An analysis on the future role of Distributed Generation in Northern Ireland

Report for RenewableNI

June 2021

KPMG Sustainable Futures

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Context

- KPMG has been engaged by RenewableNI to assess and articulate the contribution which small to medium-scale Distributed Generation assets can provide as Northern Ireland ("NI") seeks to increase the proportion of renewable energy on the system from 49% to 70% by 2030, as well as highlighting specific policy mechanisms which could be adopted to maximise this contribution.
- Within this report, Distributed Generation ("Distributed Generation") is defined as any renewable generating asset below 5MW which is either connected to the distribution network or behind-the-meter. This report has particularly focused on the future role of medium-scale distributed wind assets between 1MW and 5MW.

Introduction

- The Northern Ireland electricity sector has been highly successful over the past decade, growing the proportion of energy demand met by renewables to c.49% as of 2020.
- One particularly successful component of this renewable deployment has been the contribution that small-scale Distributed Generation has made, which now represents 23% of NI renewable generation capacity. This Distributed Generation comprises a number of proven technologies, including small-scale wind (14%), solar and anaerobic digestion, spread across more than 23,000 individual assets.
- This success has been driven in part by specific policy support, both in NI and across the UK, where policy makers recognised the intrinsic benefits of Distributed Generation, including placing generation close to demand, the democratisation of energy generation and rural income diversification.
- In deploying this volume of Distributed Generation, Northern Ireland has developed a market leading and innovative Distributed Generation sector, employing over 500 people and generating GVA for NI of c.£45m per annum. This industry is now looking to utilise its embedded knowledge to develop and roll-out the next generation of distributed generating assets across NI, which will build on local innovation, economies of scale and deliver all the wider benefits of Distributed Generation, but at a **significantly reduced cost to previous support schemes.**

Alignment with Current and Emerging Policy Direction

- While our analysis suggests large-scale wind farms deliver the lowest LCOE in most applications, the wider financial and non-financial benefits of Distributed Generation means policy makers across Europe, as well as in GB and RoI, remain committed to actively promoting the deployment of such generating assets.
- For example, in 2019 Distributed Generation represented 18% of the global spend on renewables, while in the recent Irish RESS auction, the use of separate pots ensured 50% of all successful projects were Distributed Generation assets below 5MW, with the Government actively stating that *"increasing renewable technology diversity is a policy objective and will be delivered by RESS"*, while acknowledging that the *"trade-off between cost minimisation and diversification are complex"*.
- Similarly the European Energy Directive requires member states to *"ensure that specific, simplified and streamlined authorisation procedures exist for small decentralised and/or Distributed Generation, which take into account their limited size and potential impact"*, while the UK government recently noted that it *"recognises that small-scale generation and battery storage can play an important role in cutting carbon emissions as part of a flexible and efficient energy system, both reducing local demand and providing clean power"*.
- More locally, we believe Distributed Generation is able to deliver on all four core policy objectives set out in the recent NI Energy Strategy Consultation, namely:

1. **Ensuring that energy is affordable and that consumers are protected and can participate in the energy transition**
   The smaller scale of Distributed Generation will allow significantly more communities and businesses to directly participate in the energy transition, while the next generation model proposed within this paper delivers the benefits of Distributed Generation at a significantly reduced cost to consumers.
2. **Providing economic opportunities through the creation of a low carbon skills base.**
   It is estimated that the small scale wind industry in Northern Ireland already provides 500 jobs. Increasing the installed base of Distributed Generation will provide even more employment as well as innovation opportunities which can be developed and exported internationally.

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3. **Development of an indigenous renewable base to displace fossil fuels**
   Distributed Generation already supplies more than 20% of Northern Ireland's renewable energy. Ongoing policy support will enable Distributed Generation to continue the development of a robust and geographically diversified renewable base.

4. **Creation of a digitised energy system that creates value through the smart integration of demand and supply.**
   NIE Networks' recent 'Networks for Net Zero' report highlights the increasing flexibility that will be required to support the transition of transport and heating from fossil to renewable electricity generation. Distributed Generators are located close to demand (in some cases co-located) and the diversity of it's generation profile as well as the suitability for integration of energy storage has the potential to significantly enhance the resilience of the grid.

   Furthermore, while historically Distributed Generation in NI wasn't 'controllable' by the grid, the next generation of distribution generation as proposed within this paper will be fully controllable and part of a smart, flexible, digital grid.

Ancillary Benefit of Distributed Generation

- Alongside the strong policy alignment against the objectives of the upcoming Northern Ireland Energy Strategy, Distributed Generation delivers a number of key ancillary benefits which support it's inclusion within energy policy:

Transmission Losses

According to OFGEM, c.6.5% of all electricity generated is lost as it is transported to consumers through the grid.

In a recent review, the Government stated that *"DG has the potential to reduce losses of electricity resulting from it's transportation to the customer. In situations where DG supplies local consumers and reduces supplies from more remote sources, system losses [could be] reduced"*

Ancillary Benefit of Distributed Generation (cont…)

Transmission Upgrade Avoidance

In a recent consultation, the Government noted that *"Connecting electricity generation closer to the point of use reduces the extent of the infrastructure needed to transport the electricity. DG may therefore be able to offer T&D cost savings by reducing, or in some situations, avoiding completely, the costs incurred in reinforcing these networks.*

Security & Reliability

A Distributed Generation portfolio can create the same volume of renewable energy as a wind farm, however it enjoys wide geographic diversification, while not presenting a single grid connection point-of-failure risk.

Democratisation of Energy Generation

While historically virtually all of Northern Ireland's electricity was owned and controlled by just three power stations, Distributed Generation has allowed more than 23,000 consumers across Northern Ireland to own a stake in the energy transition.

Going forward, we believe support for larger Distributed Generation assets would make this asset class ideal to encourage and facilitate community participation in future auctions.

Support for the Rural Economy

KPMG's analysis has found that 89.9% of NI's 706 100kW - 250kW single turbines are installed in primarily rural locations with a population density of less than 100 / km2.

Distributed Generation is particularly well suited to supporting the decarbonisation of the agricultural sector, including co-location with large agri-industry and farms, while creating a diversification of income for farmers and rural land owners.

Speed of Deployment

Large-scale wind farms remain challenging and slow to deliver in NI, both in terms of planning and grid. Distributed Generation is much more flexible, opening up a broader geographic opportunity to deploy wind in appropriate locations in a much faster timescale.

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Proposed Vision of a Modern Distributed Generation Sector

- While the small-wind sector has been hugely successful in its deployment of generating assets in NI over the past 10 years, industry participants are keen to embrace new innovations and falling costs such that Distributed Generation best meets the future needs of the energy system, consumers and policy makers.
- The graphic below outlines the industry's vision for a future distributed wind sector in NI.

Volume Ambition

"Deliver 225MW of the estimated 1.6GW[1] of incremental renewable generation capacity by 2030 through Distributed Generation, in line with Distributed Generation's current 14% share of wind capacity in NI "

Economic Scale

"Deployment of modern, efficient distributed turbines with capacities between 1MW – 5MW, reducing historic small-wind LCOE by over 65%"

Innovative

"Create integrated, distributed energy units combining wind with solar PV, battery storage and (eventually) modular hydrogen electrolysers to maximise site efficiency"

Controllable

"Support the creation of a smart, flexible and digital grid by ensuring all future distributed generation is controllable by the grid operator"

Competitive

"Support the move to competitive auctions to ensure ongoing consumer value, set within separate auction capacity lots, to ensure large wind farms don't crowd out generation diversity"

Adjacent to Demand

"Seek to locate assets close to local demand, with particular focus on industrial, rural & farm decarbonisation"

[1] EirGrid *"Shaping Our Electricity Future"*

Executive Summary

Policy Recommendations

In order to deliver on the benefits of Distributed Generation, the industry is seeking specific policy recognition to ensure it has fair access to any future renewable support measures which may be introduced in Northern Ireland.

1. **Specific inclusion of Distributed Generation within the design of any support mechanism by ensuring that generators <5MW are not excluded from participation in any competitive auction process.**

   CfD mechanism in the UK is only open to generation units that exceed 5MW.

   Industry would seek the adoption of a policy position in line with the Irish RESS scheme, whereby the competitive auction is open to all technologies above 0.5MW.

2. **Creation of a separate pot for Distributed Generators in any competitive auction process.**

   The creation of a separate, technology neutral pot for Distributed Generation would put this asset class on an equal footing with offshore wind in the UK and with both solar and community energy projects in Ireland and ensure it isn't crowded out by a small number of large wind farms which won't deliver the full range of benefits associated with Distributed Generation.

   We would highlight that despite the inclusion of a separate pot, the competitive element of the auction design will ensure value for money for consumers is maintained.

   The concept of separate pots is already in place within the GB CfD for offshore wind assets, while the Irish RESS scheme has separate pots for both solar and small-scale community generation, while the South African renewable support scheme has a separate pot for sub-5MW generation assets.

3. **Allow generators participating in any competitive auction process to bid in an aggregated group of single Distributed Generation assets as a single bid entity**

   This move would facilitate the inclusion of smaller Distributed Generation assets in any future support, while ensuring they can remain competitive and realise appropriate economies of scale.

4. **Ensure that the payment support mechanism used in any process does not disincentivise innovative hybrid models from emerging.**

   The basis on which CfD payments are currently calculated in GB (using metered generation and a half-hourly CfD calculation) means that there is a limited incentive for generators to co-locate energy storage behind a single meter.

   The inclusion of storage alongside Distributed Generation assets would provide the NI grid with significantly enhanced resilience and flexibility and therefore the auction design needs to incentivise and facilitate its inclusion.

5. **Grid connection process for hybrid generation units**

   Installing multiple technologies behind a single meter connection can add a lot of value to the system if controlled and operated appropriately. This would also create the opportunity to utilise the scarce resource that is grid connection in a much more effective manner.

Energy Policy Context

UK Climate Targets

Introduction

In December 2020 the Committee on Climate Change ("CCC") recommended that Northern Ireland include a target to reduce all greenhouse gases ("GHGs") by 82% by 2050. This reduction is considered by the CCC to be a fair contribution to the UK's target of Net Zero emissions by 2050. An 82% reduction in GHGs is a challenging but achievable target that will require concerted action across all sectors of the Northern Ireland economy. It is clear that in order for Northern Ireland to achieve its recommended target the energy sector will need to achieve zero emissions in absolute terms. This section considers the alignment of Distributed Generation with key policy objectives as well as key considerations to ensure the design of future policy successfully supports the decarbonisation of the Northern Ireland economy.

Net Zero 2050

The term Net Zero does not mean that there will be no GHG emissions, but it does require that any residual emissions which are too expensive or difficult to avoid will be matched by eliminating an equivalent amount of GHGs from the atmosphere. This removal can be achieved through technologies such as bioenergy carbon capture and storage ("BECCS") or by planting trees.

In May 2019 the CCC recommended that the UK target Net Zero emissions by 2050. This recommendation is based on evidence from a number of sources, particularly a report from the International Panel on Climate Change titled 'Special Report on Global Warming of 1.5°C'. Net Zero emissions is considered to be key to avoiding an increase in global temperatures beyond which there is expected to be a step-change in catastrophic environmental and social outcomes.

The UK's Net Zero target was set in legislation enacted in June 2019 which replaced the previous 2050 target of an 80% reduction (compared to 1990 levels) with a 100% reduction. The legislation also provided a role for the CCC to advise the Westminster government and the devolved parliaments on climate targets that would set the UK overall on a pathway to Net Zero, through a series of Carbon Budgets.

6th Carbon Budget

The CCC's most recent Carbon Budget covers the period 2033-37. It recommends that UK-wide GHG emissions in 2030 are reduced by 68% and a further reduced by 78% in 2035 (both targets being relative to 1990 levels). An early reduction in emissions across the globe is considered to increase the likelihood of remaining below 1.5°C of Global Warming.

The 6th Carbon Budget is also designed to put the UK on a decisive path to achieving Net Zero by 2050 and demonstrate global leadership. The UK is set to host the next round of UN climate talks and the ambitious target is intended to underscore the union's role as President.

The costs of achieving the 6th Carbon Budget are considered to be relatively low; a cost equivalent to 1% of GDP has been estimated by the CCC. It is also considered that its implementation will create positive spill over effects for the UK economy. There is a growing global market for low-carbon goods and services; the CCC believes that the UK can put its economy to the fore of this megatrend with the implementation of the 6th Carbon Budget.

The CCC Budget report notes that 20% of the reduction required to achieve the Carbon Budget is within the purview of the devolved governments of Scotland, Wales and Northern Ireland. As such there is a recognition that the devolved authorities must see the benefits of the broader UK transition.

6th Carbon Budget and Northern Ireland

6th Carbon Budget and Northern Ireland

Responsibility for sectors of the economy covering 60% of the emissions in Wales, Scotland and Northern Ireland is devolved to national administrations. These sectors include policy for agriculture and land-use; building efficiency and heat; demand-side transport; and waste. Additionally the Northern Ireland Executive holds responsibility for energy distribution networks.

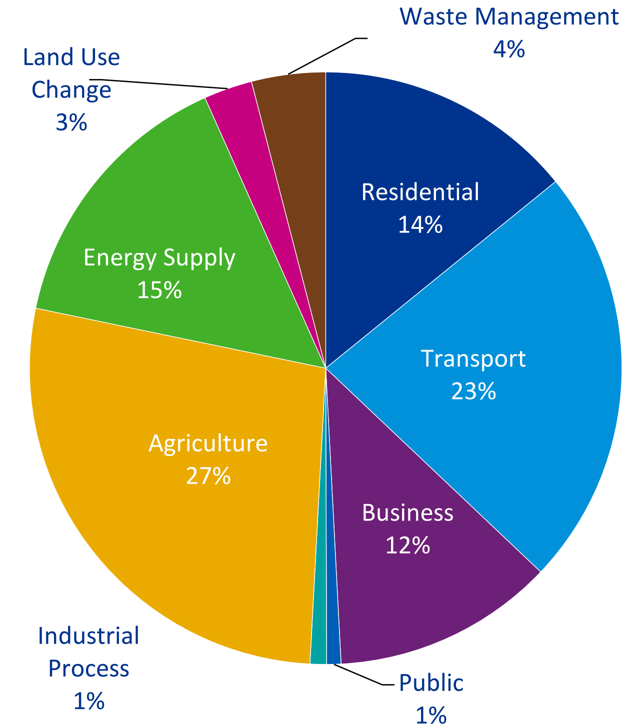
The 6th Carbon Budget sets out a recommended target for Northern Ireland of a 60% reduction in emissions in the period 2033-2037. Ultimately Northern Ireland is expected to deliver savings of 82% as part of the overall UK Net Zero target; the role of agriculture in the economy and the associated methane emissions are recognised in this target. There is also a recommendation that Northern Ireland should introduce climate legislation to support this target.

In an April 2021 letter sent to Northern Ireland's Minister of Agriculture, Environment and Rural Affairs, by the CCC it is estimated that meeting the 6th Carbon Budget would require annual investment in the order of £1.3bn by 2030. Key areas that have been identified as requiring investment are renewable / low-carbon power generation, upgraded energy distribution capacity, building energy retrofit and electric vehicle infrastructure. The benefit of this investment will be realised over a number of years through lower emissions and reduced operating costs as fossil-fuels are displaced by technologies with lower operating costs.

The pathways through which Northern Ireland achieves its targets are currently the subject of consultation, however it is clear that electrification and greater proliferation of renewable electricity has a significant role to play in three key sectors. Moving passenger vehicles from petrol or diesel to electric vehicles has the potential to reduce harmful emissions from urban areas as well as eliminating 23% of Northern Ireland's total GHG inventory. Solid fuel and oil combustion still play an outsized role in heating Northern Ireland's residential building stock; heat-pumps and in some cases direct-electrification can address an area responsible for 14% of total emissions. Energy-supply itself should not be overlooked and as the share of renewable electricity in the system expands, fossil fuels – starting with coal and oil and ending with natural-gas – will be squeezed from the merit-order by renewable electricity.

High levels of electrification, powered by low carbon sources will require the delivery of renewable energy capacity on an unprecedented scale. It is in this context that distributed electricity generation with its specific attributes should be considered alongside support for the largest utility-scale projects.

NI GHG Emissions by Sector (2018)



Source: NISRA

GB Renewable Electricity CfD

Contracts for Difference

The UK electricity system has been subject to carbon pricing since 2005, when the UK was a member of the EU. The UK has recently introduced its own carbon emissions trading mechanism ("UK ETS"). Despite the constant and strengthening presence of a carbon price, UK Government policy has supported the introduction of additional policy mechanisms to accelerate the deployment of renewable power generation. This is unsurprising as the CCC has advised that the move to decarbonise the UK could result in an annual electricity demand that is four times higher than current levels.

Earlier renewable support mechanisms such as ROCs or FIT have been discontinued in favour of an auction known as the Contracts for Difference ("CfD"). The UK Government has held three CfD auctions, however established generation technologies (solar and onshore wind) were excluded from recent auctions.

The government is planning to open a fourth auction round ("AR4") in December 21. AR4 differs from recent predecessors in one key regard: it is open to a much broader category of renewable generation technologies by inviting bids through two separate pots.

- **Pot 1** will support established technologies such as onshore wind, solar photovoltaic, energy from waste with CHP, hydro, dedicated biomass with CHP, floating offshore wind, geothermal, remote island wind, tidal stream and wave energy.
- **Pot 2** will continue to support offshore wind projects.

The key commercial terms of the CfD are that:

- Contracts are 15-years in duration;
- Each contract has an inflation-linked (CPI) strike price ("Strike Price");
- Payments under the contract are calculated for each half-hour trading period;
- Where the day-ahead half hourly market price ("Market Price") exceeds the Strike Price the generator makes payments equivalent to meter volume times the excess, such that their net income does not exceed the Strike Price; and
- Where the Market Price is below the Strike Price the generator receives payment such that their net income does not fall below the Strike Price.

The existing GB CfD structure is not fully-aligned with supporting the future rollout of Distributed Generation:

- Distributed generators are excluded from participation in the CfD market by virtue of the minimum capacity required for participation being set at 5MW.
- The administrative burden for participants is significant.
- While the government has committed to updating Community Engagement and Guidance Benefits for Onshore Wind, there is no explicit mechanism that allows for direct community participation in the auction.
- The basis upon which CfD payments are calculated disincentivises the installation of co-located storage behind the same meter (and sharing the same expensive grid connection) from utilising this scarce resource to the maximum benefit of the system.

The CfD mechanism has delivered significant benefits to GB, however a simple transposition of this mechanism to Northern Ireland will inhibit the growth of a class of renewable energy generation that has the potential play a significant role in the delivery of decarbonisation targets.

The Future Role of Distributed Generation

What is Distributed Generation?

Introduction

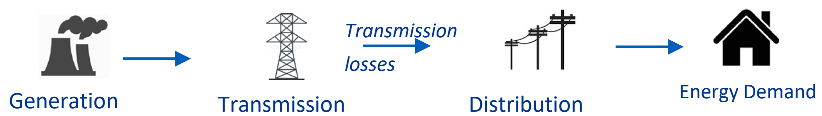
While there is no specific definition of Distributed Generation, Ofgem defines it as *'electricity generation which is connected to the distribution network rather than the high voltage transmission network',* while academic literature typically defines it as *"small-scale electric power generation that is located close to customer needs"*[1]. Such systems typically produce between 1kW and 5MW of power supply.

Within this document, we are categorising Distributed Generation as any single generating asset below 5MW in capacity which is either off-grid or connected to the distribution network and includes a range of technologies including wind, solar & AD CHP.

Overview

Historically, electricity in Northern Ireland was generated from a small number of large, centralised thermal power stations (mostly coal, oil & gas) and transported into the transmission system, through to distribution systems and delivered to loads such as homes and businesses.

Legacy Energy Supply Model

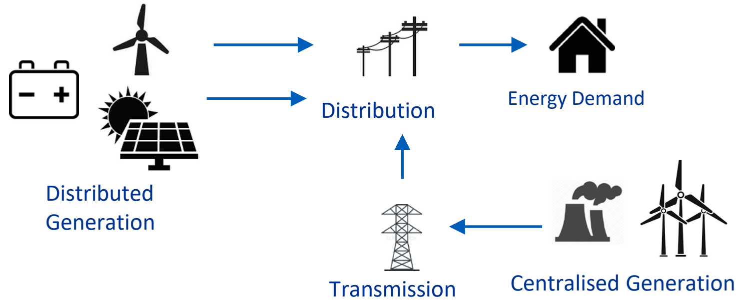


Under this model, the electricity is transported significant distances from generation to end-use across the transmission network, resulting in transmission / distribution electrical losses and adding costs to the electricity consumed.

While this centralised system is easier for the System Operator to manage and was sensible when generating assets needed to be a certain scale to be economically viable, the evolution of the energy system and significant technical innovation in generation technology means this is unlikely to be the optimal model going forward.

In contrast, under a Distributed Generation model, centralised generation is complemented, or in some cases replaced, by a large number of individual smaller generating assets that are geographically spread across the system, bringing generation closer to actual energy demand.

Emerging Energy Supply Model



These Distributed Assets can be connected to the distribution network, or located 'behind the meter' such that they directly supply power to end users without having to utilise the grid network at all. By locating close to the demand for power, these assets can reduce strain on the network or demand for power which may otherwise have had to travel long distances across the system.

While Distributed Generation can in theory cover a wide range of technologies, including both fossil and renewables, the development of the decarbonisation agenda has fuelled interest and viability of distributed renewable generation, with proven small-scale wind, solar and biomass CHP technologies now dominating the deployment of Distributed Generation globally.

1 Arthur D. Little (1999)

Distributed Generation in Northern Ireland

Distributed Generation in Northern Ireland

Northern Ireland's energy system has evolved significantly over the past 15 years, as outlined in the table below.

Back in 2005 over 95% of NI's generating capacity was provided by just three assets, located in Greater Belfast and the north west, supported by a small number of modest wind farms.

	2005	2020
Centralised Generation	3 Generating Units 2,012MW	3 Generating Units 1,788MW*
Large-Scale Renewables	27 Wind Farms 112MW	53 Wind Farms + Large Solar 1,229MW
Distributed Generation	17 decentralised Units < 1MW	23,528 decentralised units 348MW

Source: OFGEM RO Annual Reports, EirGrid Capacity Statement

With limited push for decarbonisation, there were limited options for smaller-scale fossil fuelled generating assets, meaning the dominant centralised model remained rational.

In contrast, as of 2020, the success of the renewable obligation scheme, and innovation in smaller-scale efficient renewable generated assets, has facilitated a significant increase in Distributed Generation coming onto the system. These three same thermal generating stations are now supported by over 23,000 distributed generating stations spread across NI, consisting of small-scale wind, solar, AD, landfill gas & small-hydro totalling more than c.340MW of capacity.

This Distributed Generation has taken numerous forms, with particularly strong deployment of individual small-scale wind turbines below 250kW, as well as a large number of rooftop solar installations on commercial and residential properties.

* plus additional fossil fuelled AGU/DSU capacity

This deployment to date means that 23% of Northern Ireland's renewable energy (on a capacity weighted basis) now comes from small-scale Distributed Generation, rather than larger one-off wind or solar farms.

The table below shows the split of assets between large-scale generating assets and small-scale distributed assets (excluding micro generation).

	Nominal Capacity (MW)	Assumed Capacity Factor	Weighted Capacity (MW)
Large-Scale Assets			
Large Wind	1,095	24%	263
Large Solar	134	10%	13
WtE	16	90%	14
	1,245		**291**
Small-Scale Assets			
Small Wind	173	22%	38
Small Solar	112	8%	9
Small Biogas	24	70%	17
Small Biomass	6	70%	4
LFG	16	90%	14
CHP	3	90%	3
Small Hydro	6	70%	4
	340		**89**

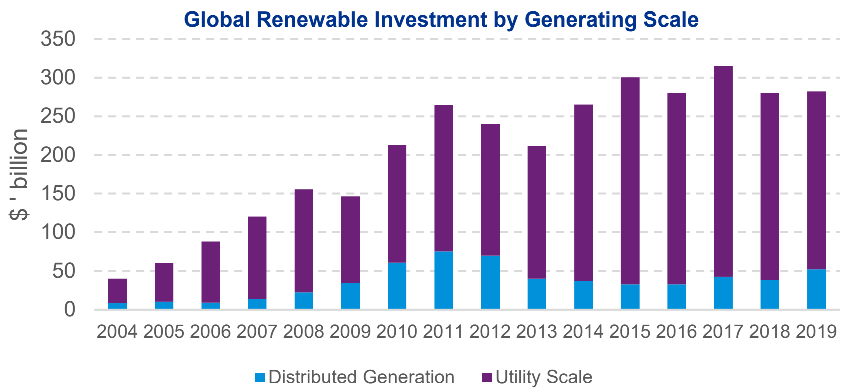
This level of small-scale, Distributed Generation is a significant achievement for Northern Ireland, and has demonstrated the network's ability to successfully integrate and manage this proportion of Distributed Generation on the system.

In a report commissioned to identify global sustainable energy technology market opportunities that could be realised by exploiting NI's science, research and technology capabilities, the Sustainable Energy Horizon Report recommended that *"NI take a leadership role in the development of distributed energy solutions and their integration into Intelligent Energy Systems that will optimise efficiencies through the use of local resources and participation of multiple stakeholders; and to create an International Reference Site to demonstrate the commercial scalability of these solutions to the global market".*

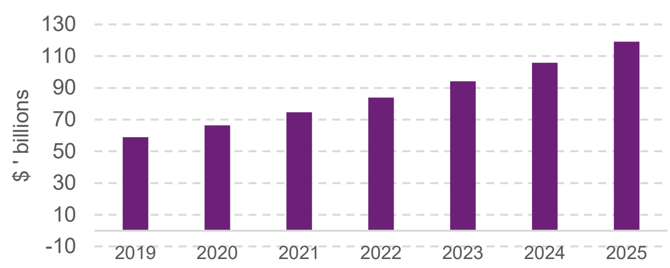
Market Trends in Distributed Generation

Global Growth in Distributed Generation Deployment

Distributed Generation has grown to become a material component of the global renewable energy system[2]. As outlined in the graph below, Distributed Generation (< 1MW) has represented on average 18% of global investment in renewable capacity over the past 15 years, with a 37% increase in investment in 2019 vs 2018. This recent investment has been dominated by distributed solar deployment across the US, China, Germany & Brazil, driven by policy support for widespread small-scale generation.



This growth in Distributed Generation is expected to continue, with a 2020 market study estimating the global market will double to more than €119b by 2025.



[2] Source: Global Trends in Renewable Energy Investment, 2020

This growth in Distributed Generation globally is supported in many cases by active policy design. Within a recent report for the Department of the Economy[3], Cornwall Insight provided an example from South Africa where *"the REIPPP scheme is aimed at above 5MW for the main element, with a 100MW reserve in each auction set aside for below 5MW project. This is effectively a minima to support small scale developments who would otherwise be uncompetitive in the auctions"*.

GB Policy Context

GB policy has long recognised the benefits of Distributed Generation on the system, with its main policy tool, the Feed-in Tariff Scheme, launched in 2010 designed to *"promote take up of small scale low-carbon electricity technologies by communities and the public in Great Britain up to a Specified Maximum Installed Capacity of 5MW".*[4]

Since its introduction, the FIT scheme supported the deployment of over 850,000 installations, with a total of over 6.6GW of UK generation capacity, representing c.15% of the 44.4GW of total renewable generation capacity in GB as of 2018[5].

In a 2019 consultation the UK Government noted that *"the FIT scheme gave the public a stake in the transition to a low-carbon economy and in turn fostered reductions in energy costs for households, businesses and communities that generate electricity"*[6].

While the FIT scheme closed in 2019, the UK Government has noted that it remains *"committed to driving forward the policies needed to improve the resilience and flexibility of our energy system through decentralised energy. We are seeing more generation located nearer to peoples' homes"*[6]. Accordingly, in 2020 the Government launched a new scheme called the Smart Export Guarantee ("SEG"), which is designed to remunerate small-scale low-carbon generators (onshore wind, AD & solar up to 5MW) for electricity they export to the grid.

Unlike the FIT, the SEG doesn't provide a fixed export tariff, and instead seeks to introduce a competitive market into the support for small-scale renewables, with energy suppliers bidding to provide export tariffs for generators. While the scheme has come in for criticism for not going far enough, it demonstrated that the Government recognises and supports the deployment of Distributed Generation assets.

[3] Source: "*Futures of Renewables in NI*", Cornwall [4] Source: Consultation on Feed-in Tariffs for solar PV, 2011

[5] Source: OFGEM FIT Annual Review [6] *"The Future for Small-scale low carbon generation", BEIS 2019*

Market Trends in Distributed Generation

EU Policy

The European Clean Energy package, which was introduced in 2019, is intended to *"establish a modern design for Europe's electricity market, adapted to new commercial realities – more flexible, more market-based and better placed to integrate a greater share of renewables"*[7].

Distributed Generation features heavily in the various components of the European Energy Reform, with the Energy Directive stipulating that all Member States must:

- *"ensure that specific, simplified and streamlined authorisation procedures exist for small decentralised and/or distributed generation, which take into account their limited size and potential impact";*
- *"take account of the long-term, marginal, avoided network costs from distributed generation and demand-side management measures".*
- *"ensure that distribution system operators are able to procure such services from providers of distributed generation, demand response or energy storage… where such services cost-effectively alleviate the need to upgrade or replace electricity capacity and support the efficient and secure operation of the distribution system"*

This policy support is seeing strong European deployment of Distributed Generation, with, for example, over 100,000 new distributed solar installations in Germany in 2020 alone.

As articulated in a July 2020 report by the European Parliament, Distributed Generation can *"improve resource efficiency, increase energy system resilience, and give individuals and communities a stronger role in decarbonisation. As such it appears to fit well with the European Green Deal and EU plans for secure, affordable, and clean energy"*[8].

While Distributed Generation can operate as a standalone asset, a recent EU-funded study by PVP4Grid found a particularly strong trend and rationale for the deployment of behind the meter Distributed Generation, where the generating assets either partly or completely satisfies demand of energy consumers. The report noted that *"This model of distributed generation and consumption can be extremely efficient and has the potential for greater expansion both in Germany and across Europe"*[9]. The research project found that combining solar PV systems, energy storage and charging points for electric vehicles leads to particularly high rates of on-site energy consumption, and notes that if grid operators adopt the necessary control systems, these sites can help stabilise power grids.

[7] Source: EU Directive 2019/944, June 2019
[8] Source: *"Will distributed energy resources (DERs) change how we get our energy?", EPRS*

Irish Policy

Irish renewable energy policy has evolved significantly over recent years as the Government has adopted a Net Zero energy target, and sought to materially increase the level of renewable electricity on the system by 2030.

Within its policy design, the Irish Government has been careful to ensure its support schemes facilitate smaller-scale Distributed Generation within the competitive processes. For example, unlike the GB CfD system, which only permits assets greater than 5MW, the RoI RESS scheme is open to all assets above 500kW.

Furthermore, the Government has a stated aim of creating diversity in the generation mix, noting that "*increasing renewable technology diversity is a policy objective and will be delivered by RESS".* This included an objective to ensure large onshore wind, which they recognised was the lowest cost option, was complimented by *"a broad mix of technologies including commercial rooftop solar PV, medium solar PV, medium onshore wind, small onshore wind, small hydro".* They further noted that *"Technology Neutral auctions, with targeted interventions can deliver technology diversity and ensure the introduction of a level playing field for competing technologies"*[10].

As a result of these policy objectives, the Irish Government introduced separate 'pots' within the auction to achieve a broad mix of technologies and scales, recognising that a single auction would result in a dominance of lowest cost large scale wind. In the end, 50% of all successful projects were sub-5MW Distributed Generation assets, including both wind and solar.

The Irish RESS scheme also included a separate pot for community-led renewable assets, focused on the range of 0.5MW – 5MW. Such projects were provided with a separate pot to ensure a minimum level of participation.

The Irish Government also included a number of other key objectives within its design of the RESS scheme, noting that *"other national considerations which have a direct impact on the design of RESS include rural development and farming. Security of supply is also key energy policy objective, and the RESS will further reduce Ireland's dependence on imported fossil fuels by broadening the mix of technologies"*[10].

[9] Source: www.pvp4grid.eu [10] DCCAE: RESS Support Scheme, High Level Design

Rationale for Further Investment in Distributed Generation

Rationale for Distributed Generation Policy Support

Policy support for small-scale renewables generation was originally introduced in 2010 to assist the UK and NI Governments in achieving a number of key policy objectives, including:

- *"Increasing the level of renewable generation of electricity in order to achieve the targets for renewable energy";*
- *"Bringing the direct benefits of renewable electricity to the wider general public";*
- *"Engaging more people in directly tackling climate change [which] should help bring about greater acceptance of the behavioural changes that we need to make"; and*
- *"those who generate their own electricity, are likely to value it more and use it more responsibly and efficiently"* [11].

More recently in 2019, in considering the next phase of support for Distributed Generation, the UK Government reiterated its support for the concept, noting that it *"recognises that small-scale generation and battery storage can play an important role in cutting carbon emissions as part of a flexible and efficient energy system, both reducing local demand and providing clean power. Building on the success of the FIT scheme, [new policy support] can help the UK to transition to an energy system that is smarter and cleaner, whilst keeping consumers firmly at its heart"*[12].

In the recent NI Energy Strategy Consultation, it notes that *"We believe Distributed Generation is the ideal technology to achieve this ambition. We will facilitate decentralisation that supports demand-side flexibility as a tool to empower consumers and minimise network investment costs"*[13].

Building on this support, the following section provides a more detailed analysis of the key rationale for Distributed Generation, alongside its key benefits to consumers, the grid system and energy consumers.

[11] Source: EU State aid No N 76/2010 (NIRO), DECC "Government's Response to the 2009 Consultation"
[12]*"The Future for Small-scale low carbon generation", BEIS*
[13] NI Energy Strategy Consultation 2021

Transmission Losses

Under a centralised model, the power is produced in centralised locations, and then transported at high voltages across the transmission system. According to OFGEM, c.6.5%[14] of all electricity generated is lost as it is transported to consumers in this way.

In contrast, DG offers the potential to site renewable generation either adjacent to the energy demand (see NI case studies on page 25), avoiding any transmission or distribution losses, or on the distribution network close to the demand, avoiding having to transport the power long distance.

In a review of DG, the UK Government acknowledged this benefit, stating that *"DG has the potential to reduce losses of electricity resulting from its transportation to the customer. In situations where DG supplies local consumers and reduces supplies from more remote sources, system losses [could be] reduced"*[3]

Transmission Upgrade Avoidance

As outlined within the recent SONI consultation document *"Shaping Our Electricity Future"*, which discusses future changes to the NI grid in order to accommodate an increase in renewable generation, SONI analysis suggests that the lowest cost model for NI, requiring the least network upgrades, is a Generation-Led network's model where one *"puts clean electricity generation close to where the power is used"*.

This concept of proximity is inherent in the deployment of Distributed Generation, which seeks to locate generation in a geographically diverse manner, close to, or adjacent to demand centres. In an analysis commissioned by the RoI Government, they concluded that the higher costs of diversification away from lowest cost large onshore wind *"are likely to be at least partially compensated by lower grid expansion costs in the Diversify scenarios since the RES-E generation is more scattered over the country"*[16].

This concept is accepted by the UK Government, who noted that *"Connecting electricity generation closer to the point of use reduces the extent of the infrastructure needed to transport the electricity. DG may therefore be able to offer T&D cost savings by reducing, or in some situations, avoiding completely the costs incurred in reinforcing these networks"*[15].

[14] OFGEM Sustainable Development Report 2006 [15] "Review of Distributed Generation", DTI
[16] "Optimally allocating renewable generation in Ireland" ESRI 2018

Rationale for Further Investment in Distributed Generation

Reliability & Resilience

A key rationale for the deployment of Distributed Generation is the diversity and resilience it can bring to an energy system. Instead of relying on a small number of generating stations with a single point of failure risk, Distributed Generation allows the capacity to be spread across hundreds of individual units, each with their own grid connections, meaning individual failure has minimal impact on the system. Similarly, the geographic spread of assets means no concentration risk against localised issues.

In a recent consultation, the UK Government recognised this benefit, commenting that it is *"committed to driving forward the policies needed to improve the resilience and flexibility of our energy system through decentralised energy".*[17]

Furthermore, in a 2010 study commissioned by DETI and the NIAUR, its author Cambridge Economic Policy Associates ("CEPA"), while noting that small-scale wind is more expensive than large-scale wind farms, outlined a number of benefits to NI from small-scale wind, including that *"small-scale generation delivers a dispersed supply to the power system, and could, therefore, be argued to enhance security of supply."*

Support for the Rural Economy

While any future deployment of Distributed Generation is likely to be spread across NI, we would expect there to be particularly strong deployment across rural Northern Ireland. This is supported by KPMG analysis of ROC-based small scale wind which found that 90% of the 706 100kW – 250kW turbines in NI were deployed within areas of population density below 100 person per km^2.

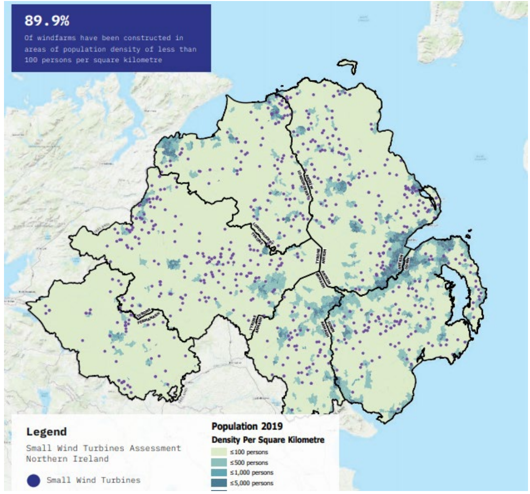
Similarly, a recent 2021 report on Distributed Generation across GB by MCS analysed 1.2m installations over a 14 year period and found that rural and semi-rural areas dominated distributed asset deployment, representing 18 of the top 20 local authority areas. In particular, the report noted that *"the highest demand for small-scale wind turbines tends to be in rural areas farthest away from urban areas"*[18].

The rural opportunity is highlighted in the 2021 NI Energy Strategy consultation, which it notes the opportunity for our *"substantial rural agriculture base"* to contribute to renewable energy production.

[17] *"The Future for Small-scale low carbon generation", BEIS 2019*

[18] "Renewing Britain: The Changing Landscape of Home-Grown Energy 2008 – 2021", MCS

This rural bias is logical and positive. In particular it provides a good counterbalance to the predominantly east-based, urban thermal generation bias of the current NI system, while providing energy users in western, rural locations with an ability to create their own localised decarbonised generation without the power having to be transported large distances from East to West.



We consider this rural support particularly relevant given the increasing focus on the decarbonisation of the NI agricultural sector, which is one of NI's highest emitting sectors. Given the few levers available to the farming community to decarbonise their farming operations, it is vital that they are provided with an ability to access renewable electricity as they decarbonise their operations and increase energy consumption through electrification of their operations.

The opportunity to support the rural economy was also taken into account in the design of the RoI RESS scheme, where the Government noted in its design consultation that *"other national considerations which have a direct impact on the design of RESS include rural development and farming"*[19].

This resulted in the creation of a dedicated community 'pot' in the RESS scheme, to facilitate local communities, often rural, to develop assets in their locality.

[19] DCCAE: RESS Support Scheme, High Level Design

Rationale for Further Investment in Distributed Generation

Speed of Deployment

The NI Energy Strategy Consultation sets out an ambitious target to achieve 70% renewable penetration by 2030, requiring c.1,200 – 1,300MW of new generation capacity.

While onshore and offshore wind farms are expected to make the main contribution to this target, development and planning timelines, especially for offshore wind, mean that achieving the target with these generation classes alone will be more difficult.

A key benefit of Distributed Generation is its ability to deploy assets at a quicker pace, due to smaller individual scale and environmental considerations, with Distributed Generation likely to allow incremental deployment at an earlier point over the next decade.

As such, the inclusion of Distributed Generation within the energy policy will provide significant additional comfort that new generating capacity can be deployed efficiently from the commencement of any scheme.

Democratisation of Renewable Generation

As noted on page 13, back in 2005 over 95% of NI's generating capacity was provided by just three assets, located in Greater Belfast and the north west. Through the success in the deployment of Distributed Generation over the past 10 years, there are now over 23,000 individuals across Northern Ireland involved in renewable energy production.

This 'democratisation' of energy generation is fully in line with both existing government policy objectives, whereby it notes that *"those who generate their own electricity, are likely to value it more and use it more responsibly and efficiently"*[20], as well as core objectives set out in the future NI energy strategy, where the Government notes a core objective of *"offering consumers the chance to participate in the delivery of a net zero carbon energy future".* Policy support for Distributed Generation will allow corporate consumers to get directly involved in the deployment of Distributed Generation, ensuring they can enjoy the direct benefits of the energy transition.

Grid Infill

Grid connectivity remains a key challenge for the delivery of incremental generating capacity in NI by 2030. While the recent SONI consultation sets out a number of grid strategies, including a focus on investments to facilitate the connection of large-scale onshore and offshore assets, we believe Distributed Generation can also play a valuable complimentary role by providing a more nimble and flexible scale of generation which can infill pockets of available capacity across the network, address local generational needs, and be integrated into the network in a controllable manner to provide increased local flexibility for the grid operator.

[20] DECC "Government's Response to the 2009 Consultation"

Alignment with Future Energy Policy

In March 2021, Department for the Economy ("DfE") published a consultation paper on the options for an updated energy strategy for Northern Ireland. The new energy strategy is intended to reflect:

- The Net Zero by 2050 target and interim carbon budgets;
- Enhanced energy resilience for Northern Ireland;
- The opportunity for consumers to participate in its delivery; and
- The opportunity to stimulate economic development and innovation.

We believe Distributed Generation has the potential to meet these four objectives, as well as deliver on all five principles which will underpin the new energy strategy:

DFE Strategy Principle	Energy strategy objective / Scope for Distributed Generation to address
✓ Placing you at the heart of the energy future	**Objective:** Ensuring that energy is affordable and that consumers are protected and can participate in the energy transition. ▪ *The smaller scale of Distributed Generation will allow significantly more communities and businesses to directly participate in the energy transition, while the next generation model proposed within this paper delivers the benefits of Distributed Generation at a significantly reduced cost to consumers.*
✓ Grow a green economy	**Objective:** Providing economic opportunities through the creation of a low carbon skills base. ▪ *It is estimated that the small scale wind industry in Northern Ireland already provides 500 jobs. Increasing the installed base of Distributed Generation will provide even more employment as well as innovation opportunities which can be developed and exported internationally.*
✓ Do more with less	**Objective:** Setting improved energy efficiency and building-energy standards and supporting consumers to invest in building upgrades. ▪ *Locating generation units closer to demand minimises electrical power losses and in some cases co-location of demand and generation can completely eliminate associated network losses.*
✓ Replace fossil fuels with indigenous renewables	**Objective:** Development of an indigenous renewable base to displace fossil fuels. ▪ *Distributed Generation already supplies more than 20% of Northern Ireland's renewable energy. Ongoing policy support will enable Distributed Generation to continue the development of a robust and geographically diversified renewable base.*
✓ Create a flexible and integrated energy system	**Objective:** Creation of a digitised energy system that creates value through the smart integration of demand and supply. ▪ *NIE Networks' recent 'Networks for Net Zero' report highlights the increasing flexibility that will be required to support the transition of transport and heating from fossil to renewable electricity generation. Distributed Generators are located close to demand (in some cases co-located) and the diversity of it's generation profile as well as the suitability for integration of energy storage has the potential to significantly enhance the resilience of the grid.* *Furthermore, while historically Distributed Generation in NI wasn't 'controllable' by the grid, the next generation of Distribution Generation as proposed within this paper will be fully controllable and part of a smart, flexible, digital grid.*

Economics of Distributed Generation

Distributed Generation at a competitive LCOE

- While the NIROC scheme was successful in delivering a significant volume of Distributed Generation across NI, it was recognised that this was delivered at a cost premium to large-scale wind farms, with the UK Government noting in its submission for EU State Aid that *"the levelised cost of energy ("LCOE") for a 250kW onshore wind turbine was £289/MWh as of 2010"*[21], and as such provided 4 ROCs / MWh, over four times that provided to a large onshore wind farm.
- In developing its vision for the next generation of Distributed Generation in Northern Ireland, RenewableNI members have sought to build on innovations and efficiencies since 2010, as well as economies of scale from larger turbines, to ensure that Distributed Generation can now be deployed at a scale that delivers a LCOE much closer to wind farms, while still delivering all the benefits of Distributed Generation.
- RenewableNI is seeking policy support for the deployment of significantly larger Distributed Generation assets in the range of 1MW – 5MW. As outlined in the table below, such a move would significantly reduce LCOE of such assets compared to the previous sub-250kW scale:

Single Wind Turbine	250KW Turbine (2010)	2.5MW Turbine (2021)
Capex £ / MW	2,904	1,700
Opex £ / MW	170	80
Capacity Factor	22%	30%
Asset Life	20 years	25 years+
Return Expectations	8 – 10%	< 8%
LCOE (£ / MWh)	**289**	**< 90**

Note: In developing this cost schedule, we have referred to a recent report produced by KPMG on the "Economics of Small-Scale Wind in Northern Ireland" to establish an average cost of a new sub-250kW turbine installed in Northern Ireland between 2010 and 2017, and compared this to up-to-date project costs for a 2.5MW turbine as of 2021. We have assumed the same price per MW for grid within for both assets, albeit would expect further grid economies of scale for the larger turbine.

Economic Comparison Analysis

- As can be seen in the table opposite, the move to a larger turbine captures significant capex & opex economies of scale, including lower turbine and civil costs on a per MW basis.
- The larger turbine can be expected to achieve higher capacity factors than the smaller 250kW turbines, which average c.22% - 24% in Northern Ireland.
- Additionally, sub-250kW turbines are not economically viable post-subsidy, meaning they have a capped asset life of the 20-year ROC duration, whereas a larger 2.5MW turbine will remain economically viable post-support period, allowing significantly longer productive generation.
- Finally, the now proven nature of Distributed Generation in NI will deliver a material reduction in investor return requirements, which based on our market knowledge, would now be below the previous range of 8% - 10% targeted under NIROCs.

Economic Conclusion

- Based on this high level analysis, our modelling has shown that if NI energy policy supported the move to larger Distributed Generation in the range 1MW – 5MW, the sector would be able to reduce LCOE by over 65% compared to existing Distributed Generation.
- Furthermore, such a scale could be economically delivered over a 15-year support scheme, as opposed to 20 years required under NIROCs, which would also have a material reduction in the cost to consumers.
- As such, while the Distributed Generation sector would still need its own 'pot' in any CfD auction to ensure it could compete with onshore wind, this premium is now likely to be less than 20%, compared to over 400% historically, while still delivering the same benefit of Distributed Generation as previously targeted under the previous support scheme.

[21] Source: EU State aid No N 76/2010 (NIRO),

Innovation using Hybrid Generation

Integrating Variable Renewable Generation

- Previous renewable support mechanisms in Northern Ireland did not allow for more than one generation class to be installed behind a single meter point.
- There is a negative correlation between, for example, the output time series of solar PV and onshore wind.
- Combining both generation classes behind a single meter point presents the opportunity to increase the utilisation of grid capacity and provide a higher load-factor output to the grid.

Hybrid Generation Network Integration

- 188MW of hybrid generation connections were issued in the Republic of Ireland's ECP-2.1 connection process. The distribution network in Northern Ireland does not permit the connection of sites where the total installed generation capacity exceeds the export capacity by more than 120%. KPMG notes that a review of this requirement is being considered in the context of NIE Networks' participation in the Flextech project with SONI, Eirgrid and ESB Networks.
- There is a requirement for all generators greater than 11kW to have an active connection to the network which makes the generation unit controllable. Controllability of generation units can facilitate the installation of two generator units with a combined capacity exceeding the sites maximum export capacity without violating the terms of connection.

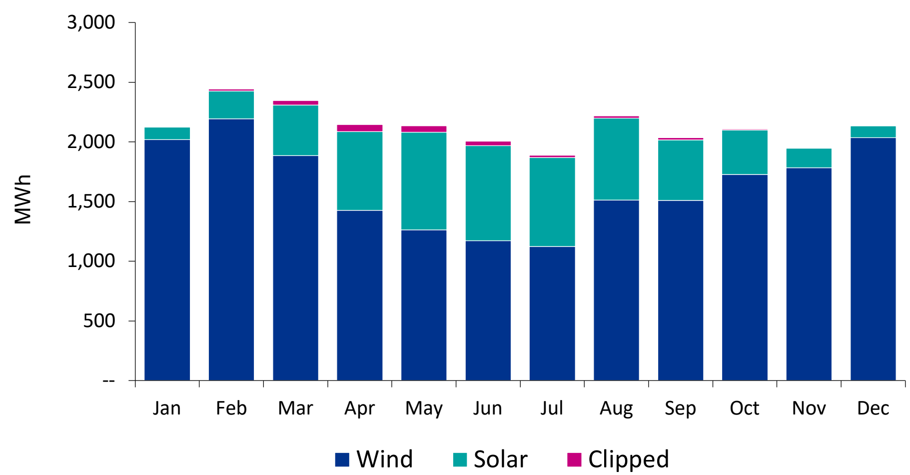
CfD Support Mechanism

- GB's CfD support mechanism currently only supports projects of a single technology, however this is under review. In a recent consultation on the rules for the upcoming CfD auction (AR4) BEIS asked stakeholders whether multiple technologies at a single site should be facilitated.
- There is also a recognition from BEIS that "*sharing infrastructure, as well as operation and maintenance can improve the economics of co-located sites*"[22].

Example

- The figure below shows the impact of combining 2.5MW of solar generation with 2.5MW of wind generation.
- In the summer months when the output of the wind generation is at its lowest, the output from the solar generator is maximised.
- The unattenuated output from the hybrid site is modelled to reach 94% of the combined capacities of the generators (5MW), so a control system would be required to ensure that the site's maximum export capacity is not breached. The 'lost' energy in this case would be approximately equal to 1% of total energy generated.
- In this example (modelled using historical NI wind and solar time series data) combining solar with a load factor of 9% and wind generation with a load factor of 30% results in a combined load factor of 38%, increasing grid utilisation – particularly during daytime hours.

Example Hybrid Unit Output



[22] "Enabling a High Renewable, Net Zero Electricity System", BEIS March 21

Co-location with Demand

Demand Energy Pricing

- The unit price for electricity paid by large businesses and medium industrial users is c.£80/MWh. This represents a significant premium (in the order of £30/MWh) to the wholesale energy price paid by the industrial customer as network and other system charges are also incurred.
- The CfD support mechanism in GB is designed to guarantee the income of generators that export to wholesale energy market.
- Co-location of demand and generation creates potential for the generator to achieve a price in excess of the wholesale price and for the onsite demand user to buy renewables at a price equivalent to or lower than the import price.

Opportunity for additional renewables at a lower cost

- The premium to the wholesale energy market which an industrial user would be willing to pay will be close to the cost at which no support mechanism is required, however not all the energy will be consumed onsite.
- If the volumes exported to the grid are not eligible for renewable support then the overall economics of the project may be impacted to the point where it does not go ahead or the installation size is reduced.

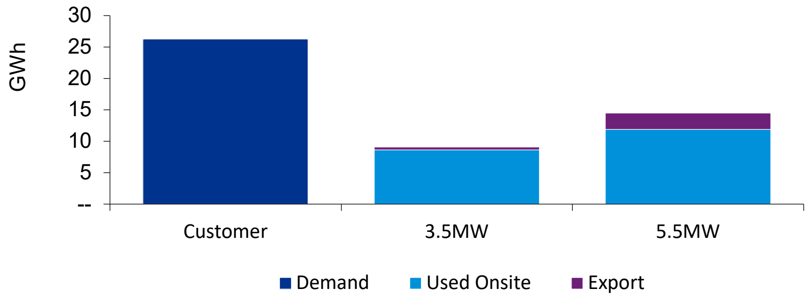
Co-location of demand and generation is beneficial

- Ensuring that volumes that are exported to the grid can access a renewable support mechanism will incentivise larger installations (only a portion of which require support).
- The grid connection for a large industrial user is an expensive piece of infrastructure and while some modifications would be required, export capacity can leverage the same physical connection as import capacity, resulting in lower costs.

Example of onsite generation

- The figure below shows the annual energy volumes of an industrial user with an annual demand of 25GWh; peak demand of 5MW; import connection 5.5MW; and 60% load factor.
- If onsite generation is designed to minimise export then a 3.5MW wind turbine would be the optimal installation (>5% export).
- Allowing the site to participate in a renewable support mechanism for a portion of its export volume (up to 20% of total output) would incentivise a 60% larger unit to be installed (up to 5.5MW) maximising the use of the network connection. The system would benefit from a larger installation while the support mechanism only applies to a smaller proportion.

Example Onsite Generation



Implications for support mechanism design

- Any support mechanism should facilitate the entry of co-located generation and demand.
- A competitive support mechanism should also recognise the overall renewable generation volumes of the project relative to the impact on any support mechanism costs.

Proposed Capacity of Distributed Generation

Ambition for Distributed Generation in Northern Ireland

The members of RenewableNI have proposed two ambitions for Distribution Generation to KPMG:

1) To maintain the share of renewable energy provided from Distributed Generation (including small scale wind); and
2) To increase the flexibility of Northern Ireland's distribution system and facilitate the transition to Net Zero.

1. Maintain Share of Renewable Energy

Small scale wind in Northern Ireland currently contributes 14% of all renewable electricity.

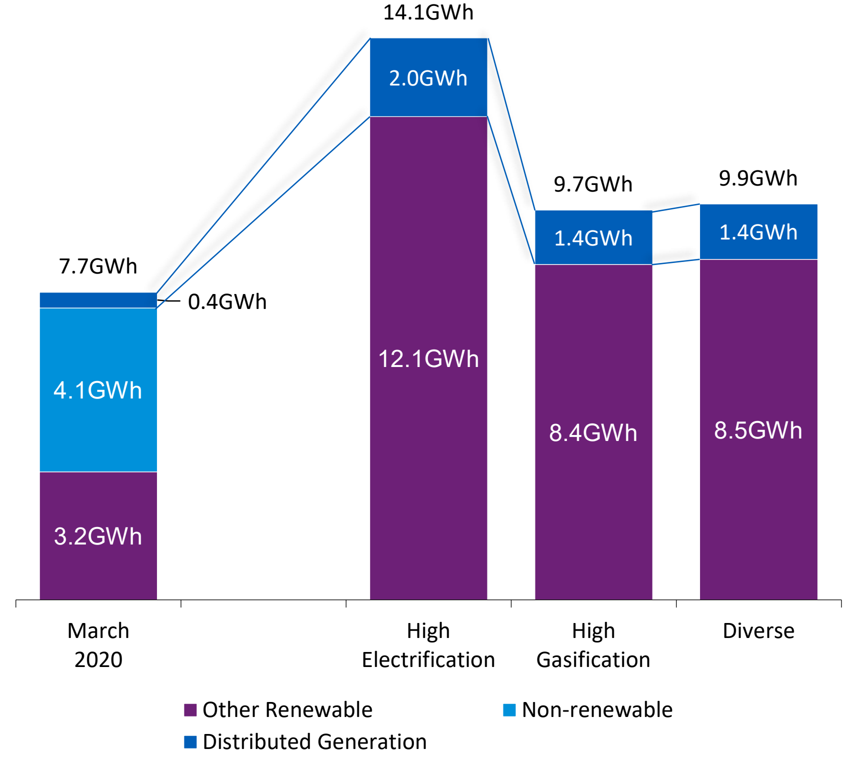
KPMG's analysis suggests that in each of the three scenarios outlined by DFE in their '*Future Energy Decarbonisation Scenarios, Northern Ireland'* this is a realistic and achievable target requiring only a 2.5x (in Diverse and High Gasification scenarios) and 4x increase (High Electrification) on the generation volume base to maintain relative share in a fully renewable energy system.

The average installed capacity of small scale wind in Northern Ireland is currently 224kW and an increase to larger turbines (1MW) could deliver this increase. Although a simple scaling of turbines may not be the optimal solution it does illustrate the achievability of the RenewableNI's vision.

2. Facilitate the transition to Net Zero through the provision of flexibility

NIE Networks' recent '*Networks for Net Zero*' report highlights the increasing flexibility that will be required to support the transition of transport and heating from fossil to renewable electricity generation. Distributed Generators are located close to demand (in some cases co-located) and the diversity of its generation profile as well as the suitability for integration of energy storage has the potential to significantly enhance the resilience of the grid.

14% Ambition Mapped to DFE Pathways

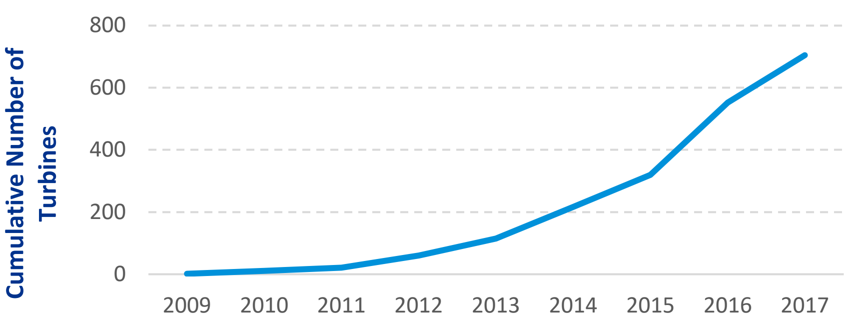


Proven Track Record of Distributed Generation

NI Small-Scale Wind

- Northern Ireland has a proven track record in the deployment of Distributed Generation, with particular success in small-scale (sub 250kW) onshore wind turbines.
- As outlined in the graph below, over a 7 year period, NI installed and fully integrated over 700 distributed wind turbines with capacity between 100kW and 250kW, with a peak installation of over 230 in a single year alone.

NI Small-Scale Wind Deployment (2009 - 2017)



Source: OFGEM

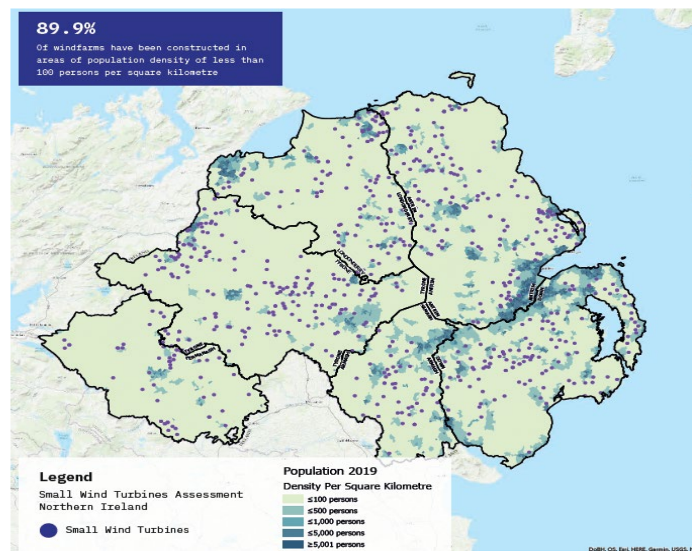
- Overall, more than £400m of investment was made in small-scale wind, accounting for 14% of onshore wind capacity, and creating a sustained 500 jobs[23].
- This track record demonstrates the feasibility of large-scale distributed wind deployment, the success in the wind industry scaling up to meet the challenges of such volumes, as well as the proven ability to source grid capacity and integrate the generation onto the grid system.
- Based on our analysis, the vast majority of this Distributed Generation was developed and deployed by local NI companies, who have created and sustained 500 jobs locally, and who retain the skills and capabilities to continue to the next stage of renewable capacity expansion in NI.

[23] *"Economics of Small-Scale Wind in Northern Ireland"* ,KPMG Jan 21

Innovation

- Through deploying the large volumes of distributed generating assets over the past 10 years, NI wind companies have developed a world-leading track record in the sourcing, development and operation of such assets.
- This has included the innovative use of refurbished turbines, which align with the concept of the circular economy and waste minimisation, the use of derated turbines to optimise site yields and grid connection capacity, as well as the control and monitoring of distributed assets such that they can act as a single Virtual Power Plant ("VPP")
- With the right policy support, the existing NI wind sector will be in a position to utilise this embedded knowledge, innovative practices and proven deployment track record to assist in the next generation roll-out of NI renewable generation capacity.

Map of the 706 distributed small-scale wind turbines in NI



Source: KPMG Analysis

NI Distributed Generation - Case Studies

While the structure of the NIROC scheme encouraged the deployment of small-scale Distributed Generation assets such as sub-250kW wind turbines, there are numerous examples of larger distributed assets which have been successfully deployed across Northern Ireland and which provide an excellent blueprint of how larger scale distributed assets can be strategically located to maximise the benefits of Distributed Generation.

Antrim Area Hospital

- In 2005, Antrim Area Hospital became the first hospital in Northern Ireland to generate its own power from a wind turbine. Antrim Area Hospital is an acute general hospital, managed by the Northern Health and Social Care Trust. The Vestas V47 turbine stands at 40m high and has an output of 660kW.
- While connected to the distribution network, it is located 'behind the meter' and provides the hospital with fully decarbonised power without any transmission or distribution losses.

Source: Sustainable Development Commission, The Wind Power

Brett Martin

- Headquartered in Newtonabbey, Brett Martin is a leading supplier of plastic sheets, rooflights, plumbing and drainage products.
- In 2011, Brett Martin completed the installation of its first wind turbine at the company's headquarters, becoming one of the first Northern Irish manufacturers to do so.
- The Enercon E-70 turbine stands at a fully extended height of almost 100m with a blade span of 71 metres. The turbine has an output of 2.3MW and as at 2018, covered 11% of the company's energy costs. The turbine reduces the company's carbon emissions by c.4,000 tonnes per annum.
- The company has since entered into a private wire agreement on another co-located 6MWe solar farm, which supplies a further 14% of the company's power requirements.

Source: Brett Martin

Bombardier Aerospace

- In 2015, Bombardier installed a number of renewable assets adjacent to its C-Series factory in Belfast, including a 3.8MW solar array on the factory roof, a 4MW biogas CHP engine within the factory, and a direct wire to a 15MW EfW plant located adjacent to the factory.
- Combined, these three generating assets have the potential to provide up to 100% of the factories electricity requirements.

Policy Recommendations

Policy Recommendations

Policy Recommendations

In order to deliver on the benefits of Distributed Generation, the industry is seeking specific policy recognition to ensure it has fair access to any future renewable support measures which may be introduced in Northern Ireland.

1. **Specific inclusion of Distributed Generation within the design of any support mechanism by ensuring that generators <5MW are not excluded from participation in any competitive auction process.**

   CfD mechanism in the UK is only open to generation units that exceed 5MW.

   Industry would seek the adoption of a policy position in line with the Irish RESS scheme, whereby the competitive auction is open to all technologies above 0.5MW.

2. **Creation of a separate pot for Distributed Generators in any competitive auction process.**

   The creation of a separate, technology-neutral pot for Distributed Generation would put this asset class on an equal footing with offshore wind in the UK and with both solar and community energy projects in Ireland and ensure it isn't crowded out by a small number of large wind farms which won't deliver the full range of benefits associated with Distributed Generation.

   We would highlight that despite the inclusion of a separate pot, the competitive element of the auction design will ensure value for money for consumers is maintained.

   The concept of separate pots is already in place within the GB CfD for offshore wind assets, while the Irish RESS scheme has separate pots for both solar and small-scale community generation, while the South African renewable support scheme has a separate pot for sub-5MW generation assets.

3. **Allow generators participating in any competitive auction process to bid in an aggregated group of single Distributed Generation assets as a single bid entity**

   This move would facilitate the inclusion of smaller Distributed Generation assets in any future support, while ensuring they can remain competitive and realise appropriate economies of scale.

4. **Ensure that the payment support mechanism used in any process does not disincentivise innovative hybrid models from emerging.**

   The basis on which CfD payments are currently calculated in GB (using metered generation and a half-hourly CfD calculation) means that there is a limited incentive for generators to co-locate energy storage behind a single meter.

   The inclusion of storage alongside Distributed Generation assets would provide the NI grid with significantly enhanced resilience and flexibility and therefore the auction design needs to incentivise and facilitate its inclusion.

5. **Grid connection process for hybrid generation units**

   Installing multiple technologies behind a single meter connection can add a lot of value to the system if controlled and operated appropriately. This would also create the opportunity to utilise the scarce resource that is grid connection in a much more effective manner.

Important Notice

This report has been prepared for and on behalf of RenewableNI (a trade association which represents over 40 businesses in the renewable electricity industry in Northern Ireland, fostering knowledge exchange, sharing best practice and supporting policy development) and the Irish Wind Energy Association.

All work carried out by KMPG was carried out on the instruction of the RenewableNI and Irish Wind Energy Association in accordance with the Engagement Letter dated June 2021.

The report contained herein is primarily based on publicly available information and is only intended to address the requirements of the Irish Wind Energy Association as set out in the Engagement Letter, and not any third party individual or entity.

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Although we endeavour to ensure the accuracy of the contents of this report, the accuracy of the information contained herein is dependent on the accuracy of the publicly available information. We have sense checked the underlying information however we cannot provide any guarantee or warranty as to its accuracy.

KPMG

Report Lead Author:

Russell Smyth
Partner, KPMG Ireland
email: russell.smyth@kpmg.ie

kpmg.ie