RenewableNI

The Power Of Renewables:
A Route To 80 By 30

A report to RenewableNI
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Highlights

- **No renewables were built in Northern Ireland in 2019.** For the first time in fifteen years, no large scale renewable projects became operational in Northern Ireland in 2019, largely due to the absence of an effective renewables policy.

- **A new policy framework could be imminent.** With no renewables policy in place, the presence of net zero targets for both the UK and Ireland (as well as specific 2030 renewables targets for Ireland), the expected introduction of a new Energy Strategy in Northern Ireland and the commitment of Northern Ireland to a green COVID-19 recovery, have increased the likelihood of a new policy being developed and implemented in the coming years.

- **RenewableNI believes a renewables penetration target of 80% by 2030 would represent a plausible yet ambitious target,** given progress to date (annual renewables penetration is currently well above the 40% 2020 target and could approach 50% for 2020).

- **There is clear evidence that the implementation of a Contracts for Difference (CfD) scheme could provide value to consumers in Northern Ireland.** Although there are a range of potential policy options, CfD schemes appear to provide good value to consumers and have proved successful in GB as well as being key to Ireland's climate ambitions.

- **There are several specific designs of CfD scheme that could be appropriate for Northern Ireland.** These range from a fully bespoke scheme to joining either of the GB or Irish schemes (known as RESS) or potentially implementing a Northern Ireland version of one of these schemes.

- **Any scheme should strive to satisfy the following principles:** result in ***Northern Ireland Deployment*** of additional renewables; deliver a Just Transition; have the potential for ***Timely Delivery*** of renewables capacity; be ***Cost Effective*** from an administration and design perspective; and promote ***Market Integrity***. A scheme that satisfies these principles should: deliver value to consumers; provide greater investment and with that jobs and economic growth; and help Northern Ireland maximise its potential to contribute to renewable energy and decarbonisation ambitions.

- **A typical wind or solar project in Northern Ireland may not be able to compete on a level footing with GB / Irish projects.** This raises the possibility that simply joining the GB CfD scheme or extending the Irish scheme to an all-island basis may not result in deployment of additional renewables capacity in Northern Ireland nor provide for a just transition for Northern Ireland consumers (who may have to shoulder certain costs without receiving the associated benefits).

- **A tailored Northern Ireland scheme is likely to provide the best solution (Table 1).** Given the importance of administrative efficiency, this would point towards the implementation of a Northern Ireland version of the GB CfD scheme or Irish RESS.

- **Both options could potentially result in new capacity being deployed from the mid-2020s,** whilst being aligned with Northern Ireland's needs. This leaves only a small window of opportunity before potential 2030 targets must be met.

- **Next steps include:**

    1. creation of Renewables Working Group including DFE, SONI, NIE Networks, the UR and representatives of the Northern Ireland's renewables industry (including RenewableNI amongst others);

    2. formal assessment of potential options for a renewables stabilisation scheme, including network building by all key parties in Northern Ireland with relevant counterparts in GB and Ireland;

    3. establishment of the high level design of the new stabilisation scheme.

Table 1 – Policy vs. principles: How do the various options compare?

Scheme	NI Deployment	Just Transition	Timely Delivery	Cost Effective	Market Integrity
Bespoke Scheme					
GB CfD					
NI-CfD					
All-Island RESS					
NI-RESS					

1 Introduction

For the first time in fifteen years, no large scale renewable projects became operational in Northern Ireland in 2019, largely due to the absence of an effective renewables policy. Despite this, several factors have increased the likelihood of a new government-backed renewables stabilisation scheme being introduced in Northern Ireland in the coming years:

- Northern Ireland is effectively the only region in the UK where energy policy is devolved and has the potential to choose when / if a scheme is introduced.
- There is no current government-backed renewables stabilisation scheme following the closure of the Northern Ireland Renewables Obligation (NIRO) in 2016-17.
- In 2019, the UK Government passed laws[1] committing the UK to achieving net zero greenhouse gas emissions by 2050.
- Similarly in 2019, the Irish Government laid out its vision for decarbonising the Irish economy[2], including the introduction of an ambitious 70% renewables penetration target for 2030 and achieving net zero by 2050.
- The Northern Ireland Department for the Economy (DfE) published a *Call for Evidence*[3] regarding Northern Ireland's future Energy Strategy in December 2019. As part of this, the DfE asked for views on potential 2030 renewables targets[4] as well as what incentives and support would be required to deliver enough renewables to meet any 2030 targets. A consultation on the Energy Strategy Options is expected by the end of March 2021 with the final Energy Strategy to be launched by the end of 2021.
- The DfE has made building a greener economy, with a clear role for the clean energy sector, a key part of its medium-term recovery strategy[5].
- The Northern Ireland Transmission System Operator (TSO), SONI, has assumed a significant increase in renewables ambition, even its most pessimistic forward planning scenario[6].

In light of these developments, RenewableNI has been evaluating several potential renewables policy options and has asked AFRY to assist in assessing the merits of these options.

In the remainder of this Report, we:

- outline several potential policy options for Northern Ireland in Section 2;
- discuss the key principles a renewables policy has to satisfy in Section 3;
- assess a range of issues that affect the competitiveness of renewables in Northern Ireland in Section 4; and
- provide our conclusions regarding which options may be most appropriate for Northern Ireland in Section 5.

1 The Climate Change Act 2008 (2050 Target Amendment) Order 2019, 26 June 2019.
2 DCCAE, Climate Action Plan, 16 June 2019.
3 DfE, Energy Strategy Call for Evidence, 17 December 2019.
4 DfE's starting point is to consider renewables penetration of 60%, 70% or 80%.
5 DfE, Rebuilding a stronger economy – the medium term recovery, 17 June 2020.
6 SONI, Tomorrow's Energy Scenarios Northern Ireland 2020, July 2020.

2 Potential Policy Options

In 2018, RenewableNI identified several potential renewables policy options for Northern Ireland[7], including:

- creation of a tailored, local scheme that is bespoke for Northern Ireland (hereafter known as Bespoke Scheme);
- joining the GB Contracts for Difference (CfD) scheme (which would not include any ring-fencing for projects in Northern Ireland);
- expanding Ireland's Renewable Electricity Support Scheme (RESS) to an all-island RESS (i.e. with no ring-fencing for projects in Northern Ireland);
- creation of a parallel Northern Ireland RESS (hereafter called NI-RESS) using the systems developed for RESS and with a distinct pot for projects in Northern Ireland; and
- provision of a supportive environment.

To this list we would also add the possibility that Northern Ireland could have its own ring-fenced pot within the GB CfD scheme (hereafter called NI-CfD).

A supportive environment should be considered a pre-requisite for any renewables policy

The creation of a supportive environment could take several forms, including:

- providing fair and transparent planning guidelines for local authorities to follow;
- ensuring grid connections are readily available for renewables projects; and
- ensuring there are suitable incentives for the private sector to procure energy from renewable sources (e.g. via corporate power purchase agreements or CPPAs).

In our opinion, it goes without saying that creating a supportive environment for renewables development is critical and is in no way mutually exclusive to the other options identified above.

However, it must also be said that it is unlikely that a supportive environment on its own would be sufficient to deliver the 2-3GW[8] of additional renewables capacity required to meet the range of potential 2030 targets for Northern Ireland. This is largely because while a supportive environment (including CPPAs) could help to reduce costs, it is unlikely to provide the long-term visibility on risks that would be required for investors to finance gigawatts of renewables capacity. Consequently, we limit our focus to the various government-backed schemes outlined above in what follows.

A summary of the high level advantages and disadvantages of these options is shown in Table 2. A description of what we envisage each option to entail is provided below.

2.1 Bespoke Scheme

For the purposes of our analysis, we view this option as entailing the creation of a two-way CfD scheme specifically for Northern Ireland (although other market-based mechanisms could of course be used). Whilst superficially it could resemble the GB CfD scheme or Ireland's RESS (which although being labelled a two-way floating feed in premium is in essence a two-way CfD), it would rely on different systems, be tailored to deliver the volumes of generation that Northern Ireland may require and have a different legal basis to either GB CfD or RESS.

7 RenewableNI, Securing an Effective Route to Market for Renewable Electricity in Northern Ireland, 2018.
8 This assumes: the additional RES output required is split equally between onshore wind and solar; RES penetration of 60-80%; solar load factors of 10- 11%; onshore wind load factors of 30-35%; and 2030 demand of 10TWh.

2.2 GB CfD

Under this option, Northern Ireland would join the GB CfD scheme from Allocation Round 4 (currently expected in 2021). The scheme is designed to assist the UK in achieving its 2050 net zero target and is run as a biennial competitive auction for a 2-way CfD contract under which successful bidders receive a strike price that is stabilised[9] at the auction clearing price. This stabilisation typically lasts for fifteen years. Allocation Round 4 is expected to include onshore wind and solar, although we note that historically, the focus of Allocation Rounds has been offshore wind.

2.3 NI-CfD

This option assumes a specific Northern Ireland pot would be created from Allocation Round 5 onwards (which we assume would be held in 2023). This pot would reflect Northern Ireland renewables targets and would expose Northern Ireland's consumers only to the costs of renewables in Northern Ireland. The existing infrastructure used to run the GB CfD scheme would be utilised with the UK's Department for Business, Energy & Industrial Strategy (BEIS) taking a significant role in the administration and running of the scheme.

2.4 All-Island RESS

The fourth option entails the expansion of Ireland's RESS to an all-island scheme. In concept this would require additional volumes to be auctioned (reflecting any Northern Ireland targets) and projects in Northern Ireland to be allowed to qualify and participate in the auctions. There would be no separation of projects in Ireland and Northern Ireland, with all participants competing on an equal footing. Although the same auction systems would be used, this option would require the introduction of an appropriate funding mechanism / counterparty in Northern Ireland.

2.5 NI-RESS

This option would see SONI leveraging its close ties with EirGrid to deploy the systems developed for RESS for a distinct Northern Ireland pot. In many respects this would resemble the bespoke Northern Ireland scheme with the main constraint being that the systems and process developed for RESS would be used.

9 In simple terms, when wholesale day ahead power prices are above the strike price a successful bidder pays back the difference between the wholesale price and the strike price to the CfD counterparty (LCCC). When prices are below the strike price, a successful bidder is paid the difference between the wholesale power price and the strike price.

Table 2 – Summary of the advantages and disadvantages of each option

Name	Description	Advantages	Disadvantages
Bespoke Scheme	Tailored policy framework applying to NI only.	Ensures NI requirements are met and NI consumers do not pay for RES in other regions.	Likely the most costly option to design / administer. Slowest option to implement.
GB CfD	GB CfD scheme is opened to NI projects, volumes are focused on ensuring the UK meets net zero target.	Could deliver new capacity quickly. Relatively low cost option to design / administer.	No formal alignment with potential NI targets. Additional RES capacity will not necessarily be built in NI. Could be expensive for NI consumers if NI consumers have to shoulder a share of the costs of historical auctions.
NI-CfD	A specific NI pot is included in the GB CfD scheme from Allocation Round 5 onwards. This would be tailored to NI targets with costs for NI renewables born by NI consumers.	Could deliver new capacity fairly quickly. Some cost synergies resulting from overlap with GB CfD scheme.	Unclear how much appetite there is by the UK government to implement such an option. More complex than simply joining the GB CfD without a separate NI pot.
All-Island RESS	RESS is expanded to include NI projects with volumes adjusted to reflect NI targets.	Ensures NI requirements are met and NI consumers do not pay for RES in other regions.	Additional RES capacity will not necessarily be built in NI. NI consumers may end up paying for RES capacity built in ROI.
NI-RESS	Given the close relationship between EirGrid and SONI, NI uses the systems developed for RESS to run a NI version of RESS.	Could deliver new capacity fairly quickly. Potentially a low cost option to design / administer. Promotes market integrity. Some alignment with NI targets.	Medium cost option to design / administer. Could take longer to implement than joining GB CfD or direct participation in all-island RES.

3 Requirements of a Renewables Stabilisation Scheme

3.1 Value to consumers

In our view, the primary requirement of any of the aforementioned policy options is that they should provide value to consumers. Although a rigorous cost-benefit analysis of each option is outside the scope of this report, we would highlight two pieces of work carried out by IWEA and RenewableNI that shed some light on this issue.

The first is IWEA and AFRY's 2019 Cheaper and Greener[10] report. The key finding of this work was that if the SEM were to reach 70% renewables penetration by 2030 via new CfD-supported capacity, it could result in

significant consumer value being delivered (€2-4B between 2025 and 2040 depending on the strike prices of the CFDs[11]). This could occur because the renewables that would be built are cheaper than their fossil fuel equivalents (and result in less volatile power prices), and result in lower wholesale power prices in a world where 70% renewables penetration is achieved vs. a world where no new renewables are built after 2020.

This analysis focussed on the benefits of reduced wholesale prices and the resulting costs of providing revenue stability. It did not consider additional ancillary services costs or investments in the network and the net benefits can be thought of as the budget available to provide additional ancillary services or network investments.

However, this latter point was covered in the second piece of work published by RenewableNI[12]. This was a similar, albeit largely backward-looking analysis, that considered the net benefits of the construction of NI's wind fleet between 2000 and 2020. This report concluded that consumers have benefited by around £135M as a result of the deployment of wind generation in NI, even after accounting for the investments in the network, providing ancillary services and constraint costs, as well as providing to support to wind generators via NIRO.

Consequently, we believe there is clear evidence that a CfD scheme of some form could provide value to NI consumers provided it is well implemented and satisfies the key principles outlined below.

3.2 Additional key principles

Beyond delivering value to consumers, there are a wide range of additional requirements for any future renewables stabilisation scheme in NI, from which five key principles stand out:

1. **Northern Ireland deployment** – the chosen scheme should drive investment in Northern Ireland's renewables sector and result in deployment of sufficient additional renewables in Northern Ireland to meet any Northern Ireland targets;

2. **Just Transition** – the chosen scheme should result in a just transition of the energy sector with any costs of the scheme borne by those benefitting from it;

3. **Timely delivery** – the scheme should strive to deliver new capacity in a timely fashion;

4. **Cost Effective** – the scheme should be cost effective with simplicity and low administrative / design costs encouraged; and

5. **Market Integrity** – the scheme should support the continued development of the all-island Single Electricity Market (SEM) and should avoid a two-speed market developing.

10 AFRY / IWEA, Cheaper and Greener – How renewable energy will deliver low-cost power to Irish homes and businesses, October 2019.
11 In present value terms and assuming auction strike prices range between €50/MWh and €60/MWh.
12 RenewableNI / Baringa, The Wind Dividend – How wind energy pays back to Northern Ireland, April 2019.

3.2.1 Northern Ireland Deployment

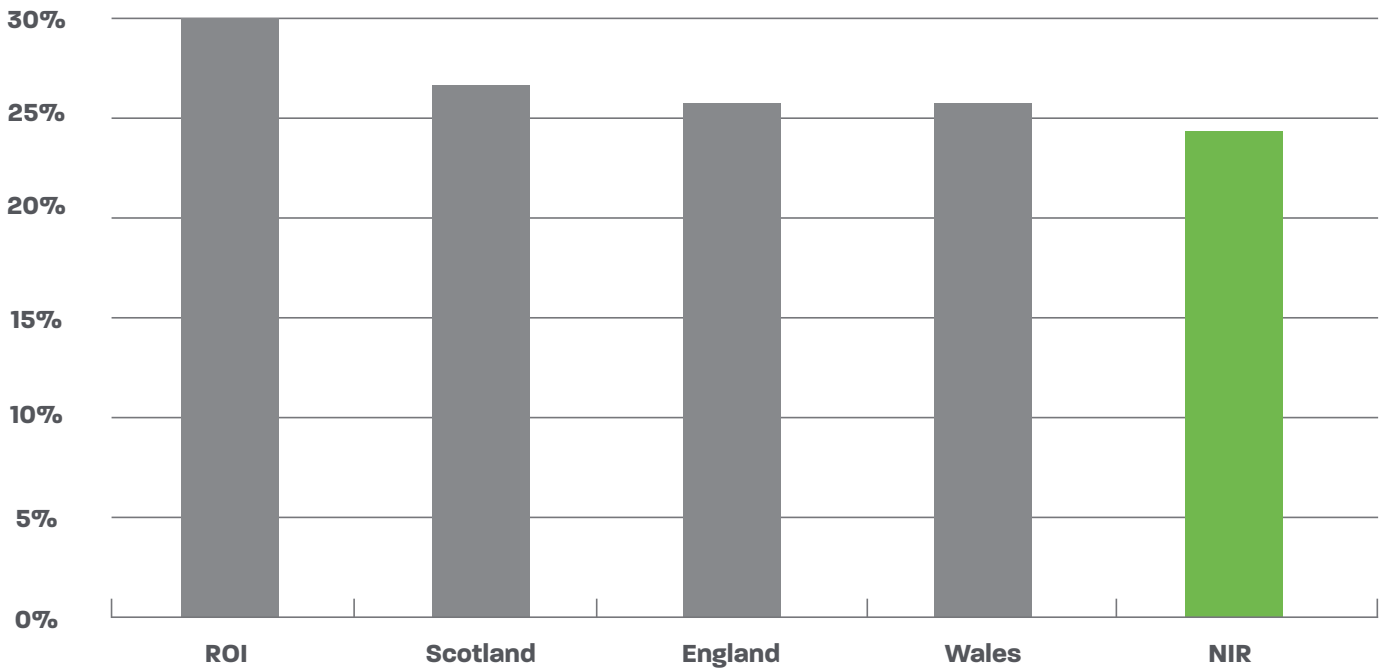
Our first principle is that a scheme should result in the deployment of sufficient additional renewables in Northern Ireland to meet any targets that may be introduced by the Energy Strategy. This will stimulate investment in the renewables sector in Northern Ireland, boost economic growth and provide skilled jobs for the population of Northern Ireland.

Three options could unequivocally ensure this: the Bespoke Scheme; NI CfD; and NI-RESS. However, in the time it takes to develop these options, Northern Ireland's renewables industry could be adversely affected by the lack of deployment. On the other hand, if Northern Ireland joins the GB CfD scheme or if RESS is extended to cover the island of Ireland, investment in the Northern Ireland renewables sector could happen sooner but only if projects in Northern Ireland can compete on a level footing against comparable projects in GB and Ireland.

This last point is particularly important as there are some indications that renewables projects in Northern Ireland (particularly onshore wind) may be structurally disadvantaged vs. projects in GB and Ireland, as evidenced by the differences in historical onshore wind load factors (Figure 1). To put these differences in context, assuming all other factors were identical (costs, auction design, hurdle rates etc.), a difference in annual load factor of around 5 percentage points could result in onshore wind auction bids differing by €10- 15/MWh.

We consider these issues in further detail in Section 4.

Figure 1 – Onshore wind load factors (2011-19 average across entire onshore wind fleet)



Notes: ROI and NIR load factors are not reduced for dispatch down.
Source: EirGrid (ROI and NIR); and BEIS (England, Scotland, Wales).

3.2.2 Just Transition

Our second principle is that any new scheme should support a **Just Transition**. Typically this term is associated with ensuring no segment of society is specifically disadvantaged. In this case we specifically take it to mean that only those that benefit from a scheme should be expected to pay for it and by extension, those that do not benefit should not have to pay.

As with our first principle, only the Bespoke Scheme, NI-CfD and NI-RESS can guarantee a Just Transition as it is only these schemes that ensure additional RES capacity would be deployed in Northern Ireland. This is needed to ensure that Northern Ireland's consumers only pay for renewables from which they derive a benefit.

Were Northern Ireland to join the GB CfD scheme or an all-island RESS be implemented, there would be a risk that Northern Ireland's consumers may bear the costs of renewables capacity not deployed in Northern Ireland. This could arise from two sources:

- potential differences in competitiveness of projects in Northern Ireland (as described above); as well as
- Northern Ireland's consumers being asked to bear the costs of capacity developed under previous auctions not open to Northern Ireland.

It should be noted that the risks would be lower in an all-island RESS (vs. the GB CfD scheme) because Northern Ireland's consumers would benefit from the lower wholesale prices that would be expected to result from the deployment of additional renewables generation capacity anywhere in the SEM, even if additional renewable generation capacity was not deployed within Northern Ireland itself.

3.2.3 Timely delivery

Our third principle recognises the importance of **Timely Delivery**. The renewables sector in Northern Ireland has stagnated somewhat recently and earlier deployment of renewables capacity would benefit not just the renewables industry but also Northern Ireland as a whole as it would, ceteris paribus, increase the likelihood of Northern Ireland meeting any potential 2030 targets.

Turning to the specific options, the earliest new capacity could potentially be deployed is in the 2022-24 time frame if the GB CfD scheme were joined. On the other hand, if a Bespoke Scheme were developed, additional capacity may not materialise until well into the second half of the decade (Figure 2), putting at risk the achievement of potential 2030 targets.

3.2.4 Cost Effective

This principle is straightforward: the policy framework that is adopted should strive to be administratively cost effective, with simplicity and a low design burden encouraged.

Although a full assessment of design and administrative costs is outside the scope of this Report, there appears to be a clear hierarchy of the options described above, with the GB CfD scheme representing the simplest and cheapest option and the Bespoke Scheme the most complex and expensive option. An all island RESS scheme would likely be more complex and more expensive to design and administer than the GB CfD scheme with the NI-CfD and NI-RESS options being yet more complex and costly.

3.2.5 Market Integrity

The **Market Integrity** principle is focused on ensuring that a Northern Ireland scheme strengthens and promotes the SEM and avoids a two speed renewables market developing further across Northern Ireland and the Republic of Ireland.

In our view, the creation of an all-island RESS scheme would represent the strongest vision of a single renewables market. However, even this may not ensure a two speed market is avoided if there are structural differences in the competitiveness of projects in Ireland and Northern Ireland.

The Bespoke Scheme, NI-CfD and NI-RESS should be viewed as weaker implementations of a single renewables market insofar as they would not inherently provide a common market, but would at least give Northern Ireland's renewables industry a chance to compete with the Irish renewables industry.

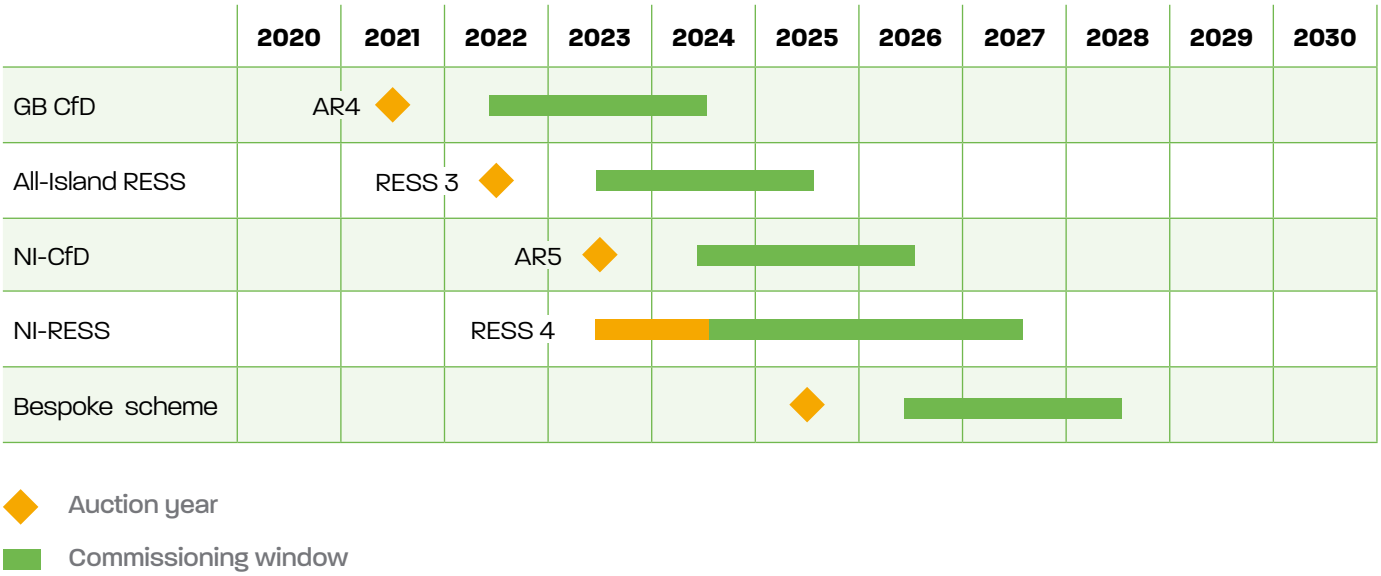
Joining the GB CfD scheme would be the least satisfactory outcome in respect of the **Market Integrity** principle as it would distance the renewables sectors in Ireland and Northern Ireland as well doing little to strengthen the SEM.

3.3 Maximising Northern Ireland's potential

Table 3 summarises our initial assessment of how the five options identified in Section 2 compare with respect to the key principles identified above. It is apparent that there is a reasonable degree of uncertainty particularly with respect to the **Northern Ireland Deployment** and **Just Transition** principles.

Given the uncertainties around these two principles, we cannot yet conclude which of the schemes offers the greatest chances of maximising Northern Ireland's renewables potential. Therefore the next Section will explore several issues that may shed light on the competitiveness of projects in Northern Ireland vis-à-vis those in Ireland and GB and thus how the GB CfD and all-island RESS options fare on the principles of **Northern Ireland Deployment** and **Just Transition**.

Figure 2 – Illustrative timeline for the various schemes



Notes: We have assumed capacity can be deployed 12-36 months after a potential auction date (representing a plausible range of deployment times for solar, onshore and offshore wind). Potential auction timings are uncertain and represent our estimates of when auctions could take place.

Table 3 – Assessing how the policy options compare with respect to the key principles

Scheme	NI Deployment	Just Transition	Timely Delivery	Cost Effective	Market Integrity
Bespoke Scheme					
GB CfD	?	?			
NI-CfD					
All-Island RESS	?	?			
NI-RESS					

4 Drivers of Competitiveness

There are a wide range of factors that affect the competitiveness[13] of renewable projects' bids in CfD auctions. In broad terms, these can be considered to be factors that affect costs (i.e. capex and opex), factors that affect output (i.e. capacity factor) and factors that affect risk (i.e. the cost of capital).

We are most concerned with those factors that may differ structurally between Northern Ireland, GB and Ireland – if there are structural differences in these factors, it may affect the ability of projects in Northern Ireland to successfully compete in the GB CfD scheme or an all-island RESS. This could affect the assessment of each scheme on the principles described above, particularly the **Northern Ireland RES Investment** and **Fairness** principles.

The factors that we have assessed include:

- wind and solar resource;
- typical turbine sizes;
- wind farm tip heights (including hub heights and rotor diameters);
- dispatch down (i.e. curtailment and constraints);
- planning and particularly the duration of the planning process; and
- labour costs (particularly salaries).

A summary of our analysis can be found in Table 4, including a simple traffic light categorisation whereby green indicates Northern Ireland has a clearly favourable position vs. GB and Ireland whilst red indicates a clearly unfavourable position.

Overall, there appears to be reasonable grounds to think that a typical renewables project (particularly onshore wind) in Northern Ireland may struggle to compete against projects in Ireland and GB. However, the picture is not clear cut and there will clearly be individual projects in Northern Ireland that are able to compete successfully against GB and Irish projects.

13 By competitiveness, we mean the ability of a project to compete against other projects in a given 2-way CfD scheme.

Table 4 – Summary assessment of drivers of project competitiveness in Northern Ireland vs. GB and Ireland

Factor	Summary	ROI	GB
Wind resource	Wind resource appears to be at least as good in Northern Ireland as in GB and Ireland.		
Solar resource	Solar resource is a little worse (unsurprisingly) in Northern Ireland than Ireland and the south of England.		
Turbine size	Turbine sizes of existing wind farms are generally similar in all three regions, although new wind farms appear to have larger turbines in Ireland / GB than in Northern Ireland.		
Tip height	Tip heights for the existing wind fleet are lower in Northern Ireland than in GB / Ireland. New projects appear to have higher tip heights in GB than in Northern Ireland, whilst being broadly similar in Ireland.		
Dispatch down	Constraints and curtailment are higher in Northern Ireland.		
Planning	Planning permission takes significantly longer to achieve in Northern Ireland than in GB and a little longer than in Ireland.		
Labour costs	Labour costs in Northern Ireland are typically lower than in Ireland and GB.		

Note: Colours indicate relative positioning of Northern Ireland vs. Ireland and GB with green indicating clearly favourable positioning and red clearly unfavourable.

4.1 Wind and solar resource

The most obvious factor to consider is whether there are fundamental differences in the meteorological endowments of Northern Ireland, GB and Ireland. We have not found significant differences between the various regions in this regard (Figure 3), other than the expected finding that solar irradiation in Northern Ireland tends to be a little lower than in Ireland as well as Wales and southern England.

4.2 Onshore wind farm turbine size

Turbine sizes can play a significant role in the unit costs (e.g. per MW of capacity or MWh of output) of a wind farm as larger turbines typically mean fewer turbines are required for a given wind farm size and thus costs are lower.

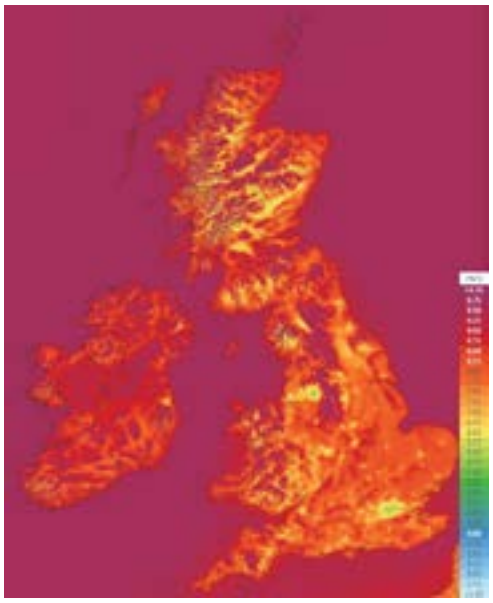
Figure 4 shows the evolution of the typical turbine size[14] of the onshore wind fleet for Northern Ireland, GB and Ireland over time. Currently, the typical turbine size of the fleet in all three regions is around 2.3MW.

Looking forward, it appears that the typical turbine size of new projects[15] is between 3MW and 4MW in Ireland and GB whilst in Northern Ireland it is closer to 3MW.

14 On a capacity weighted basis.
15 I.e. those commissioning since the start of 2019 as well as projects that became classified as under construction or consented after 1 January 2019.

Figure 3 – Mean wind speeds at 100m (m/s) and annual direct normal irradiation (kWh/m2)

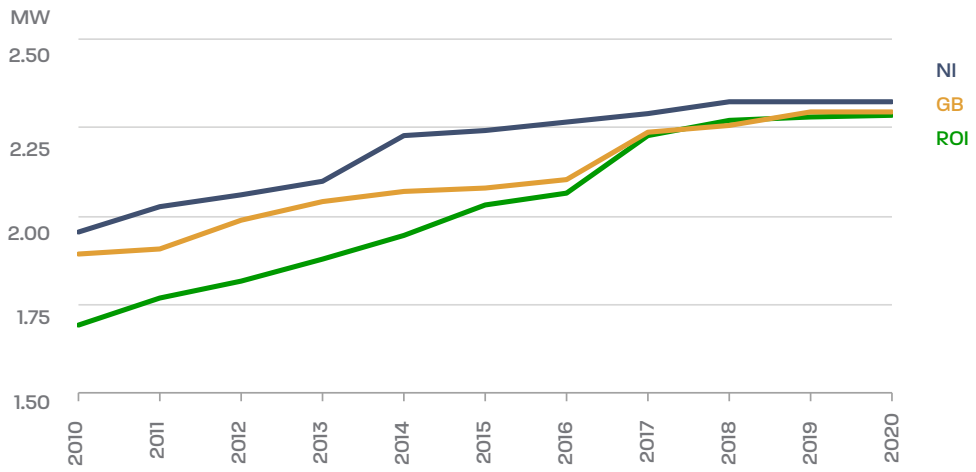
Mean wind speed



Annual solar irradiation

Source: Wind speed map – Global Wind Atlas 3.0, accessed 10 July 2020; Solar map – Global Solar Atlas 2.0, accessed 10 July 2020.

Figure 4 – Capacity-weighted average turbine size of the wind fleet over time (MW)



Note: Only wind farms with a total installed capacity of 1MW or greater were included. Sample sizes for Northern Ireland / GB / Ireland are 73 / 650 / 230.

Source: Northern Ireland and GB – Renewable UK Project Intelligence Database; Ireland – GlobalData, theWindPower.net.

4.3 Onshore wind farm tip height

Tip heights can affect competitiveness via effects on output and costs. Wind farms with higher tip heights will typically have some combination of:

- higher hub heights (resulting in higher wind speeds and greater output); and / or
- larger rotor diameters (which can result lead to either higher capacity turbines and consequently lower capital costs for a given amount of installed capacity or a 'wider' power curve that can result in higher load factors and thus output).

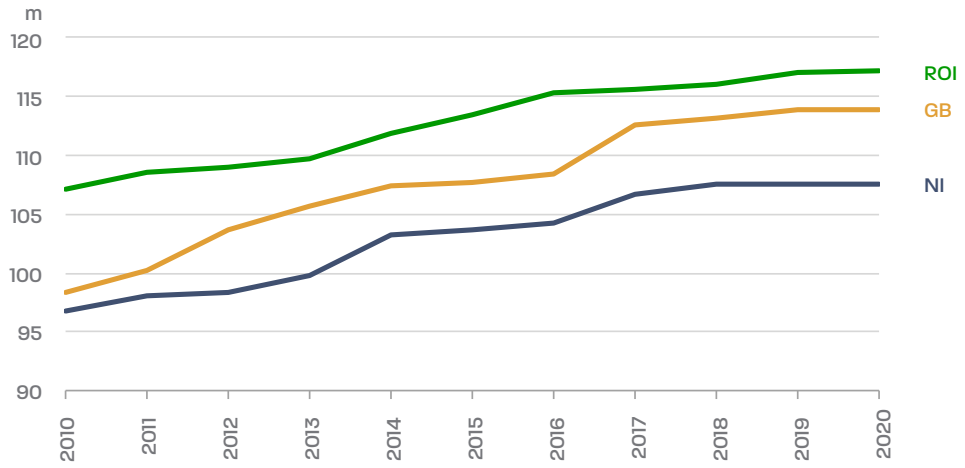
Our analysis suggests that tip heights of the Northern Ireland onshore wind fleet are generally 5-10m lower than the Irish and GB fleet (Figure 5), with lower hub heights and smaller diameter rotors. Based on information from RenewableNI members, our understanding is that this is generally because of combination of three factors:

- planning regulations (especially proposed Local Development Plans) in Northern Ireland tending to be somewhat stricter in practice than in Ireland and GB;
- the landscape in Northern Ireland can mean higher tip height turbines are not always necessary (because wind farms are often situated on hilly sites with good wind conditions); and
- access to (hilly / mountainous) sites effectively placing a cap on the size of rotor that can be delivered to site.

Interestingly, for newer projects, Northern Ireland does not appear to be particularly disadvantaged with respect to tip height (Figure 6) in comparison to projects in Ireland, with similar hub heights and rotor diameters in both areas. Projects currently under construction or with planning permission in GB do appear to be a step larger than both those in Northern Ireland and Ireland though.

Note that the Irish wind fleet appears to have the highest tip heights in this analysis. We suspect that this is due to the relatively small sample of wind farms (86) for which we have tip height data compared to Northern Ireland and GB where we have been able to include appreciably all wind farms with total installed capacity >1MW. In this case, there is more capacity in smaller wind farms in our GB sample than in our Irish sample which may result in the observed tip height differences. However, the distribution of wind farm sizes is fairly similar between Ireland and Northern Ireland.

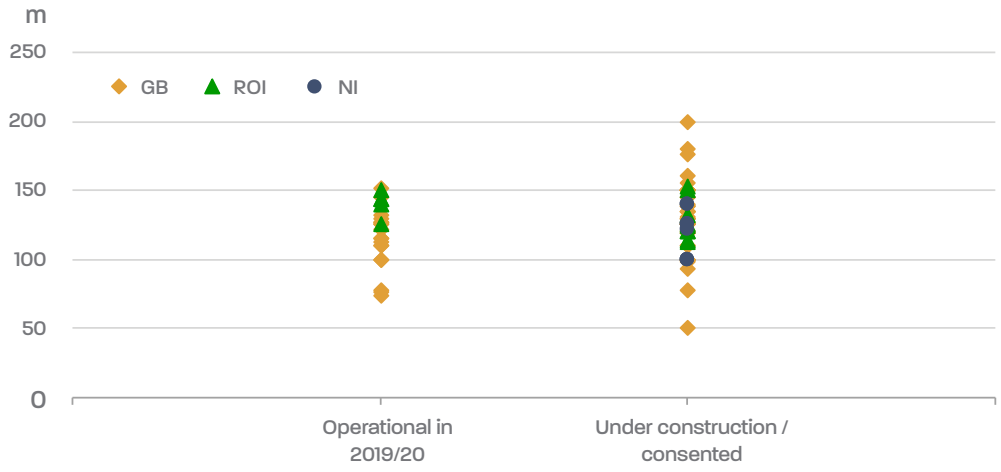
Figure 5 – Capacity-weighted average tip height of the wind fleet over time (m)



Note: Only wind farms with a total installed capacity of 1MW or greater were included. Sample sizes for Northern Ireland / GB / Ireland are 73 / 649 / 86.

Source: Northern Ireland and GB – Renewable UK Project Intelligence Database; Ireland – GlobalData, theWindPower.net.

Figure 6 – Tip heights of new projects (m)



Note: Only wind farms with a total installed capacity of 1MW or greater were included. Sample sizes for Northern Ireland / GB / Ireland are 8 / 64 / 15.

Source: Northern Ireland and GB – Renewable UK Project Intelligence Database; Ireland – GlobalData, theWindPower.net.

4.4 Dispatch down

Dispatch down in the SEM essentially occurs when the Transmission System Operator (TSO) instructs wind and solar generators to reduce their output in order to maintain network stability[16]. The TSO dispatches down renewables generators for two reasons:

- curtailment, which can be thought of as a reduction in **all (controllable) wind / solar** output in response to system-wide issue (the best known of which is probably the System Non-Synchronous Penetration (SNSP) limit); and
- constraints, which can be viewed as the reduction in output of **specific wind / solar units** to address local network issues (e.g. if a power line has been damaged).

Critically, from a competitiveness perspective, generation units in the SEM that have been curtailed are not currently[17] compensated for curtailed generation volumes. Similarly, generation units that do not have a firm connection (this is typically the case for new generation units for at least the first few years of operation) are not compensated if their output is constrained. Thus, if there are significant differences in curtailment / constraints between Northern Ireland and GB / Ireland, it could have an impact on the competitiveness of renewables projects in Northern Ireland.

In recent years, curtailment of wind in Northern Ireland has increased to levels noticeably higher than in Ireland (Figure 7). Curtailment of solar in Northern Ireland is also becoming increasingly relevant (note there is no curtailment of solar in Ireland). GB is notable by its absence from Figure 7. This is because there is no system-wide curtailment of renewables in GB and so curtailment has no negative impact on the competitiveness of GB renewables projects.

Similar data for constraints is shown in Figure 8. As with curtailment, constraints in Northern Ireland are higher than in Ireland due to more severe occurrences of local network issues. In GB, although there is curtailment for

16 The precise definition is available in the following document: EirGrid / SONI, Definition of Curtailment and Constraint, February 2013.
17 SEM Committee is currently consulting on the arrangements for compensation of curtailed / constrained generation following the introduction of Regulation (EU) 2019/943.

local network issues, this is typically compensated and therefore does not affect competitiveness.

Looking forward, the TSOs have been tasked with ensuring that the SEM can run at SNSP levels significantly higher than today, which would, all things equal, result in lower levels of curtailment than today. However, there are currently no tangible plans as to how this will be achieved and the timing of any such improvements remain uncertain.

4.5 Planning

Differences in the planning regimes is another area that could affect competitiveness. This could essentially arise through one of two ways:

- more onerous planning regulations; and / or
- a longer / more costly planning process.

The former may restrict the size of wind farms and essentially their output whilst the latter imposes direct costs and increases investment risks (and therefore required returns).

Although it is outside the scope of this report to perform a comprehensive analysis comparing the planning regulations of, and decisions made by, every local authority where renewables projects have been developed[18], we do have data on the duration of the planning process.

Specifically, Figure 9 shows the distribution of wind and solar planning applications in the UK split into those applications that have been 'granted', 'refused' or are 'outstanding'. In GB, over 95% of applications have been decided one way or another. In Northern Ireland, however, only 80% of applications have been decided, with 20% outstanding.

Turning specifically to 'granted' applications, in Northern Ireland it takes over two years on average for planning to be granted, around twice as long as it takes in GB[19] (Figure 10). According to research by IWEA, planning typically takes around two years in Ireland, with around 38 weeks with local authorities and a further 66 weeks during the appeal stage at An Bord Pleanāla.

From this, there appears to be a clear conclusion that, with respect to planning, renewables projects in Northern Ireland face a significantly longer and potentially more burdensome process than equivalent projects in GB. The picture with respect to Ireland is less clear cut, albeit still unfavourable, with ultimate planning permission taking four months longer in Northern Ireland than in Ireland.

Looking forward, given Northern Ireland's forthcoming Energy Strategy is a cross-departmental initiative, there is anticipated to be some scope that planning guidelines could be updated in a manner that gives more clarity to local authorities and speeds up the process. However, any such changes remain speculative at the current time.

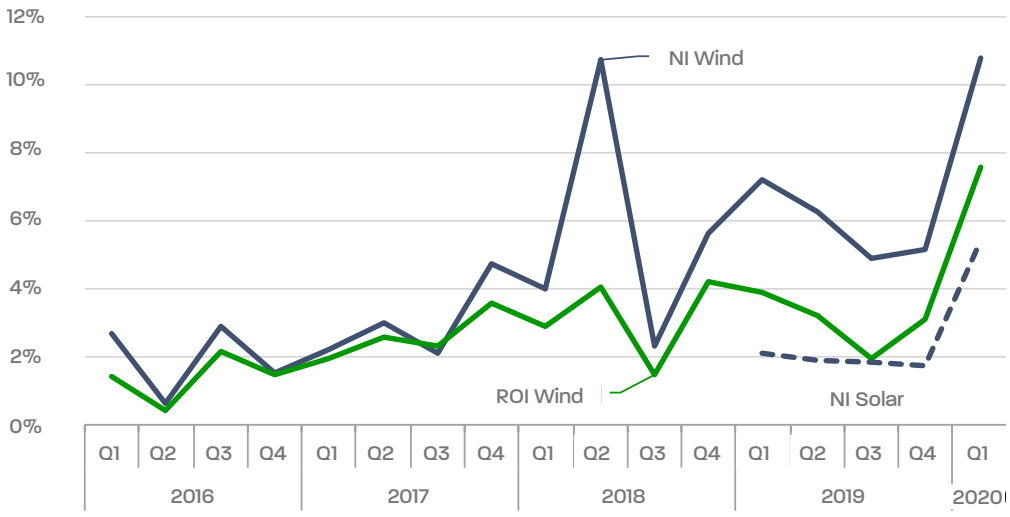
4.6 Labour costs

The final area that we have investigated relates to labour costs. We believe these typically make up around 10-20% of the cost of a wind or solar farm, primarily related to development, construction / installation and ongoing operations and maintenance. Equipment costs clearly play a larger role, but nonetheless the cost of labour should not be ignored.

In this regard, Northern Ireland appears to be at a notable advantage compared to Ireland and a small advantage to GB.

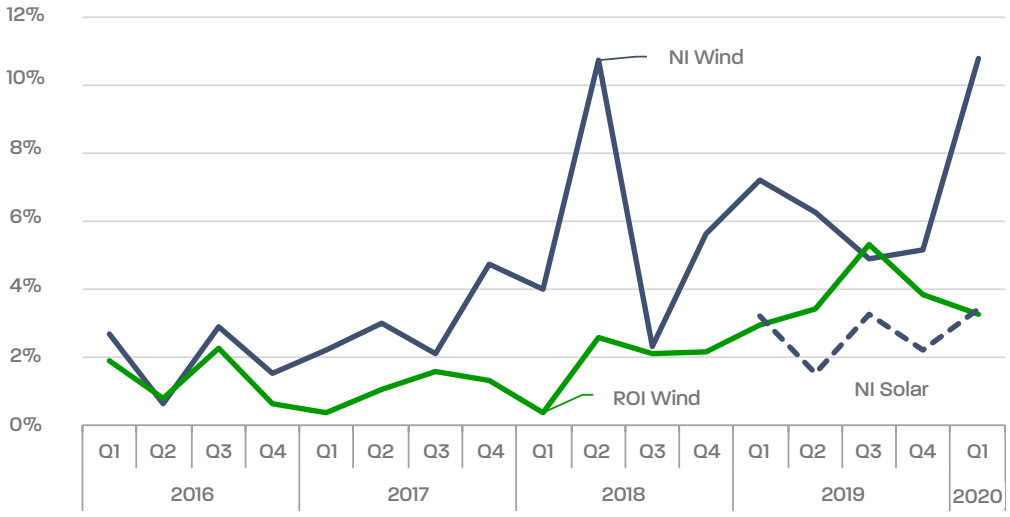
18 In all three regions, planning for most renewables projects is carried out at the local level.
19 It is worth noting that there significantly more planning applications in England (related to there being many more solar farms) and they typically have noticeably shorter planning durations than wind and solar projects in Wales and Scotland.

Figure 7 – Historical levels of curtailment over time (% of available resource)



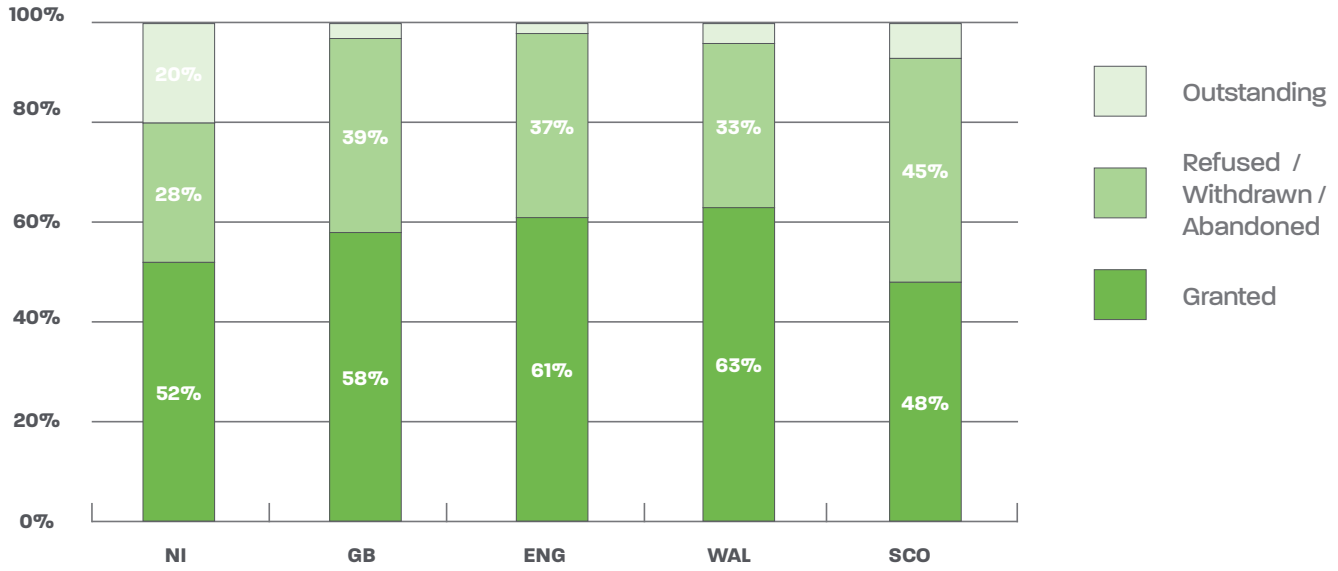
Source: EirGrid.

Figure 8 – Historical levels of constraints over time (% of available resource)



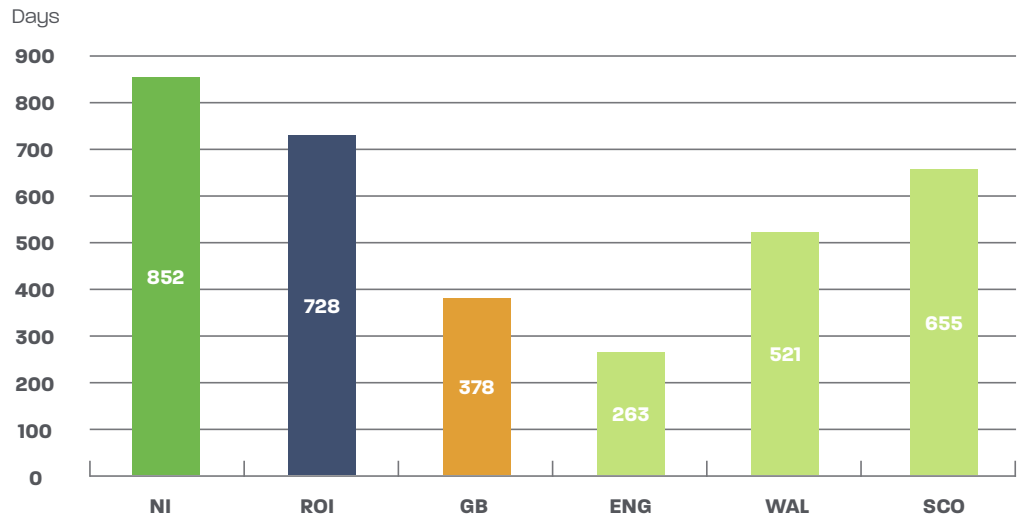
Source: EirGrid.

Figure 9 – Distribution of wind and solar planning applications in the UK



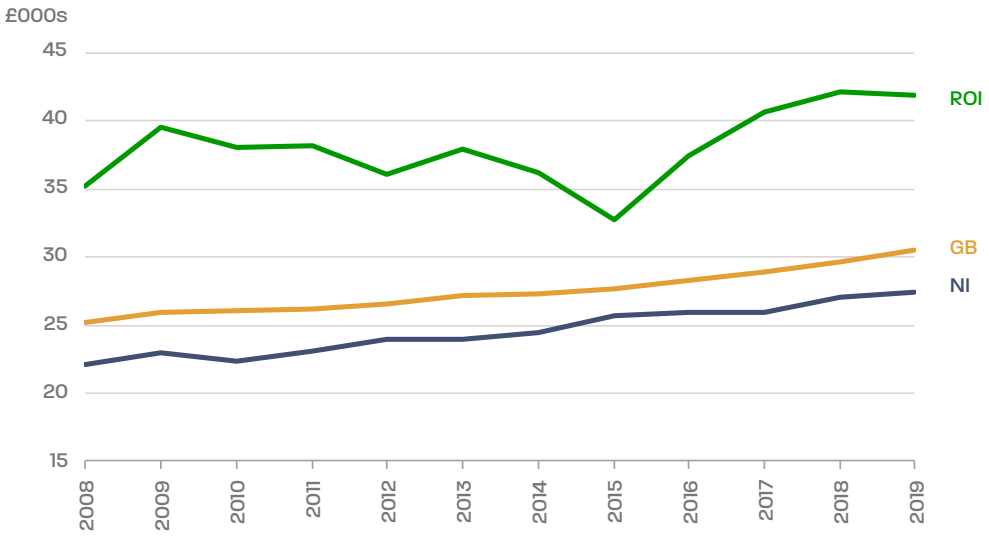
Note: Granted includes applications that were granted (either initially, on appeal or by the Secretary of State), projects that are either operational but have no record of being granted or are under construction (both of which can thus be assumed to have planning permission), have now decommissioned or had planning granted but which has since expired; Refused / Withdrawn / Abandoned includes any rejected application (either initially, on appeal or by the Secretary of State) and any abandoned or withdrawn application (either initially or at the appeal stage); outstanding applications are those where there has been no initial decision or an appeal has been lodged and not yet decided.
Source: BEIS UK Renewable Energy Planning Database.

Figure 10 – Typical duration for granting of wind and solar planning permission



Note: Granted includes applications that were granted (either initially, on appeal or by the Secretary of State), projects that are either operational but have no record of being granted or are under construction (both of which can thus be assumed to have planning permission), have now decommissioned or had planning granted but which has since expired.
Source: BEIS UK Renewable Energy Planning Database – UK nations; IWEA – Ireland.

Figure 11 – Average salaries over time (£000s, nominal money)



Note: Data shows average gross annual earnings for full time employees in all sectors.

Source: Office for National Statistics Annual Survey of Hours and Earnings – UK; Central Statistics Office Earnings Hours and Employment Costs Survey.

Recommendations

Our assessment of regional differences in drivers of renewable project competitiveness suggests there is a clear risk that a typical new wind or solar project in Northern Ireland may not be able to compete on a level playing field with projects in GB or Ireland.

Reasons for this include, lower solar irradiation, lower tip heights, higher levels of dispatch down and a lengthier and potentially more onerous (especially for wind farms) planning process. However, there is scope for all of the issues we have raised (apart from levels of solar irradiation) to be improved, either via revised planning guidelines / processes (potentially as a result of the introduction of a new Northern Ireland Energy Strategy) and / or network improvements (which are certainly planned, given the TSOs' target to increase the SNSP limit to above 90%).

As a result we feel the previous question marks related to the principles on **Northern Ireland Deployment** and **Just Transition** are best characterised as amber on our traffic light scale, meaning that they do not entirely satisfy our principles, but could change over time (Table 5).

Turning to each of the schemes identified:

- **Bespoke Scheme:** We have concerns that a bespoke scheme would take a long time to deliver (not to mention being costly) and may not be effective in helping Northern Ireland achieve any medium-term (i.e. 2030) goals.
- **GB CfD:** Joining the GB CfD scheme could potentially have the greatest short-term benefits given the timing of the next auction (2021) as well as being simple and low cost. However, while the best projects in Northern Ireland may be able to compete on a level playing field against projects in GB, it is less clear that the same is true of a typical project, especially if there are no meaningful developments in the planning process and state of the network. Furthermore, there would not be any formal alignment of the GB CfD scheme with Northern Ireland targets, suggesting long-term outcomes for Northern Ireland would be more uncertain than with other schemes.

Table 5 – Policy vs. principles: How do the various options compare?

Scheme	NI Deployment	Just Transition	Timely Delivery	Cost Effective	Market Integrity
Bespoke Scheme					
GB CfD					
NI-CfD					
All-Island RESS					
NI-RESS					

- **NI-CfD:** As with the Bespoke Scheme and NI-RESS, the NI-CfD option would satisfy the **Northern Ireland Deployment** and **Just Transition** principles. It would also be reasonably **Cost Effective** and provide somewhat **Timely Delivery** with additional capacity materialising around the middle of the decade. It would not necessarily provide the strongest support for **Market Integrity**, but it would help to avoid a two speed market for renewables developing in the SEM.

- **All-Island RESS:** The key advantage of All-Island RESS would be the strengthening of the SEM that would result from alignment of incentives for renewables in both countries. It could also prove to be fairly fast to implement as well as relatively low cost. However, the same concerns identified with respect to GB in relation to the **Northern Ireland Deployment** and **Just Transition** principles and the ability of projects in Northern Ireland to compete on a level playing field would also apply to this option. Long-term outcomes would also be far from guaranteed.

- **NI-RESS:** As with the Bespoke Scheme and NI-CfD, the main advantages of a NI-RESS scheme would be the resulting increase in **Northern Ireland Deployment** whilst allowing for a **Just Transition**. Assuming some alignment of targets with Ireland, the scheme could also be well aligned with the **Market-Integrity** principle. Similar to the NI-CfD option, NI-RESS should result in somewhat **Timely Delivery** as well as being reasonably **Cost Effective**.

Overall, we believe a tailored Northern Ireland scheme is likely to provide the best solution as the alternatives have clear risks around **Northern Ireland Deployment** and ensuring a **Just Transition**. Given the importance of administrative efficiency, this would point towards the implementation of a Northern Ireland version of either the GB CfD scheme or Irish RESS. Both options could potentially result in new capacity being deployed from the mid- 2020s, whilst being aligned with Northern Ireland's needs for 2030 and beyond.

Next steps

1. Create a Renewables Working Group

If Northern Ireland adopts a progressive renewables target for 2030, some form of renewables stabilisation scheme will be required to facilitate the development of renewables capacity sufficient to meet any target. Alongside this, additional investment in the network will also be required. Consequently, we believe the first step to be taken is the creation of a Renewables Working Group to facilitate dialogue between the DFE, SONI, NIE Networks, the Utility Regulator (UR) and representatives of the Northern Ireland's renewables industry (including RenewableNI amongst others).

2. Assess potential options for a renewables stabilisation scheme

Before any detailed work can be undertaken on a potential renewables stabilisation scheme, the DFE should carry out its own assessment of potential renewables stabilisation scheme options and decide which option to progress for further consideration. We hope the analysis above can provide something of a spring board in this regard.

As part of this process, we would urge the DFE and other members of the Renewables Working Group to seek input from relevant parties on their experiences on designing and implementing renewables stabilisation schemes. Based on our finding that a variant of the existing GB CfD scheme or Ireland's RESS tailored to Northern Ireland's needs appears to be the best way forward, we believe the following would be helpful:

- DFE should engage with DCCAE regarding the specifics of the RESS design as they stand today[20];

- DFE should engage with BEIS regarding the budget and / or capacity for the Northern Ireland pot as well as key scheme design topics (e.g. how a different wholesale power price may be referenced);

20 DCCAE, Terms and Conditions for the First Competition Under the Renewable Electricity Support Scheme, February 2020.

- SONI should engage with EirGrid to better understand (and potentially re- use / repurpose) the IT structures put in place for RESS;
- The UR should engage with the Commission for Regulation of Utilities (CRU) in relation to developing appropriate oversight functions;
- The UR should engage with the Office of Gas and Electricity Markets (OFGEM) in relation to clarifying the roles each would play in the regulation of the CfD scheme in Northern Ireland; and
- DFE should explore with SEM Committee the implications of there being two different strike price reconciliation mechanisms operating within the SEM.

3. Establish the High Level Design for a new stabilisation scheme

Establishing the High Level Design of any new scheme will be a key step before specific details are finalised. While we would expect the primary responsibility for establishing this to fall on DFE, it is important that key stakeholders (i.e. the Renewables Working Group) are involved from the start. Depending on the outcome of discussions carried out in item (2) above, the Renewables Working Group may need expanding to include relevant individuals from BEIS / DCCAE / EirGrid.

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