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Northern Ireland Audit Office

Generating electricity from renewable energy

REPORT BY THE COMPTROLLER AND AUDITOR GENERAL
13 October 2020

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Comptroller and Auditor General

Northern Ireland Audit Office
13 October 2020

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Abbreviations

AD	Anaerobic Digestion and/or Anaerobic Digester
AFBI	Agri-Food and Biosciences Institute
BEIS	Department for Business, Energy and Industrial Strategy
C&AG	Comptroller and Auditor General for Northern Ireland
CEPA	Cambridge Economic Policy Associates
CfD	Contracts for Difference
CfE	Call for Evidence
CHP	Combined heat and power
DfE	Department for the Economy
DETI	Department of Enterprise, Trade and Investment
DoF	Department of Finance
DfI	Department for Infrastructure
EN	Enforcement Notice
EU	European Union
FIT	Feed-in Tariff
GB	Great Britain
ITAR	Independent Technical Assurance Report
kW	Kilowatt
kWh	Kilowatt hour
LPS	Land and Property Services
MW	Megawatt
MWh	Megawatt hour

Abbreviations

NI	Northern Ireland
NIAUR	Northern Ireland Authority for Utility Regulation
NIEA	Northern Ireland Environment Agency
NIRO	Northern Ireland Renewables Obligation
NIROC	Northern Ireland Renewables Obligation Certificates
OFGEM	Office of Gas and Electricity Markets
RO	Renewables Obligation
ROC	Renewables Obligation Certificate
SN	Stop Notice
UK	United Kingdom
VAT	Value Added Tax
WML	Waste Management Licence

Key Facts and Forecasts

40%	Northern Ireland's 2020 target percentage of electricity to be consumed from renewable sources
46.8%	the actual percentage of electricity consumption generated from renewable sources in Northern Ireland for the 12 month period ending 31 March 2020.
85.4%	percentage of renewable electricity generated from onshore wind for the 12 month period ending 31 March 2020
5.3%	percentage of renewable electricity generated by biogas for the 12 month period ending 31 March 2020
£31	the average cost, to the average domestic electricity consumer in Northern Ireland (5 per cent of the average total electricity bill), of renewable electricity support schemes in 2019
£80	the average cost to the average domestic electricity consumer in Great Britain (7 per cent of the average total electricity bill), of renewable electricity support schemes in 2019
3.5	approximately three and a half times as many AD based generating stations per sq. km of land in Northern Ireland than in Great Britain
3	almost three times as many stand-alone wind turbines per sq. km of land in Northern Ireland than in Great Britain

Key Facts and Forecasts

£1.17 billion[1]

the Department for the Economy's estimated maximum cost to all UK suppliers of purchasing NIROCs to meet the respective renewables obligations in GB and NI from 1 April 2005 to 31 March 2019. In NIAO's opinion this figure is also a good estimate of the maximum amount that has been received by generators of renewable electricity in Northern Ireland over the same period through the sale of NIROCs under the NIRO scheme. Of this total amount:

- £0.37 billion is the estimated maximum cost to NI electricity suppliers of purchasing NIROCs to meet the renewables obligation in NI from 1 April 2005 to 31 March 2019; and
- £0.8 billion is the estimated maximum cost to GB electricity suppliers of purchasing surplus NIROCs to contribute towards meeting the renewables obligation in GB from 1 April 2005 to 31 March 2019.

£5 billion[1]

the NIAO's forecast of the total maximum cost to all UK suppliers of purchasing NIROCs to meet the respective renewables obligations in NI and in GB from 1 April 2005 to 31 March 2037. In NIAO's opinion this figure is also a good estimate of the maximum total amount that has been/will be received by generators of renewable electricity in Northern Ireland over the same period through the sale of NIROCs under the NIRO scheme. Of this total amount:

- £1.25 billion is NIAO's forecast of the maximum cost to all NI electricity suppliers of purchasing NIROCs to meet the renewables obligation in NI up to 31 March 2037; and
- £3.75 billion is NIAO's forecast of the maximum cost to all GB electricity suppliers of purchasing surplus NIROCs to contribute towards meeting the renewables obligation in GB up to 31 March 2037.

1 Paragraph 2.19 explains that it is not possible to accurately predict the consumer cost of the scheme to date or its final cost in the future. These figures therefore represent our best estimate of the maximum cost to suppliers and are based on the assumption that NI suppliers will meet their obligation solely by presenting NIROCs purchased at a net cost equal to the UK-wide buy-out fee and that GB suppliers purchase the surplus. DfE and NIAUR have advised that suppliers are only likely to purchase NIROCs if it is a cheaper option than paying the buyout fee. In reality suppliers choose a combination of purchasing ROCs from throughout the UK and paying the buy-out thus the actual cost to suppliers will be lower than this estimate.

Executive Summary

Executive Summary

Introduction

1. The Northern Ireland Renewables Obligation scheme (the NIRO) was established on 1 April 2005 and mirrored other Renewable Obligation schemes in Great Britain (GB). The primary objective in 2005 was to incentivise renewables development and increase the proportion of electricity consumption generated from renewable sources, keeping costs to consumers at a minimum. The Northern Ireland Executive established a target to achieve 40 per cent of all electricity consumed, to be generated from renewable sources by 2020[2].

2. The NIRO was open to all generators of electricity from a renewable source and closed to new applicants on 31 March 2017. It provides an additional financial return[3], by issuing a fixed number of Renewable Obligation Certificates (ROCs) for every megawatt hour (MWh) of electricity generated. ROCs are then traded in a single UK-wide market and purchased by UK electricity suppliers. Once a generator became accredited to the scheme they were entitled to claim ROCs for 20 years.

3. The NIRO does not involve any taxpayers' money being paid directly from Government to investors. Instead, the Government imposes an obligation on licensed electricity suppliers to provide evidence (in the form of ROCs) that a proportion of their electricity is generated from renewable sources, or else face a financial penalty. This provides ROCs with a base monetary value prior to being traded and purchased by the electricity suppliers, as evidence that they have met their renewables obligation. Ultimately the cost of all ROCs, irrespective of origin, is passed on by electricity suppliers to UK consumers as part of their electricity bills.

4. The NIRO has been successful in achieving its aim of promoting investment in, and the generation of, renewable electricity. From virtually a standing start in 2005, electricity consumption from renewable sources reached almost 47 per cent for the 12 month period ended 31 March 2020, and the 40 per cent target by 2020 was exceeded in 2019. The Department for the Economy's (DfE) view is that without the incentive provided by the NIRO this would not have been possible and that investment in emerging renewable technologies would have occurred at a much slower rate.

5. This report does not criticise the use of renewable sources as a means of electricity generation. There is undoubtedly a significant benefit to the environment and society, by reducing high dependence on fossil fuels, and there is evidence that the availability of renewable electricity can help control overall electricity price levels.

6. However, we identified a significant risk that some investors may be achieving a higher financial return than was required to encourage adoption of the various supported technologies. We also identified that the speed of uptake, (particularly in the two years leading up to the closure of the NIRO) has created significant additional environmental and planning impacts, which could have been avoided had there been better joined up thinking across government.

2 The overall UK target is 30 per cent by 2020 and the Northern Ireland target contributes towards this.
3 In addition to the sale of the electricity itself.

Background

7. Understanding renewable electricity generation, and how it is publically incentivised, is important as it impacts on the economy, the environment and the security of our future energy supply. In addition, recent high profile concerns relating to the Renewable Heat Incentive scheme (RHI) has led to significantly reduced public confidence in renewable energy schemes, even though the funding model is different, with RHI support paid by tax payers, whilst NIRO support is paid by electricity consumers.

8. Multiple concerns relating to the NIRO have been raised by politicians and members of the public. For example, in 2017 an anonymous letter was sent to the DfE, the Comptroller and Auditor General (C&AG) and a number of other parties, setting out serious concerns about the possibility of around 300 small-scale wind turbines, without a grid connection, rushing to join the NIRO. It was alleged that their intention was to claim ROCs without any use of the electricity generated.

9. In late 2018, the media reported the potential existence of a number of 'phantom plants'. This term related to alleged generating stations in receipt of ROCs, fuelled by biogas produced from Anaerobic Digester (AD) plants (hereafter referred to as AD based generating stations), which did not appear to physically exist. The media also reported important environmental concerns relating to AD plants. At the same time an increasing number of other public concerns were raised with us in relation to planning and environmental matters regarding certain wind turbines and AD plants.

10. Finally, concerns emerged that the level of financial support available for AD based generators in Northern Ireland (NI) was higher than in GB, and that this was attracting GB investment funds. In some cases there were allegations that the pursuit of quick returns on renewable investment could be having negative impacts on the environment. In light of all of this interest the C&AG decided that this was an important subject area to examine and report on.

11. Due to the greater number of concerns raised, the main focus of this report is therefore on small-scale, standalone on-shore wind turbines, AD plants and small scale AD based generating stations. Whilst the bulk of electricity from renewable sources in NI is generated from wind farms, with multiple turbines, these have not generated the same level of public concern.

Key Findings

There have been periods where the financial support from NIRO for small-scale wind and AD based generators in NI has been both higher and lower than the total support available in GB, although in recent periods it has tended to be higher. In addition, because of a lower renewables obligation level NI suppliers (and ultimately consumers) pay significantly less than GB counterparts to support renewable electricity

12. Energy is a devolved matter in NI and therefore policy can and will differ across devolved administrations.[4] Until 2011, NI's strategic approach and level of financial support to promote renewable electricity generation was broadly in line with GB. However, since then there has been a divergence in the approach towards achieving respective targets. One of the outcomes of this is higher levels of support in NI for investors in small-scale wind (from 2014 until closure in June 2016) and AD based generators (from 2011-12 until closure in 2017). Higher levels of support in GB, for the same technologies, were available before these dates.

13. The full cost of supporting electricity generated from renewable sources via ROCs is spread across all UK electricity suppliers who purchase the ROCs in order to meet a renewable obligation set annually by Government. The cost of meeting this obligation is passed on to consumers through their bills. However, the cost of supporting renewable electricity to the average NI domestic consumer is approximately one third of that paid by the average GB domestic consumer. This is because GB has a wider range of support mechanisms, including ROCs, and also because NI negotiated a lower annual supplier obligation level than GB, due to higher levels of consumer vulnerability and fuel poverty.

14. Despite lower costs passed on to NI consumers, we have found that, for small-scale wind and AD based generating stations (which generate approximately 17 per cent[5] of renewable electricity), returns to those renewables suppliers since 2014 can be significantly higher than in GB. However, financial returns to investors in larger scale technology, who because of their size generate the largest proportion of renewable electricity, are similar to GB.

Northern Ireland has a large number of smaller standalone wind turbines which, since 2014, can achieve higher rates of return

15. The number of smaller, standalone wind turbine based generating stations increased significantly in the last few years of the NIRO. We believe that this is as a result of the higher level of financial support available to these generating stations since 2014, as well as a surge to gain accreditation prior to scheme closure. We estimated these small-scale generating stations could potentially achieve returns on investment of more than 20 per cent per annum. These small standalone wind turbines now make up approximately 94 per cent of all wind generating stations and approximately 16 per cent of potential wind generating capacity.

4 For example, Scotland has a 100% renewable electricity target by 2020.

5 Based on wind amounting to 78 per cent of renewables (see Figure 3) of which 13 per cent is generated by small-scale turbines less than 250kw (see Figure 8) plus approximately half of fuelled generation (see Figure 3) coming from anaerobic digesters (4 per cent).

Accredited generating stations do not have to comply with planning or environmental rules to claim ROCs

16. We identified that the NIRO legislation (as well as the legislation supporting the two GB RO schemes) does not require generating stations to have planning permission, nor does it include a requirement to comply with environmental regulations, prior to being accredited to the NIRO. Our review identified examples of accredited wind based generating stations in receipt of ROCs, without planning permission, or which had not complied with certain conditions set out within their planning approval. We also found instances of accredited AD based generating stations in receipt of ROCs without environmental waste permits or planning permission. It is important to recognise that the primary responsibility for the enforcement of planning and environmental legislation, rests with those bodies tasked with doing this. However, in our opinion there were inherent weaknesses within the NIRO legislation, which if they had been addressed at the outset, could have helped to prevent or limit planning permission and environmental concerns.

There are separate risks in relation to off-grid and zero export generating stations, some of which are under investigation by OFGEM

17. In response to risks relating to off-grid or zero exporting generating stations and an allegation made about 300 off-grid wind turbines wasting electricity (see **paragraph 8**), we found that the NIRO rules with regard to permitted uses of the electricity were vague and non-specific. While we note that the NIRO legislation mirrors the legislation in GB on this matter and we were told that off-grid developments are a feature throughout the UK, we consider that this makes it difficult to determine what electricity uses were permitted, although the numbers of off-grid stations suggested in the initial allegations were greatly overstated. The DfE told us that at August 2019 there were 54 accredited generating stations (mainly wind based) which were not grid connected, or were not exporting electricity to the grid (zero-export). Since then OFGEM has conducted a programme of audits to gain assurance that these generating stations were operating lawfully and the NIRO Steering Group, which includes representatives from DfE, NIAUR and OFGEM, conducted a detailed risk assessment exercise. This concluded that electricity generated by these stations is being used in a permitted manner and that there was no evidence of wastefulness as suggested by the whistleblower.

18. However, since this conclusion, a serious issue arose, which in our opinion cast significant doubt on the reliability of one of the primary pieces of evidence used to reach it. This specifically related to thirty one 'Independent Technical Assurance Reports' (ITARs) submitted to OFGEM, whose independence, content and authorship were in doubt. OFGEM suspended NIROCs to the generating stations connected to these ITAR reports pending further investigation. In June 2020 OFGEM told us it had concluded that twenty two of the operators had provided alternative contemporaneous evidence to support the generating stations commissioned date and the issuing of NIROCS recommenced for these stations. The remaining nine stations

continue to be under investigation by OFGEM with NIROCs suspended. However, OFGEM has told us that it was able to conclude that the information related to how the electricity was being used had already been verified by a site visit from an independent auditor appointed by them.

There were a large number of accredited generating stations which had not been assessed for rates and as a result were not subject to them

19. During our review we identified a significant number of accredited wind based and AD based generating stations which had not been assessed for rates. This has primarily arisen because neither the NIRO (nor the ROs in GB) require evidence of registration for rates as part of the accreditation process. The NIAUR told us that they assume that registration was not sought by some generators and that they are entirely supportive of the need to ensure rates are paid. However, the Energy Order places a duty of confidentiality on the NIAUR which overrides the requirement for public bodies to inform LPS in accordance with the Rates (NI) Order 1977[6]. Based on data sets from OFGEM and LPS, we originally estimated that there was a potential annual loss of £2.1 million. Once we alerted LPS to this issue they were able to begin an exercise (using published information that NIAUR was able to direct them to) to assess the outstanding generating stations and recoup outstanding rate debts. We understand that by the end of our review significant progress had been made to address the matter and that the potential annual loss has been reduced to £0.1 million.

Financial returns for small-scale AD based generating stations appear excessive, possibly due to the limited data available to government at the time levels of support were decided

20. There has been a significant increase in the number of accredited AD based generators since 2011, when the level of ROCs was significantly increased for smaller generators following a call for evidence and consultation process. This high level of financial support for small-scale AD based generating stations, (when combined with a larger agricultural industry and the additional availability of renewable energy resources[7], relative to GB), has resulted in approximately three and a half times as many AD based generating stations per sq. km, compared to GB.

21. The vast majority of accredited AD based generating stations are classed as small-scale, and under the NIRO, the level of potential financial support available to these stations from 2011 onwards became increasingly higher (see **Figure 13**) than the level of financial support available to equivalent stations in GB under the equivalent scheme at the time.

22. The level of support provided to promote and support AD technology from 2011 was decided by the then Department of Enterprise, Trade and Investment (DETI), based on an adapted financial model provided by independent consultants. The model calculated the number of

6 NIAUR told us that they consider that the general restrictions on disclosure of information set out in Article 63(1) of the Energy (Northern Ireland) Order 2003 override the provisions included in Article 57 of the Rates (NI) Order 1977.

7 For example, high grass yields for silage and high availability of slurry.

ROCs required based on theoretical evidence submitted to DETI through a public call for evidence.

23. We noted that much of the theoretical evidence submitted came from organisations which stood to benefit financially from any increase in the level of support at that time. We also found that the model assumed that any AD based generating stations installed would be made up of a wide range of generating outputs. In reality, the vast majority of investors commissioned AD stations with a generating capacity at the maximum permissible level of the band, offering the highest level of ROCs. This enabled investors to achieve the highest available financial return and as a result it is our opinion that these potential returns are greater than DETI had originally anticipated.

The allegation of 'Phantom AD plants' was not substantiated

24. The allegation of 'phantom plants', that is, ROCs being issued to AD based generating stations which did not in fact exist, was not found to be true as OFGEM's investigation found that all AD based generating stations in receipt of ROCs did actually exist. The allegation may have arisen from a misinterpretation of how the NIRO operates. It is the generating station fuelled by biogas, rather than the AD plant supplying the biogas, that is accredited and a single AD plant can supply gas to more than one generating station. However, the allegations did lead to the identification of an issue of 'gaming'[8] at two generating stations in close proximity, with OFGEM concluding that the stations should be accredited as one station.

Concluding remarks

25. Since 2010, the deployment of renewable generating stations proceeded at a fast pace. In our opinion the supporting governance structures and policies required to proactively identify and manage the risks associated with them should have been more robust. As the NIRO is a government scheme funded through consumers' electricity bills, rather than by taxpayers' funds, it is the responsibility of government, in particular the DfE[9], to ensure that NIRO delivers value for money.

26. The DfE has commenced a post-project evaluation exercise of the NIRO scheme, which we understand will include a value for money assessment of the scheme. As part of this exercise we believe that it will need to assess the actual rates of return to renewable electricity investors. The results of this exercise are expected later this year.

8 In the above case gaming arose where two or more separate generating stations fuelled by biogas produced from AD were accredited in order to obtain a higher rate of ROCs when in reality there was only one generating station which should have received the lower rate.

9 DfE is responsible for NIRO policy and legislation including setting appropriate banding levels to deliver on the policy intent. The Renewables Obligations throughout the UK operate in tandem and DfE interacts with the Department for Business, Energy and Industrial Strategy (BEIS) and the Scottish Government, which has similar policy responsibilities in relation to the Renewables Obligation in GB. All three Departments are responsible for value for money on a UK wide basis.

27. It is clear that the scheme has been successful in achieving its primary objective of meeting renewable electricity targets. It is also clear that the significant increase in renewable electricity generated, (which now meets almost half of Northern Ireland's demand for electricity) has contributed to greater diversity of our electricity supplies and brings other benefits such as cleaner air and a reduction of our impact on the greenhouse effect. However, we consider that the same results might have been achieved more efficiently, at less cost and with less impact on the local natural environment.

Recommendations

Recommendation 1

The Department for the Economy should take a lead role in strengthening and formalising partnership arrangements across all relevant public bodies, to ensure that any future renewable electricity or energy schemes are supported by a more proactive and joined up approach to accreditation, monitoring and enforcement.

Recommendation 2

In any future schemes which support electricity generated from renewable sources, the supporting legislation should be more specific about permitted uses of the electricity generated, particularly if it is not exported to the grid. It should also include a requirement to demonstrate that, if electricity usage was not being met by renewables, it would otherwise be met by electricity from fossil fuel sources.

Recommendation 3

When drafting new legislation, all Departments need to take into account the wider public interest. In particular, the need to disclose and share information between public bodies should not be prevented by confidentiality clauses within new legislation.

Recommendation 4

There is a need for a more strategic and formal approach to encourage and enable all public bodies to be more proactive in their duty to inform the District Valuer of additions, or changes, to the Non-Domestic Valuation List. This is a project that should be led by the Department of Finance.

Recommendation 5

Land and Property Services should complete their exercise to ensure that all rateable renewable generating stations are identified, assessed and that all payments due are collected.

Recommendation 6

The Department for the Economy should carry out a review of all types of renewable generators to ensure that current levels of financial support and the actual rates of return that are being achieved are compatible with the original projections and State Aid rules. Future schemes should project rates of return across a range of outputs and, in setting any bandings, should assume that investors will usually seek to maximise their returns by choosing the most favourable output within that banding.

Part One:
Introduction

Part One:
Introduction

Electricity generated from renewable energy sources – overview and background

Renewable energy sources used to generate electricity are reducing Northern Ireland's historical high dependency on fossil fuels, are sustainable and support the economy

1.1 Sustainable, renewable sources of energy, such as solar, wind and biogas (produced from material such as animal and food waste) are used to generate electricity, supplementing and gradually reducing society's reliance on traditional fossil and nuclear fuels. In line with the rest of the European Union (EU), the UK government established legislation and policy to encourage and support the deployment of renewable electricity generating stations and in 2002, the 'Renewables Obligation' schemes were established in Great Britain (GB), with the Northern Ireland Renewables Obligation (NIRO) introduced in 2005.

1.2 Until then, Northern Ireland (NI) had depended almost entirely on importing fossil fuels, such as gas and coal, to generate electricity. This high dependency created uncertainty in terms of security of supply, exposing NI to the volatility of world energy prices. In addition, the high dependency on fossil based fuels in the energy mix[10] created a significant carbon footprint, contributing to the problems associated with climate change.

1.3 Using renewable sources of energy, in place of fossil fuels, reduces this dependency. This in turn reduces exposure to volatile fuel prices, reduces carbon emissions, reduces wholesale electricity costs and avoids EU compliance costs. The most available local source of renewable power has been wind energy, however, there has been an increasing adoption of other renewables, such as solar and biogas.

The current rate and scale of renewable electricity generation deployment would not have been possible without government intervention and support. Until 2010, Northern Ireland's strategic approach and level of financial support was broadly in line with the rest of the United Kingdom

1.4 Energy is a devolved matter and the NIRO's primary objective was to incentivise renewables development and increase the proportion of electricity consumption generated from renewable sources, keeping costs to consumers at a minimum. Secondary objectives included the encouragement of small scale development. The NIRO provided financial support for a range of renewable technologies, for example on-shore wind, solar, anaerobic digestion and biomass. Cost barriers associated with newer renewable technologies meant that these could not otherwise compete with traditional technologies. The NIRO remained the main support mechanism for renewable electricity until 2017, when the scheme closed to new applicants[11], and is discussed in more detail in **Part Two**.

10 The key elements of the 'energy mix' include fuels used to generate electricity, heating and fuel for transportation.
11 Those accredited to the scheme continue to benefit financially from the NIRO for 20 years from the date they were accredited or until March 2037, whichever is earlier.

1.5 Following a relatively slow uptake of the NIRO, the then Department of Enterprise, Trade and Investment (DETI) published 'Energy - A Strategic Framework for Northern Ireland' in 2010. The framework established the need to move rapidly to much higher levels of renewable electricity consumption and confirmed the Executive's target of 40 per cent renewable electricity by 2020[12].

1.6 Since the scheme's introduction, it has been subject to a number of amendments (see **Appendix One**), the most significant being:

- the introduction of banding[13] in 2009;
- introduction of higher banding levels for small scale wind in 2010 and AD related stations in 2011;
- the retention of subsidy levels in 2014; and
- scheme closure to new applicants for all technologies in 2017[14].

Initially support levels in GB were similar to NI in most cases and slightly higher or lower in others, such as small scale wind and small scale AD based technologies. From 2014 the equivalent levels of support for certain categories of small scale renewable technologies in GB began to fall significantly, making NI the most attractive UK region in which to invest in small scale wind based technologies and small scale anaerobic digestion (AD) based technologies.

1.7 The Department for the Economy (DfE) now has overall responsibility for renewable electricity policy and legislation, including the NIRO. The responsibility for its administration rests with the Northern Ireland Authority for Utility Regulation (NIAUR), which it fulfils through an Agency Services Agreement with the Office of Gas and Electricity Markets (OFGEM).

From 2014 Northern Ireland became the most attractive UK region in which to invest in certain small scale renewable technologies

1.8 The introduction and retention of higher levels of subsidy in NI for certain small scale technologies, than in the rest of the UK, (which required separate EU State Aid approval), led to the rapid deployment of renewable electricity generators in NI in these technologies. This exceeded (relative to land size) deployment in the rest of the UK and it contributed to a large increase in the amount of electricity consumption generated from a renewable source in 2017 (see **Figure 1)**. The NIRO was therefore successful in achieving its primary objective of attracting investment to facilitate renewable electricity generation and consumption of 40 per cent by 2020 (46.8 per cent was achieved for the 12 month period ended 31 March 2020).

12 The initial target of 12 per cent by 2012 was met and an intermediate target of 20 per cent by 2015 was set out in the Programme for Government at that time.

13 Different technologies and generation capacities receive different levels of incentivisation according to need and this is known as 'banding'.

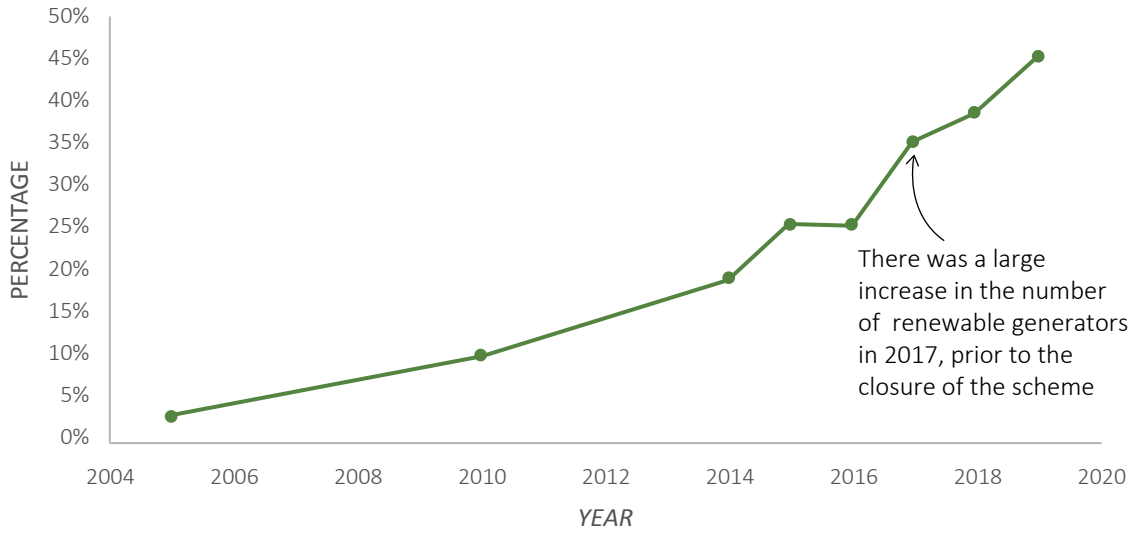
14 Subject to grace periods, the NIRO closed to large scale wind on 31 March 2016 and to small scale wind on 30 June 2016. The NIRO closed to all other technologies on 31 March 2017.

Part One:
Introduction

1.9 The NIRO scheme closed to new applicants in 2017 following a decision by the UK Government. Between January 2017 and January 2020, the absence of a sitting Executive and Assembly prevented any legislation from being introduced to encourage and support any new investment in renewable energy. GB has two other renewable energy schemes – Feed-in Tariffs (FIT) scheme[15] for small scale generation up to 5MW and Contracts for Difference (CfD)[16] scheme for large scale generation over 5MW. The FIT scheme closed on 31 March 2019, but the CfD scheme continues to provide ongoing support for existing and new generation. This means that NI is the only UK region without an incentivisation mechanism for large scale renewable electricity generation. A new Energy Strategy is currently being drafted by the DfE following a call for evidence in December 2019.

Figure 1. Percentage of total electricity consumption generated from renewable sources in Northern Ireland

Consumption of electricity from renewable sources has increased by over 400% since 2010



Source: Northern Ireland Statistical Research Agency

In 2017, concerns relating to renewable electricity began to emerge and since then the NIAO has identified further risks

1.10 In 2017, concerns relating to the operation of small- scale wind generators which were not connected to the grid (off-grid generators) were brought to the attention of the Comptroller and Auditor General (C&AG) and the DfE by an anonymous source. Following this, and prompted by a NI Assembly debate on the Renewable Heat Incentive (RHI) scheme, the Minister for the Economy tasked his Department with producing a risk assessment and audit plan of "other aspects of renewable energy". This was to ensure that all potential vulnerabilities could be

15 The FIT scheme was introduced in GB on 1 April 2010 and closed on 31 March 2019, and requires participating licensed electricity suppliers to make payments on both generation and export from eligible installations.

16 Contracts for Difference (CfD) scheme incentivises investment in renewable electricity by providing developers of projects with high upfront costs and long lifetimes with direct protection from volatile wholesale prices, and they protect consumers from paying increased support costs when electricity prices are high.

identified and proportionate action planned and executed to ensure that public confidence in the system was restored.

1.11 In response, the DfE established the 'NIRO Assurance and Risk Management Steering Group' (the Steering Group - comprising the DfE, the NIAUR and OFGEM) to identify, understand and address risks associated with the NIRO scheme. Subsequently, a number of concerns associated with possible abuse of the NIRO by some accredited generating stations fuelled by biogas produced from AD began to emerge in the media towards the end of 2018. In addition, following concerns from the Northern Ireland Environment Agency (NIEA) and the Department for Infrastructure (DfI) that they did not have all the data required to identify operating AD plants, the DfE instigated a review of all AD plants in March 2019. This engaged the NIAUR, OFGEM, the NIEA and the DfI (with assistance from the local councils) to compile a list of all AD plants and generating stations, in order to identify the environmental and planning requirements for each one. Prior to this review there had been some informal engagement between the NIEA and the DfI, but this was the first time all of these public bodies had got together to share information and work as a single group.

Structure

1.12 We have focused our commentary on the facts relating to certain aspects of renewable electricity, the influence of the NIRO scheme and the risks and concerns that have emerged. Our commentary also provides context, considering why these risks have emerged and what central and local government bodies have done to manage them and, going forward, what could be done to prevent them arising again.

1.13 This report does not make any criticism of renewable electricity as a replacement for traditional electricity generation. The fact that NI has exceeded its target of 40 per cent of electricity consumption from renewables before 2020 is a considerable achievement. This achievement has given rise to positive impacts in several areas such as the price of electricity, jobs and reductions in emissions, which fall outside the scope of this report. However it is important to recognise that this has been achieved at a considerable financial cost and also in unforeseen impacts on the local natural environment.

1.14 The report is structured in the following way:

Part Two presents a factual overview of the NIRO scheme, how it is funded and its contribution to the growth of renewable electricity generation and consumption. It also provides a summary of how renewable generators become accredited to the scheme and the overall cost of the scheme to electricity consumers.

Part One:
Introduction

Part Three focuses on wind technology, support for which has changed during the lifetime of the NIRO, offering higher levels of support than the rest of the UK. It also focuses on some of the key risks and concerns which have emerged. Areas looked at include:

- an explanation of wind renewable energy;
- comparison of financial support for wind technology in GB and NI;
- how NI funding bands have encouraged smaller single turbines;
- planning and environmental concerns and a lack of joined up thinking;
- off-grid and zero-export generators; and
- failure to charge rates for some wind turbines and anaerobic digesters.

Part Four focuses on the financial support to promote the uptake of anaerobic digester based technologies, which has also changed during the lifetime of the NIRO, offering higher levels of support than the rest of the United Kingdom. The chapter focuses on:

- how the biogas produced from the anaerobic digestion process can be used to generate electricity;
- investment and uptake of anaerobic digestion technology;
- the level of returns which, based on evidence in 2010, may have been too high;
- planning issues;
- lack of waste management licences at some anaerobic digester plants;
- handling of digestate waste from anaerobic digester plants; and
- concerns raised in the media relating to 'phantom plants.'

Methodology

1.15 Our investigation has used a combination of quantitative and qualitative methods to gather evidence. Our assessment of electricity from renewable energy and the NIRO, and how the direct and indirect risks associated with them have been identified and addressed, was informed by discussions with key staff at:

- Department for the Economy (DfE);
- Northern Ireland Authority for Utility Regulation (NIAUR);
- Office of Gas and Electricity Markets (OFGEM);
- Northern Ireland Environment Agency (NIEA);
- Agri-Food and Biosciences Institute (AFBI);
- Department for Infrastructure (DfI);

- Department of Finance (DoF);
- Land Property Services (LPS); and
- local councils.

1.16 We also engaged extensively with a wide range of other third parties, including renewable electricity station operators, elected representatives, industry representatives, environmental groups and campaigners, journalists and concerned citizens. We reviewed documents from a wide range of sources and analysed published and unpublished data and other information held by the government and other private sources.

Part Two:

The Northern Ireland Renewables Obligation scheme – how it is funded and its contribution to the growth of renewable electricity generation

Part Two:
The Northern Ireland Renewables Obligation scheme – how it is funded and its contribution to the growth of renewable electricity generation

The Northern Ireland Renewables Obligation has been the main support mechanism to encourage investment in renewable electricity and is part of a wider UK system that is ultimately paid for by all UK electricity consumers

2.1 Since 2005 the NIRO scheme has been the main support mechanism for encouraging increased renewable electricity generation in NI. In conjunction with the support mechanisms in the rest of the UK it ensures that NI contributes to UK wide targets in respect of renewable electricity and it also contributes to secondary policy objectives, such as encouraging the participation of small scale generators and greater diversification. It is part of a wider UK scheme which places a legal requirement on all licensed electricity suppliers to account for a specified and increasing proportion of their electricity (obligation levels) as having been supplied from renewable energy sources, or to pay a buy-out fee [17] for any shortfall in fulfilling its obligation. Income from the buy-out fee is used to fund the administration of the NIRO, minimising any costs to the public purse.

2.2 Operators of accredited renewable generating stations (accredited generators) are given Renewables Obligation Certificates (ROCs) for each megawatt-hour (MWh) of eligible output. These certificates can then be traded and bought by electricity suppliers who can use them to provide evidence towards their compliance with the renewable obligation level that has been set by government.

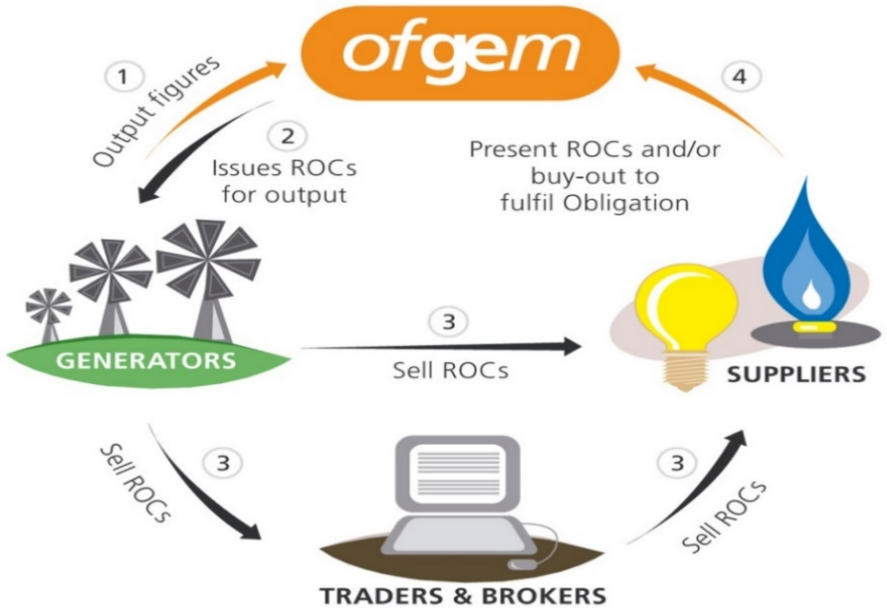
2.3 ROCs issued in NI are tradable along with ROCs issued in England, Scotland and Wales in a UK-wide market for ROCs. Normal market forces mean that electricity suppliers will compete with each other to meet their obligation at the lowest cost possible, by sourcing competitively priced ROCs, (or by paying a buy-out fee) to fulfil their obligation. In any given year, the cost of meeting the obligation will depend on the supply of ROCs available from renewable generators and the demand for ROCs from electricity suppliers.

2.4 Unlike other renewable energy schemes in NI, for example RHI, the NIRO is not funded by taxpayers. It is part of a UK wide market-based Renewable Obligation certificate system, which is ultimately paid for by all UK electricity consumers. The overall cost to consumers (see **paragraphs 2.12 - 2.16**) is primarily determined by government via a number of complex mechanisms, which include setting obligation levels, the ROC buy-out price for electricity suppliers and setting the number of ROCs to be awarded to accredited generators.

2.5 The NIRO has been subject to a number of changes since its introduction (see timeline in **Appendix 1**) and on 31 March 2017, following a decision to close the scheme in GB, it closed to new applications. There were exceptions for applicants meeting certain criteria for grace periods, however these grace periods have now passed and the scheme is now fully closed.

17 Suppliers can also meet their obligation by paying a buy-out price or a combination of ROCs and a buy-out price to meet any shortfall.

Figure 2. How the NIRO works



Source: Image courtesy of OFGEM

2.6 Income from selling ROCs provides accredited generators with a relatively stable revenue stream for a period of twenty years, or until 31 March 2037, whichever is earlier. Government considered that a long term revenue stream was necessary to stimulate investment, by providing accredited generators and their investors with a sufficiently attractive return on their investment (see **Part Four)**.

Most renewable electricity is generated by on-shore wind turbines

2.7 OFGEM is responsible for assessing applications to the scheme, with all applicants having to meet eligibility conditions and criteria [18] to be granted accreditation. At 31 March 2019 there were 23,682 renewable generating stations accredited to the NIRO. Whilst solar stations account for approximately 94 per cent of all accredited stations, significantly outnumbering all other technologies, they are mostly micro generators, accounting for less than 7 per cent of renewable electricity generated. Most generation comes from on-shore wind turbines (85.4 per cent [19]), with fuelled generating stations (which includes AD based generating stations) accounting for 10.6 per cent (see **Figure 3**). This report focuses on small scale wind and AD based renewable electricity sources.

18 *'Guidance for generators that receive or would like to receive support under the Renewables Obligation (RO) scheme'*, OFGEM, April 2019.

19 *'Electricity Consumption and Renewable Generation in Northern Ireland: Year Ending March 2020'*, Northern Ireland Statistics and Research Agency, June 2020.

Part Two:
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Figure 3. Accredited renewable generating stations and generating capacity by type

Generating station type	Number of stations	% of stations	% of renewable electricity generated in 2019-20
Solar	22,196	94	3.3
Wind	1,282	5	85.4
Fuelled (includes biomass /AD biogas and landfill gas)	126	<1	10.6
Hydro & Tidal	86	<1	0.6
Total	**23,690**	**100**	**100.0**

Source: The number of stations comes from OFGEM's latest published data at 31 March 2019 and the percentage of electricity generated comes from Northern Ireland Statistics and Research Agency rolling 12 month data from April 2019 to March 2020.

2.8 Once accredited and operational, accredited generators submit output data to OFGEM, which is used to calculate the number of ROCs to be issued. There is a responsibility on accredited generators to submit accurate, non-fraudulent data to OFGEM. However, there are inevitably some risks associated with accrediting generating stations and issuing ROCs to generators who are motivated to maximise revenue from their assets. To manage these risks, OFGEM conducts a programme of generating station audits to verify the submitted data and information.

2.9 The objectives of these audits [20] can be summarised as follows:

- verify generated output data submissions (based on which ROCs are issued);
- assure accreditation information is correct;
- detect fraud and non-compliance;
- deter the fraudulent or careless submission of inaccurate data; and
- detect departures from good practice.

2.10 OFGEM told us that it compares the generation data submitted to it from accredited generators against data provided by Northern Ireland Electricity Networks Limited which shows how much renewable electricity has been uploaded to the grid, and it investigates any anomalies. Based on the findings from this work, OFGEM has the power to withhold or revoke ROCs, or to revoke accreditation from a generating station. It also has a dedicated Counter Fraud team which provides fraud prevention, detection and investigation support to the NIRO.

20 A summary of the outcomes from these annual audits is published annually by OFGEM and available from its website.

2.11 In 2018 OFGEM also carried out an additional programme of audit and verification checks (including 100 per cent on-site audits of off-grid or zero-exporting stations) in response to allegations relating to a small number of generating stations which were at risk of gaming the system [21]. These allegations, along with other emerging risks, are discussed in more detail in **Parts Three and Four**.

The cost of the NIRO and GBRO schemes are borne by all UK consumers but the lower obligation level in NI means that the impact on consumers here will be less than in GB

2.12 The costs associated with all of the RO schemes are initially paid for by UK electricity suppliers, who then pass on these costs to electricity consumers, through their electricity bills. Suppliers are obliged to source a proportion of the electricity they supply from renewable sources and to evidence that they have done so by submitting a certain number of ROCs (or a cost equivalent) as a proportion of the amount of annual electricity provided to their customers. ROCs are purchased directly from accredited generators or from a central trading market. The proportion of electricity that suppliers must source from renewables is known as the renewables obligation level and this is set in advance each year by the Department for Business, Energy and Industrial Strategy (BEIS) for all UK regions.

2.13 At the outset of the scheme, a significantly lower annual obligation level was agreed for NI, which took into account its higher levels of consumer vulnerability, particularly as a result of higher levels of fuel poverty [22] compared to other UK regions. In 2020-21, for example:

- NI electricity suppliers will be required to submit 0.185 ROCs for each MWh supplied; whereas
- GB electricity suppliers will be required to submit 0.471 ROCs for each MWh supplied.

2.14 Since all ROCs are tradable within a single UK-wide market, the costs associated with them are socialised, meaning they are spread across all UK electricity consumers. As a result, the lower obligation level in NI results in lower costs for NI suppliers relative to GB and ultimately lower renewable electricity costs for electricity consumers in NI. In addition to this, more ROCs are issued to NI renewable electricity generators than NI suppliers require to meet their obligation and any surplus NIROCs are purchased by GB electricity suppliers who then present them to meet their GB obligation. Our calculations indicated that approximately 75 per cent of NIROCs are purchased by GB electricity suppliers, who then pass on these costs to GB consumers.

21 Exploiting rules and procedures established to protect the NIRO scheme to manipulate the scheme for financial gain.

22 Higher fuel poverty levels arise from a combination of a cooler climate, lower incomes, higher fuel price and a high dependence on oil. In Northern Ireland oil is the most common home heating fuel. This over-dependence on one unregulated fuel has led to a unique set of challenges which do not exist in other UK regions.

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The Northern Ireland Renewables Obligation scheme – how it is funded and its contribution to the growth of renewable electricity generation

2.15 However, the DfE and the NIAUR have told us that it is important to note that they consider this is not an additional cost to GB consumers. This is because GB suppliers are required to comply with their respective obligations regardless of the availability of NIROCs and are likely to purchase NIROCs only where doing so is the most commercially advantageous method of meeting their own obligations. They also advised that the separate renewables obligations in the devolved administrations were always intended to run as if it was one UK wide scheme, thus contributing to both local and UK national targets, with renewables locating throughout the UK where renewable resource is available and ROCs traded throughout the UK in accordance with supplier demand.

2.16 An outcome from this is a net positive transfer from GB to NI. By way of an example, in 2017-18, the total value of ROCs issued to NI generators was around £259 million[23], while we have estimated that the cost to NI consumers was approximately £68 million[24].

2.17 The annual cost of the NIRO to the average NI domestic consumer[25] increased from approximately £18 in 2015 to almost £31 in 2019 (see **Figure 4**). This equates to a percentage increase from 3.5 per cent to 5.1 per cent of the total average bill. GB domestic consumers pay a higher amount as a result of having a higher obligation level. In addition, GB has another two renewable electricity schemes (FIT and CfD, which were not extended to NI – see **Paragraph 1.9**). For example, in 2018 the average GB domestic consumer paid just over £80 to support renewable electricity (including almost £58 relating to the ROCs scheme), compared to the average NI customer who paid almost £29 (see **Figure 4)**.

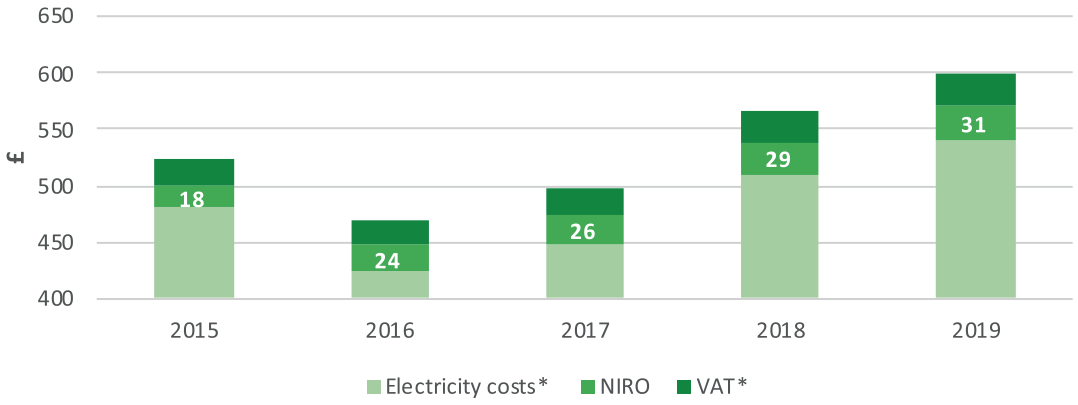
23 OFGEM's *'Renewables Obligation Annual Report 2017-18'* sets out that the number of ROCs awarded to accredited NI generators was 5,033,303 and each ROC was worth £51.43.

24 This was calculated from the total number of ROCs required by NI suppliers to meet the Obligation level for 2017-18 (1,320,647) multiplied by notional value of a ROC in 2017-18 per OFGEM (£51.43).

25 All calculations in Figure 4 are based on the Northern Ireland average usage of 3.2 MW per annum. To enable a direct comparison with the rest of the UK calculations in Figure 5, this has been reduced to match the GB average of 3.1 MW per annum.

Figure 4. Annual cost of the NIRO to the average domestic consumer in Northern Ireland

The annual cost of the NIRO to the average domestic consumer has increased each year



Source: NIAUR

** Electricity costs include generation, supply and distribution costs.*
** VAT is applied to all costs, including the NIRO element, at a rate of 5 per cent.*
** Annual costs have been rounded up to the nearest £.*

2.18 The lower obligation level means that NI consumers pay less for the NIRO than GB consumers pay for the RO schemes. If NI operated a separate renewable electricity scheme independent from GB, the total cost to the NI consumer to achieve the same outcomes would be significantly higher. However, we accept that if NI was not part of the overall UK scheme this would not necessarily reduce costs for GB suppliers and consumers unless the obligation level for renewables in GB was also reduced.

2.19 Due to the complexity of the scheme, including how costs are met by suppliers and what element of these costs are passed on to consumers, it is not possible to accurately estimate the consumer cost of the scheme to date, nor predict its final cost in the future. Based on the annual number of ROCs issued to accredited renewable NI generators since 2005 and the annual buy-out fee[26] the DfE estimated that, from 1 April 2005 to 31 March 2019 the maximum cost of the NIRO scheme to all NI electricity suppliers is approximately £0.37 billion[27] and the cost to all GB suppliers of purchasing surplus NIROCs to contribute towards compliance

26 The maximum cost of meeting an annual obligation level.

27 These figures represent our best estimate of the maximum cost to suppliers and are based on the assumption that NI suppliers will meet their obligation solely by presenting NIROCs purchased at a net cost equal to the UK-wide buy-out fee and that GB suppliers purchase the surplus. DfE and NIAUR have advised that suppliers are only likely to purchase NIROCs if it is a cheaper option than paying the buyout fee. In reality suppliers choose a combination of purchasing ROCs from throughout the UK and paying the buy-out thus the actual cost to suppliers will be lower than this estimate.

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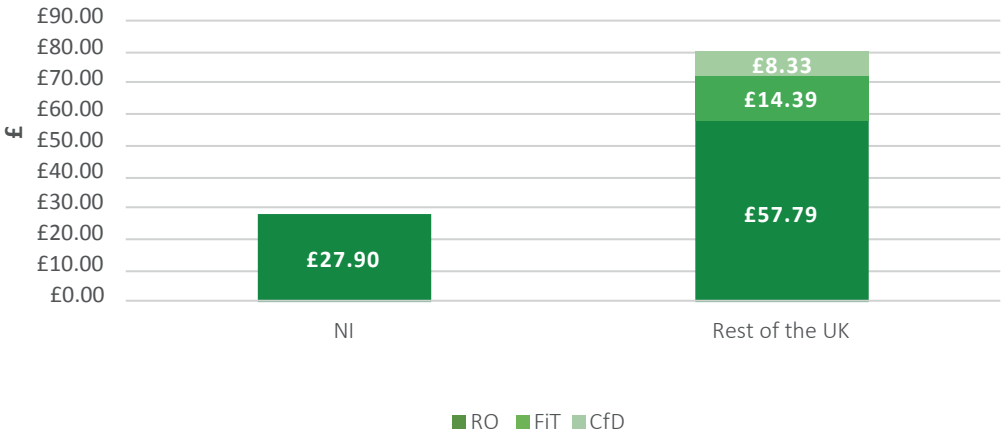
with the obligation level in GB would have been approximately £0.8 billion[27] which represents a significant contribution to the NI economy. We estimated that over the whole life of the scheme, from 2005 to 2037, the total cost could be £5 billion, three quarters of which could be met by GB suppliers purchasing NIROCS to comply with their obligation level.

2.20 Whatever the overall cost turns out to be, it needs to be balanced against wider sustainable benefits arising from the scheme, such as the impact on wholesale electricity prices, job creation, emission reductions from reduced reliance on fossil fuels, together with the increased resilience of supply.

Figure 5. Annual cost of renewable electricity support in 2018, NI versus rest of the UK

Renewable electricity costs the average NI domestic consumer one third of the amount paid by the rest of the UK domestic consumers



Note: Figure 5 costs are based on an average usage of 3.1 MW p.a. to enable a direct comparison with the rest of the UK.

Source: Department for the Economy

27 These figures represent our best estimate of the maximum cost to suppliers and are based on the assumption that NI suppliers will meet their obligation solely by presenting NIROCs purchased at a net cost equal to the UK-wide buy-out fee and that GB suppliers purchase the surplus. DfE and NIAUR have advised that suppliers are only likely to purchase NIROCs if it is a cheaper option than paying the buyout fee. In reality suppliers choose a combination of purchasing ROCs from throughout the UK and paying the buy-out thus the actual cost to suppliers will be lower than this estimate.

While higher levels of NIRO financial support to a small number of small scale technology types since 2014 has contributed to achieving Northern Ireland's renewable electricity targets, this may have been at a higher cost than was necessary. The extent of renewables investment has also contributed to a number of planning and environmental concerns

2.21 Since 2014 financial support from the NIRO for some small scale onshore wind and AD related technologies has generally been higher in NI than the rest of the UK (see **Part Four**). This higher level of support has attracted increased investment in the generation of renewable electricity in NI which has contributed to the achievement of the 40 per cent renewable electricity target, as well as the associated benefits to the environment and to the renewables and agriculture industries. However, the increase in investment in small-scale wind and AD based renewable electricity, particularly after the announcement of the closure of the NIRO scheme to new applicants, has contributed to a number of planning and environment related concerns which are discussed in **Part Three** of this report.

Part Three:

Wind turbine technology together with planning, environmental and other emerging risks relating to all renewable electricity generation

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Wind turbine technology together with planning, environmental and other emerging risks relating to all renewable electricity generation

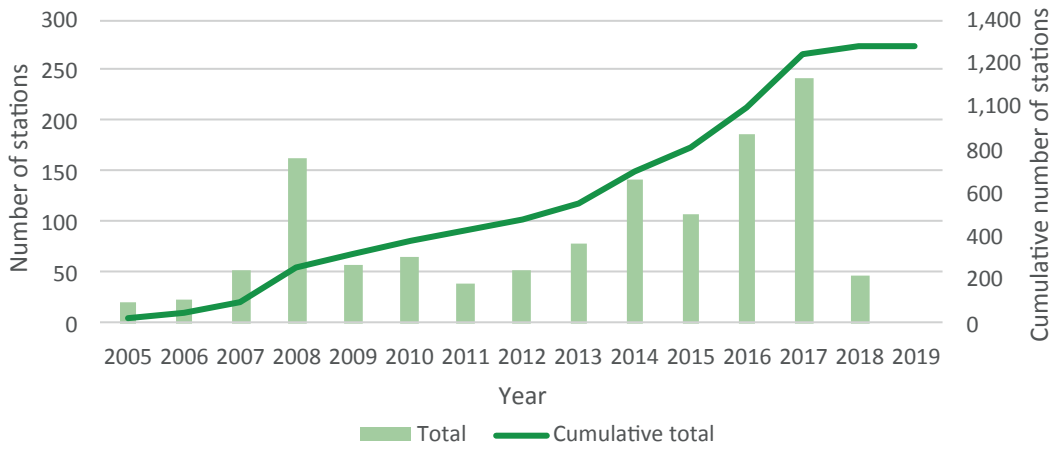
Introduction to and uptake of on-shore wind turbine technology

On-shore wind generating stations provide approximately 85 per cent[28] of all renewable electricity generated in Northern Ireland

3.1 Wind generating stations located on land (on-shore) harness the energy of moving air to generate renewable electricity using one or more wind turbines. Along with Scotland and Wales, NI has a particularly good wind resource which, when combined with financial support from the NIRO, has made the uptake of this technology popular since 2005 (see **Figure 6**).

Figure 6. The number of accredited wind generating stations since 2005 in Northern Ireland

The growth in the number of wind generating stations since 2005 has been driven by the NIRO



Note: OFGEM accredits single and multiple turbines grouped together and treats them as a single station. This graph shows the number of wind generating stations, rather than the number of individual turbines. The number of individual turbines is approximately 1,700. The spike in accreditations in 2008 can be attributed to the introduction of agents to the NIRO, which made the process easier and more straightforward for micro-generators to accredit to the scheme.

Source: OFGEM

3.2 Wind generating stations can range from very small-scale single, micro turbines of around 4kW, costing a few thousand pounds, to multi-MW wind farms with multiple turbine stations costing millions of pounds. While there are a number of cost factors unique to each wind generating station, for example commissioning costs, grid connection costs and groundwork costs, the range and complexity of these capital costs are much less than those associated with

28 See Figure 3.

generating stations fuelled by biogas produced from AD. (Anaerobic Digester (AD) plants are discussed in **Part Four**). The day to day operating costs are also significantly less.

3.3 Being an older and more popular renewable technology than AD, more accurate financial data[29] was available to DETI to forecast the level of financial support required to stimulate investment in wind generation and, as a result, the risk of overcompensating investors should have been significantly less than with AD.

Since 2014 a higher level of support for smaller standalone wind turbines, compared to GB, has led to a significant number of them in Northern Ireland

3.4 NI has significant numbers of smaller wind turbine generators with a capacity of less than 250kW (see **Figure 7**) accounting for a third of on-shore wind ROCs issued. This has been primarily driven by the higher levels of ROCs per 1MWh for the smaller generators and has led to a much larger proportion of smaller standalone wind turbines in NI than in GB; approximately three times as many by geographical area.

Figure 7. Analysis of accredited wind generating stations in Northern Ireland at 31 March 2019

Wind generating station generating capacity	Number of ROCs awarded per 1MWh generated (since 2010)	Number of accredited wind generating stations in Northern Ireland
≤250 kWh	4	1,209
250kWh - 5MWh	1	20
>5MWh	0.9	53
Total	**-**	**1,282**

Note: > than 250 and above 5MW often consist of consist of larger windfarms with up to 20 individual turbines.

Source: OFGEM

3.5 As was the case with AD technology, the divergence in government financial support for small scale wind technology between NI and the rest of the UK stimulated the successful uptake of the technology, particularly after the NIRO closure was announced.

3.6 In 2014, the DfE carried out a review of banding levels which indicated that capital costs were marginally increasing and decided therefore to maintain 2010 support levels. Apart from this review, we are not aware of any regular monitoring process which could have alerted the Department to the risk of higher (or lower) returns being made by wind generating stations, prior to the closure of the NIRO to small scale wind on 30 June 2016.

3.7 We have calculated that the ROCs paid for a typical 225kW standalone wind turbine with a

29 Regional wind strength and speed data available also helped determine potential generating capacities of generating stations.

Part Three:
Wind turbine technology together with planning, environmental and other emerging risks relating to all renewable electricity generation

24 per cent load factor (the percentage of time the turbine generates electricity) would give an annual return in excess of 20 per cent and a payback time on the original investment of less than 4 years[30]. Therefore, in our opinion the rate of ROCs paid for turbines with capacity less than 250kWh appears to have been excessive.

Smaller standalone wind turbines generate a relatively small amount of electricity but account for a much larger number of ROCs issued

3.8 The 2019 deployment profiles of on-shore wind generated electricity (see **Figure 8**) show that 84 per cent of potential wind generating capacity is provided by generators in the over 5MW band[31]. Typically these will be large windfarms with many turbines, although for the purposes of NIRO accreditation they are categorised as single stations. As renewable electricity generated in this band only earns 0.9 ROC per MWh generated (compared to 4 ROCs per MWh generated by smaller turbines up to 250 kW), it provides better value for money to the consumer.

3.9 As an illustration, a standalone 225kW turbine accredited since March 2010, generating 473 MW of electricity in 2019, will receive 1,892 ROCs, which is worth approximately £95,000[32]. However, the same amount of electricity produced by a same size turbine which is part of a larger windfarm will result in the issue of 426 ROCs, worth approximately £21,000.

Figure 8. Analysis of the deployment of accredited wind generating stations in Northern Ireland at 31 March 2019

Capacity	Deployment percentages in 2019	Deployment percentages in 2014	Percentage change
<5 kW	<0.1%	< 0.1%	-
5-50 kW	< 1%	1%	-
50-500 kW*	13%	3%	+ 10%
500-5,000 kW	3%	3%	-
>5,000 kW	**84%**	**93%**	**-9%**

** As per Figure 7 there are only 20 stations with a capacity between 250 and 500kw. 98.4 per cent of stations in this band are less than or equal too 250kW.*

Source: 2019 deployment percentages calculated from OFGEM 2019 data. 2014 deployment percentages taken from "Review of RO banding for small scale renewables" – Cambridge Economic Policy Associates and Parsons Brinckerhoff, January 2014.

30 Based on a 225kw wind turbine costing £144,000, installation cost £67,000 and grid connection cost £100,000 plus £5,000 per annum servicing costs.

31 Turbines in this band form part of a windfarm which has up to 20 turbines and for the purposes of the NIRO is accredited as a single generator.

32 Based on a 24 per cent load and a ROC value of £50 (approximate average value in recent years).

3.10 **Figure 8** indicates that since the 2014 decision to retain higher levels of ROCs and the subsequent divergence from GB support via the FIT (see **Part Four, paragraph 4.19)**, there has been a decrease in the percentage of capacity at the >5MWband, with a corresponding increase in capacity at the 50-500 kW band. This change in generating deployment since 2014 means that smaller standalone turbines (up to 250 kW), which are capable of generating around 13 per cent of on-shore wind generation, account for approximately 40 per cent of the total NIRO cost associated with wind generation[33]. This compares to around 60 per cent of the cost supporting almost 87 per cent of wind generation for > 500kW.

3.11 We conclude from this that the high levels of investment in small scale wind generating stations, was driven by the potential for more favourable financial returns, when compared to the potential returns available to large scale wind generating stations. The retention of more favourable returns in 2014 combined with the announced closure of the scheme accelerated this level of investment, leading to a reduction in value for money to the electricity consumer.

Planning and environmental emerging risks

The primary responsibility for planning and environmental matters rests with the bodies tasked with doing this. However it was surprising that there was no provision in NIRO legislation to revoke accreditation or withhold ROCs from generating stations which do not meet planning or environmental requirements

3.12 Since 2015 councils have been responsible for local planning[34], with the DfI retaining regional oversight and planning responsibilities for larger projects of regional significance. This is often referred to as a two tier planning system. The DfI also has reserved power to take local planning enforcement action, but this is only intended to be exercised in exceptional circumstances and, to date, has not been exercised in local renewable electricity planning developments.

3.13 AD plants and wind turbines normally require planning approval[35] which must be acquired prior to construction, and developers are required to comply with any conditions set out within the approval. Where appropriate, environmental impacts associated with the construction and operation of a generating station fuelled by biogas produced from an AD plant[36] or wind turbine are built into the planning process.

33 Our calculations are based on weighted deployment capacity bands and ROC bands for wind turbines accredited after March 2010.

34 Prior to reaching a decision on a planning application for an AD plant or wind turbine, councils engage with a number of public bodies, such as the NIEA, for potential environmental impacts and the DfI for any potential road and traffic impacts.

35 Some very small farm-based AD plants may not require planning approval, if they comply with a list of conditions under permitted development legislation (Part 7 of the Planning (General Permitted Development) Order (Northern Ireland) 2015).

36 The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2015 and the Conservation (Natural Habitats etc.) Regulations (Northern Ireland) 1995.

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3.14 When it was announced that the NIRO was closing on 31 March 2017, there was a large increase in applications to the scheme. In order to secure NIRO accreditation by particular dates, some developers proceeded to construct their AD plants and wind turbines without securing the necessary grant of planning permission or other consents (where this was required).

3.15 There is no requirement in the NIRO legislation for planning and environmental regulations to be complied with in order for a generating station to be accredited and receive ROCs. As a result a large number of wind turbines (and AD plants with a generating station – see **Part 4**) were built and started claiming ROCs despite not having planning permission. In many cases planning permission was then sought retrospectively.

3.16 The Planning Act (Northern Ireland) 2011 provides planning enforcement powers, whereby if a council considers that there has been a breach of planning control, it may take enforcement action. In determining the most appropriate course of action in response to alleged breaches of planning control, planning authorities take into account the extent of the breach and its potential impact. If a council determines that a wind turbine (or AD plant) has not complied with planning laws, either by not seeking approval before building or not following the stipulations in its planning approval, then the developer may have an opportunity to regularise the development. This can be achieved by complying with the original planning approval, by submitting a revised planning application, or if no planning application had previously been submitted, by seeking retrospective approval. Failure to do one of these can lead to the wind turbine (or AD plant) being categorised as 'unauthorised development' or a breach of planning control and subject to formal enforcement action, such as the service of an Enforcement Notice (EN), Stop Notice (SN) or Breach of Condition Notice (BOCN).

3.17 While an EN may ultimately prove effective in remedying a breach of planning control, it does not lead to immediate action. The combined effect of legislation and planning policies can often lead to considerable delay between the date of issue of an EN and the date on which non-compliance becomes a criminal offence. This is because the EN may be appealed and a council must wait until an appeal is heard and determined. **Appendix 3** details an example of an EN being issued to an AD Plant as a result of a breach in planning regulations.

3.18 During this period, a non-compliant or unauthorised wind turbine/AD plant with a generating station will continue to earn ROCs, as there is no provision within the NIRO legislation to enable the NIAUR or OFGEM to revoke accreditation or to stop or reclaim ROCs payments made to generating stations which are not complying with planning or environmental laws. If the NIAUR or OFGEM were to attempt to withhold NIROCs due to a planning issue, it could result in a potential claim for compensation from the developer which would not only be costly, but the developer could be successful as there is no legal basis for them to do so.

3.19 Councils also have the power to issue a SN alongside an EN, which will compel an AD or wind turbine developer to cease operations. However, this must be given careful consideration, as it can result in a legal challenge and a potential claim for compensation, which can be

extremely costly to a council. As a result, councils only consider issuing a SN if there is demonstrable harm to the environment as a result of the alleged breach.

3.20 There have been a number of compliance breaches associated with AD plants and wind turbines. Most breaches are deemed minor and were usually resolved by negotiation or were not expedient to pursue. However, a small number of generating stations have had more complex or persistent concerns which have resulted in ENs (and to a lesser extent SNs) being issued. Examples ranged from breaching of specific planning conditions, through to unauthorised AD plants or wind turbines.

3.21 NIAUR and OFGEM told us that they have no vires in respect of AD plants or related planning matters and therefore they place full reliance on councils and DfI to ensure that both AD plants (which supply biogas to AD based generating stations) and wind turbines have appropriate planning approval and that this is enforced in accordance with the requirements of planning legislation.

3.22 We noted that in renewable developments with more than one occurrence of non-compliance, or with a history of non-compliance, follow-up checks are not performed by councils. We understand that the onus is on developers to satisfy themselves that the development on site has been carried out in accordance with the approval and that council planning staff do not have the resources to check, or follow up, on all non-compliance matters. As with all other areas of planning, reliance is placed on members of the public or other third parties to bring potential matters of non-compliance to a council's attention.

3.23 To date, two councils have each issued a single SN to wind turbine developments. No generating stations fuelled by biogas produced from AD have been issued with a SN. Even when a SN is issued to a generator, its developers would still be entitled to all ROCs earned (and previous ROCs earned) up to the point at which operations ceased, even if the plant is found to have operated illegally.

The NIRO legislation did not take account of planning and environmental risks. Engagement with other agencies and departments at an earlier stage would likely have supported greater joined up thinking in the design of the scheme

3.24 In our opinion, a small number of AD and wind turbine developers appear to have taken advantage of a number of regulatory systems which:

- were not designed from the outset to identify and manage the complexities and risks of renewable technology development;
- faced a surge in applications for planning, waste management licences (WML) and accreditation to the NIRO, which was not entirely forecast;
- are reliant on self-compliance by developers;
- were not operating in partnership from the outset of the NIRO scheme; and

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- lacked adequate, joined-up sanctions to deal with non-compliance.

3.25 The concerns in relation to the NIRO could have been avoided if:

- formal partnership arrangements had been in place between all public bodies connected to the NIRO, to align renewables development policies and strengthen regulatory enforcement powers, as well as sharing of information;
- the legislation had enabled NIAUR and OFGEM complementary enforcement powers to withhold and revoke ROCs from AD based generating stations (using biogas from a non-compliant or unauthorised AD plant) and non-compliant or unauthorised wind turbines; and
- the legislation had enabled OFGEM to ensure that planning approval and WML were in place prior to granting accreditation to an AD based generating station (physically connected to and located with an AD plant).

Recommendation 1

The Department for the Economy should take a lead role in strengthening and formalising partnership arrangements across all relevant public bodies, to ensure that any future renewable electricity or energy schemes are supported by a more proactive and joined up approach to accreditation, monitoring and enforcement.

A small number of renewable generators are not connected to the electricity grid. This leads to a risk that electricity could be generated just to collect ROCs and used in a wasteful manner

3.26 All accredited UK RO scheme generators can claim ROCs so long as the renewable electricity generated is supplied by a licensed electricity supplier to customers or is used in a "Permitted Way [37]". Prior to the introduction of "Permitted Ways" in 2009, there was no scope for generators operating off-grid to claim ROCs. Since 2009, the NIRO legislation, which mirrors the RO legislation in GB, has not required an accredited generating station to be connected to the main grid. Some stations consume all electricity generated onsite or sell it to a third party via a private line and therefore would not require a grid connection.

3.27 In early 2016, OFGEM alerted NIAUR and the DfE that prospective participants were making enquiries about off-grid and zero-export stations. In such cases, operators would use the power generated for purposes such as drying wood and keeping livestock warm. Whilst there was nothing in the NIRO Order to prevent this type of usage, there was a concern regarding the lack of independent commissioning evidence. OFGEM used its powers of information request to ask prospective generators to provide an independent report attesting to the fact that the generating station had been commissioned and explaining how the power generated was being used. These reports are known as Independent Technical Assurance Reports (ITARs).

37 While NIRO legislation defines 'Permitted Ways' as the manner in which electricity can be used, it is silent on the purposes for which it can be used.

3.28 In January 2017, the C&AG and DfE received an anonymous letter setting out concerns that an estimated 300 small on-shore wind projects would rush to accredit to the NIRO prior to the closure of the scheme, for the sole purpose of claiming ROCs, with no intention of connecting to the grid, and would use electricity unnecessarily.

3.29 In response to these concerns, the Steering Group (see **paragraph 1.11**) carried out a desk based risk assessment exercise of the risks associated with both off-grid and zero-export stations. In addition to this exercise, OFGEM introduced additional accreditation assurances and onsite audits of all off-grid stations, to ensure that any electricity generated and used was in accordance with scheme requirements and had a genuine purpose.

3.30 As at August 2019 there were 54 'zero-export' or 'off-grid' generating stations, which do not export any electricity to the grid. This is because either all electricity generated is consumed on site, exported to a third party, or in some cases the grid infrastructure was at full capacity and no further connections were available. The Steering Group identified 10 stations of high risk, with a further 12 warranting further consideration.

3.31 The Steering Group concluded, on the basis of its exercise and the additional audit work undertaken by OFGEM, that all stations were using electricity generated in a manner which was consistent with the provisions of the NIRO and that there was no evidence to demonstrate that any of these stations can be shown to be using the electricity generated in a deliberately wasteful manner.

3.32 Following the Steering Group's conclusion and towards the end of our review, we became aware of an issue in relation to the authenticity and authorship of 31 of the ITAR reports which, unknown to OFGEM at the time of submission, were compiled and signed by persons other than the stated independent energy consultant. OFGEM suspended NIROCs to the generating stations connected to these ITAR reports pending further investigation. In June 2020, OFGEM concluded that the ITAR was a material piece of evidence, amongst a range of information, on which they relied upon to grant accreditation to these generating stations. However, 22 operators provided alternative contemporaneous evidence to support the generating stations commissioned date. As such NIROC issue recommenced for these stations. The remaining 9 stations continue to be under investigation by OFGEM with NIROCs suspended. If OFGEM are not satisfied that accurate and reliable information has been provided in respect of the generating stations in question, they may take further compliance action.

3.33 We understand that the Steering Group will continue to monitor off-grid and zero-export stations. We reviewed the Steering Group's programme of work to date and are content that, together with the ongoing work, it is proportionate to the risk that remains. However, it is our opinion that the Steering Group should not place reliance on any of the ITAR reports unless their authenticity, authorship and independence can be confirmed.

Part Three:
Wind turbine technology together with planning, environmental and other emerging risks relating to all renewable electricity generation

Recommendation 2

In any future schemes which support electricity generated from renewable sources, the supporting legislation should be more specific about permitted uses of the electricity generated, particularly if it is not exported to the grid. It should also include a requirement to demonstrate that, if electricity usage was not being met by renewables, it would otherwise be met by electricity from fossil fuel sources.

A significant number of generating stations had not been identified for a rates assessment, however progress has been made to address the issue

3.34 All renewable generating stations over 50kW[38] are subject to a non-domestic rates assessment to determine if they are eligible or exempt from rates. Types of exemptions include farm based generators and/or those not exporting electricity for sale to a third party. The amount of rates payable is calculated on a valuation which takes into account the income and expenditure of the generating station.

3.35 Legislation[39] puts a duty on all public bodies to inform Land and Property Services[40] (LPS) of any relevant information that they come across during the exercise of their functions which may require an alteration to the rates valuation list. LPS has traditionally relied on local councils' building control teams to inform them of new properties that are subject to non-domestic rates. However, all renewable generating stations are exempt from building control and therefore in the absence of notifications from other public bodies, LPS has had to rely on alternative sources, such as notifications from generating station owners[41] or other third parties.

3.36 We conducted a high level matching exercise of separate datasets held by OFGEM and LPS and identified a significant difference in the total number of operating accredited generating stations and the number either being charged rates, awaiting valuation, or exempt from rates (see **Figure 9**). Prior to this exercise LPS had been unaware of a significant number of AD based and wind generating stations and as a result these had not been assessed. This has primarily arisen because neither the NIRO nor the ROs in GB require evidence of registration for rates as part of the accreditation process. The NIAUR told us that they assume that registration for rates was not sought by some generators and that they are entirely supportive of the need to ensure rates are paid. However, the Energy Order places a duty of confidentiality on the NIAUR which overrides the requirement for public bodies to inform LPS in accordance with the Rates (NI) Order 1977.

38 The Rates (Microgeneration) Order (Northern Ireland) 2012, from 1 April 2012.

39 Article 57 of the Rates (NI) Order 1977.

40 LPS, as the District Valuer, is responsible for the calculation and collection of rates in Northern Ireland.

41 There is no legal requirement for a station owner to inform LPS of their existence.

Recommendation 3

When drafting new legislation, all Departments need to take into account the wider public interest. In particular, the need to disclose and share information between public bodies should not be prevented by confidentiality clauses within new legislation.

3.37 Once we alerted LPS to this issue, they were able to begin an exercise, with the assistance of published information that NIAUR were able to provide, to assess the outstanding generating stations and recoup outstanding rates debts. As set out below, considerable progress had been made in resolving this issue by the time this report was finalised.

Figure 9. Total number of operating accredited stations >50kW versus total number assessed by LPS

Generating station type	Number of operating accredited stations	Number charged rates by LPS	Number of stations either awaiting valuation or exempt
Single wind turbines	702	676 (458)	26 (1)
Wind farms	66	66 (66)	1 (1)
AD generating stations	88	88 (41)	0 (5)
Total	**856**	**830 (565)**	**27 (7)**

Source: OFGEM and LPS

Note: Numbers in brackets relate to the status at December 2019 with non-bracketed numbers indicating status at June 2020.

Recommendation 4

There is a need for a more strategic and formal approach to encourage and enable all public bodies to be more proactive in their duty to inform the District Valuer of additions, or changes, to the Non-Domestic Valuation List. This is a project that should be led by the Department of Finance.

3.38 We performed a high level calculation based on average rates paid by each generator type in 2019-20 and those generating stations which had not yet been assessed. This indicated that until we brought this information to the attention of LPS, the potential annual loss to the public purse could have been around £2.1 million. As a result of the progress made by LPS since then to assess previously unidentified generating stations, it has calculated that the potential annual loss has been significantly reduced to just under £0.1 million.

Part Three:
Wind turbine technology together with planning, environmental and other emerging risks relating to all renewable electricity generation

Recommendation 5

Land and Property Services should complete their exercise to ensure that all rateable renewable generating stations are identified, assessed and that all payments due are collected.

Part Four:

Financial support to promote the uptake of anaerobic digester based technologies

Part Four:
Financial support to promote the uptake of anaerobic digester based technologies

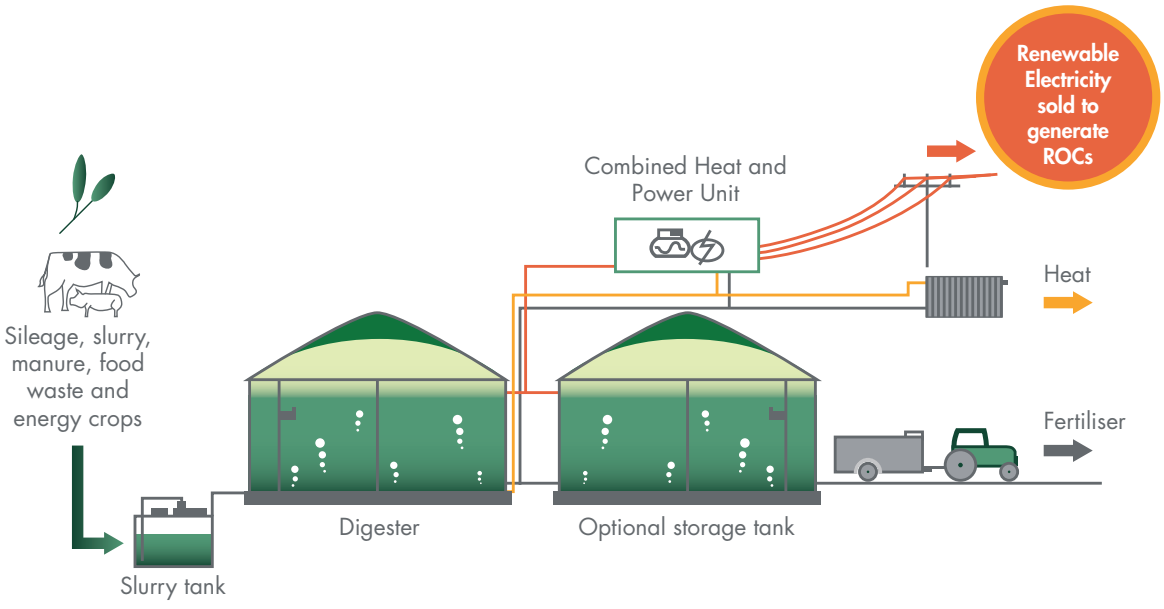
Introduction to anaerobic digestion technology

Anaerobic digester plants produce biogas which, when combusted, can generate renewable electricity

4.1 Anaerobic digestion is a natural process, involving the breakdown (digestion) of biomass (organic matter from plants and animals) by bacteria, in the absence of oxygen (anaerobic). Methane gas is produced which is collected in a membrane and combusted in a nearby combined heat and power (CHP) unit[42], which powers a generator, producing renewable electricity and heat.

4.2 AD plants typically use a combination of slurry, silage, energy crops, food waste and animal by-products (collectively called 'feedstock') which are digested in a large concrete or steel tank. This process can be managed and controlled in an anaerobic digester (AD) plant (see **Figure 10**).

Figure 10. Example of a typical anaerobic digester plant



4.3 The CHP unit and generator are collectively referred to as a 'generating station' and it is this station that is accredited by OFGEM for the purposes of the NIRO scheme and not the AD plant creating the biogas.

42 Also referred to as an engine.

4.4 Typically, some of the electricity generated is used on site, with the surplus sold to the grid (or over a private wire) and, together with income from ROCs awarded and sold, provides the primary income for an AD plant and/or generating station. The amount of heat produced by both the AD plant and the CHP unit is very significant and could potentially be used on-site or sold. However, in the absence of any district heating infrastructure[43] in NI and the absence of any financial incentivisation (as is the case in GB), heat may be wasted.

4.5 The leftover material from the process, digestate, is rich in certain nutrients and can be used as a fertiliser to be spread on agricultural land. Despite its potential as a fertiliser, we found no evidence indicating that digestate had a market value. Whilst digestate, if spread correctly, is considered less hazardous to the environment than raw slurry, there are some environmental concerns in relation to the types and quantities of digestate and where it is being spread.

4.6 AD plants range in size and output and the cost to develop one depends on the potential electrical generating capacity required from its associated generating station[44]. They can range from a very small-scale farm based station of 40kW, costing hundreds of thousands of pounds, to multi-MW stations costing tens of millions of pounds. However, due to a wide variety of factors unique to each AD plant, for example commissioning costs, grid connection costs and groundwork costs, there is no typical cost. The most popular type of AD plant in NI has been a generating station capacity of around 500kW which can cost between £2 million and £4 million, depending on various factors including grid connection costs, location, type of inputs to the AD and building costs.

4.7 As part of its policy of promoting renewable electricity, the UK government regarded financial support as essential in enabling AD technology to be commercially attractive to investors. Without support, operating an AD plant with an associated generating station as a profitable, commercial business would be very challenging, unless it formed part of a larger integrated business, such as a farm or factory. Therefore, setting the correct level of support for the NIRO scheme was critical in attracting the level of private investment required to contribute to NI's renewable electricity target.

4.8 While all renewable technologies have their own advantages and disadvantages, well operated AD based technology has two key advantages over wind technology which are particularly important for NI:

- a more steady and reliable supply of electricity; and
- the ability to help address a food and agricultural waste problem.

4.9 In order to avail of the NIRO, OFGEM[45] accredited AD based generating stations once they met, and continued to meet, certain criteria set out in the NIRO legislation (although these criteria do not include securing any necessary waste licence, or planning permission).

43 In some countries where AD is well established, district heating infrastructure allows AD plants to supply hot water to villages in return for additional revenue.

44 The generating capacity of the CHP unit determines the amount of biogas required to run it efficiently. The higher the output, the more biogas required. The more biogas required, the larger the AD plant needs to be.

45 Responsibility for administration of the NIRO scheme rests with the NIAUR, which sub-contracted the administration of the scheme to OFGEM. OFGEM also administer the GB schemes.

Part Four:
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Whilst the AD plant itself does not form part of the accreditation process, it may be subject to requirements under planning and environmental legislation. Instead, it is the generating station – typically an engine based generator fuelled by the biogas from an AD plant – that is accredited under the NIRO. The vast majority of AD plants have a generating station but not all generating stations have an AD plant. AD plants can supply surplus biogas to other generating stations, so there are more accredited AD based generating stations than there are AD plants.

4.10 The majority of accredited AD based generating stations are connected directly to a neighbouring AD plant and are farm based. There are a smaller number of commercial, factory based stations, either with an associated AD plant or standalone, using stored biogas from a separate AD plant. A small number of larger, commercial AD plants specialise in digesting food waste, animal by-products and chicken litter (see **Appendix 2**).

4.11 AD plants benefit from economies of scale, meaning that the higher the generating capacity of an AD plant's generating station, the higher its capability of generating electricity at a lower cost. For example, a 250kW and 500kW AD plant and generating station will utilise much of the same main infrastructure, such as the heating, pumping, cooling and electrical systems. These will all be of similar specification, regardless of the generating capacity of the generating station. The main components which differ are the size of the CHP unit and the size of the tanks.

Investment and uptake of anaerobic digestion technology

While the uptake of the technology was initially very slow, higher levels of financial support and good access to energy crops and waste, have resulted in Northern Ireland becoming the most attractive region in the UK to invest in AD technology

4.12 Between 2005 and 2010, the initial uptake of AD technology in NI was significantly less than the rest of GB, despite similar levels of government led financial support. By 2010 there was only one AD plant with an accredited generating station, which was government owned and used for research purposes. There were a number of primary reasons for the slow uptake:

- high capital costs and the difficulties with securing finance;
- low levels of NIRO support (2 ROCs per 1 MWh generated), which industry claimed would not compensate investors of small-scale AD generation; and
- small-scale wind generation had a number of competitive advantages relative to AD, primarily a higher level of NIRO support (4 ROCs per 1 MWh generated), lower capital costs and easier access to finance.

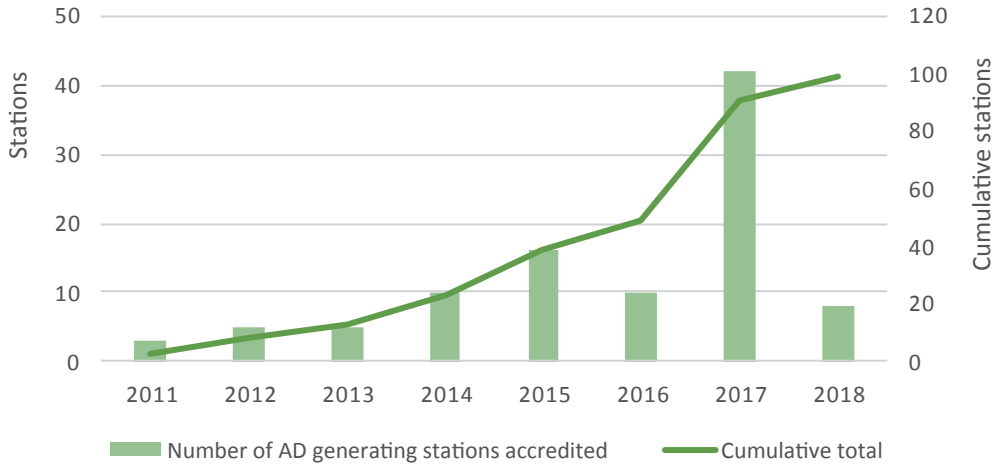
4.13 In 2011, the Department responsible for renewable energy at that time, (Department for Enterprise, Trade and Investment (DETI)), introduced revised banding levels for small-scale

AD generators. As part of this process it increased the level of financial support, addressing the primary reasons for the slow uptake of AD technology. In the same year, GB increased financial support for small-scale AD based generation, through a FIT scheme.

4.14 In July 2011 the UK Government announced the closure date of the Renewables Obligation (RO) schemes in GB to all new generating capacity from 31 March 2017. In May 2012 DETI announced that the NIRO would close from the same date. From 2013, the financial support provided by the FIT scheme to GB investment progressively reduced (see **Figure 13**), whilst the NIRO support to investment in NI was maintained at 2011 levels. This divergence, along with the high availability of agricultural waste, food waste, silage, energy crops and slurry, saw NI become the most attractive region in the UK to invest in AD technology.

4.15 This series of events directly led to a significant growth in the number of planning applications for AD plants across NI. This was followed by significant levels of financial investment, resulting in the rapid growth in the number of accredited AD based generating stations[46]. Growth peaked in 2017, (prior to scheme closure on 31 March 2017) and by 2019 there were 79 accredited generating stations with associated AD plants) and 31 accredited standalone AD based generating stations, a total of 110 (see **Figure 11**). By comparison there are over 600 AD stations in GB. The high level of financial support when combined with a larger agricultural industry, relative to GB, has resulted in approximately three and a half times as many AD based generating stations per sq. km of land when compared to GB. Taking into account the respective size of the agriculture base still leads to almost twice as many AD stations in NI as GB.

Figure 11. Number of accredited AD generating stations since 2010 in Northern Ireland



Source: OFGEM data

46 These numbers are based on commissioning dates, i.e. the dates on which the AD generating station was capable of generating electricity. Planning, financing, construction and grid connecting can take 2-4 years. There is therefore a delay between policy implementation and the economic impact. These numbers do not include any AD generating stations which have not sought accreditation or have been ineligible for accreditation.

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The majority of AD plants have accredited generating stations designed to output the highest permitted capacity of renewable electricity for the maximum ROC entitlement

4.16 Due to the economies of scale associated with AD plants (see **paragraph 4.11**), it makes commercial sense for an investor to invest in AD plants with a generating station capacity aligned to the highest permitted capacity of the NIRO AD bands, that is 500kW and 5MW. This minimises the cost of electricity generated and maximises the number of ROCs it is entitled to receive. The more efficiently the plant and station is operated, the shorter the payback period[47] and the higher the rate of return[48]. The key limiting factors in achieving this include:

- the availability of finance;
- the ability to acquire planning approval;
- the capability of the grid to facilitate a higher output without significant additional expense; and
- a consistent supply of feedstock to produce larger quantities of biogas.

4.17 By 2019 all NIRO accredited AD generating stations were classified as small-scale (up to or equal to 5MW (≤5 MW)) (see **Figure 12**). Out of the 110 accredited generating stations, 91 (83 per cent) have a generating capacity up to or equal to 500kW (≤500kW), with most of these having a generating capacity of 499-500 kW. This is aligned to the maximum permitted in the ≤500kW band, entitling these stations to 4 ROCs for every 1 MW generated. Some generating stations were commissioned but initially operated temporarily[49], in advance of constructing an associated AD plant, in order to achieve accreditation prior to the closure of the scheme. Therefore the number of actual AD plants is likely to rise over the next couple of years.

47 The payback period is the length of time it takes for a project to break even and recover the cost of the initial investment. The shorter the period, the quicker an investor can reinvest.

48 The 'rate of return' is the term used to describe the amount of profit an investor can expect to receive in return for investing money in a commercial project. It is usually expressed as a percentage of the original investment.

49 Since it is the generating station that is accredited and not the AD plant, a developer can build the station in advance of the plant in order to have it accredited on time. They are normally commissioned using bottled biogas from another AD source.

Figure 12. Analysis of accredited AD generating stations in Northern Ireland at 31 March 2019

AD generating station capacity	Number of NIROCs (2005-2010) and GBROCs[50] awarded (2005 – present)per 1MWh generated	Number of NIROCs awarded per 1MWh generated since 2010	Number of accredited generating stations in operation	Number of accredited generating stations not operating	Total number of accredited generating stations
≤500 kWh	2	4	80	11	91
501kWh - 5MWh	2	3	8	11	19
>5MWh	2	2 (reducing to 1.8 by 2016-17)	0	0	0
Totals	**-**	**-**	**88**	**22**	**110**

Source: OFGEM

4.18 From 2010, small-scale AD generating stations in GB could alternatively seek accreditation of the FIT scheme, however from 2013 this scheme was subject to deployment caps[51] and significantly reduced tariffs. This was primarily as a result of inaccurate early forecasts, with higher than expected uptake and spending relating to the scheme. The National Audit Office reported[52] that this arose as a result of lower than expected technology costs, costs of borrowing, and returns on alternative investments relating to smaller solar generating stations. The Government therefore decided to cap costs on all types of generating station to help ensure that GB consumers were getting value for money.

4.19 It should be noted that the NIRO is part of the UK-wide renewables obligation mechanism (which is very different to FIT) and it would not have been possible to introduce automatic digression driven by technology caps as was applied to the FIT. While the financial support levels of FIT have significantly reduced since its introduction, the financial support levels of NIRO were maintained. Unlike GB, DETI claimed at the time that technology costs associated with AD were not decreasing. While the number of ROCs awarded was maintained, the value of a ROC, whilst increasing in line with inflation, will fluctuate over time.

4.20 **Figure 13** compares the potential level of financial support[53] per MWh generated across the three different renewable electricity support schemes[54] since 2010 – the NIRO scheme in NI and the two main GB schemes. It reflects NI policy to attract investment in AD technology compared to GB's policy changes to cap costs. The significant growth in the number of AD generating stations over a relatively short period of time indicates the successful outcomes of the NI policy, which was to promote AD technology in order to contribute to the overall renewable electricity target.

50 ROCs issued to generators in GB as part of the England and Wales scheme as well as an equivalent scheme in Scotland.

51 A limit was placed on the number of new AD generators that could avail of the scheme each year.

52 *The Levy Control Framework*, NAO, November 2013.

53 Based on an AD generating station with <500kWh output. Most AD plants in Northern Ireland fall within this range.

54 The income for all ROCs fluctuates, depending on demand. The income from FIT is based on the generation tariff only. The generating tariff has significantly reduced since 2013.

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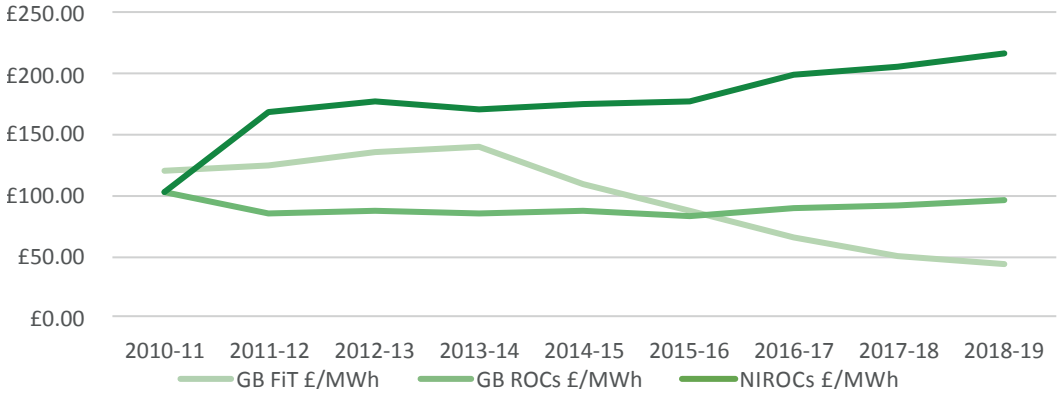
Figure 13. Available financial support per MWh generated for an AD generating station ≤500kW, based on average market ROC prices

Since 2010 Northern Ireland has benefited from higher levels of financial support. Between 2013 and 2017 it increasingly became the most attractive UK region to invest in renewable electricity using AD technology.



Source: OFGEM data

Note: Where there were multiple FIT tariffs each year, an average of the tariffs have been taken. FIT tariffs only relate to 250kw-500kw and not the below 250kw category.

Setting financial support levels and the return on investment for AD based generating stations

The current level of financial support for small-scale AD based generating stations has been in place since 2011 and was based on evidence that was available at the time and at the time of the 2014 banding review

4.21 Conventional commercial lenders were slow to finance projects to construct AD plants and generating stations, primarily due to high capital costs, the risk that the technology may not be commercially viable and a lack of local knowledge and experience of the industry. Consequently, there has been a greater reliance on other types of private finance, such as venture capital. This can involve significantly more complex loan facilities, contractual lease arrangements and buy out options, which are more expensive than traditional loans, as the organisations involved expect higher rates of return and shorter pay back periods.

4.22 Industry claims at the time indicated that that the level of support between 2005 and 2010[55] was insufficient to attract investment in small-scale AD technology. DETI claimed at the time that it had no local evidence base to assess the accuracy of these claims, as there were no commercial AD based generators in NI. In response, DETI's Minister published a 'Call for Evidence' (CfE), in April 2010 followed by public consultation, with a view to increase ROC

55 Between 2005 and 2008 the level of support was 1 ROC per 1 MWh generated. This increased in 2009 to 2 ROCs per 1 MWh generated.

banding levels if supported by sufficient evidence. At the time, the 2 ROCs available in NI provided a lower return on investment in AD stations than the FIT in GB.

4.23 Due to the absence of enabling legislation and potential prohibitive costs, DETI decided not to follow the GB approach of introducing a FIT scheme[56]. Therefore any enhancement had to be made through the existing NIRO scheme. From the evidence submitted, DETI estimated that the number of ROCs required to provide a rate of return for investors of between 10 and 15 per cent was:

- 4 ROCs per MWh for generating stations with capacity up to and equal to 500kW; and
- 3 ROCs per MWh for installations with capacity greater than 500kW up to 5MW.

This level of support was deemed to be broadly in line with GB's FIT scheme and with an average rate of return of 12.5 per cent, DETI was able to acquire State Aid approval from the European Commission. Subsequently the NI Assembly passed the legislation required to increase the level of support from April 2011.

4.24 In 2014, DETI performed an exercise[57] to assess technology cost changes since 2010 and forecast changes to 2017. By this time, support from the GB FIT scheme had reduced (see **Figure 14**), and would continue to do so. As part of the exercise, DETI set out to determine if the banding levels of ROCs issued to each type of renewable electricity technology were still appropriate. It concluded that there had been little change in AD technology costs[58] and, as a result, retained existing banding levels.

4.25 Other than the 2010 and 2014 reviews, we are not aware of any regular monitoring process which could have alerted the DfE to the risk of higher (or lower) returns being made by generating stations fuelled by biogas produced from AD, prior to the closure of the NIRO to AD technology in 2017.

There is a significant risk that the potential rates of return achievable by most generating stations fuelled by biogas produced from AD are higher than DETI originally forecast, which could lead to financial overcompensation

4.26 In 2018, environmental campaigners and media reports described NIRO support for AD technology as a *"generously subsidised farm waste to energy scheme"*[59] that *"attract lucrative subsidies"*[60] based on claims that *"Stormont, in 2011, increased the renewables subsidy to four times that of the corresponding payment in the rest of Britain"*[61]. As part of our review we

56 The cost of a FIT scheme would have to be met entirely by the NI consumer, whilst the cost of the NIRO scheme is shared by all UK consumers.

57 Periodic banding reviews are a requirement of the NIRO legislation.

58 According to a CEPA report which formed the basis of DETIs review, AD technology costs were increasing, in particular grid connection costs.

59 https://www.irishnews.com/news/northernirelandnews/2018/11/14/news/generously-subsidised-farm-waste-to-energy-scheme-will-dwarf-rhi-scandal–1484380/

60 https://www.bbc.co.uk/news/uk-northern-ireland-46178533

61 https://www.theirishworld.com/new-stormont-environmental-scandal-worse-than-cash-for-ash/

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assessed these claims and while **Figure 14** indicates a higher level of support, there are three key reasons why this has happened:

- since 2013, policy changes in GB have consistently reduced the level of financial support for the FIT scheme;
- DETI's 2014 banding review maintained a higher the level of ROCs, until the scheme closed; and
- the value of ROCs have steadily increased over this period of time, in line with inflation.

4.27 This has resulted in significant divergence in the level of support between GB and NI, encouraging those wishing to invest in and develop AD technology. Coupled with a region which has an abundance of grass, energy crops and waste, this led to a significant spike in investment.

The decision to increase support for AD generating stations was based on evidence from both public and private organisations which would benefit most from the changes

4.28 In 2010, DETI faced difficulties associated with deciding what level of ROCs was required to deliver a rate of return that would incentivise the market, but not overcompensate investors, most notably:

- the major variables and ranges in capital and operating costs associated with an AD plant and generating station;
- the range in output capacities of generating stations fuelled by biogas produced from AD and whether generating stations would be standalone or connected to an AD plant; and
- limited local experience and knowledge of AD technology and absence of real cost data available to government[62], with reliance largely placed on consultants and other interested parties.

4.29 DETI considered all of the information received from the 2010 CfE and subsequent public consultation, against a backdrop that no AD fuelled generation stations had been accredited to the NIRO at that time and that the assumptions and information submitted varied considerably, when considering a new technology such as this. We reviewed DETI's financial model and the submissions from the CfE and while it is important to recognise that this was all the evidence that DETI had at the time, we made three key observations:

- many of the submissions came from prospective and existing developers with a vested financial interest in the renewables industry. Some of these submissions lobbied for an increase in ROC levels and included the specific number of ROCs they required to enable them to proceed with their projects;

62 The one exception was the government owned AFBI plant.

- more than one submission included information indicating the benefits of a greater number of support bands within the 0 -500kW band, reducing ROC levels after a specific period of time, or reducing the length of the NIRO[63]; and
- capital costs, in particular grid connection costs in NI, were claimed to be higher than in GB.

4.30 In relation to the first point, it is unclear from the evidence presented to us what level of due diligence was conducted by DETI to confirm the accuracy and independence of the information supplied. The DfE told us that the purpose of any consultation is to allow stakeholders the opportunity to comment on the Government's proposals. In this instance, DETI received a number of responses from stakeholders, including prospective investors and some with experience of operating generating stations fuelled by biogas produced from AD. The evidence submitted was analysed in a model by DETI economists. The evidence and subsequent due diligence carried out by DETI indicated that the proposed ROC banding levels were appropriate to encourage deployment and to deliver a reasonable average rate of return.

4.31 It is not clear to us why DETI did not include an additional band within the 0-500kW range, or reduce the level of ROCs after a ten year period, as suggested by a small number of evidence submissions, including the submission by AFBI, a public body with primary evidence and operating experience of a non-commercial operating generating station fuelled by biogas produced from AD.

4.32 Claims of higher capital costs than in GB would, if substantiated, have been a valid reason to maintain higher levels of support. We identified, the following legitimate concerns that could marginally increase costs:

- additional plant and equipment shipping costs;
- higher consultancy and project management costs due to the absence of AD specialists operating in NI;
- higher financing costs, due to the higher risks associated with a new technology to NI; and
- longer planning approval and grid connection waiting times in NI, delaying project delivery and adding to final project costs.

4.33 We considered concerns that actual grid connection costs were higher in NI than GB, a cost which could significantly impact on the overall project cost. However, NIAUR told us that, as a result of a review of grid costs in 2012 (two years after the 2010 AD review), it was satisfied that grid connection costs were not higher[64]. We concluded from this that industry concerns of higher grid costs may have been based on individual experiences or perceptions and were potentially not an accurate reflection of the overall picture.

63 In a public sector submission from AFBI, who ran the only AD plant and generating station at that time, a higher number of banding rates was recommended. To protect commercial interests we do not identify any non-government based submissions.

64 Subsequent annual reviews are performed to monitor NI grid costs, but do not make comparisons to GB.

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The limited range of data submitted to DETI and the way in which some of it was distributed and calculated within the financial model resulted in banding levels which risked overcompensating some investors

4.34 Regarding the financial model, we made two key observations in relation to the data submitted to DETI and used to calculate the level of ROCs in both bands:

- Data was skewed towards very small generating stations - 91 per cent of data in the ≤500KW band related to AD project examples with a generating capacity of 250KW or less. In the 501 kW– 5MW band all examples were less than 850KW; and
- Data relating to 500kW generating stations was included in the higher band calculation – whilst this did not impact significantly on the final banding levels, it was further evidence that data was skewed towards smaller generating stations in both bands.

4.35 This led to two ROC calculations which were based on compensating the smallest stations in both of the bands, at the risk of overcompensating the larger stations. The impact of this today is important as approximately 67 per cent of all stations developed within the ≤500KW band and 42 per cent of all stations within the 501-5MW band have gravitated towards the maximum installed capacity of each band (see **Figure 14**).

Figure 14. Capacity profile of AD generating stations – actual versus DETI model

Total installed capacity (kWh)	Percentage of AD projects in DETI's 2010 model %	Actual percentage of accredited AD generating stations in 2019 %
0-100	18	6
101-200	36.5	5
201-300	36.5	15
301-400	9	7
401-500*	0	67
Total ≤500KW	**100**	**100**
501 -600	67	26
601-700	0	16
701-800	16.5	0
801-900	16.5	16
901- 1000	0	0
1001 - 5000	0	42
Total 501- 5000KW	**100**	**100**

Note: Data relating to a number of 500kW projects were not included in the ≤500kW band, but instead used in the higher 501-5000 MW band calculation. All of the actual generating stations in this 401-500 band have a total installed capacity of 499 -500 kW.

Source: DETI model and OFGEM data

4.36 In our opinion, investors would have been fully aware of the financial advantages of aligning their AD generating stations as close to the highest allowable capacity within each band, as well as the benefits of economies of scale (see **paragraph 4.11**). However, it is not clear to us if DETI was aware of the risks associated with these financial advantages, and if it was, why they were not mitigated or addressed prior to deciding the level of ROCs to award.

4.37 The DfE told us that they did not rely on any single source of evidence which would have required validating. DETI was not accrediting the source, and therefore would not have any reason or indeed means to validate the information provided. At the time, DETI had said it was seeking a range of information to help inform decision making and it would not have been normal practice to validate responses to a call for evidence on a policy decision.

4.38 Setting ROCs at too high a level does not guarantee a shorter payback period or a higher rate of return, but does create the opportunity to do so. AD based generating stations need to be operated efficiently to maximise this opportunity. The opportunity also creates a perverse incentive of rewarding less efficient generating stations, or those who just want to get by, enabling them to still make a reasonable return.

4.39 In carrying out its ROCs calculations, DETI should have assumed that the majority of applicants would seek to maximise returns by installing an AD plant at the upper end of any banding. The fact that this was not done, and instead calculations were based on installations around the midpoint of each band, means that there is a serious risk of over-compensation.

4.40 Our review of OFGEM data indicated an efficiency average of 72 per cent[65] (average for the UK is 70 per cent) and that approximately 22 per cent of AD based generating stations have had an average efficiency rate of 90 per cent or higher. The vast majority of these 'highly efficient' generating stations have a generating output of 500kW.

4.41 Even higher rates of return can be achieved by more commercially aware investors by ensuring the AD plant supplying the station:

- uses cheaper or freely available feedstock (for example waste food);
- exploits additional income streams, for example charging gate fees or selling excess heat or electricity via a private line;
- maximises the self-usage of generated electricity, to offset cost of grid purchased electricity;
- maximises the use of heat to offset energy costs; and
- utilises, where possible, digestate to offset fertiliser costs.

4.42 We also identified a small number of AD plants that were not compliant with planning and/or environmental legislation (see **Part Three**). Significant capital costs and, to a lesser extent,

65 We anticipate the overall average will rise as operators' experience of running an efficient AD plant increases.

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operational costs, can be avoided through non-compliance, which if not effectively enforced, will shorten the payback period and increase the rate of return.

4.43 As a result of all of these observations, we believe there is a significant risk that the average rates of return being achieved by accredited AD based generating stations are higher than the 12.5 per cent DETI had originally forecast. During our review, the DfE announced its intention to commence a post project review of NIRO, using a sample of information on real life business models and costs to inform its assessment. Part of this process will include a rate of return analysis.

4.44 The DfE told us that it is important to recognise that some generators accredited under the NIRO will realise higher returns than the rate considered as typical and that others will realise lower returns than the typical rate and that this is the nature of any market and/or support scheme, particularly in the case of AD where there are numerous cost variables. It considered that potentially higher rates of returns for a sub-set of generators are not out of line with the design of the RO schemes and do not demonstrate that the NIRO overall provided higher rates of return than were needed. The Department pointed out that some of the generators realising rates of return below the average may consider that the policies were not generous enough.

4.45 In our opinion, using a higher number of bands, for example four rather than two, for small-scale generation, and reducing the level of ROCs after a ten year period could have:

- reduced the risk of some investors being overcompensated and still provided them with a competitive rate of return;
- encouraged all operators to run their plants and stations as efficiently as possible;
- contributed to better value for money for all UK consumers who pay for all ROCs through their electricity bills; and
- encouraged the development of smaller, more sustainable and environmentally friendly AD plants which are more aligned to the small farm sizes in NI.

Recommendation 6

The Department for the Economy should carry out a review of all types of renewable generators to ensure that current levels of financial support and the actual rates of return that are being achieved are compatible with the original projections and State Aid rules. Future schemes should project rates of return across a range of outputs and, in setting any bandings, should assume that investors will usually seek to maximise their returns by choosing the most favourable output within that banding.

A significant number of AD plants processing waste have been operating without a waste management licence. ROCs are still issued to generating stations using the biogas from these plants

4.46 An AD plant processing waste[66] as part of its feedstock must obtain a Waste Management Licence (WML), which is only granted if the plant has been awarded planning approval. Approximately 86 per cent of all AD plants process waste.

4.47 The NIEA's review during 2019 (see **paragraph 1.11**), indicated that out of 68[67] AD plants currently operating and requiring a licence:

- 38 which required a WML licence to process waste had one;
- 28 were still in the process of acquiring a WML, or had not yet applied for one; and
- 2 were undergoing enforcement proceedings.

4.48 As is the case with planning, there is no provision within the NIRO legislation to enable OFGEM to revoke accreditation, nor withhold or revoke ROCs issued to an accredited generating station, which is part of an AD plant operating without a WML. As a result, the generating stations co-located with 30 (44 per cent) AD plants which have been processing waste without a WML, or undergoing enforcement proceedings, were still in receipt of ROCs.

4.49 Respective legislation provides councils[68] and the NIEA[69] with enforcement powers to fine, suspend or terminate operations at a non-compliant AD plant. However, the fines and other financial and legal costs associated with non-compliance and/or appealing decisions are small in comparison to the capital and operating costs that can be avoided or deferred by a developer. This is further compounded by the income that can be generated from ROCs by a co-located generating station until a successful enforcement is made. At the time of publication, no AD plant has had its operations suspended or terminated as a result of either council or NIEA enforcement.

4.50 The time and cost to enforce a planning or environmental decision is primarily influenced by the complexity of each case and the resources available to a council or the NIEA. The length of time can range from months to several years and costs include staff time and legal costs, which are not recorded on a case by case basis. It is our opinion that the cost of this work has been directly created by the NIRO, which encouraged the development of AD plants and their associated generating stations and is ultimately paid for by the taxpayer and ratepayer.

4.51 As part of our review we identified an additional AD plant with an accredited generating station which was operating under permitted planning development rules. However, according to OFGEM data, the generating station's capacity exceeded the maximum capacity permitted

66 Any biomass that is not an energy crop is generally considered as waste.

67 There were also a further 11 plants that did not require a licence as non-waste feedstock was being used or the plant was not currently operating.

68 The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2015 and the Conservation (Natural Habitats etc.) Regulations (Northern Ireland) 1995.

69 The Waste and Contaminated Land (Northern Ireland) Order 1997.

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under the rules and therefore should have had planning approval. The same AD plant has also been operating without a WML. Despite these ongoing infractions, the generating stations associated with these developments continue to operate and earn ROCs.

There are growing environmental concerns that the quantity of agricultural waste, which includes digestate from AD plants, is disproportionate to the size of Northern Ireland

4.52 During our review, we were contacted by a number of concerned third parties relating to ongoing environmental risks linked to farm based AD plants. These ranged from importing waste and energy crops (to 'feed' an AD plant) and the subsequent export of digestate, to heat being wasted and vented to the atmosphere and slurry and digestate entering waterways.

4.53 It is generally accepted that most digestate produced by an AD plant is more environmentally friendly than raw slurry when applied to the ground correctly and is beneficial as a fertiliser for growing energy crops. However, like slurry, digestate is not always considered by the NIEA to be a waste product. Like slurry, it is monitored and controlled under the Nutrient Action Programme (NAP) regulations which apply to all NI farms. It is the responsibility of the farmer spreading anaerobic digestate to ensure that they prepare and retain a fertilisation plan; conduct a soil analysis; if importing anaerobic digestate, obtain a nutrient content analysis from the supplier; and with effect from 1 February 2020, use only low emission slurry spreading equipment (LESSE) methods for spreading anaerobic digestate. Other concerns raised suggest that heavily subsidised AD plants contribute to an existing agricultural waste problem by encouraging intensive farming techniques.

4.54 There is a growing body of evidence and research indicating that NI has a significant and growing ammonia problem. It is responsible for 12 per cent of UK ammonia emissions, despite only having 3 per cent of the UK population and 6 per cent of the land area[70]. The agriculture sector is responsible for 96 per cent of ammonia emissions in NI. Of these agricultural emissions, 75 per cent can be attributed to the cattle sector, 14 per cent to poultry and 8 per cent to the pig sector. The management of agricultural manures and slurries has a significant influence on ammonia emissions. **Appendix 2** outlines the growing problems associated with processing poultry litter.

4.55 Agricultural waste, and its impact on the environment, is a separate subject area which the C&AG will continue to monitor, and may form the basis of a future study.

70 https://www.daera-ni.gov.uk/articles/ammonia-emissions-northern-ireland

There were media allegations of ROCs being issued to 'phantom' AD plants and connected generating stations. However, there was no evidence of this or of widespread 'gaming'

4.56 Concerns were raised by the media in late 2018, questioning the physical existence of some AD plants. These concerns included:

- 'phantom plants' – ROCs issued to accredited AD based generating stations which did not appear to have an associated AD plant on satellite imagery;
- the identification of up to eight pairs of generating stations, with each pair located near each other, which potentially should have been accredited as sixteen single generating stations. In so doing each pair could take advantage of the NIRO by claiming additional ROCs. For example, by installing two 500kW generators instead of a single 1000kW generator a developer could be awarded 8 ROCs for 2 MW generated rather than 6 ROCs for the same output by a single larger station; and
- a wider risk of 'gaming' whereby developers could have installed two smaller stations which, as highlighted above, could earn approximately twenty five per cent more ROCs for the same amount of electricity generated than one larger station.

4.57 The Steering Group investigated these concerns and subsequently confirmed, through independent onsite audits arranged by OFGEM, that all accredited AD based generating stations physically existed and concluded that the alleged issue regarding "phantom plants" was incorrect. We understand that the media concerns may have arisen as a result of reliance on satellite imagery and an incorrect interpretation that all accredited AD generators should have a physical AD plant located close by.

4.58 However, the Steering Group still had concerns regarding the potential of pairs of connected generating stations. In addition to the eight potentially connected pairs, a mapping exercise by OFGEM using satellite imagery identified a further pair of stations that was at risk of being connected. Investigations in relation to each of the pairs are ongoing and to date OFGEM has found that:

- one of the pairs of stations has been reclassified as a single station;
- a second pair was not accredited (and therefore not in receipt of ROCs) and was assessed as one station; this station has subsequently been accredited and is receiving a NIROC banding of 3 NIROCs/MWh
- six pairs have been confirmed as two separate and unconnected stations; and
- work on the remaining pair (which has not yet been accredited) is ongoing, with further information being sought, particularly with regard to premises and ownership arrangements.

If necessary, ROCs which have been overpaid to any generating stations because they were wrongly classified as two instead of one can be recovered.

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4.59 We reviewed the work that has been done to address these concerns. Although the body of work conducted has been largely reactive, the risks identified are now being addressed. The media and third party whistleblowers have played an important role in identifying these concerns. We believe that it was important for the Steering Group to have conducted this programme of work, to help restore public confidence in renewable energy related schemes and to identify and manage emerging risks specific to the NIRO.

Appendices

Appendix 1:
NIRO timeline

Date	Legislation	Main impact	Description
1 April 2005	Renewables Obligation Order (Northern Ireland) 2005	NIRO scheme opened in Northern Ireland with an end date of 31 March 2027	The NIRO was introduced on 1 April 2005 as the main support mechanism for encouraging increased generation of electricity from renewable energy sources in Northern Ireland. The original 2005 legislation was subject to amendment by new Orders in 2006, 2007 and 2009.
1 April 2009	Renewables Obligation Order (Northern Ireland) 2009	The NIRO moved from a mechanism which offered a single level of support for all renewable technologies to one where support levels vary by technology according to a number of factors including their costs and level of development.	This was intended to give investors and developers greater certainty and confidence. In turn this would help bring forward the scale of renewable electricity deployment needed to deliver the target and other important energy and climate change objectives. A number of minor amendments were made to the 2009 Order until 2015.
1 April 2010	N/A	England, Wales and Scotland introduced the 'Feed in Tariff' (FIT) scheme to replace the ROC scheme on micro generators[71]. Instead of passing legislation to enable a similar scheme in NI, the Assembly retained the NIRO for micro generators, with enhanced measures. NIRO end date extended to 31 March 2033.	To reflect the long term nature of renewable electricity generation, with project lives and financing structured over 15-20 years. This was seen as necessary to give long term certainty to support investors.
	The Renewables Obligation (Amendment) Order (Northern Ireland) 2012	NIRO end date extended to 31 March 2037	To bring the NIRO in line with GB closure date.
1 April 2015	The Renewables Obligation (Amendment) Order (Northern Ireland) 2015	Following a banding review, NI retains higher levels of ROCs for on-shore wind, anaerobic digestion and hydro micro generators to encourage further investment to meet renewable targets.	In GB, having met renewable targets, FIT tariffs were significantly reduced to make them less attractive in advance of scheme closure which came about in March 2019.

71 Micro generator was defined as a solar or wind installation with a capacity of 50kw or less.

Date	Legislation	Main impact	Description
31 March 2016	The Renewables Obligation Closure Order (Northern Ireland) 2015	The NIRO closed to new large-scale on-shore wind on 31 March 2016	
30 June 2016	The Renewables Obligation Closure (No.2) Order (Northern Ireland)	The NIRO closed to new small-scale on-shore wind on 30 June 2016	
31 March 2017	The Renewables Obligation Closure (No.2) Order (Northern Ireland)	The NIRO closed to all other technologies on 31 March 2017, with the exception of those projects that met the criteria for grace periods	
Present day		All grace periods have expired and the NIRO is now closed to all new renewable electricity generation. All those projects already accredited will continue to receive ROCs for 20 years from their accreditation date or until 31 March 2037, whichever is earlier.	

Appendix 2:
Northern Ireland's poultry litter problem

Poultry litter consists of a bedding material such as wood shavings, sawdust and straw, together with spilled feed and accumulated manure droppings. It is rich in important agricultural nutrients, nitrogen and phosphorous and until recent years has been traditionally spread on agricultural land. However, this is not sustainable and there are concerns in relation to its contribution to:

- agricultural run-off polluting the ground and surface waters with excessive levels of these nutrients;
- ammonia emissions, with poultry litter accounting for roughly 6 per cent of all ammonia emissions in NI in 2017[72]; and
- increased cases of botulism, predominantly in cattle. The risk arises from the spreading on land of poultry litter contaminated with poultry carcasses that died during production (with scavenging animals or birds picking through field heaped or field spread poultry litter also capable of further dispersing the bacteria [73]).

Estimating the volumes of poultry litter produced in NI is difficult. The most recent published data on poultry litter by DAERA for 2016 estimated 175,000 tonnes[74].

It is also difficult to determine the destination of all poultry litter produced. With no incinerator option available in NI following the rejection of the Rose Energy incinerator plant in 2012 (which could have processed around 260,000 tonnes per year), AD plants have become increasingly important and export of poultry litter (to the Republic of Ireland) remains significant.

There are two highly significant AD plants currently processing poultry litter on behalf of NI's largest poultry producer, one near Ballymena with annual capacity of 40,000 tonnes of poultry litter (operating at 37,000 tonnes in 2018[75]), with a further 25,000 tonnes sent to an AD plant in Donegal. Both of these plants are supported through loan funding totalling £17.4 million by Invest NI and the biogas produced is used to generate electricity for which ROCs are also payable.

DAERA has told us that based on very latest information from the poultry industry, approximately 190,000 tonnes were produced in 2019, with an estimated 60 per cent of this being exported or treated in AD plants and the remainder likely being treated as a mix of land spreading on arable land and grassland in NI and manufacturing of mushroom composting.

72 Figure taken from National Atmospheric Emissions Inventory work (see https://naei.beis.gov.uk/reports/reports?report_id=996). Poultry farming (NFRCode's 3B4gi-iv) accounted for 2.02k tonnes of approximately 34k tonnes total ammonia emissions.

73 https://www.daera-ni.gov.uk/news/botulism-cattle-ongoing-concern

74 http://aims.niassembly.gov.uk/questions/printweeklyresults.aspx?d=0&fd=09/12/2016&sc=All%20questions%20answered%20by%20All%20Ministers,%20weekending%2009/12/2016

75 https://www.causewaycoastandglens.gov.uk/uploads/general/ITEM_5.3_-_191023_Major_Item_-_LA01.2017.0999.F_Moneybrannon_Road.pdf

Appendix 3:
Example of an Enforcement Notice issued[76]

We reviewed a complex, contractual arrangement between a management company, a venture capital lending company and a farmer to plan, finance, construct and operate an AD plant with an accredited generating station, located on the banks of the river Foyle.

Once planning approval was granted to the farmer, the management company, (using finance provided by the venture capital lending company), managed the construction of the AD plant and generating station. The arrangement entitles the two parties to legal ownership of the AD plant for ten years, after which ownership can pass to the landowner, for a fee (the depreciated value of the AD plant).

During the first ten year period, the landowner would operate the plant on behalf of the management company for an annual management fee, while the management company benefited from all of the income from ROCs and electricity sales, to repay the lending company and cover its own costs. If operated consistently, generating high output levels during this first ten year period, it could enable both the management company and the lending company to each make a satisfactory rate of return before selling the depreciated plant to the farmer. The farmer could then financially benefit from the remaining 10 years of the NIRO scheme.

Construction on this AD Plant commenced in June 2014 and was completed at the start of 2015. However the farmer became disillusioned with the project as significantly more feedstock was required than he had been originally agreed (which had to be bought in from outside his farm) resulting in more waste. This led to contractual disagreements with the venture capital lending company. Also in August 2019, an Enforcement Notice was issued by a local council as planning regulations were breached. Council officials indicated that checks on the potential environmental impact of the digester should have taken place before it was approved, but no such checks took place. The EN has been appealed, but ROCs continue to be issued until the appeal outcome is decided.

76 https://www.bbc.co.uk/news/uk-northern-ireland-50022538

NIAO Reports 2019 and 2020

Title	Date Published
2019	
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2020	
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