Research Bulletin 22/8 | Integrating Sustainability into the 10X Agenda

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Summary

Sustainability and the net zero transition are core elements of Northern Ireland's 10X Economic Vision, with targets specified around emissions intensity and electricity generated from renewable sources.

This focus on sustainability is also common across many other small advanced economies, with policy focused on supporting the net zero transition. Many small economies – and firms from these small economies – have been able to develop positions of global competitive advantage in renewable energy and green technology (examples include Denmark and the Netherlands).

There are several types of economic value: from the direct value associated with the production of renewable energy and associated green technologies; to the economy-wide strengthening of competitive advantage due to cheaper, lower emissions-energy that provides an edge to economic activity located in the economy.

Northern Ireland can capture these economic benefits as well if it positions itself appropriately. However, this is a competitive and fast-moving space, with significant investments being made in net zero and sustainability in many competing jurisdictions. Northern Ireland will need to be thoughtful about the pace and nature of its policy and resource allocation commitments in order to capture maximum economic value.

Introduction

Sustainable growth is one of three pillars sitting under Northern Ireland's 10X Economic Vision. The two metrics selected to capture progress under the sustainable growth pillar are the proportion of electricity generated from renewable sources and carbon dioxide emissions.

Sustainability is a broader concept than the net zero transition – the circular economy, pollution, biodiversity, and so on, are also important attributes of a sustainability agenda. This Bulletin focuses

primarily on actions relating to reducing emissions and the net zero agenda. Although the net zero transition is only one element of the broader sustainability agenda, it is an important element – and will necessarily transform economic behaviour across advanced economies over the next few decades, including in Northern Ireland.

Less has been done to date in terms of policy initiatives and at-scale resourcing around broader sustainability issues, although this is an area of rapidly growing interest and activity. Much of the policy action and investment is around reducing emissions.

Achieving the UK's net zero target by 2050 – which is the same as Northern Ireland's emissions target – will be demanding and disruptive, involving meaningful costs and investments on the part of private enterprise, the government sector, and others. Reducing emissions to net zero by 2050 will involve the transformation of large parts of the Northern Ireland economy, from energy to transport and industry – and require substantial investment and adjustments over the next few decades.

However, there are also many economic opportunities associated with building a more sustainable economy as well. It is important to integrate sustainability goals into the overall economic policy agenda: the economic change involved in the net zero transition is too meaningful to treat this as a separate endeavour to economic strategy.

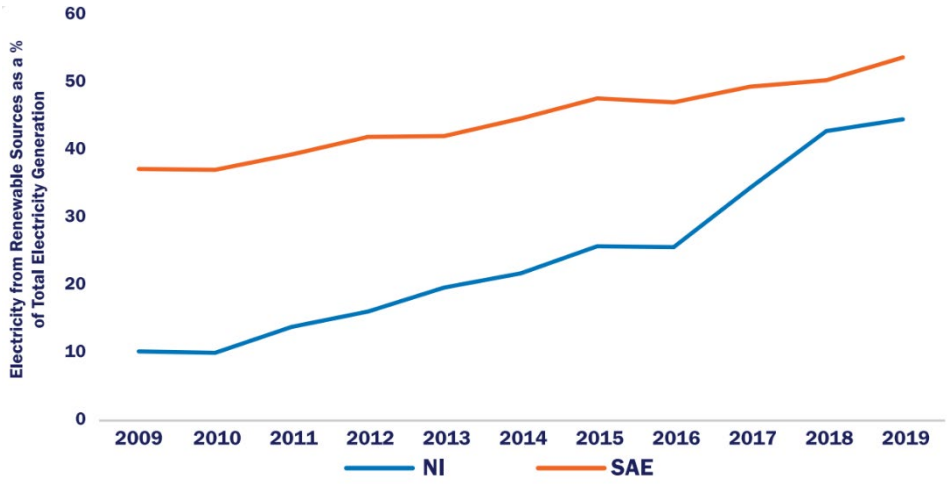
This Research Bulletin draws on the international small advanced economy experience to provide a sense of the types of economic benefits that are available from a sustainability agenda (primarily around renewables/the net zero transition). It begins by describing what several selected small advanced economies are doing at intersection of economic strategy and net zero/sustainability, through a series of short case studies.

Based on these international observations, it identifies the various classes of economic value that can be generated from the net zero transition, and then considers the possible policy implications for Northern Ireland.

International Case Studies

Many other small advanced economies are moving at pace and scale on the net zero transition and are looking to identify opportunities for economic value capture. Several small advanced economies, such as New Zealand and Norway, already generate relatively large shares of electricity from renewable sources. As shown in Figures 1 and 2, Northern Ireland has converged to around the average of its small advanced economy (SAE) peers in terms of the share of electricity generated from renewable sources and in terms of carbon dioxide emissions per capita.[i] Northern Ireland has been improving its performance on both of these measures over the past decade.

Figure 1: Electricity Generation, % from Renewable Sources



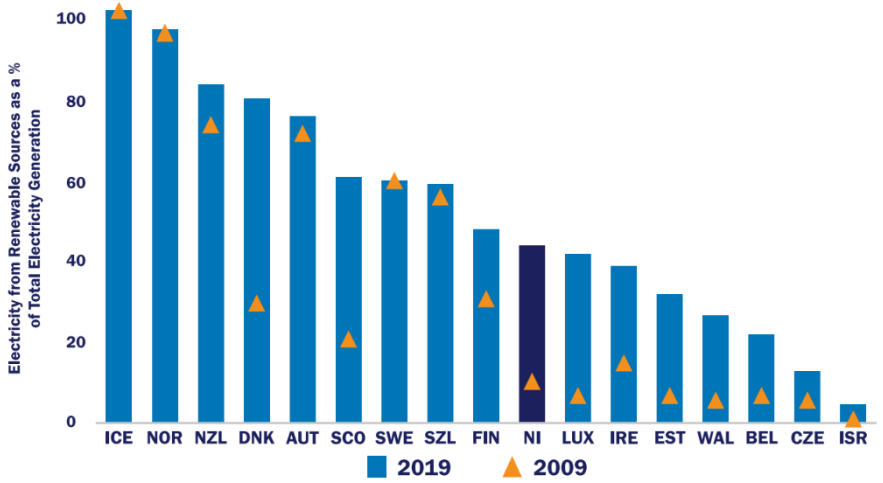
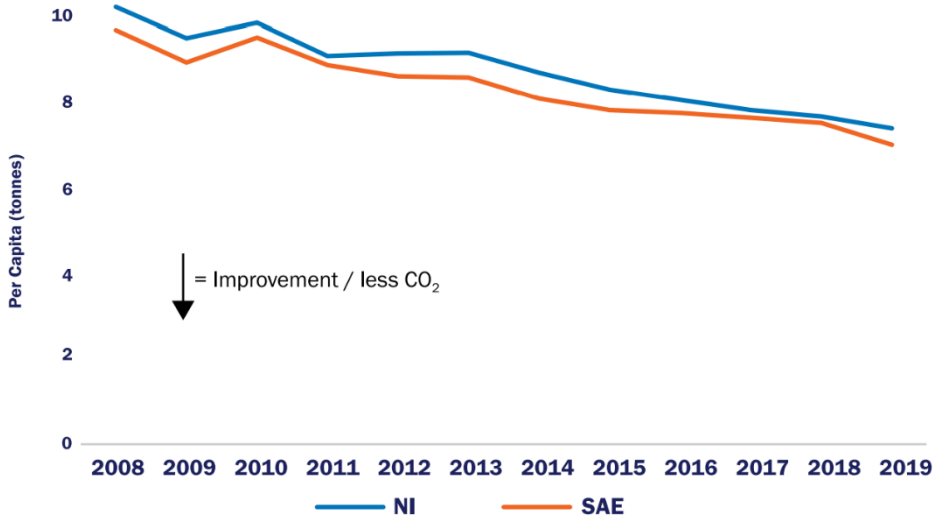
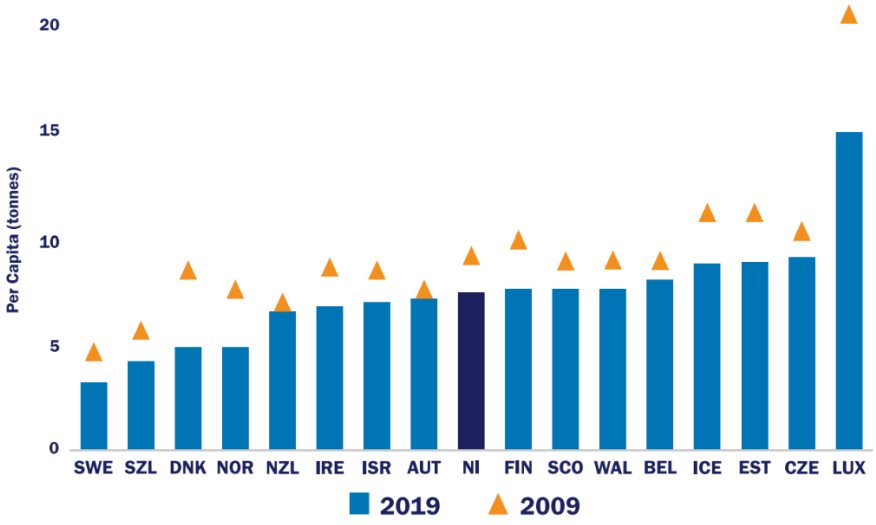


Figure 2: Carbon Dioxide (CO_2) Emissions Per Capita (Tonnes)





Several small advanced economies have developed leading positions of global competitive advantage in renewable energy and green technology – with accompanying economic value being generated. The small advanced economy experience shows that economic and sustainability objectives can be complementary and mutually-reinforcing.

This focus on sustainability and the net zero transition has been accelerating over the past several years, and again through the pandemic. Economic recovery packages in the EU and elsewhere have focused on accelerating the green and digital transitions. Across advanced economies, legislative commitments to net zero have become widespread. Consumer and investor preferences are shifting, with increased demand for low emissions goods and services – and a shift in sentiment away from higher emissions products and firms.[ii]

To provide some examples of how small advanced economies are moving, and the type of economic impact that these activities can have, the following discussion provides a series of selected small economy case studies.

Denmark

Denmark moved early (from the 1970s) to reduce energy intensity and has developed a leading position in wind energy. Approximately 80% of Denmark's electricity comes from renewable sources, and it is moving to further reduce emissions intensity. Denmark has also developed a broader green ecosystem, from mobility (high electric vehicle penetration rates, world-leading cycling infrastructure) to green initiatives in industrial companies and city-wide heating.

Emissions have been cut without overall employment losses, partly due to active labour market and skills policy that allows for workers to move to new opportunities. Denmark now has leading global companies in wind energy (Vestas, Orsted) and is on the cutting edge of renewable technology.

The Climate Act sets a legally binding objective of reducing Denmark's emissions by 70% by 2030 from 1990, on track to achieving carbon neutrality by 2050. A climate roadmap has recently been released by the government, outlining the steps to be taken.[iii] This will require substantial investment, estimated to be in the order of 1% to 2% of GDP annually.

One substantial government commitment is in the form of investments in facilities to support new offshore wind farms.[iv] Two islands will be developed (one new/artificial island in the North Sea, one an existing island) to support new arrays of wind farms. It will be a PPP (public private partnership), with the majority financed by the private sector – but with the Danish state retaining a majority stake. It is estimated to cost €37bn.[v]

Denmark is already selling renewable electricity to the Netherlands to fund additional investments in renewable energy and green technology.[vi] Denmark is now moving to develop hydrogen capabilities, recently releasing a hydrogen strategy.[vii]

The Netherlands

The Netherlands is one of the most emissions-intensive advanced economies in Europe. This is partly a function of its economic structure, as well as its oil and gas reserves. However, over the past few years, the Dutch Government has made substantial investment commitments to strengthen renewable energy and green technology – with a view to reducing emissions and generating additional economic value.

In the recent coalition agreement (December 2021), the coalition parties agreed to establish substantial new funding vehicles to reduce emissions by at least 55% by 2030, with a goal of a 60% reduction.[viii] A new €35bn climate change fund was announced (equivalent to 4.3% of GDP). A dedicated Minister for Climate and Energy will be responsible for this fund. The government is also preparing for the construction of two new nuclear power plants.

Beyond building renewable capacity, the Netherlands is also investing heavily in green technology – notably hydrogen. The Netherlands already has a well-developed position in grey hydrogen, which means that Dutch industry has the infrastructure and capabilities to adapt to green hydrogen.

A national hydrogen strategy was published in 2020.[ix] Of the new €35bn climate change fund agreed in the December 2021 coalition agreement, it is expected that at least €5bn – 10bn will be allocated to the development of the hydrogen economy – such as financing new factories for green hydrogen'.[x] Additional money is being used for infrastructure (pipelines) and upgrading industrial facilities. The aim is to position Dutch firms – and the Dutch economy – to build at-scale competitive advantage in the hydrogen economy in Europe and elsewhere.

The 2021 Government Budget committed to funding a national hydrogen backbone. 85% of this will use the existing natural gas grid (retrofitted to allow for the transport of hydrogen), with 15% requiring new pipelines. This will connect five large industrial clusters in the north, south and southwest of the Netherlands with hydrogen production sites, ports, and storage facilities; as well as cross-border connections. The cost is expected to be €1.5bn, of which the government will provide half.[xi]

Scotland

Scotland's investment in renewable energy and green technology is shaped by the UK policy and regulatory environment. Renewable energy capacity has been increasing, and there are aggressive

commitments ahead. A successful ScotWind leasing round of 25GW of offshore wind was concluded earlier this year, with further investment expected to come.

Aspirational targets for hydrogen have also been specified by the government. The growth of renewable energy capacity is expected to ease the transition away from oil and gas, as jobs flow to new green opportunities across the economy. In addition to the substantial new economic activity in the sector, there is an expectation of strengthened competitive advantage across the Scottish economy – lower cost, more resilient energy supply, with a much-reduced emissions intensity.

New Zealand

New Zealand has a very high share of renewable energy (hydro, wind) in electricity generation (moving towards 90%), but this has not been used to develop clusters in the green technology space. The focus has been on production of green energy rather than production of green technology. New Zealand is largely an importer of foreign green technology.

New Zealand has used sustainability/green aggressively in its national branding, to support international tourism, exports of food and beverage, and so on. However, about 50% of New Zealand's total emissions come from agriculture (largely methane), and there are few easy ways of reducing agricultural emissions. This creates challenges for achieving net zero by 2050, a target that is written into legislation. New Zealand remains one of the most emissions intensive advanced economies in the world, when full greenhouse gases are measured (not just CO_2).

There are some recent examples of data centres locating in New Zealand in part due to access to renewable energy, and there are some new small-scale pilot projects for the industrial use of green hydrogen. However, much of the economic value that New Zealand has captured from green technology has been in the direct production of renewable energy.

The Sources of Economic Value for Northern Ireland

The international experience shows that some (not all) small economies can capture substantial economic value from the transition to net zero. Different countries have different options in terms of the extent to which – and how – they can generate economic value from the net zero transition. For example, those economies that can produce renewable energy and accompanying green technologies are better positioned to capture economic value.

The international experience also highlights various classes of economic opportunities from the transition to net zero. To simplify, it is useful to distinguish between the direct economic value from the production of renewable energy (such as onshore and offshore wind); the value from associated green technologies (of which green hydrogen) is perhaps the most material; as well as the 'horizontal

benefits' across the economy as lower emissions and improved sustainability strengthen the competitive positions of the economy.

This discussion describes these classes of economic benefits and applies this framework to Northern Ireland.

Direct Production of Renewable Energy

There is economic value associated with building renewable energy capacity (onshore and offshore wind, tidal, solar, and so on). There are direct jobs and economic activity associated with the construction process and subsequent operations and maintenance, as well as in the associated supply chains. This activity creates jobs and incomes (often outside the major urban centres), but this is often a gradual increase rather than a transformational process – construction takes time and will often not be a large proportion of national GVA. And sustained investment is required to build a pipeline of workers with the relevant skills.

The direct production of renewable energy is even less likely to have a transformational economic effect when much of the capital and technology is imported, as will generally be the case – particularly in the early stages of deployment. The extent of value capture depends on the depth of the value chain in Northern Ireland. Opex and maintenance functions add relatively little value relative to the capex phase; particularly when this includes functions such as the construction of the turbines.

Beyond the capex and opex activities associated with the construction and operation of renewable energy facilities, there are additional sources of value. For example, where 'excess' electricity is generated, there will be additional value in terms of Northern Ireland exporting renewable energy to the Republic of Ireland, transmissions to the rest of the UK[xii], and so on.

Northern Ireland has a substantial renewable energy resource endowment, which compares well to many other northern European countries, particularly in terms of wind energy. However, Northern Ireland's renewable energy pipeline is relatively small at the moment, compared to England and Scotland – as well as several other small economies, where substantial investments are being made. As this pipeline is scaled up, there will be meaningful sources of economic value.

Associated Green Technologies (e.g., Green Hydrogen)

Beyond the direct production of renewable energy, there is economic value in related green technology; for example, the production of emissions-free green hydrogen. To define terms:

- Green hydrogen is produced from water by electrolysis from renewable energy (with no direct emissions);

- Blue hydrogen is produced from natural gas, with the accompanying emissions captured and stored;
- Grey hydrogen is produced from natural gas, without any capture of the accompanying emissions.[xiii]

Green hydrogen is widely recognised to be central to the decarbonisation process, allowing for hydrocarbons to be removed from a range of industrial and transport activities. Although the technology is not yet widely deployed, and remains expensive, the cost structures are declining rapidly – and many governments and firms are making substantial investments in this technology. The cost structures of green hydrogen are expected to reach parity with blue hydrogen within the next decade.

For economies with the potential to produce an 'excess supply' of renewable energy, the production of green hydrogen can generate significant income. In various jurisdictions, the employment and GVA impact associated with green hydrogen is estimated to be substantial, particularly where aspects of the supply chain can be built domestically. For example, in Scotland, recent (aggressive) estimates are that 300,000 jobs could be created from green hydrogen (supply chains, building capabilities around electrolyser technology and production, as well as the direct production process).

Major hydrogen hubs are being established in countries on the North Sea (notably Denmark, Norway, and the Netherlands), involving tens of billions of euros. And the EU has tagged significant funding for this: the European Green Deal includes a commitment to Green Hydrogen, with a roadmap to achieving 80GW of electrolyser capacity by 2030.

A recent report commissioned by Matrix offers a perspective on the economic value that is potentially available to Northern Ireland from the hydrogen economy, as well as the policy interventions that would be required to support the development of green hydrogen.[xiv] Northern Ireland already has existing strengths in this space – for example, around hydrogen buses.[xv]

For Northern Ireland, green hydrogen solutions will be part of the net zero transition supporting the decarbonisation of the economy. However, a certain scale is required to become a hub, and the scale and intensity of investment across several northern European economies suggests a limited window of opportunity for Northern Ireland to build a leading position. Northern Ireland will be able to produce green hydrogen and may develop capabilities in parts of the associated value chain. However, other economies are moving fast, and there is likely to be a first mover advantage in being the location for green hydrogen technology.

More broadly, the green economy is an area of strong potential demand growth around the world. The UK-wide 'Low Carbon and Renewable Energy Survey' reports ONS turnover of around £1bn and employment of about 5,000 FTEs in this sector in Northern Ireland.[xvi] The Northern Ireland Energy

Strategy, and the 10X Next Steps for Implementation, has an objective to 'Double the size of our low carbon and renewable energy economy to more than £2bn turnover'.[xvii]

Strengthening Competitiveness

Beyond these direct economic benefits from renewable energy production and associated green technology, there are broader economic opportunities from aggressively developing renewable energy resources and reducing emissions intensity. There are several types of potential benefits, which are relevant to the Northern Ireland context.

First, greater energy independence – and a reduced national energy import bill. Increased production of renewable energy will mean that more economic activity is generated in Northern Ireland, which will contribute directly to employment, GVA, and an improved external balance. The recent experience of a substantial external energy price shock (largely due to Russia's invasion of Ukraine) suggests that greater energy resilience/independence is a source of substantial economic value.

Second, the reducing cost structure of renewable energy indicates that this form of energy will be lower cost relative to hydrocarbons. UK electricity prices are markedly higher than in continental Europe; reducing energy costs by increasing Northern Ireland's exposure to renewable energy would strengthen the competitive position of Northern Ireland-based firms.

This will make locating economic activity in Northern Ireland (domestic or foreign) more attractive. As other proximate locations expand their renewable energy footprint, access to cheap energy will be important for maintaining competitive advantage – particularly for energy intensive activities, such as many manufacturing activities.

Third, increased renewable energy supply will position the Northern Ireland economy to compete in a lower emissions intensity manner. Transitioning to lower emissions production of goods and services is increasingly a commercial imperative. In addition to government net zero commitments and policies such as emissions pricing, companies are responding to changing consumer and investor preferences. The emissions intensity of goods and services will become increasingly relevant – and a source of competitive advantage (or disadvantage).

The direct implication is that the ability to produce low emissions goods and services in Northern Ireland will increasingly become an important driver of competitive advantage in the Northern Ireland economy. This is seen elsewhere also. In Sweden and Finland, there are recent examples of major new industrial facilities (green steel, battery production) being established/expanded close to renewable energy supply – so that production can be low emissions.

Attracting (and Retaining) FDI

A strong renewable energy position can be used to strengthen Northern Ireland's ability to attract FDI that is looking for access to low emissions energy sources. As consumer/investor preferences shift, having an assured supply of low cost, renewable energy can become an important part of Northern Ireland's value proposition. There is a premium on being able to produce goods and services in a low emissions manner.

This will be relevant for activities that are part of/adjacent to several of the priority clusters identified in 10X. For example, data centres (which are emissions intensive) are attracted to locations where they can secure renewable energy supply; this could strengthen Northern Ireland's digital cluster. This is also the case for some industrial activities (e.g., advanced manufacturing). This can become a core part of Invest NI's proposition to inward FDI.

Of course, this is a competitive space and other nearby, competing locations will also be trying to strengthen their value proposition in this space. If Northern Ireland's renewable energy offering is not close to the mark, then there is a risk of losing FDI over time.

Implications for Northern Ireland

Emissions have fallen more slowly in Northern Ireland than in the entire UK over the past few decades. The planned acceleration of the emissions reduction process in Northern Ireland creates the potential to capture economic value as well as to avoid economic costs and risks.[xviii] A net zero transition is underway, and the earlier this transition begins the more likely it is to have net economic benefits. Recent developments with surging electricity and gas prices across Europe have reinforced the urgency of this process.

Northern Ireland can capture broad economic value from this net zero transition. There is economic value as Northern Ireland builds out its renewable energy capacity, particularly if it can attract multiple aspects of the supply chain to locate value-adding functions in Northern Ireland. Much of this economic activity is likely to be in regional areas of Northern Ireland, which will support a broader geographic distribution of employment and income across the economy.

There are also potential benefits from the development of green technologies. Green hydrogen is often mentioned. However, as discussed above, this is a very competitive space with many countries – including in Europe – moving quickly and investing aggressively to develop leading positions. There are green technologies in which Northern Ireland firms do have strong competitive positions, such as in transportation.

Beyond these direct sources of economic value, there are substantial 'horizontal' opportunities across the Northern Ireland economy from the net zero transition. Reducing energy prices and emissions intensity over time provides the basis for strengthening the competitiveness of the Northern Ireland economy. Developing an innovation and technology-intensive clean energy cluster is important but is not the only way to capture value from the net zero transition.

Indeed, Northern Ireland's resource endowment (particularly onshore and offshore wind assets) provides Northern Ireland with an advantage over economies that have fewer low-cost alternatives to reduce emissions intensity. There is real value in Northern Ireland leveraging renewable energy (and green hydrogen) to decarbonise its economy, and to use this as the basis for strengthening its productive base as well as attracting more quality FDI.

A strong renewable energy position can be used to strengthen Northern Ireland's competitive position; for example, better enabling Northern Ireland to attract FDI that is looking for access to low emissions energy sources. As one example, a strong renewable energy position could attract data centres, strengthening Northern Ireland's digital cluster, or manufacturing facilities to Northern Ireland.

The international small advanced economy experience shows that the benefits from the net zero transition can be captured across the economy. The Netherlands, for example, does not have renewable energy champions of the scale of Vestas and Orsted, but is able to capture value from green energy across its economy.

The key insight is that capturing economic value from the net zero transition needs to be an object of deliberate economic policy and required sustained at-scale investment. This international small advanced economy experience is relevant to the Northern Ireland context.

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