail riding, iceberg watching, fishing expeditions, biking tours and rentals, hiking, zip line, boating, canoeing, rafting, kayaking, hot springs, bird and other animal migration viewing, photography tours and classes, wild food foraging and education.

QTP2

Cultural tourism products and services.

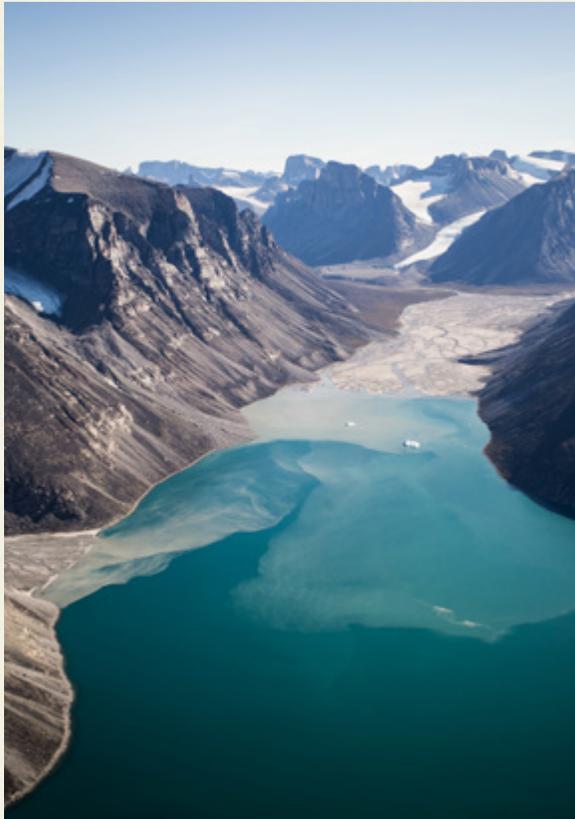
The Inuit in Nunavut have a rich culture, stretching back 4,000 years in their polar homeland. Their art, stories, songs, sealskin products, instruments and new forms of artistic expression often reflect their deep connection to the Arctic, the wildlife, the sea and each other. Many tourists are interested in Inuit culture and there are growing options to see and experience it. In fact, the arts economy is likely the most popular reason travelers make the long journey to Nunavut. Innovative projects such as those offered by Carvings Nunavut simultaneously provide support for artists and destinations (i.e. galleries) for travelers. Working very closely with the artists, “Carvings Nunavut offers the artists the tools, proper protection and the stone they require. Carvings Nunavut has numerous artists fly to Iqaluit and supplies housing and financial support for the artists while they produce their art.”¹⁷³



A piece by Elisapee Ishulutaq featured by the Uqurmiut Centre for the Arts and Crafts.

Education and training (ET)

A successful Indigenous tourism sector in Nunavut requires a pool of skilled operators educated about Nunavut's unique natural and cultural resources and capable of managing the detail-oriented work associated with planning itineraries, providing hospitality services, coordinating travel, promoting activities, advising travelers on required documentation, bookkeeping and administration of tourism businesses. Degrees and certificates offered by colleges and universities, community-based training, as well as onsite specialized technical and professional training are all promising strategies now being pursued. Examples include:



Sam Ford Fjord in Clyde River.

ET1 **Formal training programs at accredited colleges and universities.**

The Canadian Tourism College (CTC) of British Columbia provides a useful example that could be replicated in Nunavut. CTC was the first private

college in BC to offer Adventure Tourism Diploma training with a new focus on sustainable outdoor tourism. CTC finds that “[a]s travelers increasingly seek authentic interactions with nature and unique cultural experiences, qualified professionals are needed in the outdoor recreation, eco-tourism and adventure tourism industries.”¹⁷⁴ Ocean kayak guiding, river guiding, heritage interpretation, tour organizing, operation administration and educator and trainer are career opportunities they offer.

ET2 **Modular tourism training courses.**

Modular training courses such as Wilderness First Aid, Recreational Fishing Guide, Interpretation, and Tourism Business Management are now being distributed and promoted by Nunavut Tourism and its partners. The modules are now included in programs offered by the Nunavut Arctic College.

ET3 **Cultural industries projects.**

This is one of the three streams of financial assistance offered by the Community Tourism and Cultural Industries program of Nunavut's Department of Economic Development and Transportation (DEDT). This stream provides a mix of support to artists. Projects involve technical and professional production and support, supporting artists' knowledge of the tourist market's expectations, initiatives to develop markets for Nunavut's products and artists, youth engagements, residencies, mentoring and more.¹⁷⁵



Strategic public investments in tourism infrastructure (PI)

There are many public and private sector investments that can be made to enhance Nunavut's Indigenous tourism potential. According to Nunavut's tourism strategy, public investment totaled \$25.7 million in 2011-2012 and helped generate \$40 million in tourism sector revenues. This kind of return provides a solid basis for securing additional resources from public, private, and NGO partners. Investments in all kinds of tourism infrastructure such as marketing services and product packages, parks and protected areas on land and at sea, visitor centers and galleries are needed. Indigenous tourism is already benefitting from several strategic investment areas, including:

P11

Parks and protected areas.

Protecting unique elements of natural and cultural capital through designation and management of national parks, marine protected areas, territorial parks, heritage rivers, wildlife sanctuaries, museums and visitor centers is one of the most important policy interventions that can be made to bolster Nunavut's Indigenous tourism market. The tourism strategy recognizes that all of these designations provide opportunities for development of specific tourism products. Proportionally, Nunavut is fourth among provinces with the amount of land in protected status (10%), the first being British Columbia (14.4%). Expediting designation of the many protected areas being proposed — like the proposed Lancaster Sound Marine Protected Area — will help close this gap and provide the foundation for new opportunities in the Indigenous tourism sector.

P12

Community tourism projects.

This is the second financial assistance stream offered by DEDT's Community Tourism and Cultural Industries program. It involves strengthening Nunavut's natural advantage in cultural tourism by providing funding for new or upgrading arts and culture infrastructure, marketing community products and art-based tourism businesses, organizational support for the arts economy, and other technical and professional support.

P13

Cultural tourism projects.

This is the third financial assistance stream of the DEDT program. It involves planning, product development and improvements, marketing, marine tourism, tourism packages, improving local community visitor centers and visitor welcome experiences at airports and is also involved in community engagement.

Key Sector 4: Sustainable Arctic Fisheries

Fishing in Nunavut consists primarily of Arctic char and Greenland halibut, also known as turbot. Cod and northern shrimp are also caught to lesser extents. Fishing has always been a part of Inuit subsistence based living, but local consumption of these sea creatures is more important than ever in a time when food prices are high, and nutritious food options are limited.

Since the 1993 Nunavut Land Claims Agreement was signed, fisheries in Nunavut have been controlled by the Nunavut Wildlife Management Board (NWMB).¹⁷⁶ NWMB conducts research to track the health of animal species in the Arctic North, and sets the total allowable harvest quotas for land and sea creatures. Thanks to a subsection in the 1993 agreement, Inuit peoples are given priority fishing rights and access to traditional foods. This means that for any total allowable harvest quota the NWMB sets for wildlife in Nunavut, the Inuit have first pick and are guaranteed sufficient access to meet their personal and traditional needs.¹⁷⁷ The NWMB also seeks to approach fisheries management based on a combination of scientific knowledge and Inuit Qaujimagatuqangit (IQ), which includes Inuit beliefs, laws, principles, values, skills, knowledge and attitudes.^{178,179} By working in partnership with Inuit Elders and by

valuing traditional knowledge, the NWMB actively engaged with the Inuit communities of Nunavut in an effort to sustainably manage wildlife populations.

The total allowable harvest quotas for fish are imposed on all fishing companies operating in Nunavut. The largest is Baffin Fisheries, created in 2000 by five hunters and trappers associations across Baffin Island and four private businesses.¹⁸⁰ It operates four fishing vessels, and gained 100% Inuit ownership of its entire fleet in late 2015. Its goal is to consolidate Inuit-control over Arctic shrimp and turbot fishing in Nunavut's waters, in order to maximize the benefits the industry provides to local residents and to ensure the sustainability of the fisheries themselves.¹⁸¹ Other, smaller Inuit fishing businesses are supported in part by the Nunavut Development Corporation (NDC), whose mandate is to support local employment in Nunavut and which seeks to market their catches in the territory's twenty five communities.¹⁸² To maximize the livelihood benefits of scaling up sustainable fisheries in Nunavut, several policy options are proving effective, including scientific research, support for Indigenous-owned and operated companies and cooperatives, and changes in fishery management.



Arctic Grayling.

Commercial fisheries research (CF)

Efforts are underway in Nunavut to expand sustainable fishing practices and to adapt to the environmental changes being brought about by global warming in the region. Research on sustained yield catch levels, preferred habitats and prey, and sustainable fishing methods is critical. Examples include:

CF1

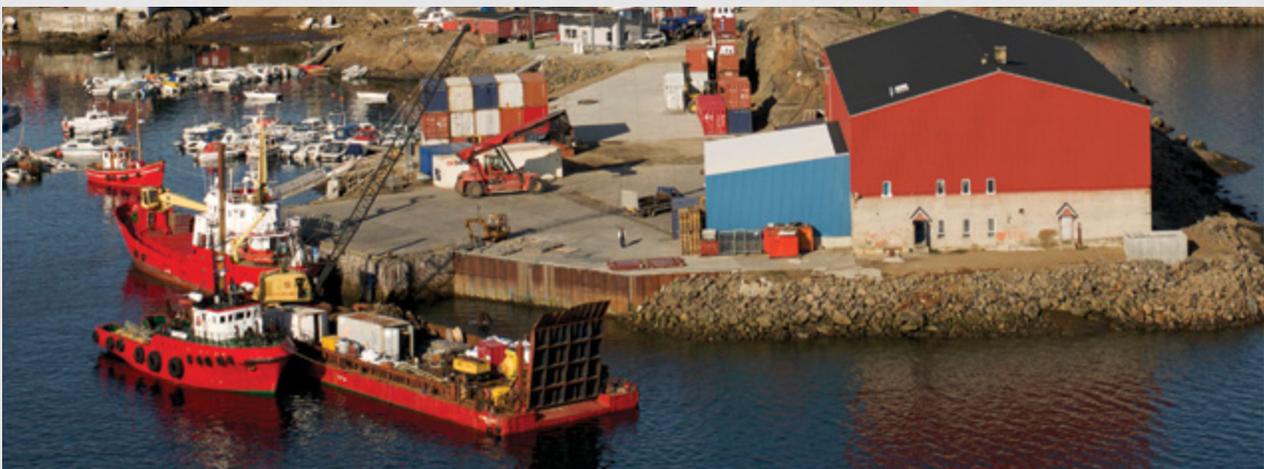
Developing science-based fishery plans.

As Arctic fisheries become more productive, scientific investigations are needed to make the most of the opportunities while protecting fish populations. In 2015, four researchers from Queen's University and Carleton University in Ontario launched a \$5.6 million dollar fishery project called "Towards a Sustainable Fishery for Nunavummiut" aimed at increasing fishing of Arctic Char, Arctic Cod, and Northern Shrimp.¹⁸³ Because of increased ice melt due to global warming, access to Arctic char is increasing, and the researchers seek to develop a sustainable, science-based fishing plan to make use of this new opportunity.¹⁸⁴ The researchers collect seal feces and analyze it in a lab to determine which fish they are eating, and to zone in on the location of the fish. DNA analysis also helps keep tabs on the size of fish populations. The project, funded primarily by Genome Canada, is also training researchers at Nunavut Arctic College to identify various fish through DNA analysis, and is working closely with community members and elders to combine their traditional knowledge with cutting-edge genetic and bioinformatics methods for tracking stock populations.

CF2

Integration of Inuit IQ.

Development of new opportunities for sustainable fisheries will benefit greatly from integration of TEK and other aspects of Inuit IQ. For example, Fish-WIKS (Western and Indigenous Knowledge Systems), run through Dalhousie University in Halifax, Nova Scotia, is working to complement western scientific approaches to fisheries with Indigenous traditional knowledge in Northern Canada.¹⁸⁵ Fish-WIKS currently works in four Indigenous coastal communities in Canada (Tla-o-qui-aht, BC, Repulse Bay, NU, Nipissing, ON and Eskasoni, NS) to learn more about how Indigenous knowledge systems can enhance the current sustainable fisheries methods used by the Canadian Government to regulate fisheries and marine habitats. The organization is working with the Government of Nunavut to conduct their research in Repulse Bay, and has been funded by the Social Sciences and Humanities Research Council of Canada for the duration of the five-year program, which began in March 2012.¹⁸⁶



Support for Indigenous fishing cooperatives and businesses (IF)

Global fisheries often reflect a tension between large-scale commercial operations and local fishers who provide important sources of food for their communities but find it difficult to compete for income with globalized commercial operations who benefit from economies of scale, such as those that employ factory trawlers. Thus, measures that support smaller-scale, more sustainable operations are gaining traction. For example:

IF1 Financial and marketing support.

The NDC provides business support in the form of equity financing, in return for which business (the investee) agrees to provide NDC with a form of ownership in the business. One company supported by NDC is Kitikmeot Foods, which was founded in 1993 and is located in Cambridge Bay, or as it is called in the local language, Iqaluktuuttiaq (“good fishing place”).¹⁸⁷ It employs six permanent and 14 seasonal staff, as well as 50 seasonal hunters and fishers that harvest Arctic Char sustainably in the Kitikmeot Region. The business specializes in fillets and jerky products, which are sold all across Nunavut, as well as distributed throughout Canada and the US in partnership with the San-Francisco organization CleanFish.¹⁸⁸ Another such organization is Kivalliq Arctic Foods, based in Rankin Inlet and which employs seven to twelve local meat cutters and processors for Arctic Char, caribou, and muskox depending on the season.¹⁸⁹

IF2 Partnerships with conservation organizations.

Many environmental NGOs are eager to help scale up sustainable fishing alternatives through certification, policy changes, and consumer-based advocacy. An example of the latter is Greenpeace’s recent success in securing agreements from some of the world’s largest fishing and seafood companies to refrain from expanding their factory-trawler operations into new ice-free waters as the ice melts. “We have agreed that from the 2016 season, the catching sector will not expand their cod fishing activities with trawl gear into those areas where regular fishing has not taken place before,” the industry group said in a statement.



IF3 Indigenous aquaculture research and development.

Currently, there are no commercial aquaculture producers in Nunavut, but by 2011, over fifty First Nation and Aboriginal communities across Canada had developed aquaculture business ventures and partnerships.¹⁹⁰ Growth in this sector is seen as one way to meet growing global demand for seafood. In response to growing Aboriginal interest across Canada, the Aboriginal Aquaculture in Canada Initiative (AACI) was launched to provide support to capitalize on the economic development opportunities in aquaculture. Services include assistance with development and preparation of business plans, feasibility studies, preparation of project funding proposals, and help with the provision of advisory and aftercare support.¹⁹¹

Fisheries management for Fisher People's benefit (FM)

One rather complex area of policy reform seeks to rebalance global fishery management for the benefit of Indigenous and local economies. International groups, such as the World Forum on Fisher Peoples and the Northwest Atlantic Marine Alliance, are busy developing sustainable fishing practices and providing a platform for marginalized fishing people to bring their struggles onto the world stage. The World Forum on Fisher Peoples (WFFP) founded in 1997 in New Delhi, India, was established to support small-scale fisheries and local peoples fighting against the forces of globalization and industrialization around the world. It has twenty-nine member organizations hailing from twenty-three countries, and one of its partners, the Bear River First Nation, is located in Annapolis County, Nova Scotia.

The Fisher Peoples movement was established “in response to the increasing pressure being placed on small-scale fisheries, including habitat destruction, anthropogenic pollution, encroachment on small-scale fishing territories by the large scale fishing fleets, illegal fishing and overfishing.” Climate change has now also been added to the WFFP agenda. Examples of initiatives being pursued include:

FM1

Marine protected areas for local benefit.

As mentioned earlier, establishing marine protected areas (MPAs) is an important strategy for enhancing Indigenous tourism. But the benefits of MPAs are even more important to local fisheries as long as Indigenous use rights are protected.¹⁹² Monitoring results from 89 MPAs around the world have shown that, on average, fish density, biomass, size, and diversity all increased within marine reserves.¹⁹³ Indigenous use areas within these MPAs are thus directly enhanced. And since MPA designations in Nunavut's waters must all comply with Inuit use and access standards of the Nunavut Land Claims Agreement, MPAs in Nunavut have a high likelihood of enhancing sustainable Aboriginal fishing practices.¹⁹⁴ But fisheries benefits extend well outside MPA boundaries. The “spillover” effects on surrounding fisheries have also been well demonstrated due to emigration, increase in abundance, and increase in fish size.¹⁹⁵ So all of Nunavut's fisheries will benefit from an increase in MPA designations.

FM2

Fish locally initiatives.

Another major fisheries policy reform seeks reorientation of fishery management to emphasize local benefits. The Northwest Atlantic Marine Alliance (NAMA), a fishermen led advocacy organization based out of New England, is supporting a community of over 400,000 fishing families, scientists, policy reformers, youth activists, and food activists across the US, Canada, Latin America, and Europe that seeks to transform fisheries policies and markets for seafood worldwide.^{196,197} Called the “Fish Locally Collaborative,” the goal of the movement is to achieve systemic reform in the seafood value chain through political action and alternative marketing programs so that consumers and fisher folks can work together to maximize the benefits of fishing for local economies, the environment, and marginalized racial and ethnic populations.

VI

Concluding thoughts – Nunavut at a crossroads

Nunavut is at a crossroads. Pressures are mounting to continue down the road of resource development, fully embrace the globalized formal market economy, and leave traditional ways of living behind. In 2014, Canada's National Energy Board approved a Geophysical Operations Authorization (GOA) application by three seismic companies to conduct offshore seismic surveys in Baffin Bay and Davis Strait. The mining company Baffinland just opened a major new open pit iron mine on the west side of Baffin Island. Federal and territorial officials are seeking ways to exploit Nunavut's rich endowment of base metals, diamonds, gold, iron, uranium, copper, nickel, lead and silver.

While these activities do bring with them formal sector jobs and incomes, history has shown that building an economy around extraction of fossil fuels or any other nonrenewable resource often brings on the "curse" of dependency on global markets that inevitably lead to economic insecurity and, at worse, the miserable economic conditions now facing resource-based economies like Venezuela once market conditions turn for the worse. Resource extraction is also often accompanied by a host of social ills. In an honest assessment of the costs and benefits of mining activity near Qamani'tuaq (Baker Lake), a report by the Canadian Women's Foundation found that mining activity had led to an increase in the use of alcohol, language conflicts, more money being spent on alcohol and drugs, a loss of traditional/cultural practices, racism, sexual harassment, an increase in sexually transmitted infections and more prostitution.¹⁹⁸ And should oil and gas extraction become important, it will simply add to the global climate disaster unfolding in Nunavut in the form of rising sea levels, disappearing sea ice, changes in animal and fish migration patterns, melting permafrost, and erosion of traditional ecological knowledge.

Given the worrisome economic, social, and environmental issues associated with resource extraction as a focus for development, there is a growing chorus of voices calling for an alternative path consistent with the principles of sustainable development embraced by Canada and 191 other nations at the Rio+20 Conference on Sustainable Development, global Sustainable Development Goals, global climate agreements, and other compatible frameworks.

All these frameworks call attention to development solutions that are targeted directly at those least well off, preserve Indigenous people's rights and culture, help solve the global climate crisis, and promote production and consumption patterns consistent with maintenance of biological diversity, healthy oceans, and productive ecosystems. In this report, we have highlighted some of the development solutions being advanced by leaders within Nunavut's government, by researchers, and by community and environmental organizations who recognize Nunavut's potential to leapfrog past a resource extraction focus and demonstrate to the world what sustainable development looks like in the era beyond fossil fuels and other types of resource extraction.

While the four sectors we discussed in detail — human capital, renewable energy, Indigenous tourism, and sustainable fisheries — are fruitful areas of innovation, they represent just a handful of solutions that can help Nunavut maximize benefits of both the formal market economy and the Indigenous Inuit economy while avoiding the resource curse that plagues nations and regions that have been hooked by the illusion of prosperity created by developing oil, gas, and mineral extraction for export. We hope this report energizes the discussion of sustainable alternatives.

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