Learning from the “Least Vulnerable”?
Climate Adaptation in the Nordic Countries

Marcus Arcanjo
July 2018
Introduction

Earlier this year, an HSBC study named three Nordic countries – Norway, Sweden, and Finland – among five of the least vulnerable nations to climate change, alongside New Zealand and Estonia. In developing the index, the firm assessed their vulnerability to the physical impacts of climate change, sensitivity to extreme weather, and ability to respond to changes. These countries’ comparative lack of vulnerability stems largely from the actions they have taken to date – strategies that have hitherto successfully been employed to help cope with a rapidly changing climate – rather than their mere geographic situation.

This paper focuses on how the Nordic countries are working to speed up their transition to a low carbon, sustainable future and how they have earned the “least vulnerable” title. It explores the three Nordic nations featured in the study, and discusses the ways in which they are successfully combatting climate change. Having analysed the vulnerabilities that do exist, this analysis will then focuses on the ways in which these nations are adapting to, and mitigating the impacts of, climate change, which have helped them to reduce their susceptibility to the phenomenon. It suggests that a combination of three factors has done much to enable their relative success in this regard: namely, the implementation of strict and ambitious climate policies, supported by proactive governments; an embrace of cutting-edge technology and the development of an environment that rewards innovation; and regional cooperation and collaboration between the various Nordic countries (e.g. through the creation of councils and research institutes) to provide optimal conditions for knowledge-sharing. While it will take countries with similar financial capabilities to recreate this model elsewhere, this paper discusses how the Nordics are assisting other, more vulnerable nations to enhance the latter's resilience to climate change. It supports the argument that developing nations face greater barriers to building adaptive capacity and implementing mitigation strategies, but suggests that the Nordic countries are going above and beyond by providing guidance and, perhaps most importantly, finance.

Nordic Vulnerabilities

There is a widespread misconception that the successes achieved by the Nordics in the area of climate change policy are primarily due to these countries simply having less exposure to extreme weather events. Some commentators have even quipped that a slight hindrance to cross-country skiing, among other leisure activities, would represent the most significant negative impact of higher temperatures in the region. This is clearly not the case, as demonstrated by the recent wildfires sweeping through Sweden. Indeed, research from the Arctic Circle paints an alarming picture, with temperatures throughout the region set to rise at double the global average. According to the Norwegian Environment Agency, that country has seen temperatures increase by 1.5 degrees Celsius above this average.

To make matters worse, temperature deviations in the Norwegian Arctic are even greater. In Svalbard, a Norwegian territory situated close to the North Pole, temperatures are reaching 4 degrees Celsius, even in the depths of winter – a long way off the norm of -16 degrees Celsius. This territory is vital for global research and is home to the Svalbard Global Seed Vault, a vital storage facility containing thousands of seed varieties to be used should these strains become extinct elsewhere. In recent years, melting permafrost has flooded the vault, triggering increased
concerns about rising temperatures. Furthermore, Vidar Helgesen, Norway’s former Minister of Climate and Environment, has brought attention to the fact that major glaciers in the region are retreating at a rate of two kilometres every five years. At the same time, rapidly melting Arctic ice in close proximity threatens to flood the country’s long coastlines, while higher temperatures are altering the timing of the seasons.

Such enormous disruptions are especially concerning for the indigenous communities of the far north. The Sámi People, who have inhabited the northern expanses of Norway, Sweden, and Finland for at least 5,000 years, rely on stable Arctic conditions to sustain their age-old way of life. If climate change accelerates, Sámi culture and the traditional livelihoods of its people – from reindeer herding to fishing – could be endangered.

Meanwhile, some of the economic activities pursued within the Nordic countries are also questionable. Norway, for example, still relies heavily on oil extraction as a major source of national income. Arctic oil fields provide enormous potential for economic exploitation, but such activities are incredibly damaging to the local environment. Indeed, a whiff of hypocrisy can be identified surrounding this topic, with the CEO of Norway’s leading oil extractor a frequent speaker at clean energy conferences – despite his company’s ambitious plans for tapping hitherto untouched Arctic resources. Stricter government policies must be implemented to prevent such blatant breaches of the goals set out in Paris and preserve Norway’s image as a credible leader in the green energy market.

The Nordic region is, after all, in the same boat with the rest of the world when it comes to the negative impacts of climate change. A study by the Urban Climate Change Research Network projected that thirteen cities worldwide could experience temperature increases above 2 degrees Celsius by as early as the next decade, including Trondheim in Norway and Helsinki in Finland. This is especially concerning in the case of Helsinki, as Finland’s capital and home to more than 20 percent of the country’s population. Unless emissions are curbed, a growing population – combined with rapid urbanisation – may well create a spike in CO2 levels.

Meanwhile, Finnish estimates indicate that average precipitation will rise by 15-25 percent, which would increase the threat of floods and extreme weather events in many regions. Knock-on effects would particularly impact the agriculture, water, and energy sectors. The Finnish Ministry of Agriculture and Forestry expects tree growth to be much weaker as a result, and the quality of groundwater will also be considerably lower. Changes in precipitation also render the anticipation of hydropower more challenging, whilst simultaneously causing increased maintenance costs for existing infrastructure. Despite Finland’s size and geographic diversity, Veijalainen et al. (2010) found that large scale flooding would likely occur throughout the country.

Of the three Nordic states analysed here, Sweden is the most populous, with major cities such as Stockholm and Gothenburg situated along the country’s long coastline. The Swedish Commission on Climate and Vulnerability found that there is a pressing need to prepare for potential floods, erosion, and landslides. The report concluded that temperatures would likely see a 3 to 5-degree Celsius rise by 2080 compared to 1960-1990 levels, with areas in northern Sweden potentially exceeding a 7-degree Celsius increase. As with Norway, the climatic conditions for reindeer herding and other traditional activities in the far north are expected to worsen significantly – a problem compounded by foreign vegetation accompanying the advancing tree line, burgeoning mosquito and other pest populations, and new diseases brought with them.
At the same time, the sea level is expected to rise by 0.2 metres. In a country like Sweden, where up to 200,000 buildings are located close to water, this represents a large-scale challenge – putting myriad structures at risk due to flooding and/or landslides. While increased runoff provides the potential for greater hydropower generation, it also means that massive new investments in dam safety, building construction, and infrastructure – such as roads and railways – will be necessary. The Commission on Climate and Vulnerability also articulated concerns regarding the extensive ecosystem changes that would occur, both in freshwater bodies and in the Baltic Sea, expressing the view that “maintaining good water quality will become more challenging” as a consequence. Many other vulnerabilities exist in the region – not least the increased risks of forest fires, as evidenced by ongoing events in Sweden. Nevertheless, the Nordic countries have also developed an impressive set of successful strategies to cope with the worsening climate, which is the subject of the following study.

Embracing Technology and Climate Policy

Sweden

Sweden has taken a particularly proactive approach in the area of climate policy. The country has adopted a climate policy framework, developed new climate goals, and created a council of climate policy experts in order to reduce emissions. According to the Nordic Council of Ministers, Sweden’s goals include reducing emissions by 59 percent compared to 2005 levels by 2030, with emissions from domestic transport to be reduced by 70 percent by the same year; furthermore, a national council of climate experts will provide independent assessments of how shifting government policies comply with the country’s climate goals. In addition, Sweden began the year by updating its climate legislation, with the stated aim of net zero greenhouse gas emissions by 2045 – five years earlier than its previous target, making this the most ambitious climate act in the world. Legally, and for the first time, Sweden now has an obligation to pursue climate policies based on goals laid down by parliament.

Enormous strides are also being made in the country’s clean energy sector. Renewables – in particular hydropower and biofuel – account for 54 percent of Sweden’s energy mix, meaning that the country has already achieved its 2020 goals in this sector. This is due in part to a 2003 electricity certification scheme, which obliged suppliers to obtain a certain proportion of their energy from renewable sources. The proportion increases each year, and enormously enhances energy efficiency as a result.

Efforts to educate the public on climate issues are also ongoing, and producing results. The country has fostered an environment in which climate change is both talked about and actively tackled. A survey in 2015 found that 26 percent of Swedes cite climate change and the state of the environment as a cause for concern, compared with an EU average of just 6 percent. A renewed focus on energy efficiency is also a driving factor, with government policy aimed at improving efficiency by 20 percent compared to 2008 levels. One component of this strategy has seen heavy industries offered tax benefits in exchange for the implementation of energy plans that reduce harmful usage. Carbon taxes are also a common tool in order to further accelerate the transition. Placing mark ups on harmful emissions in this way provides incentives to find alternatives. An important way of developing such innovative alternatives is through the
financing of sustainable solutions. In recent years, Sweden has spent in excess of 3.3 percent of national GDP on research and development initiatives in this crucial area.

Fossil fuel-free transportation in Sweden, meanwhile, already exceeds the 10 percent by 2020 target set by the EU. In fact, according to 2017 data, the current share of transport fuelled by renewables is 19 percent and rising rapidly. According to the same report, “Sweden aims to further reduce emissions from the transport sector by [improving] planning of cities to reduce demand for transport, by encouraging the use of public transport, by promoting a shift from road to rail and sea transportation, and by developing more efficient vehicles and renewable fuels.” It aims to follow in Norway’s footsteps by focusing on electric vehicles, including the creation of an incentive system for purchasers of the lowest emission cars.

**Norway**

Norway is similarly committed to global climate action. Its government has passed laws to help achieve ambitious emissions reduction targets as part of the country’s transition to a low carbon society. Indeed, Norway’s stated aim is to be carbon neutral by 2030 by becoming more energy efficient at home and by financing emissions reductions abroad that are equivalent to its own remaining emissions. The share of renewables in the country’s energy mix, meanwhile, will increase to 67.5 percent by 2020 – up 3 percent from current levels.

Climate finance mechanisms play a particularly important role in Norway. Despite not being a member of the EU, it participates in the block’s emissions trading system (ETS). This scheme covers installations in the heavy industry and energy sectors, and an agreement to meet the 2030 targets will result in cooperation among sectors not traditionally in the scheme (transport, construction, and agriculture). Norway has further combined the ETS system with its own carbon taxes, accounting for over 80 percent of greenhouse gas (GHG) emissions. According to Bird (2017), emissions from extensive offshore oil and gas extraction are now subject to levels of CO2 taxation that will provide an important incentive for industry to reduce emissions. Indeed, the Green Tax Commission produced a report in 2015 highlighting that green tax reform can be used to “secure reduced greenhouse gas emissions, improved environmental conditions and sustainable economic growth.”

Meanwhile, rapid advances in typically high emitting industries, such as shipping, are looking promising for the future. Norway is pioneering wind power technology that generates assisted propulsion for ships, thereby reducing the use of the main engines and leading in turn to a fall in fuel consumption. Industry giant Norsepower has further developed a modern re-creation of traditional technology that allows for wind to be harnessed directly. They estimate that global emissions could fall by over 5 percent if 20,000 ships were to use this technology. The company was recognised with one of five 2018 WWF Climate Solver Nordic Awards, a prestigious honour that awards transformative technologies that have the potential to positively disrupt business-as-usual methods. Predictions show that these technologies are likely to reduce CO2 emissions by 100 million tonnes annually over the coming decade.

While electric vehicle adoption is occurring at a slower pace in the rest of the world, it is the new norm for the Nordics. According to Reuters, over 50 percent of all car sales in Norway were electric – due in part to generous government subsidies aimed at promoting a shift away from fossil fuels. Benefits include free parking and charging, heavily decreased road taxes, and no city emissions charges or fees for using ferries and road tolls. In short, Norwegian governments
have fostered an environment in which electric car ownership makes economic sense. The country is a world leader in this market, and plans for 100 percent of its vehicles to be electric by 2025. The financing of charging infrastructure that utilises inexpensive renewable energy sources is one of the latest government schemes, allowing for a much more efficient use of energy all around.

Norway has also taken a cutting-edge approach to enhancing the efficiency of public infrastructure. The installation of smart streetlights is one new energy-saving initiative that aims to reduce unnecessary wastage. As in many homes and buildings, this technology automatically lowers the level of light when no one is around, before returning it to full power when vehicles or pedestrians approach. Dimming the light to 20 percent of total output saves in excess of 2100 kilowatt-hours per week.\(^{26}\) This technology is also much more cost effective, as the LEDs used not only have a battery life that is many times greater but also do not require regular maintenance.

**Finland**

According to a 2017 report, two aspects form the basis of Finnish climate policy: the reduction of greenhouse gas emissions, and the development of a bioeconomy. The country’s Climate Change Act implemented a longer-term policy approach that aims to reduce GHG emissions by 80 percent by 2050. Meanwhile, medium term policies (up until 2030) have set targets for reducing GHG emissions in transport, housing, and agriculture.\(^ {27}\) The Act has also outlined measures to ensure that the nation is on track to reach the EU’s determined goals.

In the longer term, ambitious plans are underway to make Finland a successful, low-carbon bioeconomy. Given Finland’s enormous tracts of forestland and stores of renewable biomass, this has become a major focus for energy production over the coming decades. The use of wood-based energy already accounts for almost 25 percent of total energy usage in the country, and is the driving force behind district heating and power schemes.\(^{28}\) Finland’s large forests also act as important carbon sinks. Tree growth is currently outpacing the felling needed for energy use, meaning that this is a sustainable proposition. Indeed, some estimates show that annual sinks accounted for upwards of 60 percent of total emissions.\(^ {29}\)

As with Norway and Sweden, Finland also provides extensive support for innovation in the clean technology sector. A multitude of networks and programmes have been implemented to help incentivise development in this area. The Cleantech Finland initiative, for example, “strives to promote and export Finnish innovations in key technical fields including energy efficiency and renewable energy.”\(^ {30}\) Other programmes for sustainable consumption and production aim to reduce impacts on food, housing, and transport. In the aforementioned Climate Solver Nordic Awards, meanwhile, Finland was also a winner for a design that allowed electric vehicle-charging indoors.\(^ {31}\) Such emissions-saving technologies also lead to cost savings. Businesses that innovate to create these promising products will lead the way in the global market, and the Finnish government is helping to build an entrepreneurial environment that promotes a better future for both producers and consumers in this area.
Regional Collaboration

Cooperation and collaboration on climate change initiatives between and within Nordic countries is not a recent development, but has rather been a long time coming. There have been calls from academics and other experts for greater knowledge sharing and educational and awareness improvements in this area for almost a decade. Nilsson et al. (2012) found that knowledge exchange between local and national levels was weak in Sweden, and that there was a strong need for better feedback mechanisms. Such research echoed the results of a previous study by Glaas (2010), concluding that there was a “lack of local co-ordination, and an absence of methods and traditions to build institutional knowledge.”

The 2006 Nordic Countries’ Ministerial Declaration on Adapting to Climate Change called for greater and more extensive teamwork between regional organisations, a suggestion echoed by the 2009-2012 Nordic Sustainable Development Strategy, which sought to tackle climate change and promote renewable energy at the regional level. Researchers have suggested that, rather than developing separate mitigation and adaptation strategies, the Nordic countries should acknowledge the need to tackle both in a complementary and collaborative fashion. Juhola, meanwhile, has determined that the Nordics have reduced their climate vulnerabilities due to their adaptive capacity, with the nations collectively found to have a high level of adaptive capacity but with noticeable individual differences. In order to effectively tackle climate change at a regional level, he found, the countries must develop more symbiotic relationships.

As a result, number of regional institutes and initiatives were created to promote knowledge sharing and enhance environmental resilience. Organisations such as the Stockholm Environment Institute (SEI) provide leading research on climate issues that extends far beyond the Nordic region. Similarly, the Nordic Council of Ministers oversees regional cooperation efforts, and its regular meetings ensure that there is accountability for achieving the goals set out by member states. By pooling resources to fight climate change through various Nordic initiatives, a greater understanding of regional vulnerabilities has emerged, along with valuable learning opportunities for nations facing similar threats. This has also meant that less money is needed within the region itself, given the greater efficiency of allocating resources, in turn allowing additional funds to be set aside for overseas initiatives.

Climate change issues also take up a large part of the ‘Nordic Solutions to Global Challenges’ initiative, run collectively by regional states. Much of the work within this initiative focuses on “developing models and tools for reforming the subsidy system to fossil fuels.” A number of other joint mechanisms – discussed in the following section – likewise provide much-needed assistance beyond the Nordic region. In sum, there is a strong belief within the region that teamwork represents a better approach for tackling climate change than individual action.

Assisting the More Vulnerable

In a 2007 report by the Intergovernmental Panel on Climate Change (IPCC), Adger wrote that there are five barriers to creating adaptive capacity and reducing climate vulnerability: physical and ecological; social and cultural; financial; informational; and technological. The Nordic countries, comparatively speaking, are not greatly hindered in any of these areas. Many developing nations, however, are home to widespread poverty, a fundamental lack of economic opportunities, little to no governance or governmental support, and an inability to access the
latest technologies. The suggestion that they should simply mimic the Nordic approach is therefore neither helpful nor realistic. Countries that cannot afford to feed their own people do not have hundreds of millions of dollars to spend, for example, on technological innovation. A different approach is called for.

The Nordics are at the forefront when it comes to climate adaptation, and these countries are deploying cutting-edge technology and approaches at such a rapid pace that they are in fact outpacing the 2030 climate targets. Nevertheless, there is a concern amongst these states that focusing merely on themselves will lead to even greater disparities between the developed and developing worlds. Providing international assistance is therefore imperative in order to ensure that the gap is reduced and not widened. The rapid progress achieved by the Nordics is increasing optimism for the future, while simultaneously allowing these countries to shift their focus towards helping others. They have, in short, bought themselves time that can now be spent on assisting the more vulnerable.

In this vein, researchers from the SEI have highlighted the need for Sweden to take global responsibility for combating climate change. They noted that, although Sweden already has hugely ambitious policies in place, they are not enough in the long term. Rather, the country must “develop a vision which helps avoid high-end climate change by setting targets and measures for emission reductions derived from Swedish consumption of imported goods.”\(^{37}\) It seems as though the national government has listened, in recent years pledging SEK 4 billion ($581 million) over three years to the United Nations Green Climate Fund – a financial mechanism nations can draw upon to aid their transition to a clean energy economy.\(^{38}\)

Norway has followed suit, pledging NOK 1.6 billion (around $271 million) to the same fund over three years. The country has also announced that it will raise its contribution before 2020, and that it would further “double it if the fund develops a framework that secures verified emission reductions from reduced deforestation and forest degradation.”\(^{39}\) Indeed, Norway has been the largest contributor to global efforts to reduce GHG emissions from deforestation and forest degradation in developing nations, pledging vast amounts through 2016 and promising even more up until 2020 to support civil society and indigenous peoples around the world as they deal with these and related challenges.

Nordic cooperation also extends beyond regional climate issues. The Nordic Development Fund (NDF) is a multilateral financial organisation that provides funding for climate change projects in low-income nations. The fund targets projects in Africa, Asia, and Latin America aimed at adaptation and mitigation, in particular those with significant scale-up potential. For example, NDF’s Emerging and Sustainable Cities Initiative has now reached 71 cities in Latin America.\(^{40}\) The fund is pouring money into sustainable initiatives elsewhere as well, as it recognises the importance of broad-based international cooperation. Currently, the NDF is helping finance sustainable projects in 18 other countries, including increasing access to clean energy technology in Ethiopia and green transport infrastructure in Laos aimed at improving mobility.\(^{41}\)

In a similar vein, Nordic Environment Finance Corporation (NEFCO) provides results-based green financing to a multitude of other initiatives. It is targeted at small and medium-sized projects that show value in non-Nordic regions, while also providing benefits locally. For instance, a survey by NEFCO found that its annual outlay results in the creation of 500 jobs, 15 percent of which are within the region.\(^{42}\) The funding thereby benefits both other countries (e.g. through improved climate adaptation and mitigation mechanisms abroad) as well as the Nordics themselves (e.g. through job creation at home). The infographic below highlights some of
NEFCO’s key energy reduction achievements in recent years, including 5.1 million tonnes of saved carbon dioxide emissions and 1520 GWh of energy.¹³

<table>
<thead>
<tr>
<th>CO₂ direct + CER</th>
<th>NOx</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 million tonnes</td>
<td>514 tonnes</td>
</tr>
<tr>
<td>10 million people traveling from Helsinki to Paris and back by aircraft</td>
<td>90% of the emissions from Finnish industrial processes in 2014</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>P</th>
<th>Energy (direct electricity and heat reductions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,053 tonnes</td>
<td>1,520 GWh</td>
</tr>
<tr>
<td>Untreated wastewater from 1.44 million people (equals Reykjavik and Oslo)</td>
<td>79% of Stockholm’s total electricity consumption in 2015</td>
</tr>
</tbody>
</table>

(Source: NEFCO)

Educational efforts are also a focus area. According to Reuters, cities such as Malmö in Sweden are teaming up with small island states to assist them in their resilience efforts. More broadly, plans are being drawn up to enable richer cities to share resources and experience with more vulnerable counterparts. Malmö itself is working to protect its low-lying districts from rising sea levels, and would be able to share knowledge of these and other efforts, such as how to efficiently cut fossil fuel use.⁴⁴ Organising events that promote discussion and knowledge sharing between nations and sub-national entities allows for those with less resources to learn and develop important coping strategies in the face of significant climate challenges.

Aggressive green finance initiatives have also highlighted the Nordics’ desire to mitigate the impacts climate change. In 2017, the countries issued 7.8 billion euros in bonds to help tackle the phenomenon – more than ten times the value of green bonds in 2013.⁴⁵ Such actions have been helped by regulations ensuring that developers account for sustainability concerns within the planning process. Importantly, the money raised by these loans will directly finance low-carbon initiatives, with rapid and extensive investments in the following green sectors: 29 percent in renewable energy projects; 20 percent on energy efficient buildings; and 20 percent on low-carbon transport.⁴⁶ Impressively, each of the Nordic nations analysed ranked within the top 20 in
terms of the size and performance of their green bonds. According to the Climate Bonds Initiative, the organisation responsible of the ranking, the Nordics are at the forefront of global climate finance. By accelerating investments in this area, these countries are leading by example and taking essential steps toward meeting the ambitious goals set out by the Paris Agreement.

Conclusion

The Nordics are also suffering the negative impacts of climate change, as recent events demonstrate. From the increased risk of forest fires to coastal flooding caused by melting Arctic ice, these countries face a plethora of challenges. Nonetheless, their comparatively effective management of these issues to date has led them to be considered some of the least vulnerable nations on earth to climate change.

They have achieved this by taking proactive approaches in different areas. By introducing strict and ambitious climate policies, creating legislation for climate goals, and developing subsidies for clean energy initiatives, they have placed themselves at the forefront of efforts to combat climate change. Nordic governments are now being held accountable by their countries’ own laws to make significant strides toward achieving ambitious climate policy goals, which also leaves them open to criticism. However, by embracing and promoting the use of the latest technologies, the Nordics have given innovators in the clean energy sector the opportunity to benefit themselves while contributing to the greater good. Today, the region is the only one significantly outpacing its climate goals, suggesting that the strategies employed by its governments do indeed work.

At the same time, the Nordics recognise that they possess financial capabilities and opportunities that developing nations do not, and are therefore intentionally going above and beyond to contribute to global efforts in this area. Through collaboration schemes they donate billions of dollars towards climate change efforts worldwide, in order to reduce the disparity between countries as opposed to widening it. Funding initiatives while also sharing research and experience has allowed the Nordics to have a more hands-on role in international efforts.

Mimicking the Nordic model of climate action accountability, coupled with these countries’ efficient deployment of cutting-edge technology, is certainly not a strategy that all nations are in a position to implement at present. Nevertheless, similarly developed states that also suffer from climate vulnerabilities, such as Australia and New Zealand, would do well to follow the Nordics’ lead, and may also find themselves in a position to assist others in a similar fashion. By showing others how they can successfully reduce emissions and providing the financial support for them to do so, the Nordic countries are generating much-needed optimism – and opportunities – on a global scale.

*Marcus Arcanjo is a Research Fellow at the Climate Institute. He holds an MSc in Development and Security from the University of Bristol and a BSc (Econ) in Business Economics from Cardiff University.*
Notes


8. Ibid.


11. Ibid

12. Ibid


18. Ibid.

19. Ibid.

20. Ibid.


22. Ibid.

23. Ibid.


28. Ibid.

29. Ibid.

30. Ibid.


42. Ibid.


46. Ibid.