An economic review of small-scale wind in Northern Ireland

Undertaken for and on behalf of RenewableNI

January 2021

Disclaimer

Contents

The NI Small-Scale Wind Sector by Numbers

706 Number of small-scale wind assets (100kW – 250kW) accredited for NIRO across NI.

12% NI small-scale wind sector as a proportion of NI's total wind sector installed capacity. This is in line with England and Wales, which generates c. 12.2% of its renewable energy from small-scale technologies.

1p The total cost of an individual small-scale turbine to the average NI domestic consumer over its 20-year life.

35p The total cost of the small-scale wind sector annually to the average NI domestic consumer (c. 1% of the renewable levy on NI domestic bills).

£570k Average capital investment for each single turbine installed in NI.

4 Years Average development time from planning submission to turbine operation across the small-scale wind sector in NI.

9.7% The expected return (IRR) which will be achieved by the average NI small-scale wind turbine, which is below the Government target return of 10% and within the expected range of 8% - 12%.

11.4% The expected return (IRR) which will be achieved by a developer replacing an existing small-scale turbine with a more efficient de-rated turbine. Such a turbine will cost the average NI consumer an incremental one sixteenth of one pence per annum.

£400m The total capital investment made by the small-scale wind sector across NI over the past decade.

£45m 2019 annual GVA contribution of the small-scale wind sector to the NI economy which is estimated to include total employment of over 500 jobs.

88,000 The number of NI homes which can be supplied with 100% green electricity by the NI small-scale wind sector.

1 Executive Summary

1.1 INTRODUCTION

KPMG has been commissioned by RenewableNI to conduct a detailed analysis of the small-scale wind sector in Northern Ireland ("NI") in order to address questions and concerns which have been raised in the public domain in recent times. These concerns have primarily focused on suggestions of excessive returns to developers of small-scale wind under the Northern Ireland Renewables Obligation scheme ("NIRO").

Our report has focused exclusively on small-scale wind assets with a capacity between 100kW and 250kW, of which there are a total of 706 accredited as part of the NIRO scheme. These assets account for 94% of small-scale wind capacity in NI.

In producing this report, KPMG has undertaken the most detailed review of the NI small-scale wind sector to date, including analysis of both publicly available information and private sector information not previously in the public domain. The latter was gathered by speaking with a wide variety of sector representatives and participants, and developing a comprehensive database ("the KPMG NI Small-Scale Wind Dataset", the "Dataset") of actual costs for a representative sample of 134 small-scale wind assets in NI based on detailed developer discussions, analysis and questionnaire responses. The assets in the Dataset account for 20% of the total capacity of NI small-scale wind assets in the 100-250kW range and 19% of the total number of accredited stations in this range.

In order to substantiate the information provided by private developers KPMG has:

— audited c.20% of development and operating costs within the Dataset back to underlying invoices and contracts;

— cross-referenced and benchmarked the development and operating costs in the Dataset to data on over 100 small-scale NI wind turbines that KPMG has access to through other work in the small-scale wind sector; and

— benchmarked the average development cost in the Dataset with those referenced in independent assessments commissioned by the UK and NI governments during the policy period[1].

[1] Please refer to the main body of the report for all reference material supporting the report and Executive Summary.

1.2 CONTEXT

The NIRO was introduced in 2005 as the main policy tool in the promotion of renewable energy. It operates alongside the Renewables Obligation ("RO") schemes in England and Wales, and Scotland.

Under the schemes, Renewables Obligation Certificates ("ROCs") are issued to accredited generators in respect of the eligible renewable electricity they produce. These ROCs are purchased by electricity suppliers to demonstrate that they have sourced a specified level of renewable electricity. Once accredited, generators typically receive support under NIRO for 20 years.

At its inception, the NIRO was technology neutral (i.e. one ROC was issued per MWh of renewable electricity generated) however it evolved over time to become both technology and scale dependent. This was to encourage greater and more rapid deployment of renewables and to increase the effectiveness of the scheme by increasing support to the technologies that needed it, while reducing subsidy to those that didn't. Changes to the NIRO were typically informed by independent consultant analysis, public consultations and ultimately reviewed and approved by the European Commission.

The NIRO largely mirrored the RO scheme in England and Wales until 2010 when the UK Government introduced a Feed-in Tariff (FIT) regime to create a subsidy framework for small-scale low carbon technologies. For legislative reasons, similar provisions could not be introduced in NI at the same time and therefore the NIRO was amended to provide four ROCs per MWh for small scale onshore wind generators ("Enhanced Support"), as well as a number of other technologies. The increased level of ROCs was designed to make the deployment of small-scale wind turbines economically viable and induce investment in smaller scale renewable technologies in order to increase the overall level of renewable generation of electricity.

The NIRO has been successful in increasing the proportion of electricity generated from renewable sources in NI, which have risen from 3% since the introduction of the NIRO in 2005 to 42% in 2018. Wind energy has been the biggest contributor to this growth - in 2018 c. 35% of NI's electricity generation was from wind sources. The majority of wind generation is provided by large-scale wind farms, although the introduction of Enhanced Support for small-scale wind in 2010 has enabled a steady increase in the contribution from small-scale wind, which now represents c. 12% of installed capacity in the NI wind sector.

1.3 REVIEW FINDINGS

Policy decisions:

- The NI Government's original decision in 2010 to introduce, and then subsequently retain, Enhanced Support (i.e. four ROCs per MWh) for small-scale wind turbines was analysed and informed by numerous independent studies. Based on these studies, it was demonstrated that Enhanced Support did not provide excessive returns to developers and was in line with the policy direction and level of support provided for similar assets in Great Britain ("GB") at the time it was introduced. In approving the level of support for small-scale wind in NI, the European Commission noted that "the increased support levels have no overcompensation implications for wind".
- While the UK Government chose to reduce similar subsidy support for small-scale wind in GB in 2015, its analysis demonstrated that the existing support level remained appropriate, however it wished to reduce spending on renewable energy investment more generally as part of a reallocation of general Government spending priorities. These cuts were later criticised by the UK Environmental Audit Committee.
- Despite policy variances, renewable generation profiles remain broadly consistent across the UK. NI small-scale wind represents c. 12% of the NI wind sector installed capacity. This is in line with England and Wales, which generates c. 12.2% of its renewable energy from small-scale technologies.

Investment returns analysis:

- Based on our analysis, Enhanced Support for small-scale wind is not expected to generate average developer returns in excess of the Government's target return level. The average small-scale wind turbine in NI can expect to achieve an annual return (IRR) of 9.7%[2]. This is broadly in line with the Government's target return of 10% and within the expected range of 8% - 12%.
- The development of small-scale wind turbines carried a significant degree of risk for developers, which the targeted return reflected. Based on data available to us, less than 50% of planning applications led to a developed asset, representing considerable sunk investment. Furthermore, developers typically had to provide substantial collateral to secure debt finance for development and construction costs as unsecured finance was generally unavailable. In addition, future electricity price forecasts have fallen by 13% since 2016 and expected corporation tax rate reductions reversed, reducing forecast returns to developers since their original investment decision[3].
- While only applicable to a minority of sites and based on a typical repowering scenario, we estimate that the forecast return to a developer who replaces an existing small-scale turbine with a more efficient de-rated turbine will be c. 11.4%, which remains within the expected range of returns.
- While there was a significant increase in the deployment of small-scale wind in the final years of the scheme, this appears to be primarily as a result of delays in planning and grid connection offers, rather than new developers entering the market. Based on data available to us, small-scale wind assets installed in 2016, 2017 and 2018 had been in development for approximately four years by the time of installation, while average expected returns for developers were reducing in the later years of the scheme as capital costs increased.

Cost of small-scale wind to energy consumers:

- The average small-scale wind turbine costs each individual NI consumer a total of one pence over its 20-year life (i.e. one twentieth of a penny per annum).
- The incremental cost to the average domestic NI consumer of repowering a small-scale turbine with a more efficient de-rated turbine is one sixteenth of one pence per annum. These larger turbines increase

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[2] This return analysis does not include sunk investment for projects which were progressed but did not reach operations. As such, the full developer IRR is likely to be lower.

[3] These fluctuations were not taken into consideration in the calculation of the 9.7% IRR calculation.

renewable output and thus contribute towards overall renewable energy targets without the need for new grid infrastructure or additional turbines.

- The annual cost of the renewable obligation schemes to each NI consumer in 2019 (£31) remains below the level forecast (£33) when the Enhanced Support for small-scale wind was introduced in 2010. The small-scale wind sector accounts for c. 1.1% (35 pence) of this annual bill (being approximately one twentieth of a penny per annum multiplied by 706 small-scale turbines).
- The renewable obligation schemes in England and Wales, Scotland and NI operate by socialising the total cost of renewable generation supported by the schemes across each MWh of energy supplied to consumers. Of the average annual renewable obligation cost of £31 passed onto NI domestic consumers in 2019, c. 95% of it (£29.33) was driven by the cost of renewable generation deployed in GB. Had NI not developed any renewable generation locally, NI consumers would still have had to pay its contribution towards the cost socialisation of GB renewables, without the benefits of an indigenous renewables sector.
- While NI is a net recipient of renewable obligation funding, this is in part due to NI providing a disproportionate contribution to the UK's renewable energy targets (4.5% in 2018/19) relative to its proportion of UK electricity consumption (2.8% in 2018/19). Scotland is also a net recipient under the scheme for similar reasons. This transfer of value is as originally designed by the renewables obligation schemes, whereby they sought to incentivise renewable generators to locate in areas where there are high levels of renewable energy resources, making the most of the natural endowments of different regions for the benefit of the UK as a whole in meeting its renewable targets.
- Even with the strong penetration of small-scale wind in NI, average support provided to NI renewable energy is lower than the average support provided to renewable energy generated in England and Wales. The average support per MWh of renewable energy generated in NI is £87.51, which is lower than the average support of £89.60 per MWh of renewable energy generated in England and Wales. Accordingly, NI renewable energy can be considered to represent relative value-for-money within a UK context.

Benefits of small-scale wind:

- While small-scale wind has a higher levelised cost of energy than large-scale wind farms, the benefits to NI from supporting small-scale wind include job creation, democratisation of energy generation, enhanced security of supply and the ability to infill available pockets of grid capacity across the NI grid network where there was insufficient capacity to accommodate larger wind farms.
- The majority of small-scale turbines were developed and are owned by local NI farmers, individuals and businesses, with most installation, civil engineering and operations carried out by NI enterprises.
- The strong penetration of small-scale wind within the farming community has provided NI farmers with access to lower cost energy, wider distribution of three-phase power, a reduced carbon footprint and diversification of income.
- Based on data collected from sector representatives and participants for 2019, we estimate that the small-scale wind sector contributed £45m to NI's Gross Value Added (i.e. the economic measure of the value of goods and services produced) in 2019 and supported 500 direct and indirect employees. Due to the nature of the sector's activity, many of these benefits are generated across rural NI. In addition, the sector has reduced import costs for non-renewable fuels by c. £7m per annum. and can power c. 88,000 NI homes annually.

2 Introduction

2.1 BACKGROUND TO THIS REPORT

KPMG has been commissioned by RenewableNI to carry out a detailed analysis of the small-scale wind sector in Northern Ireland ("NI") in order to address questions and concerns which have been raised in the public domain in recent times. These concerns have primarily focused on suggestions of excessive returns to developers of small-scale wind under the Northern Ireland Renewables Obligation (NIRO).

The issues that have been raised are complex and important, however due to a lack of publicly available information, up until now there has been an insufficient evidence base on which to form robust views and conclusions.

Unless stated otherwise, this report focuses on small-scale wind assets in the 100-250kW capacity range, which represents 94%[4] of the NI small scale wind generation installed capacity.

2.2 METHODOLOGY

In undertaking this review, KPMG has:

- reviewed publicly available information, including the monthly performance of all small-scale turbines since 2006[5];
- spoken with a wide variety of sector representatives and participants;
- had extensive dialogue with and issued questionnaires to developers (which included independent developers, farmers and Small and Medium-Sized Enterprises ("SMEs")) in order to compile a comprehensive database ("KPMG NI Small-Scale Wind Dataset", the "Dataset") of actual small-scale wind costs and a separate database (the "KPMG Small-Scale Repowering Dataset", the "Repowering Dataset") of 44 repowering projects[6] across NI; and
- prepared a financial model to calculate expected returns to small-scale wind developers.

This information has been analysed with a view to providing factual and evidence-based answers to the most pertinent economic and financial related queries which have been raised.

More detail in respect of the methodologies adopted and assumptions used is provided throughout the report in the relevant sections. More detail in respect of the KPMG NI Small-Scale Wind Dataset and the KPMG Small-Scale Repowering Dataset is provided below.

The KPMG NI Small-Scale Wind Dataset

This Dataset contains information for 134 small-scale wind assets in NI which account for 20% of the total capacity of NI small-scale wind assets in the 100-250kW range and 19% of the total number of accredited stations in this range[7].

Key figures in the Dataset are the capital and operating expenses associated with the 134 assets. These figures have been used to derive average cost figures which are then used as inputs in the financial model to calculate the average expected return to developers. Please refer to section 5 for more information in this respect.

In order to substantiate the information provided by private developers, KPMG has:

- audited c. 20% of development and operating costs in the KPMG NI Small-Scale Wind Dataset back to underlying invoices and contracts;
- cross-referenced and benchmarked the costs to data on over 100 small-scale NI wind turbines that KPMG has access to through other work in the small-scale wind sector; and

[4] KPMG analysis of the OFGEM ROC Register, December 2020
[5] Capacity factors have been derived from the OFGEM ROC Register, December 2020
[6] Please refer to section 6 for more detail regarding the concept of repowering
[7] KPMG comparative analysis of the OFGEM ROC Register (December 2020) and the Dataset

- benchmarked the average development cost with those referenced in independent assessments commissioned by the UK and NI governments over the period[8].

Data on the exact composition of the sector is not publicly available however we believe our dataset is broadly representative of the wider NI small-scale wind market, incorporating a majority (74%) of refurbished assets and a substantial proportion (37%) of de-rated turbines[9], across a broad selection of turbine makes and models.

The KPMG Small-Scale Repowering Dataset

The Repowering Dataset contains information on 44 repowering projects in NI, some of which have already been completed, and a number which have been planned and fully costed but not yet completed.

These data points consist of development and operating costs as well as expected or actual average capacity factors and have been developed from discussions with, and confidential questionnaire responses from, a variety of developers and sector representatives, as well as proprietary KPMG data[10].

2.3 AN OVERVIEW OF NIRO

The Northern Ireland Renewables Obligation ("NIRO") was introduced in 2005 as the main policy tool in the promotion of renewable energy. It operates alongside the Renewables Obligation schemes in England and Wales, and Scotland.

Under the schemes, renewable obligation certificates ("ROCs")[11] are issued by the Authority[12] to accredited generators in respect of the eligible renewable electricity they produce. Once accredited, generators receive support under the NIRO for 20 years or until 2037, whichever is sooner.

The schemes place a statutory obligation on electricity suppliers to demonstrate the supply of electricity (to specified levels determined by the schemes) from renewable sources. Electricity suppliers can:

a) Evidence that they have fulfilled part or all of their obligation by presenting the required amount of ROCs to the Authority; and/or

b) Pay a set amount per MWh (to the Authority) for any shortfall of ROCs and this is called the buyout price.

At the end of each annual obligation period, all proceeds from buyout payments across the UK are collected in a consolidated buyout fund and, following deductions for scheme administration costs, are recycled to suppliers in proportion to the number of ROCs they presented. This is known as ROC recycle.

As such, accredited renewable electricity generators have three potential sources of income:

1. From the sale of the renewable electricity they produce (and/or from electricity cost savings where they use some or all of the electricity generated themselves);

2. From the sale of the ROCs issued to them by the Authority in respect of the renewable electricity they generate; and

3. From the ROC recycle, which is a delayed payment to the electricity supplier (who may or may not share some or all of it with the generator) that can vary depending on supply and demand for ROCs in that particular obligation period.

The ROC scheme is ultimately funded by electricity users, with suppliers passing the cost of ROCs on to consumers through their electricity bill.

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[8] This includes the following reports which provide changes in the capex and opex costs over time:
- Review of RO Banding for Small-Scale Renewables, CEPA 2014
- Impact Assessment of the Periodic Review of FITs, DECC 2015

[9] We understand that there are 242 de-rated turbines in NI (source: Department of the Economy Assembly Response). Assuming these turbines are all de-rated to between 100-250kW capacity, this represents 34% of assets in that category which is in line with the proportion of de-rated assets in the KPMG NI Small-Scale Wind Dataset (37%).

[10] This has been obtained in the ordinary course of our business advising on renewable energy projects. Consent has subsequently been obtained from the information owners to use the information for the purposes of this report.

[11] Technically renewable obligation certificates (being the collective term for certificates issued under any of the RO, Renewables Obligation Scotland or NIRO) are different to ROCs, which are certificates issued under the RO in England and Wales with certificates issued in NI and Scotland called NIROCs and SROCs respectively. While electricity suppliers can discharge their obligations using either NIROCS, ROCS or SROCS, the distinction arises because each scheme can issue a different amount of renewable obligation certificates in respect of the same amount of renewable electricity generation. For simplicity and in line with commonly used terminology, we have referred to NIROCs as ROCs in the report unless stated otherwise.

[12] In NI this is the Northern Ireland Authority for Utility Regulation (NIAUR)

2.4 KEY CHANGES TO NIRO

The NIRO has evolved over time. This section sets out a high level, non-exhaustive overview of the key changes to NIRO, with a focus on those changes affecting small scale wind.

When the NIRO was first established, one ROC was issued per megawatt hour of renewable electricity generated. This technology-neutral approach incentivised the development of the most efficient forms of renewable electricity generation (i.e. the lowest hanging fruit) which was primarily large-scale wind.

In 2009, in line with Great Britain ("GB"), the Renewables Obligation Order (Northern Ireland) 2009 introduced banding provisions such that the number of ROCs issued per MWh became dependent on the technology used to generate that renewable electricity. The rationale was to encourage greater and more rapid deployment of renewables and to increase the effectiveness of the scheme by increasing support to the technologies that needed it, while reducing subsidy to those that didn't.

In 2010, the UK Government introduced a Feed-in Tariff ("FIT") regime to create a subsidy framework for small-scale low carbon technologies. It was intended to enable democratisation of the renewable electricity industry, enabling participation of individuals and communities (often rural communities), as well as energy professionals, in the shift to a low carbon economy. Under the FIT scheme, electricity suppliers are required to pay set tariffs on both the generation and export of renewable electricity from accredited installations (including wind energy up to a maximum capacity of 5MW). As tariffs were set by the Government, this offered more certainty of returns to generators (as they were no longer exposed to volatile electricity prices) and was generally considered less complex relative to the RO (and NIRO).

The FIT legislation in GB did not extend to NI and therefore, in response, the NI Government passed the Renewables Obligation (Amendment) Order (Northern Ireland) 2010 amending the NIRO to increase the number of ROCs granted to selected small scale renewable generators. Four ROCs per MWh were provided to small scale onshore wind (with net capacity of up to 250kW) as well as solar photovoltaic stations (up to 50kW), hydro stations (up to 20kW) and anaerobic digestion plants (up to 500kW). This was designed to align NI and GB support levels for small scale generators in these sectors, allowing individuals, SMEs and communities to also participate in renewable energy generation.

In addition, the Department of Enterprise Trade and Investment ("DETI", the Department which oversaw the NIRO, and was eventually replaced by the Department for the Economy) and the NI Authority for Utility Regulation ("NIAUR") commissioned a review[13] of the most appropriate form of support for renewable electricity in NI. This review concluded that the case to move from the NIRO to a form of FIT regime was not justified for various reasons as set out in section 3 of this report.

Further amendments to the NIRO were made in 2011, 2013 and 2014. These were informed by a series of consultations, and a formal independent review in 2013 to ensure ongoing effectiveness, efficiency and value for money. While there were changes to support levels for different technologies in some of these amendment orders, there was no change to small-scale wind.

As part of the UK's Electricity Market Reform (including the transition to Contracts for Difference as the main support mechanism for low carbon electricity generation), the renewable obligation schemes in England and Wales, Scotland and NI were closed to new renewable electricity generation in stages depending on the type and scale of technology. Under the Renewables Obligation Closure (no. 2) Order (Northern Ireland) 2016, no new small-scale wind station could qualify for ROCs from 1 July 2016 (slightly later than the GB date of 12 May 2016) unless it qualified for a defined number of grace periods. All grace periods ceased by 2019.

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[13] Incentivising Renewable Generation in NI, CEPA 2010

2.5 RENEWABLE ENERGY IN NI

Energy policy is a devolved matter and the key energy strategies in NI to date have included the Strategic Energy Framework (June 2004) and the Strategic Framework for NI (2010). These energy frameworks set targets for NI's consumption of renewable electricity which included the 2012 target of 12% and the 2020 target of 40%.

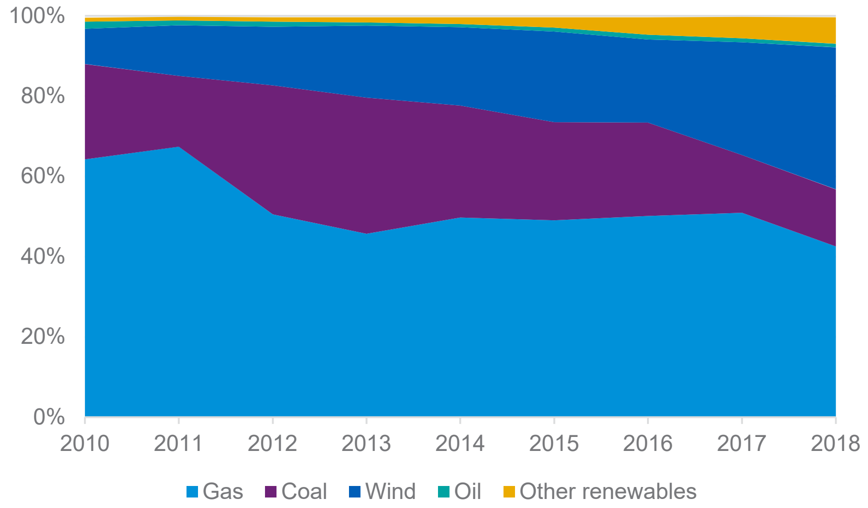
Like the other regions of the UK, NI dramatically increased its renewable electricity generation and consumption over the last c. 15 years. This enabled it to achieve both its 2012 and 2020 targets a year early.

The NIRO has been a key element of this, with the proportion of electricity generated from renewable sources in NI rising from 3% since its introduction in 2005 to 42% in 2018. Only Scotland produced a higher proportion of renewable electricity in the UK in 2018 (54.9%).[14]

As shown in the graph on page 9, renewable electricity generated by wind energy has been the largest contributor to this growth and it is now one of the key sources of electricity in NI, second only to gas. In 2018, c. 35% of NI's electricity generation was from wind sources, as compared to all other renewable generation (7%). Wind has seen the most rapid deployment and growth in NI due to the abundance of high wind speeds and it being the most established and cost-effective renewable technology.

[14] Energy Trends, National Statistics 2019

FIGURE 1: ENERGY MIX IN NI BY FUEL TYPE

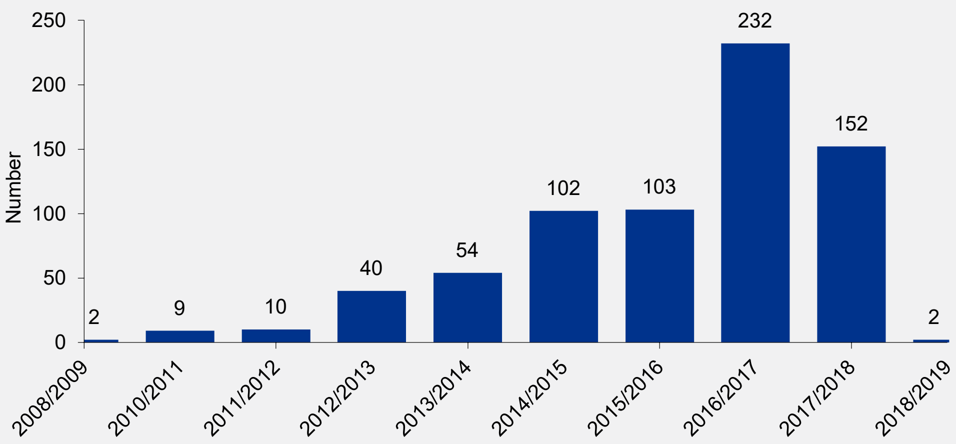


Source: KPMG analysis of Energy Trends, National Statistics 2019 and Energy data tables, NI

Total installed (and accredited) capacity from wind assets now stands at c. 1245MW[15]. The vast majority of wind generation is provided by large-scale wind farms, although the introduction of Enhanced Support for small-scale wind in 2009 has supported a steady increase in the contribution from small-scale wind, which generated c. 11% of renewable energy from the wind sector for the year ended March 2020.

There are 706 ROC accredited small-scale (100-250kW) wind assets in NI, which became operational and accredited over a 10-year period as outlined below.

FIGURE 2: THE NUMBER OF NI SMALL-SCALE WIND ASSETS ACCREDITED ANNUALLY

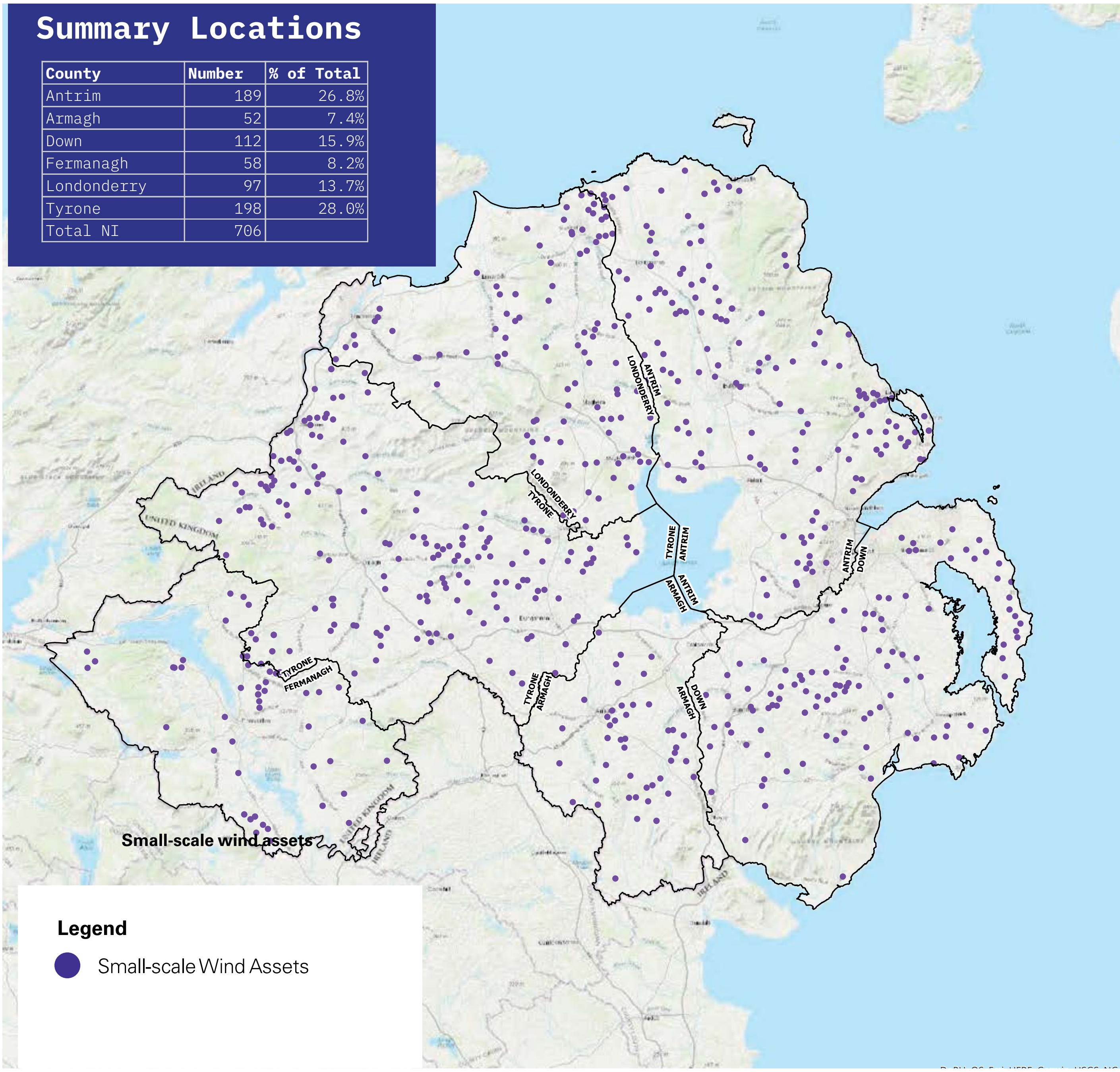


Source: OFGEM ROC Register, December 2020

The map on page 10 shows the location of the 100-250kW wind assets in NI. Small-scale wind is predominantly located in rural areas, with almost 90% in areas of population density of less than 100 people per square kilometre. Counties Tyrone and Antrim have the highest proportion of small-scale wind, with 198 (28%) and 189 (27%) stations respectively. County Fermanagh has the least number (58 stations, representing 8%).

[15] OFGEM ROC Register, December 2020

FIGURE 3: MAP OF NI SMALL-SCALE WIND ASSETS IN RELATION TO POPULATION DENSITY



County	Number	% of Total
Antrim	189	26.8%
Armagh	52	7.4%
Down	112	15.9%
Fermanagh	58	8.2%
Londonderry	97	13.7%
Tyrone	198	28.0%
Total NI	706	

Source: OFGEM ROC Register (December 2020) and KPMG analysis

Following the closure of the NIRO, there is currently no NI government subsidy support mechanism in place to incentivise further deployment of renewables, at either large or small-scale, with very limited new development taking place. The Department for the Economy is currently developing a new NI Energy Strategy within the context of the UK's 2019 commitment to net zero emissions by 2050.

3 Why did the NI Government introduce Enhanced Support for small-scale wind in NI?

The NI Government's primary stated rationale for the introduction of Enhanced Support for small-scale wind in NI was to increase "*the level of renewable generation of electricity in order to achieve the 2020 targets for renewable energy*"[16]. The Government further noted that it sought an increase in support to "reflect more fully the cost of these technologies and maintain broad parity with support levels across the UK" – UK support levels had increased in 2010 as part of the introduction of the FIT regime which created a new subsidy framework for small-scale low carbon technologies.

In a 2010 study commissioned by DETI and the NIAUR[17], its author Cambridge Economic Policy Associates ("CEPA") in association with Parsons Brinkerhoff, while noting that small-scale wind is more expensive than large-scale wind farms, outlined a number of potential benefits to NI from small-scale wind, including:

— *"A range of potential socio-economic impacts from the development of the small-scale generation sector, including job creation and growth in supply chain and installer sectors.*

— *Small-scale generators provide diversity, both in terms of power sources and location, offering opportunities for households, small businesses and communities to become engaged more directly in the generation of the energy they use.*

— *Small-scale generation delivers a dispersed supply to the power system, and could, therefore, be argued to enhance security of supply."*

While not listed in the 2010 report, a further key benefit of small-scale wind in NI has been its ability to infill available pockets of grid capacity across the NI grid network where there was insufficient capacity to accommodate larger wind farms. As a result, small-scale wind has provided incremental renewable capacity to NI.

While the 2010 report did not quantify these benefits, KPMG has undertaken an economic assessment as part of this review to seek to establish a quantification of such benefits. This can be found in section 12.

The 2010 report also considered the merits of introducing a FIT in NI. They found that "*replicating the GB FIT is estimated to be a more expensive option for supporting small-scale generation than the NIRO*." The report concluded that "*the analysis illustrates that the NIRO is a relatively low-cost approach of tailoring and/or increasing the level of support to small-scale technologies in NI*."

In approving the introduction of the Enhanced Support, the EU Commission noted that "[*existing] banding of support within the general Renewables Obligation does not provide sufficient incentives to small-scale renewable generators to encourage wide-spread uptake and that the small-scale generators can only access small, higher costs technologies. The Commission thus concludes that the aid to be granted under the variation notification complies with the above-mentioned condition of viability and appears necessary so that the small-scale generation in Northern Ireland achieves its potential*"[18].

In support of the level of Enhanced Support (four ROCs per MWh) introduced in 2010[19], the UK Government concluded that the levelised cost of energy[20] ("LCOE") for a 250kW onshore wind turbine was £289/MWh. In its submission for EU state aid approval, the NI Government noted that the proposed four-ROC banding for small-scale wind would provide a total income of between £219 - £233/MWh to small-scale wind turbines (inclusive of ROC and energy income), below the independently assessed level required, and within the range of income available within the GB FIT scheme of £188 - £241/MWh at the time. The EU thus concluded that "*The Commission notes that the increased support levels have no overcompensation implications for wind*."

[16] EU Commission State aid No N 76/2010 - United Kingdom
[17] Incentivising Renewable Generation in NI, CEPA 2010
[18] EU Commission State aid No N 76/2010 - United Kingdom
[19] Design of FITs for Sub-5MW Electricity in Great Britain, Element Energy, 2009
[20] LCOE: Levelised costs reflect the amount of electricity revenue per MWh which is needed though the life of the technology to make the respective technology commercially viable.

The deployment of small-scale technology has varied considerably across the UK in line with local resource availability. NI's strong wind resources and rural landscape have allowed NI developers to deploy three times more small-scale turbines per km^2 of land than in GB, while GB's greater solar resource has allowed GB developers to deploy two times more small-scale solar PV installations per km2 than in NI. Similarly, Scotland's strong river resources have allowed Scotland to deploy three times more small-scale hydro than the rest of GB.

Despite the use of different support regimes and different technology focuses, overall renewable generation profiles remain broadly consistent across the UK. Based on OFGEM accredited stations, the NI small-scale wind represents c.12% of the NI wind sector installed capacity[21]. This is in line with England and Wales, which generates c.12.2% of its renewable energy from small-scale technologies[22].

[21] OFGEM ROC Register, December 2020

[22] Based on 7.4TWh generated under the FIT scheme and 53.5TW under the RO scheme as per OFGEM annual reports 2018/19

4 What was the investment return targeted by the Government for small-scale wind?

In order to attract investment in renewable energy projects, investors require a financial return commensurate with the risk of the project they are investing in.

In producing this report we have sought to establish what the targeted investment return deemed appropriate for small-scale onshore wind turbines was in NI when enhanced banding support was available. This is used as a benchmark to assess, in sections 5 and 6, whether the investment returns for small-scale wind are expected to, on average, outperform the returns targeted by the Government.

Investment return is most commonly measured as internal rate of return ("IRR"), which equates to the annual return an investor makes each year over the life of the asset. This is the measure used by the Government for the majority of its renewable energy schemes [23].

To determine the targeted investment return, we have reviewed publicly available reports prepared by NI and UK Governments and the independent experts they commissioned as part of both policy development and FIT and NIRO reviews between 2009 and 2015. A summary is included in the table below:

DATE	REPORT CONTEXT	IRR TARGET
2009	Commissioned by the UK Government re support for small-scale wind under the FIT [24]	8% - 12%
2010	NI Government's stated target return from 4 ROCs per the submission for EU state-aid clearance [25]	10% (8% pre-tax real) [26]
2012	Target return for small-scale wind FIT tariffs (100kW – 1.5MW) based on "the portfolio risks experienced by wind developers" [27]	10% post-tax nominal (8% pre-tax real)
2015	Review of the FIT scheme for small-scale wind in GB [28]	10.2% (8.3% pre-tax real)

[23] Our analysis uses the most commonly utilised IRR, being post-tax nominal unlevered IRR. Where required we have converted pre-tax real IRRs. See Appendix D, Calculation 5 for more detail.
[24] Design of FITs for Sub-5MW Electricity in Great Britain, Element Energy, 2009
[25] EU Commission State aid No N 76/2010 – United Kingdom
[26] The EU Commission reviewed this and noted that it "considers this level applied to the variation notification as a reasonable return on capital".
[27] Comprehensive Review of FITs, DECC consultation
[28] Periodic Review of FITs, DECC 2015

Accordingly, the targeted return range (on an unlevered, post-tax nominal basis) for small scale wind during the period in question was relatively consistent at 8% - 12%.

We would note that, while these reports recommended a broadly similar return for both the NIRO and GB FIT schemes, the GB FIT scheme provides a lower risk income for investors since they have a guaranteed fixed income for 20 years, whereas the NIRO scheme carries higher developer risk as the developer retains energy price and ROC price volatility. Indeed, in its policy review, the Department of Energy and Climate Change ("DECC", which became part of the Department for Business, Energy and Industrial Strategy ("BEIS")) noted that "*Under the RO, generators are exposed to the risk and rewards of volatility in wholesale electricity prices and ROC prices. This results in revenue uncertainty and potentially harms investment, while affecting scheme efficiency*"[29].

Similarly, in a 2010 review commissioned by DETI, the independent consultants, CEPA, concluded that "*The NIRO is set independently of the wholesale electricity price, and unlike a support mechanism such as a FIT, which takes revenue volatility away from the investor… the NIRO exposes investors in renewable generation to volatility in SEM prices. Therefore, it is feasible that investors will require greater rates of return in order to invest in the [Northern Ireland] SEM*[30]".

As such, while the NI scheme was designed to provide a return aligned with the GB FIT scheme at the time, one could rationally conclude that investors in small-scale wind investments would seek a higher return in NI than a comparable project in GB.

Based on KPMG's own experience of the small-scale wind market over the period in question, and based on questionnaire responses provided by industry representatives, it is clear that numerous developers were either unable to access unsecured debt to fund the construction of small-scale single turbines over the period 2010 – 2017, or debt costs were prohibitively high (i.e. c. 11% or higher) suggesting a perceived high-risk profile of such assets by financiers. To raise the debt needed to develop the wind turbine, many had to pledge other assets to the lenders such that if the project was unsuccessful, farms or other income and assets were at risk.

It is worth noting that the methodology adopted for both the GB FIT and NIRO scheme, of setting the support tariff based on an assessment of a "typical" project, means that there will always be a significant range in the actual returns earned by individual projects. This is the same for all technologies, including large-scale wind and solar, and was recognised in the design of the NI ROC banding system and accepted. A report prepared by independent consultants for DECC noted that "*These differences are particularly large for wind turbines at different wind-speeds, where levelised costs in 2010 vary from between £70/MWh at 8m/s to £150/MWh at 5.5 m/s. There is also significant variation in levelised costs between different turbine sizes at the same wind-speed. To match tariff levels to the levelised costs for each turbine and wind-speed band would require a large number of bands, adding significant administrative complexity to the policy.*" [31]

As such, it should be expected that while there will be a target average return within the design of the scheme, there will inevitably be projects above this return (e.g. strong wind resource sites) and projects below this return (e.g. low wind resource sites).

[29] Incentivising Renewable Generation in NI, CEPA 2010 (page 90)
[30] Incentivising Renewable Generation in NI, CEPA 2010
[31] Design of FITs for Sub-5MW Electricity in Great Britain, Element Energy, 2009

5 What is the expected investment return that the average small-scale NI turbine will achieve?

In considering the investment return for the average small scale turbine installed in NI, we have used the same methodology as adopted in previous government commissioned studies, namely we have established the "revenue streams and costs based on a "*reference installation," which is what is viewed as a "typical" project with specific characteristics. These define the size of the installation, its technology life, generating costs (capex and opex), load factors and proportion of electricity that the generator exports to the grid"* [32].

We would highlight that any such analysis can only establish an 'expected return' for developers. Single wind turbines have an expected life of 20 years, and the NIRO is set to provide a return based on this asset life. In reality, the average NI small-scale turbine is only four years old and therefore the actual returns achieved will not be known for another 16 years. In particular, the return will depend on future ROC values, future energy prices, future tax rates and the future operational performance of the turbines. By way of example, when comparing electricity price predictions made in 2017 and 2020, forecast prices from 2020 onward have fallen by 13% since the 2017 forecast.

As such, our analysis has considered the IRR[33] that a small-scale wind developer would have expected when investing in the year ended 31 March 2017 based on prevailing conditions and assumptions at that time[34]. This year has been selected as the 'average' year of investment on the basis that this is when the largest number of small-scale turbines in NI were energised, while also representing the year in which the median NI accredited asset in the 100-250kw range became operational.

The IRR has been calculated by developing cash flow projections for the development period followed by a 20-year operational period. Where possible, the assumptions used in our calculations have been taken from publicly available information – for example, we have used the weighted average capacity factor for all 100kW – 250kW wind turbines over the 10-year period up to the year ended 31 March 2016 as calculated from the OFGEM ROC Register (December 2020). Given the lack of publicly available data on development costs and operating costs, these have been taken from the KPMG NI Small-Scale Wind Dataset.

Development costs primarily consist of turbine supply and installation, civil engineering works required to the site, grid connection cost and planning costs. Ongoing operational costs primarily consist of rent, rates, operations and maintenance works and insurance. Appendix A contains a detailed list of assumptions and the basis for these assumptions.

An overview of the key figures in the Dataset have been provided below.

KPMG NI SMALL-SCALE WIND DATASET – KEY FIGURES

- Average turbine size: 224kW
- % refurbished: 74%
- % de-rated: 37%
- Most common year of accreditation: the year ended 31 March 2017
- Average development cost: £570k
- Average ongoing costs: £38k per annum (2020 prices)

[32] Periodic Review of FITs, DECC 2015

[33] Our analysis has focused on establishing the unlevered, post-tax nominal IRR, which is the most common metric used by industry for considering investment returns. This also enables comparison with the Government's targeted return range specified in section 4.

[34] We have assumed that commercial operations commence half-way through this year i.e. 1 October 2016. For simplicity, we have used the prevailing conditions as at this date, albeit in reality the developer will have invested in the project over several years prior to this and will have made a final investment decision at least a number of months prior to this.

Based on this, the forecast IRR for the average small-scale wind developer at the time of assumed investment was 9.7%. This is marginally below the Government's target return of 10% but would not be considered a material deviation.

We would highlight that this returns analysis relates only to direct costs of the average small-scale turbine. It does not take into account sunk development costs incurred by a developer relating to the multiple sites they likely assessed and potentially sought planning permission for that were subsequently not developed for various reasons (including environmental or technical assessments having adverse conclusions, planning being refused or planning being granted but grid connection costs were too expensive). If included, this would likely lower overall investment return.

In addition, the costs derived from the KPMG Dataset, including the development cost average and the annual ongoing cost averages, primarily relate to financial payments made to third parties to assist with the development of a project. The costs associated with in-house time and resources to develop a project have not been captured in most cases. Again, including these would likely lower the investment return.

6 Does the use of de-rated turbines result in returns in excess of the Government's target level?

A 'de-rated' wind turbine is one which has had its electrical output restricted to below its original maximum potential output. Such turbines are typically larger (and more expensive) than a standard turbine of similar output, and as such may operate more efficiently, or with a higher capacity factor, generating more renewable electricity.

Based on our analysis, de-rating is a fairly common practice across the NI small-scale wind sector, with c. 37% of the KPMG NI Small-Scale Wind Dataset featuring some element of de-rating, most of them since original installation of the turbine. The concept is permitted under the RO and NIRO legislation, and is typically undertaken for a number of reasons:

— To facilitate the installation of a turbine where the capacity of the grid is restricted (e.g. de-rating a standard 250kW turbine to 225kW where only a 225kW connection could be provided by Northern Ireland Electricity ("NIE");

— To provide access to a larger range of turbines (since there is a relatively small market for, and hence low availability of, sub-250kW machines); and/or

— To increase efficiency of a site with lower wind resource.

The extent of de-rating can vary. For example, in the KPMG NI Small-Scale Wind Dataset, de-rating varies from c. 17% (for example, from 300kW to 250kW) to c. 70% (e.g. from 500kW to 150kW), with an average de-rating of 46%.

As outlined in the previous section, the forecast IRR for the average asset (which is based on the KPMG NI Small-Scale Wind Dataset and therefore includes de-rated turbines) is in line with the small-scale ROC scheme return target.

Of more relevance, and a concept which has received greater public scrutiny recently, is the process of repowering (replacing) an existing small-scale operational wind turbine with a larger, more expensive, de-rated turbine, with the aim of increasing the renewable electricity output from the site.

While the level of de-rating varies, we are aware of some sites utilising turbines with an original nominal capacity of up to 900kW.

As with the use of de-rated machines more generally, repowering a wind turbine with a larger, more modern de-rated machine is fully permitted under the RO and NIRO legislation, with numerous examples already completed across NI.

It is worth noting that the NIRO scheme was designed to encourage such innovation, with a 2010 study produced for DETI when Enhanced Support for small-scale wind was introduced, noting "*the RO is beneficial in that it is only paid for energy produced, creating incentives to maintain equipment and to seek to maximise output*", while the EU Commission noted in its approval of the Enhanced Support scheme in 2009 that "*as the Renewables Obligation scheme rewards the output, there is an ongoing incentive for installations to increase their efficiency to maximise their reward*."

In general, the concept of repowering brings a number of benefits:

— It facilitates increased renewable energy generation, without the need to construct additional wind turbines across NI; and

— While a traditional wind turbine will only make use of c. 22% of its grid connection capacity, a de-rated turbine can often utilise 50% of its grid connection capacity, making much more efficient use of scarce grid capacity.

Repowering of wind turbines is common across continental Europe, and indeed many of the refurbished single turbines in use across NI came from repowered sites across Germany and the Netherlands, which have been replaced by even larger turbines in recent years [35].

[35] A Guide to Repowering in Ireland, IWEA 2019

While repowering with a de-rated turbine delivers many positives, a core concern recently expressed is that developers of such sites may earn an excessive return, above that envisaged when the small-scale wind banding was introduced.

In order to assess investment returns, KPMG has sought to model a 'typical' repowering scenario whereby an average small-scale turbine (with underlying assumptions as per the previous section and Appendix A) is assumed to be operational for four years and is then replaced with a de-rated turbine, following receipt of the required regulatory consents and planning permission, capable of achieving a significantly increased output. The costs of repowering with a de-rated turbine and the capacity factor used in this IRR calculation represent the average costs (£804k) and capacity factor (47%) from the KPMG Small-Scale Repowering Dataset. Appendix B sets out the detailed list of assumptions for this assessment.

Based on our analysis, we have calculated that the average project repowered with a larger de-rated machine is expected to achieve an IRR of 11.4%. This is within the expected range of 8% - 12% outlined in section 4. While the output achievable by the de-rated turbine is significantly higher, so is the cost given the capital investment in the original and replacement turbine.

The increased output does produce an incremental cost to consumers, with the cost of the increased ROCs earned by the turbine ultimately spread across all UK electricity consumers. Assuming a 250kW turbine is replaced with a de-rated turbine with the same capacity, and based on the uplift in capacity factors from repowering (per Appendix A and B), the average repowered turbine will produce an entitlement to an additional 2,190 ROCs per annum, at a cost of £120,000[36]. Under NIRO and its sister schemes across the UK, c. 0.42%[37] of this cost will be met by NI domestic consumers annually (c. £504 per turbine). This means the annual incremental cost to the average NI consumer from repowered projects will be 0.06p (one sixteenth of a penny) annually when divided by the number of NI domestic consumers (set out in Appendix D calculation 2).

As such, the total cost to a NI domestic consumer for repowering the average small-scale turbine with a de-rated turbine is one pence over the residual 16 year entitlement to ROCs[38], while producing additional renewable electricity without the need for incremental wind turbines or new grid connections.

[36] Assuming an incremental 2,190 ROCs x £50.05 x 10% headroom mechanism (as per official OFGEM ROC pricing 2020/21)

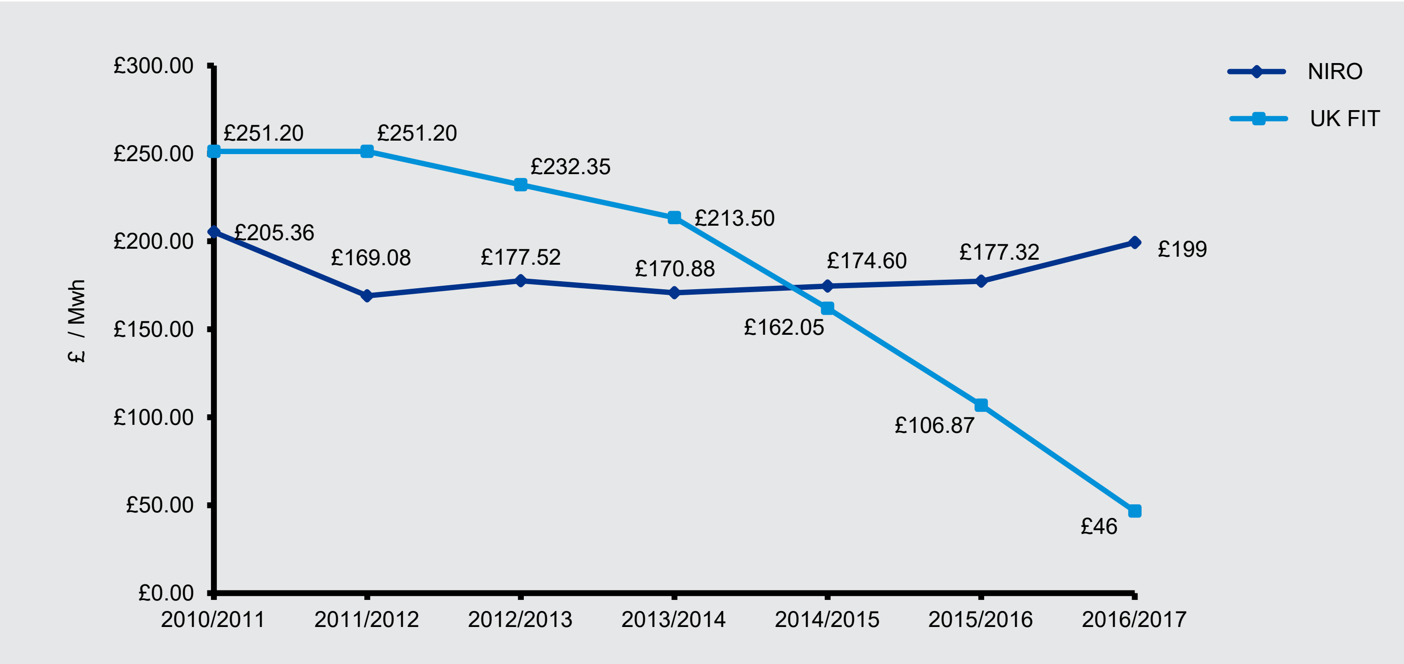
[37] See Appendix D, calculation 4

[38] Assuming the repowering occurs in year 4 of the ROC entitlement period as per our modelled scenario

7 Why did the UK Government reduce the GB FIT rate for small-scale wind in 2015 and was the decision by DETI to retain Enhanced Support after this date justified?

The graph below shows the evolution of subsidy support for 250kW small-scale onshore wind turbines in both NI and GB between 2010 and 2017.

FIGURE 4: EVOLUTION OF NIRO AND FIT TARIFFS FOR SMALL-SCALE WIND ASSETS



As can be seen in the graph above, when the enhanced NI support scheme for small-scale onshore wind was originally introduced in April 2009, it offered a level of support below the equivalent GB FIT level, despite both jurisdictions having similar cost bases and return requirements. While the NI level of support remained fairly constant over the following seven years (fluctuating in line with the market value of ROCs), the GB FIT saw successive cuts, falling significantly below the NI support level from 2015 onwards.

In our analysis we have sought to establish whether this divergence in support levels resulted in NI small-scale wind projects earning excessive returns post-2015.

As previously outlined in section 3, when the Enhanced Support was introduced in 2010, the support level was based on up-to-date analysis of costs[39]. Following review of the evidence, the EU commission approved the Enhanced Support, noting that the proposed four-ROCs "*have no overcompensation implications for [small-scale] wind … since the upper range of levelised costs is even lower than the lower range of revenues*."

Based on this analysis and subsequent EU approval, we can conclude that the level of support introduced in 2010 was based on robust analysis, was below GB support levels and did not provide excessive returns to investors.

[39] EU Commission State aid No N 76/2010 – United Kingdom, Design of FITs for Sub-5MW Electricity in Great Britain, Element Energy, 2009

The European Commission's State aid approval for both GB FITs and NIROCs required the Government to "r*eassess the costs of technologies, electricity price forecasts and whether the target rate of return is still appropriate, and consider revision of tariff levels and change accordingly* "[40].

Under the GB FIT such a review is to be undertaken every three years, while the banding introduced in the Renewable Obligations Order (Northern Ireland) 2009 required a review in 2010, and every four years thereafter.

In 2014/15, prior to the UK Government's decision to cut feed-in tariff rates for a number of technologies, including small-scale wind, the NI and GB Governments commissioned two reports on renewable support levels:

— 2014 (NI): Review of RO banding for small-scale renewables

— 2015 (GB): DECC Consultation on a review of the Feed-in Tariffs scheme

In the 2014 NI review commissioned by DETI[41] , CEPA concluded that small-scale wind capital costs in NI within the 50kW – 250kW band had risen by 17% from 2010 to 2013. CEPA noted that "*the average [grid connection] charge for a turbine at the 250kW level is around £250,000, with connection charges of £500,000 and above being quoted. This is comparable to the cost of the turbine itself. To provide sufficient subsidy to make such projects economic, the number of ROCs for wind at 250kW or below would have to be increased significantly*".

CEPA calculated that in order to maintain a commercial return for investors, the ROC banding would have to increase to 4.5 ROCs from 4 ROCs. The Government decided against increasing the tariff further (on the basis that it could lead to overcompensation where grid costs were below average) and decided to retain the 4 ROC level of support.

Around the same time as the DETI review, an independent review of FIT small-scale wind economics in GB, commissioned by DECC [42] also came to a similar conclusion that the capital cost of 100-500KW small-scale wind in GB had increased between 2012 and 2015, albeit by a more modest 1%. The report also noted that operating expenditure had increased by 7% over the period, while the average capacity factor remained the same. Further it concluded that there was no reduction in investor return requirements for this scale of technology. Based on this analysis the report concluded that the existing FIT rate in 2015 did not overcompensate small-scale wind.

Notwithstanding this analysis, DECC decided to make significant reductions to all FIT tariffs across all technologies including wind, solar and hydro. While the main capital cost reductions had been observed in solar and hydro technologies, DECC noted that it sought to "*treat all technologies covered in this stage of the consultation equally*".

In deciding to reduce the tariff despite the evidence of increased costs, the Government accepted that the return to investors in small-scale wind, at a lower 7% level, was below the targeted return of 10% as outlined by their independent consultants. In doing this, they acknowledged "*while the forecast deployment levels by technology based on the proposed tariffs are significantly lower than previous forecasts, they are the maximum currently considered affordable within the [Levy Control Framework].*" [43]

It is worth noting that this decision to reduce GB support for small-scale renewable energy investment coincided with a number of climate related policy changes including the decision to close the RO to onshore wind one year earlier than had been planned, the removal of the Climate Change Levy exemption for renewables, the exclusion of onshore wind and solar from the Contracts for Differences auctions, the cancellation of the Zero Carbon Homes policy and cancellation of the £1 billion planned for carbon capture and storage investment. The cumulative volume of these policy changes suggests that the decision to reduce the small-scale wind support in 2015 may have been part of a reallocation of general Government spending priorities rather than due to concerns about overcompensation for investors.

Indeed, in a 2018 report by the UK's Environment Audit Committee [44] ("EAC"), it was noted that "*a series of sudden changes to low-carbon energy policy in 2015 undermined investor confidence and led to a reduction in the number of projects in development*".

The EAC further noted that "*clean energy investment has fallen dramatically since 2015. In cash terms it fell by 10% in 2016 and by a further 56% in 2017. Annual clean energy investment in the UK is now the lowest it has been since 2008 and the rate at which we are installing new renewable capacity is slowing*".

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[40] DECC Consultation on a review of the Feed-in Tariffs scheme 2015

[41] Review of RO Banding, CEPA 2014

[42] Periodic Review of FITs, DECC 2015, Pg 12

[43] Periodic Review of FITs, DECC 2015

[44] Green finance: mobilising investment in clean energy, 2018

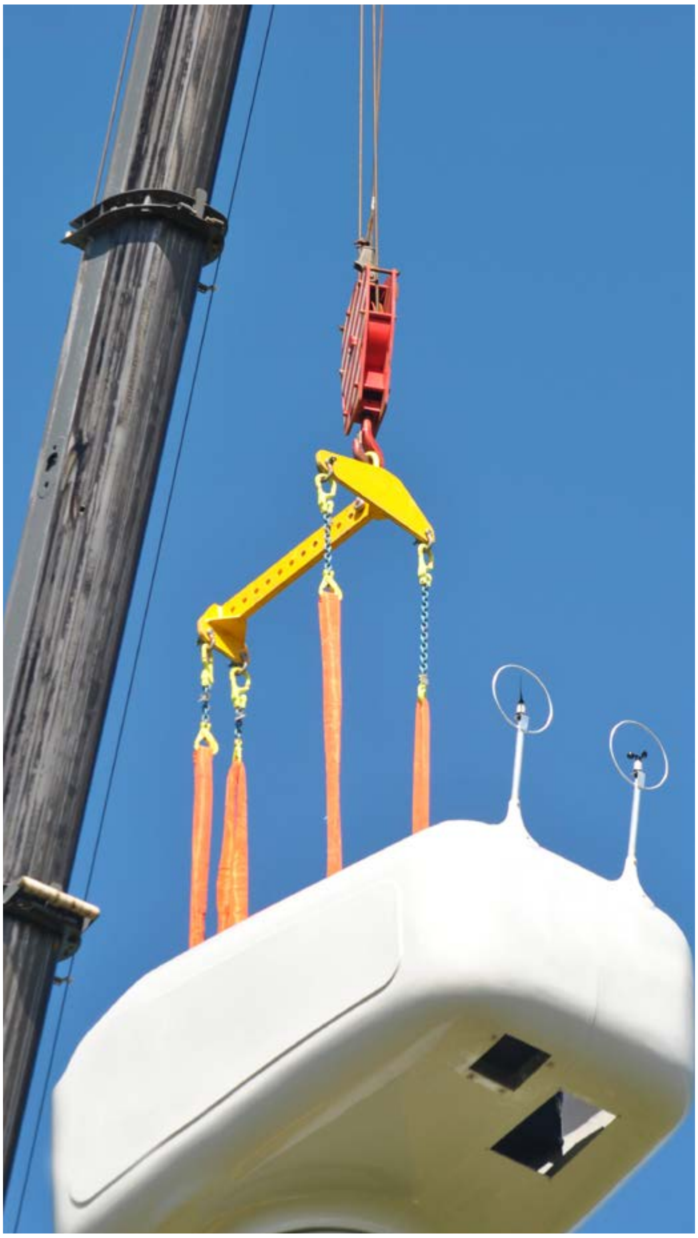
8 How much does the NI small-scale wind sector cost the average NI consumer annually?

Due to the design of the renewable obligation schemes, there is no direct link between the amount of renewable energy generated in NI (or the number of small-scale turbines installed in NI) and the cost of renewable energy to NI domestic electricity consumers. Instead, all renewable energy generated in NI feeds into the UK wide renewable generation figures, which is used to calculate the total cost of the scheme, which is then socialised across all electricity users in the UK, with the final cost determined by BEIS annually. One can however produce an estimate of the cost.

NI domestic customers consume c. 1%[45] of all electricity supplied across the UK. As a result of an agreement made with the UK Government when the NIRO was introduced in 2005, NI consumers pay a lower percentage of the cost of the collective renewable obligation schemes than GB consumers. As such, NI domestic electricity consumers pay the equivalent of approximately 0.42% of the total annual UK-wide renewable obligation scheme costs[46].

In 2018/19, the NI small-scale wind sector generated c. 1.3m ROCs[47], equating to a total cost of c. £67.5m[48]. Accordingly, the total share of this passed onto NI domestic consumers was c. £283,500[49]. This equates to 35p per annum per NI domestic electricity consumer[50]. This means the NI small-scale wind sector accounts for c. 1.1% of the total annual cost of the c. £31[51] renewable obligation within an NI consumer's annual bill.

This means that the average individual small-scale turbine costs a NI domestic consumer 0.05p (one twentieth of a penny) annually, or 1p over the entire 20-year life of the turbine [52].

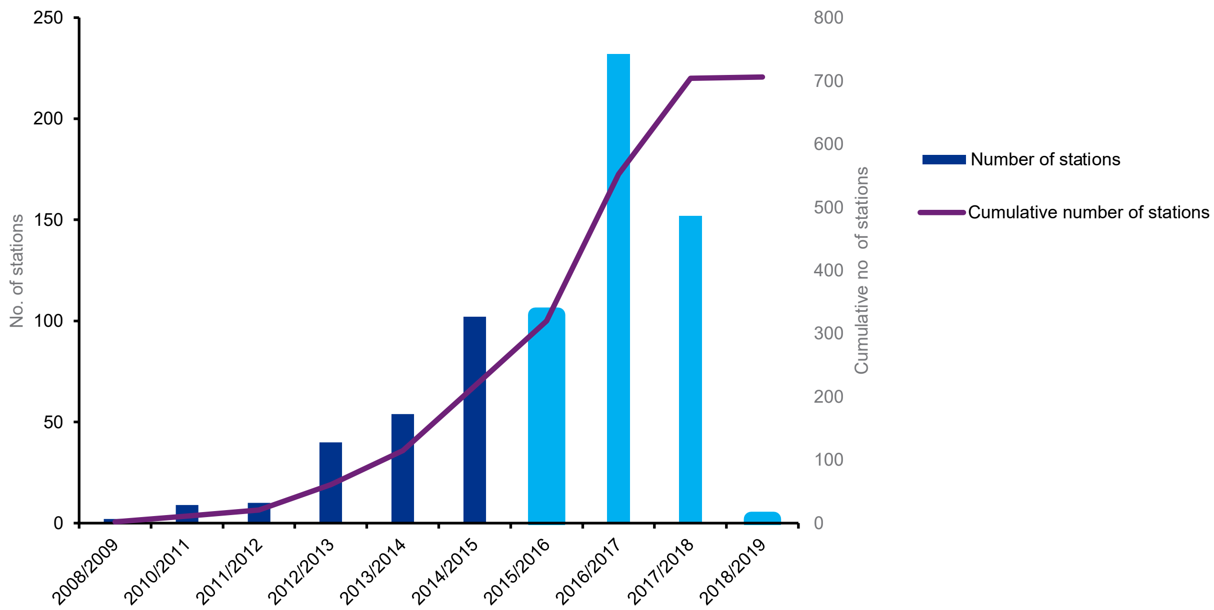


[45] See Appendix D, Calculation 3
[46] See Appendix D, Calculation 4
[47] OFGEM ROC Register, December 2020
[48] Based on the official £47.22 buyout price in 2018/19 plus 10% headroom applied
[49] See Appendix D, Calculation 4
[50] Assuming 818,616 domestic consumers as per average of NIAUR Transparency Reports (Q3 2019 – Q2 2020)
[51] Generating electricity from renewable energy, NIAO 2020
[52] See Appendix D, Calculation 2 for further detail around this calculation

9 Did the Government's decision to retain the Enhanced Support for small-scale wind in 2015 lead to a higher than expected cost of the NI Renewable Obligation to Northern Ireland energy consumers?

As can be seen in the graph below, there were c. 489 small-scale turbines installed in the four years following the NI Government's decision to retain Enhanced Support for small-scale wind. Using the methodology set out in section 8, these c. 489 turbines have resulted in an incremental cost to the NI domestic consumer of c. 24p per annum.

FIGURE 5: NI SMALL-SCALE WIND ASSETS ACCREDITED ANNUALLY



Despite the relatively low incremental cost, we have sought to establish whether this additional volume of turbines has led to the total annual cost to NI consumers being above the level expected when Enhanced Support for small-scale wind was originally introduced.

In a report commissioned by DETI and NIAUR in 2010[53] , independent consultants CEPA concluded that " *The low volume of output from NI small-scale generation, even with increased NIRO banding, has only a small impact on the total quantity of ROCs in circulation under the RO, and therefore NI and GB consumer costs*."

In the same report they forecast that the cost of the NIRO to the average NI consumer, including enhanced banding support for small-scale wind, would be £33 per annum by 2020.

In a recent report by the Northern Ireland Audit Office ("NIAO"), it was estimated that the actual cost to NI consumers of the NIRO (including all technologies of all scales) was £31 per annum in 2019[54].

As such, the Enhanced Support to small-scale wind did not increase the cost to consumers in excess of the intended or expected level. This is despite NI successfully achieving a level of renewable deployment above the original 2020 40% target.

[53] Incentivising Renewable Generation in NI, CEPA 2010
[54] Generating electricity from renewable energy, NIAO 2020

10 Is the NI small-scale wind sector placing an undue burden on GB energy consumers?

The renewable obligation schemes in England and Wales, Scotland and NI operate by socialising the total cost of renewable generation supported by the schemes across each MWh of energy supplied to consumers[55].

Across GB, this cost is spread evenly across each MWh and each consumer, both domestic and commercial, and is equal to c. £23 per MWh in 2019/20.

When the NIRO scheme was originally introduced in 2005, it was agreed that, due to a number of unique circumstances, NI consumers should pay a lower share of the overall cost of supporting the renewable obligation than GB consumers. The rationale for this included:

— NI already has a "*relatively high price of electricity*" compared to GB[56];

— "*the market structure in NI already imposes costs on NI customers which are directly comparable to the burden which the RO imposes on customers in GB*"[57]; and

— To address concerns around "*fuel poverty and the vulnerable groups identified in Section 75 of the Northern Ireland Act 1998*."

Accordingly, NI consumers pay a lower proportion, equal to c. £9 per MWh in 2019/20, towards the renewables obligation schemes than GB consumers.

This mechanism was further assessed in a 2010 study by CEPA who noted that, due to higher wholesale energy costs in NI, even with the reduced obligation level in NI "*when the total cost paid by customers is considered – that is electricity wholesale prices plus the costs of subsidy, it can be seen that customers in both GB and NI are paying a broadly comparable amount to support renewable generation*".

As such, this was a deliberate government policy decision completely unconnected with small-scale wind, and was introduced in 2005, five years before Enhanced Support for small-scale wind was introduced.

It is also worth noting that of the average annual renewable obligation cost of £31 to NI domestic consumers in 2019, 94.6% of it (£29.33) is supporting the cost of renewable generation in GB[58]. Had NI not developed renewable generation in NI, NI consumers would still have a renewables obligation bill of c. £29 per annum, without the benefits of an indigenous renewable energy sector.

That said, NI does receive a net transfer of value under the schemes. As can be seen in the table below, NI renewable assets generate 5.4% of ROCs issued across the UK, while NI consumers only pay 1.1% of the cost of ROCs. This results in a net inflow of value to NI of c. £240m per annum.

STATISTIC[59]	NI	ENGLAND & WALES	SCOTLAND
% of UK electricity Consumed	2.8%	88.3%	8.9%
% of UK RO Renewable Energy Generated	4.5%	67.7%	27.8%
% of ROCs Issued	5.4%	72.4%	22.2%
% of RO Cost borne by Consumers	1.1%	89.8%	9.1%

Source: OFGEM RO Annual Report 2018/19

[55] With some exceptions to intensive energy industries
[56] Explanatory Memorandum to NIRO Order, 2005
[57] A Response by NIAER to the DETI consultation paper, 2004
[58] See Appendix D, calculation 1
[59] OFGEM defines RO as the collective schemes in GB and NI.

Scotland also receives a net transfer of value, with its renewable assets producing c. 22.2% of all ROCs, while Scottish consumers pay c. 9.1% of the cost of the schemes. This results in a net transfer of value into Scotland of c. £700m annually, more than 2.5 times the net transfer to NI.

Accordingly, the presence of a net transfer of value to an individual country is principally because it is producing a higher proportion of the UK's renewable energy requirements than the proportion of electricity that it is consuming (e.g. NI consumes 2.8% of the UK electricity, however produces 4.5% of the UK's renewable electricity under the renewables obligation schemes).

This value transfer is as designed by the schemes. It was purposely designed as a UK-wide mechanism and incentivised renewable generators to locate in areas where there are high levels of renewable energy resources, maximising the natural endowments of different regions of the UK for the benefit of the UK as a whole in meeting its renewable targets. Since the cost of the schemes were designed to fall in proportion to energy consumption, the presence of the net transfers to NI and Scotland therefore reflect the disproportionately high level of renewable energy resources in these regions relative to electricity demand.

Finally, it is worth noting that even with the strong penetration of small-scale wind in NI, average support provided to NI renewable energy is lower than the average support provided to renewable energy generated in England and Wales. The average support per MWh of renewable energy generated in NI is £87.51[60] , which is lower than the average support of £89.60[61] per MWh of renewable energy generated in England and Wales. Accordingly, NI renewable energy can be considered to represent relative value-for-money within a UK context.

[60] NI renewable generators received c. £315m of ROC support in 2018/19 and generated c. 3.6TWh of renewable energy (OFGEM 2018/19 RO Annual Report)

[61] England & Wales renewable generators received RO and FIT income of c. £5.5b in 2018/19 and generated c. 61TWh of renewable energy (OFGEM 2018/19 RO Annual Report)

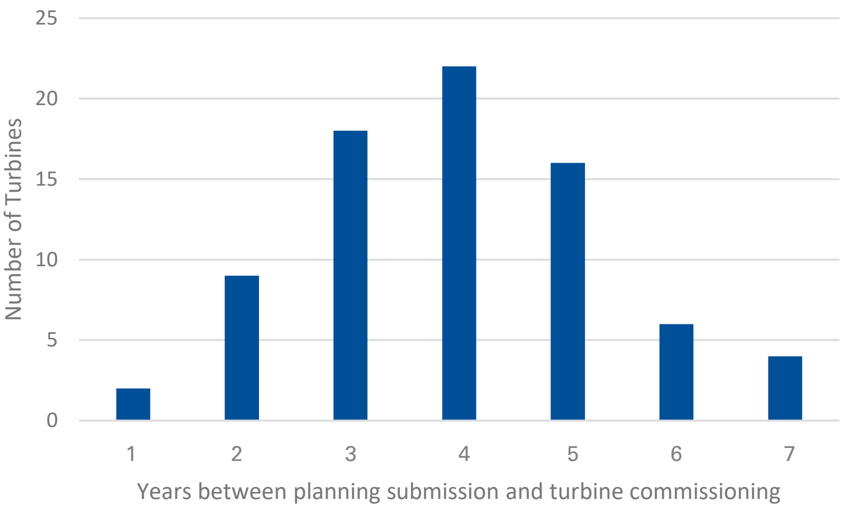
11 Why did the volume of small-scale wind turbine installations increase significantly towards the end of the NIROC scheme between 2015 and 2017?

More than 50% of all small-scale wind turbine installations in NI occurred in the period post 2015 and prior to the final close of the scheme in 2019 following expiry of certain grace periods. It has been suggested that this increase in deployment was as a result of developers observing the opportunity for excess returns and rushing to deploy assets in advance of the scheme's closure.

In order to establish whether there is evidence of a rush to develop assets, we analysed a sample of projects installed in 2016 – 2018, including their development history.

Based on a sample of 77 projects commissioned during this period, we found the average development time (from submission of planning permission to commissioning of the turbine) to be 4 years. Note that this does not include the prospecting period prior to submitting a planning application which could add c. 1-1.5 years to the average development time.

FIGURE 6: AVERAGE PROJECT DEVELOPMENT TIME



Assuming an average commissioning year of 2016/17 (the peak year of deployment), this would suggest that the average project commissioned during this period commenced preliminary investment in 2012/13 (when support levels were lower than in GB), well before the end of the ROC scheme. In fact, initial investment in over 50% of sample projects developed during this period had been in development since between 2010 and 2012.

Based on industry discussions, we understand virtually all developers experienced significant delays in developing projects, with planning permission, and grid in particular, often taking many years to secure.

As such, while there was a significant increase in the deployment of small-scale wind in the final years of the scheme, this appears to be primarily as a result of delays in planning and grid connection offers, rather than new developers entering the market or existing developers commencing new projects post the decision to retain Enhanced Support in 2015.

12 What are the key socio-economic benefits of small-scale wind in NI?

KPMG has sought to quantify the socio-economic benefits of the small-scale wind sector in NI.

In measuring the socio-economic benefits of small-scale wind assets in NI, we have used data from the KPMG NI Small-Scale Wind Dataset and scaled this to reflect the wider small-scale wind sector's footprint.

Our analysis below focuses on the following key benefits:

- Economic benefits for NI
- Support for local workforces
- Providing capacity and in-fill to the grid
- Import costs savings

12.1 ECONOMIC BENEFITS

Based on the average development cost (set out in section 5) and the number of small-scale wind stations (set out in section 2.5), we estimate a total capital investment of over £400m by the NI small-scale wind sector.

The economic measure of the value of goods and services produced in an area, industry or sector of the economy is Gross Value Added ("GVA"). This captures the total economic contribution of all goods and services sold and provided – NI's total GVA in 2018 was approximately £49 billion (latest available).

NI's 706 small-scale wind assets (with capacity of 100-250kW) contribute to economic output across the region providing energy for farms, local communities and the overall grid, and employment and returns in rural areas.

Using the KPMG Small-Scale Wind Dataset, we analysed the economic impact of the small-scale wind sector, segmenting by spend type, including development costs, payments to landholders, operation and maintenance ("O&M") payments, payments on salaries and local contributions (i.e. rates). Spend has been modelled throughout the supply chain using multipliers from Northern Ireland Statistical and Research Agency's ("NISRA") Supply and Use tables ("SUTs"). These provide relationships between spend in one sector and spend in another sector. The economic multipliers for operational GVA and construction GVA are 1.3 and 1.4 respectively.

Based on this analysis, we estimate that the sector contributed £45m to NI's economy in 2019. This is comprised of £38m in operational GVA and £7m in construction GVA.

Please refer to Appendix C for more detail regarding the assumptions underpinning this analysis.

12.2 LOCAL WORKFORCES

Small-scale wind turbines are typically developed on lands that are owned and maintained by individuals in rural communities. Farming businesses are ideally positioned to provide land to generate onsite power for grid infill. Where energy is consumed onsite, energy savings and reductions in overheads can arise, providing a valuable safeguard against macro impacts on farm businesses. Payments for energy produced and exported to the grid supports landowners and the wider workforce, including office workers, O&M staff, construction workers and farmers. Hence the sector creates both direct and indirect employment in NI.

Direct employment includes jobs in construction, operations and maintenance, office staff, and services throughout the lifecycle of a project. Additionally, the industry has created employment through the advantage of a domestic manufacturing base, with several companies building or refurbishing turbines suited to home, business and community generation in NI.

Using employment data from questionnaire responses provided by industry representatives, we have taken a bottom up approach to estimating employment by role and type and scaled this up to account for sector participants not captured in the questionnaire. Using this methodology, we estimate total employment in the small-scale wind sector is greater than 500, comprised of more than 200 direct employees and more than 300 indirect employees.

The sector's employment base is spread broadly across NI, with spend by local workforces generating additional employment in retail, food, and accommodation, amongst others. The nature of the sector's activity inevitably results in dispersion of income outside NI's major urban areas.

12.3 IN-FILL TO THE GRID

The inclusion of small-scale wind turbines in the NI energy mix is important to ensuring access to a secure low-carbon source of locally produced electricity. Generation via small scale wind power allows householders, farms and businesses to create their own electricity, shielding them from fluctuating energy costs, using an abundant local source of energy. Rural areas that may have issues connecting to the grid due to location, and which were previously supported by diesel generators, can produce and access green energy.

We estimate that NI's small-scale wind sector contributes enough to the grid to supply c. 88,000[62] homes each year depending on consumption and environmental factors.

Small-scale wind can enable the production of energy in locations that can be remote and where grid capacity cannot support larger wind farms.

12.4 REDUCES FINANCIAL AND SOCIAL IMPORT COSTS

Small wind generation displaces a share of the demand for combustible fuels such as coal, oil and gas. This reduces the use of non-renewables in power generation in NI. In the counterfactual case, where small-scale wind does not generate energy for the grid and capacity is not met by other renewable sources, imports would increase. This would result in an increase of 4.7% of KG of CO2 produced per kWh of energy, and the total financial costs of these imports would be approximately £7m per annum. This highlights the value that small-scale wind provides as a means of supporting NI to decarbonise.

Additionally, another benefit relates to the social cost of carbon ("SCC"): an estimate, in monetary values, of the economic damages that would result from emitting one additional ton of greenhouse gases into the atmosphere. The SCC puts the effects of climate change into economic terms to help policymakers and other decisionmakers understand the economic impacts of decisions that would increase or decrease emissions.

Extensive research on the SCC highlights the wider costs of same on society, with $50 per tonne of CO2 the accepted measure of the social cost of carbon. The existence of the small-scale wind sector in NI, and its consequential reduction to imports, mitigates the social cost of imported fuels.

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[62] This is based on total capacity of, and the up to date weighted average capacity factor for, the NI small-scale wind sector per the OFGEM ROC Register (December 2020) as well as average NI energy consumption figures from the NI Transparency Report (Utility Regulator) Q3 2019 – Q2 2020.

A

APPENDIX:

Overview of IRR calculation assumptions for average asset

The table below sets out the assumptions underpinning the IRR set out in section 5.

TABLE 3: FINANCIAL MODEL ASSUMPTIONS FOR AVERAGE ASSET SCENARIO

NO.	CATEGORY	ASSUMPTION	RATIONALE
1	Size of average asset	224kW	This is the average size of turbine in the KPMG NI Small-Scale Wind Dataset.
2	Development period	Development costs are incurred pro rata over the one-year period prior to operations commencing in October 2016	Development costs are typically incurred over a number of years prior to the asset being built and accredited; 1-year pro-rata is a simplifying assumption. October 2016 has been selected as the midpoint of the year in which most small-scale wind assets energised in NI.
3	Operational period	20 years	This is in line with the availability of ROCs for accredited stations.
4	Inflation rate	2.5% per annum	This is the RPI rate which was typically used as a base case assumption when raising finance for renewable assets in the year ended 31 March 2017.
5	Capacity factor	22% per annum	This is the weighted average capacity factor for 100-250kW small scale wind assets in NI for 10 years up to the year ended 31 March 2016 as derived from the OFGEM ROC register (being the weighted average capacity factor that would have been known at the time of investment).
6	Electricity price	The central wholesale electricity price projections for the SEM as prepared for calendar year 2017 onwards, including central BNE-based capacity payment projections for calendar years 2017 and 2018	This is the forecast curve that investors would have typically used when assessing their equity investment in renewable assets at the time. As part of the introduction of the iSEM, it was known at the time of the assumed investment that the existing capacity payment regime would be scrapped.
7	Generation Weighted Average ("GWA") price adjustment	-5%	This is in line with the GWA at the time, albeit it is worth noting that the discount has since increased and is forecast to increase further over time.
8	ROC buyout price	Opening price of £44.33 per ROC based on the price for the year ended 31 March 2016	This would have been the latest known ROC price at the date of investment and therefore would have formed the best estimate of the price going forward (with inflationary uplifts).
9	ROC recycle price	5% of buyout price	This is in line with the average recycle percentage (4%) based on the 5 preceding years from 2011/12 to 2015/2016 where the percentage ranged from 9% to 0%.

NO.	CATEGORY	ASSUMPTION	RATIONALE
10	Pass through rates	97% for ROCs and electricity	This is the average pass through rate per Power Purchase Agreements for renewable assets of this type.
11	Development costs – average asset	£570,540 based on the average development cost from the KPMG NI Small-Scale Wind Dataset	The development cost data points are primarily made up of costs relating to turbine supply and installation, grid connection costs, civil engineering works and planning fees. This capex figure is below the estimated development capex (£610k) for a similar sized turbine as per the Periodic Review of FITs 2015, DECC .
12	Operational costs	£38,440 per annum in 2020 prices, rebased using the 2.5% annual inflation assumption	This is based on the average operational costs for all assets in the KPMG NI Small-Scale Wind Dataset. Key cost categories include operation and maintenance contract, insurance, land lease, rates and administration costs. This opex figure is above the estimated opex (£13k) for a similar sized turbine as per the Periodic Review of FITs 2015, DECC however it did not appear to take into account costs associated with land leases and rates which accounts for the large majority of the difference with our estimate.
13	Lifecycle costs	£75,000 in year 10 of operations in 2020 prices	This is a conservative estimate based on internal KPMG data points and questionnaire responses from developers.
14	Decommissioning costs	£30,000 at the end of the appraisal period in 2020 prices	This is in line with market expectations of decommissioning costs for small scale turbines.
15	Corporate tax rates	Corporation tax rates of 20% for the year ending 31 March 2017, 19% until the year ended 31 March 2020 and 17% from 1 April 2020 onwards	These corporate tax rates are in line with enacted tax legislation applicable at the time (albeit the reduction to 17% was subsequently reversed).
16	Capital allowance assumptions	Capital allowance rate of 18% assuming 85% of development costs qualified	The qualifying proportion of 85% is a simplifying assumption which acknowledges that the majority of development costs will be eligible expenditure for capital allowance purposes.
17	Working capital	1 month for both debtors and creditors	This is a simplifying assumption.

B

APPENDIX:

Overview of IRR calculation assumptions for repowering scenario

The table below sets out the assumptions underpinning the IRR set out in section 6.

TABLE 4: FINANCIAL MODEL ASSUMPTIONS FOR REPOWERING SCENARIO

NO.	CATEGORY	ASSUMPTION	RATIONALE
1	Original average asset	Assumptions no. 1, 2, 5, 7, 11 and 12 from Appendix A apply to this scenario	See Appendix A.
2	General assumptions	Assumptions 4, 10, 16, 17 from Appendix A apply to this scenario	See Appendix A.
3	Size of repowered asset	240kW	This is the average size of turbine per the KPMG Small-Scale Repowering Dataset.
4	Repowered asset – development period	Development costs are incurred pro rata over the one year ended 30 September 2020	This is a simplifying assumption.
5	Repowered asset - appraisal period	Operations of the repowered asset commence in November 2020 and continue for 20 years such that there is a 4 year and 1 month period with no entitlement to ROC income	This is based on a switchover period of one month (to take account of the works required to remove the original turbine and install and energise the de-rated turbine) plus the expected asset life of a de-rated asset.
6	Net scrap value of original asset	£25,000 in 2020 prices, received in the quarter ended December 2020 when the repowering is assumed to occur	Conservative estimate given that there is a limited market for such assets currently (e.g. scrap metal) and this is typically at least partially offset by decommissioning and transportation costs.
7	Capacity factor – derated asset	47% per annum	This is the average capacity factor per the KPMG Small-Scale Repowering Dataset post-repowering.
8	Development costs – repowered asset	£804,120	This is based on the average development cost per the KPMG Small-Scale Repowering Dataset. The development cost data points are primarily made up of costs relating to turbine supply and installation, civil engineering works and planning fees.
9	Operational costs - repowered asset	£60,320 per annum in 2020 prices	This is based on the average operating costs per the KPMG Small-Scale Repowering Dataset.

NO.	CATEGORY	ASSUMPTION	RATIONALE
10	Electricity prices up to repowering	Actual NI power prices with a 5% Generation Weighted Average (GWA) price discount up to 30 September 2020.	In the repowering scenario, the investment decision is being taken with updated knowledge of power prices and price forecasts and therefore this has been reflected in the model.
11	Electricity prices following repowering	The central case projections for the captured price for onshore wind as prepared for Q4 2020 onwards	This is the up to date forecast curve that investors have recently used when assessing equity investments in renewable assets.
12	ROC buyout price	Actual ROC buyout prices for the period up to the year ended March 2021. Thereafter the buyout price for the year ended March 2020 is inflated using the indexation assumption set out in Appendix A	As with assumption no. 10, in the repowering scenario, the investment decision is being taken with updated knowledge of ROC buyout prices and therefore this has been reflected in the model.
13	ROC recycle price	Actual ROC recycle prices for the period up to the year ended March 2020. Thereafter the ROC recycle price is assumed to be 8% of buyout price	As set out above, in the repowering scenario, the investment decision is being taken with updated knowledge of ROC recycle prices and therefore this has been reflected in the model. The 8% assumption is based on the average recycle percentage from Appendix A updated for the subsequent known years (i.e. to the year ended 31 March 2020).
14	Lifecycle costs – repowered asset	£75,000 in year 10 of operations in 2020 prices	This is a conservative estimate based on internal KPMG data points and questionnaire responses.
15	Decommissioning costs	£30,000 at the end of the appraisal period in 2020 prices	This is in line with market expectations of decommissioning costs for small scale turbines.
16	Corporate tax rates	Actual corporation tax rate of 20% for the year ending 31 March 2017, then 19% thereafter	As noted above, in the repowering scenario, the investment decision is being taken with updated knowledge of tax rates. In reality, the planned reduction in the corporate tax rate to 17% was reversed and corporate tax rates have remained higher than originally expected.

C

APPENDIX:

Additional detail regarding the socio-economic benefit analysis

Below we set out our approach to quantifying socio-economic benefits.

Gross Value Added (GVA)

- The developer questionnaire (referred to throughout the report) obtained a breakdown of 2019 spend across different categories (e.g. land costs, operations and maintenance, insurance, utilities, grid connection and turbine costs etc.).
- Spend was categorised in line with the Northern Ireland Statistical and Research Agency (NISRA) classification of industrial sectors (i.e. identified spend allocated to utilities/agriculture/financial services, etc.).
- Spend from the KPMG sample was scaled up to account for the total estimated spend within the sector overall, taking account of the capacity of the sample relative to the total capacity of small-scale wind.
- KPMG integrated categorised spend into its existing Input-Output model, which is based on NISRA's Supply and Use Tables (SUTs)[63] – this model quantifies interdependent relationships between inputs (i.e. developer spend) and outputs (i.e. overall GVA).
- This approach enabled KPMG to identify how operational and construction expenditure flows through the supply chain of chain of small scale and contributes to overall GVA, as well as the multipliers that drive these.

Employment

- The developer questionnaire obtained the number of employees per developer, across both operational and development aspects – this provided an indication of the employment within the sample.
- To scale up the sample, KPMG reviewed third party research on the employment intensity of small-scale wind internationally. Pro forma metrics were used to estimate direct employment relating to small-scale sites outside the KPMG database (e.g. job intensity per £1 million investment; job intensity per turbine; etc.).
- In order to estimate indirect employment, KPMG utilised NISRA's Supply and Use Tables on indirect Full Time Equivalents employment multipliers by sector [64]. This identifies the relationship between direct employment on farms and in offices and indirect employment in the wider supply chain (e.g. suppliers and maintenance).
- This approach enabled KPMG to model total employment throughout the supply chain in the small-scale wind sector.

Import Cost Savings

- KPMG utilised existing data on the baseline energy fuel mix in NI to understand the current composition of the supply of energy (i.e. coal, oil, gas, wind, etc.).
- Using the KPMG NI Small-Scale Wind Dataset and NISRA information, the total capacity of small-scale wind was removed from total NI capacity to create a counterfactual scenario (i.e. how the energy mix would appear if small-scale production did not exist).
- In the counterfactual scenario, use of non-renewable sources of energy is assumed to increase, on the basis that other renewable sources (e.g. large-scale wind) would not increase capacity.
- Third party estimates on the financial cost of imported fuel were applied to the quantum of fuel needed to supplant small-scale production capacity.
- This approach enabled KPMG to model the hypothetical additional cost of imported fuel in the counterfactual scenario, had small-scale production not have materialised.

[63] NI Economic Accounts Project – 2015 and 2016 Experimental Results (2020)
[64] As above. Table 'NI IX I Multipliers, 2016'

D

APPENDIX:

Supporting Calculations

The following table is used in the calculations listed below

2018/19	NI	ENGLAND & WALES	SCOTLAND	TOTAL
Electricity Supplied (MWh)	7,747,717	244,827,229	24,810,957	277,385,903
ROC Obligation	1,433,328	114,579,143	11,611,524	127,623,995
ROCs Issued	5,716,567	76,701,212	23,530,224	105,948,003

Source: OFGEM RO Annual Review 2018/19

Calculation 1: Proportion of NI Consumer renewables obligation bill driven by GB Renewable Deployment

As per the table above, England and Wales and Scotland accounted for c. 94.6% of ROCs issued ((76.7m + 23.5m) / 105.9m) in 2018/19, and therefore, by extension, accounted for c. 94.6% of the cost of the scheme.

Given obligation costs are socialised across all UK consumers, and the renewable component of the average NI consumer bill in 2018/19 was £31, this means c. 94.6% of this cost (£29.33) was driven by the volume of renewables deployed in GB. The cost related to NI renewable deployment was therefore £1.67.

Calculation 2: Lifetime cost of the average small-scale wind turbine to the average NI domestic electricity consumer

Based on our analysis, the average small-scale wind turbine generates 1,727 ROCs per annum.

The 2020/21 ROC buy-out is £50.05, with an expected total cost of £55.06 once the 10% headroom mechanism is applied.

Therefore, the total cost of support for this turbine is expected to be 1,727 x 55.06 = £95,089 in 2020/21. This cost is ultimately socialised across all UK electricity consumers through the pass-through of supplier obligation costs.

On average NI electricity consumers meet c. 1.1% of the UK's renewable obligation costs (1.43m ROCs out of 127.6m as per the table above).

NI's 818,616 domestic consumers account for 38% NI electricity consumption (see calculation 3) and therefore will have 38% of this cost passed onto them.

Therefore:

1.1% of £95,089 = £1,068

Of which 38% is passed onto domestic customers = £406

Spread over 818,616 NI domestic customers
= 406 / 818,616 = 0.05p

0.05p x 20 years = 1 penny

Calculation 3: Proportion of electricity consumed by NI domestic consumers

As per the table above, NI consumes 7.7TWh / 277TWh = 2.8% of UK wide electricity consumption.

As per average of Q3 2019 – Q2 2020 NIAUR Transparency Reports, NI domestic consumers consumed 2.9Wh of electricity, with the balance to commercial users. As such, domestic consumers account for c. 38% of NI electricity consumption (i.e. 2.9TWh/ 7.7TWh) which represents c. 1% of UK-wide electricity consumption (2.9TWh/ 277TWh).

Calculation 4: Proportion of UK renewables obligation costs passed onto NI domestic consumers

On average, c. 1.1% of the UK's renewable obligation costs are passed onto NI electricity consumers (1.43m ROCs out of 127.6m as per the table above).

As per Calculation 3, NI domestic customers account for 38% of NI electricity consumption.

Therefore, the proportion of the cost of the renewables obligation schemes passed onto NI domestic electricity consumers is c. 1.1% x 38% = 0.42%.

Calculation 5: Conversion of post-tax nominal returns from pre-tax real returns

We have utilised the same methodology as used by Parsons Brinckerhoff and Ricardo Energy & Environment in government commissioned reports, namely "*convert pre-tax nominal returns into post-tax nominal returns by using the relevant Effective Tax Rate (ETR) for the corresponding technology and type of investor, and convert pre-tax nominal returns into pre-tax real returns, assuming an inflation rate of 3%, which is HMT's projection for RPI in the long-term*[65]"

The analysis used discounted ETR's from Electricity Market Report: Review of effective tax rates for renewable technologies, KPMG 2013, as used by government studies.

[65] FIT Consultation Responses 2015

Disclaimer

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.

KPMG's role in this analysis has included the following:

— Receiving instructions from RenewableNI commissioning the analysis and setting the focus areas of the report;

— Being introduced by RenewableNI to its small-scale wind members in order to distribute questionnaires (the "questionnaires") and collect data directly from small scale wind developers and their representatives;

— Reviewing and analysing the responses in the questionnaires to calculate forecast investment returns for 'typical' small-scale projects and estimate the socio-economic benefits of the sector for NI;

— Reviewing and analysing publicly available information to assess the policy background, the small-scale wind sector in NI more generally and to determine responses to questions that have been raised in the public domain; and

— Preparing a draft report for factual accuracy review by RenewableNI.

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 23rd November 2020 (the "Engagement Letter").

The report contained herein is primarily based on the responses to the questionnaires and 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. KPMG accepts no liability or responsibility whatsoever for any loss or damage suffered or costs incurred by any third party individual or entity arising out of or in connection with this report, however the loss or damage is caused. No third party should act on this report without appropriate professional advice after a thorough examination of the particular situation.

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 and the questionnaire responses received. We have sense checked the underlying information and have checked a sample of project data provided to underlying source documentation to enhance the perceived robustness of our data set however we cannot provide any guarantee or warranty as to its accuracy.

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