

Winds of Change: a new renewables scheme for Northern Ireland

2 May 2024



I. Overview and recommended design choices

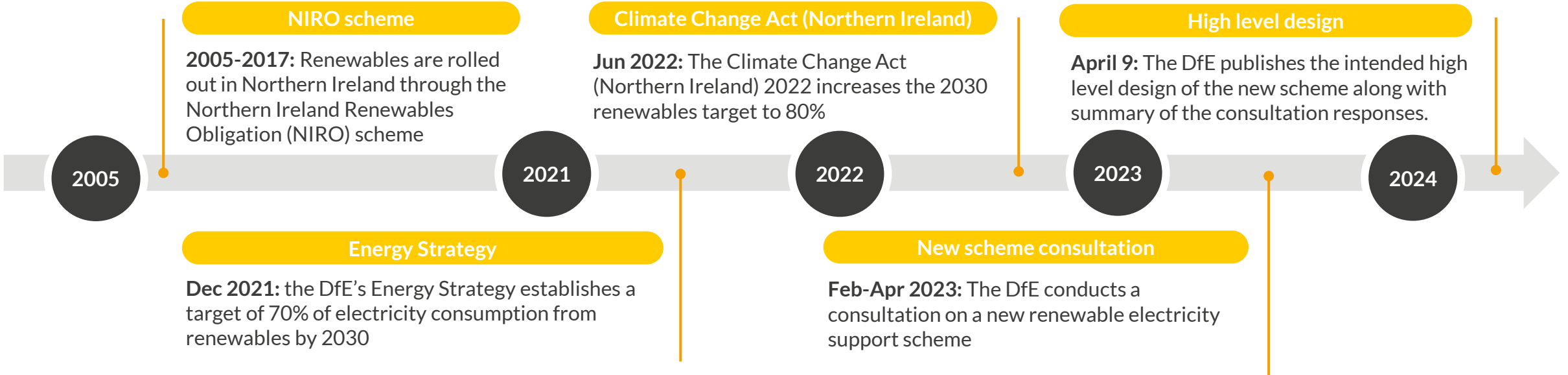
1. Project Overview
2. Recommended design choices
3. Deep dive on key design choices

II. Auction roadmap




III. Further analysis

IV. Aurora's offer for renewable auctions

Northern Ireland has established a target of 80% of electricity consumption from renewables by 2030



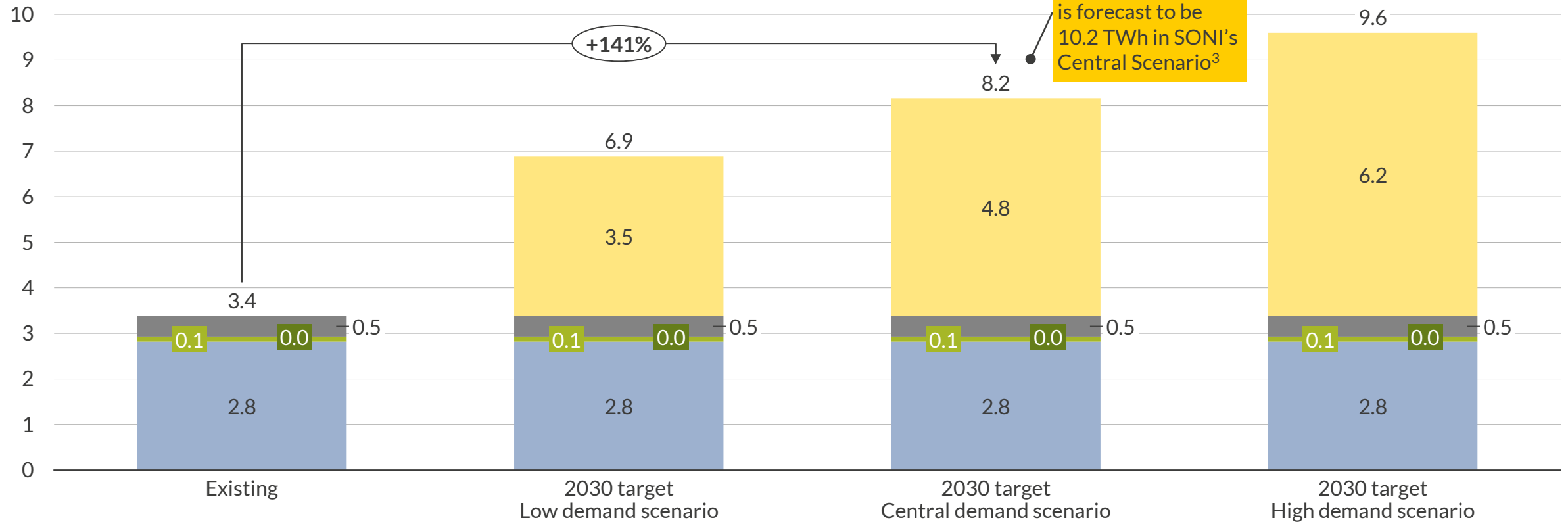
Objectives of the new renewable electricity support scheme

 80% by 2030	Incentivise sufficient renewable electricity generation to ensure that at least 80% of electricity consumption is from renewable sources by 2030 .
 Low Cost	Ensure that consumers pay a fair price for electricity produced locally and that prices are more stable .
 Energy Security	Encourage a wide range of renewable sources to diversify the technology mix to support security of supply .

1) Offshore Transmission Owner; 2) Future System Operator.

Around 5 TWh of additional renewable generation are required to reach the 80% RES-E target in 2030, 3.5 TWh of these will need CfD

Annual renewables generation in Northern Ireland TWh



- We assume 70% of ~5 TWh i.e. 3.5 TWh will need CfD based on indicative data on emerging merchant renewables
- The remaining 30% (1.5 TWh) is expected to become operational under a merchant business model (CPPA or trading on spot market)⁴

■ Onshore wind ■ Solar PV ■ Other RES¹ ■ Fuelled² ■ Missing generation required to reach 2030 target

1) Other RES includes landfill gas, tidal stream, anaerobic digestion and advanced conversion technologies. 2) Fuelled generators include biomass and waste fuel generation. 3) ~40% increase from 2022 (7.4 TWh). 4) Based at least 300GWh/yr (~10% of existing RES volumes) being contracted under CPPAs (source: Aurora Energy Research); this share is expected to increase as RES CAPEX declines in the future and due to the spillover effect from the new Support Scheme increasing RES investment in NI.

Aurora is supporting the Department of the Economy to develop the new renewables scheme in a comprehensive advisory project

Aurora develops recommendations on the design based on stakeholder engagement and techno-economic analysis. The project spans over one year and consists of three phases covering high level design, modelling, and financial impact assessment respectively.

Phase 1

High Level Design

- Nov 2023 – Feb 2024
- Develop high level design choices
 - Eligibility
 - Auction Design
 - Contract Design
 - Auction Roadmap
- Method: literature review, stakeholder engagement, high level techno-economic analysis

Phase 2

Techno economic modelling

- Mar 2024 – Jul 2024
- More in depth techno economic analysis
 - Planning restrictions
 - Grid connections
 - Cost of renewables
- Verify, refine, revise design choices and roadmap

Phase 3

Financial Impact Assessment

- Aug 2024 – Oct 2024
- Assess impact of scheme on energy bills
- Estimate impact of increased renewable penetration on energy bills
- Develop retail cost projections
- Modelling of alternative market scenarios with and without the support scheme

Publications April 2024

- Department for the Economy Northern Ireland: *Design considerations for a new renewable electricity support scheme in Northern Ireland response*
- Aurora Energy Research: *Accelerating Renewables in Northern Ireland – high level design of a support scheme*

This webinar

Focus: Phase 1 Aurora report

Key purpose:

- Present recommended high level design and key underlying analysis
- Introduce services offered by Aurora in Irish power markets

I. Overview and recommended design choices


















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Key features of a support scheme relate to eligibility, auction design, and contract design

Eligibility	Auction Design	Contract Design
 <p>Eligible Technologies</p>	 <p>Pot Structure</p>	 <p>Contract Length</p>
 <p>Eligibility Criteria</p>	 <p>Pot Size</p>	 <p>Indexation</p>
 <p>Minimum Size</p>	 <p>Maximum Strike Price</p>	 <p>Dispatch Down Compensation</p>
 <p>Existing Sites</p>	 <p>Pricing Mechanism</p>	 <p>Non-Delivery Penalties</p>
	 <p>Delivery Year</p>	 <p>Floor Price</p>
	 <p>Community Benefits</p>	 <p>Reference Price</p>
		 <p>Funding</p>

The high level design was developed using a multi criteria assessment of available options informed by stakeholder engagement

Aurora's approach to the High Level Design Phase

1. Establish key design features to be determined







2. For each feature, score a range of potential options



3. Expert Interviews and Stakeholder workshop







4. Determine recommendations for high level design







Criteria for assessment		Scoring Levels
	80% by 2030	Low
	Low Cost	Medium
	Energy Security	High
	Practicality	

Total Score = Average $\left[\begin{matrix} \text{Target} \\ \text{Low Cost} \\ \text{Energy Security} \end{matrix} \right] \times \text{Practicality}$








Sites should have planning approval and a grid connection offer in order to be eligible to participate in the scheme auctions

Eligibility	
Design Feature	Recommended Choice
 Eligible Technologies	<ul style="list-style-type: none"> • Onshore wind • Solar PV • Hydro • Tidal & Wave • Hybrid Sites (RES + BESS) • Geothermal <ul style="list-style-type: none"> • Anaerobic Digestion • Landfill gas, energy-from-waste • Biogas • Biomass • Further analysis required to determine the nature of offshore wind participation.
 Eligibility Criteria	<p>Planning permission and grid connection offer</p>
 Minimum Size	<p>Minimum size of 5MW – to be confirmed</p>
 Existing Sites	<p>Potential inclusion of existing sites in case of complete repowering – further analysis required</p>

Auctions should have one pot for onshore wind and solar, one for offshore wind, and one for the remaining technologies

Auction Design	
Design Feature	Recommended Choice
 Pot Structure	<ul style="list-style-type: none"> • Pot 1: onshore wind and solar • Pot 2: all other technologies except offshore wind • Pot 3: offshore wind (to be confirmed)
 Pot Size	Fixed by energy volume to be procured
 Maximum Strike Price	Technology specific maximum strike prices disclosed ahead of auctions
 Pricing Mechanism	Pay-as-clear auctions
 Delivery Year	2 years after the auction, long stop date 1 year after delivery year
 Community Benefits	<i>To be determined</i>

Support contracts should be linked to inflation and include compensation for dispatch down

Contract Design	
Design Feature	Recommended Choice
 Contract Length	15 years (fixed length)
 Indexation	Strike price 100% linked to inflation
 Dispatch Down Compensation	<ul style="list-style-type: none"> • Compensation for oversupply and curtailment • Recommendation regarding compensation for constraints requires further analysis
 Non-Delivery Penalties	Financial penalties (bid bonds and performance bonds)
 Floor Price	Cease support in any period when the wholesale price is negative
 Reference Price	I-SEM Day-Ahead hourly price
 Funding	<i>To be determined (funding by taxation or via energy bills under consideration)</i>

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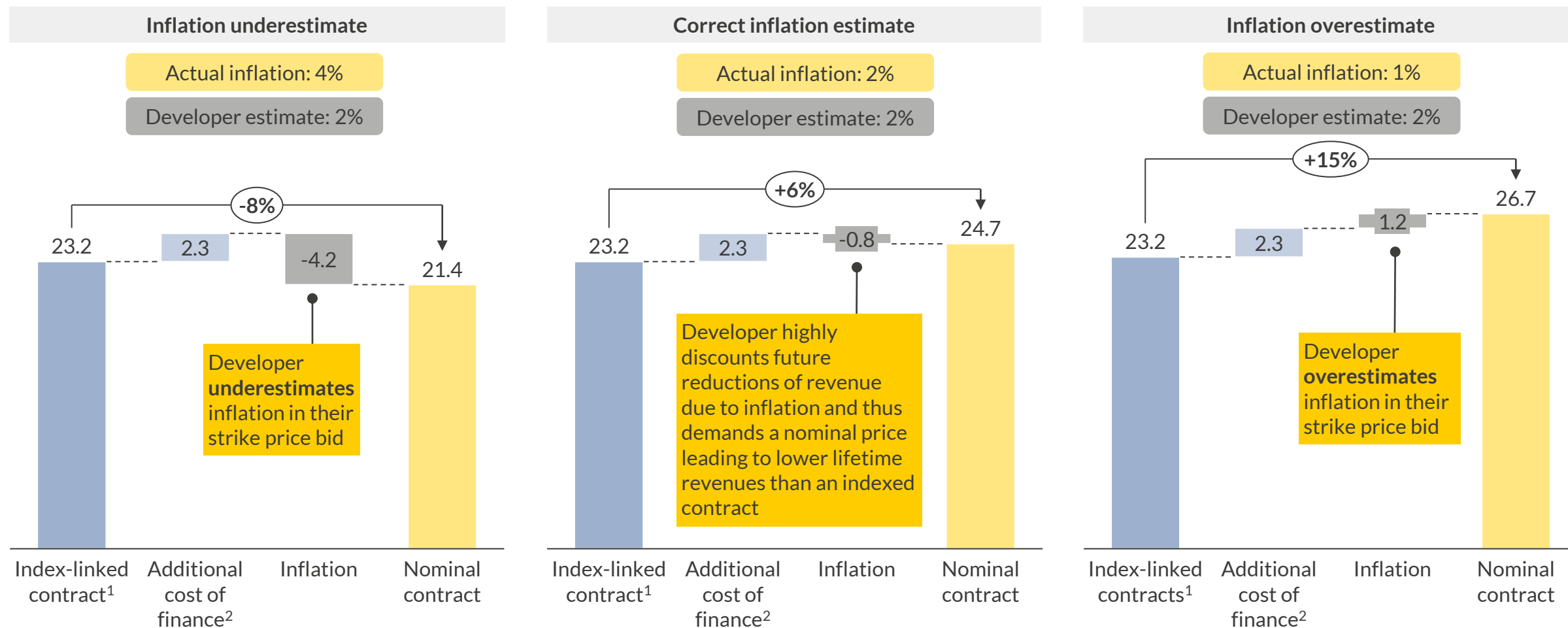
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Index-linked contracts will likely lead to lower cost to consumers than nominal contracts by reducing the cost of finance

Discounted revenues of a 10MW onshore wind plant over 20-year CfD contract

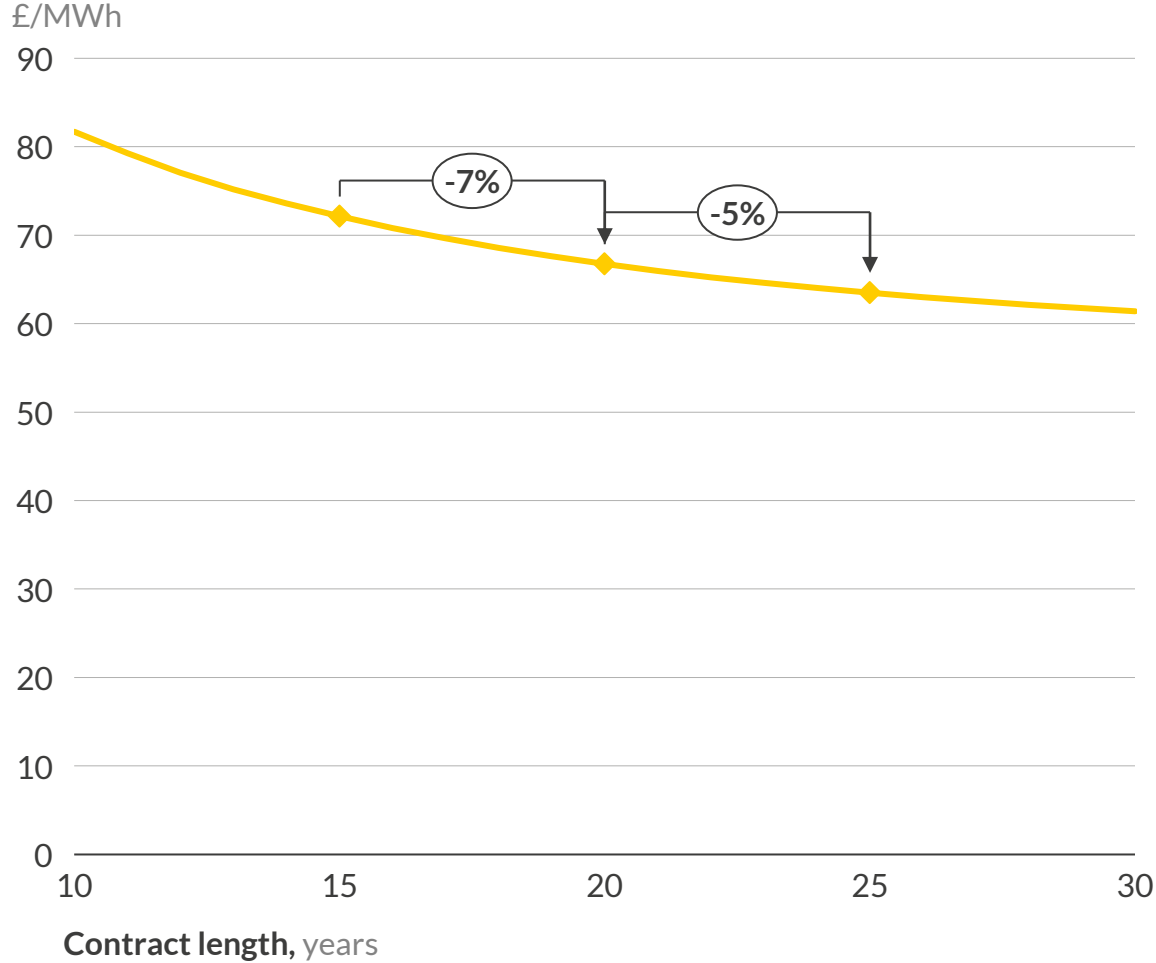
Real 2022 £mn



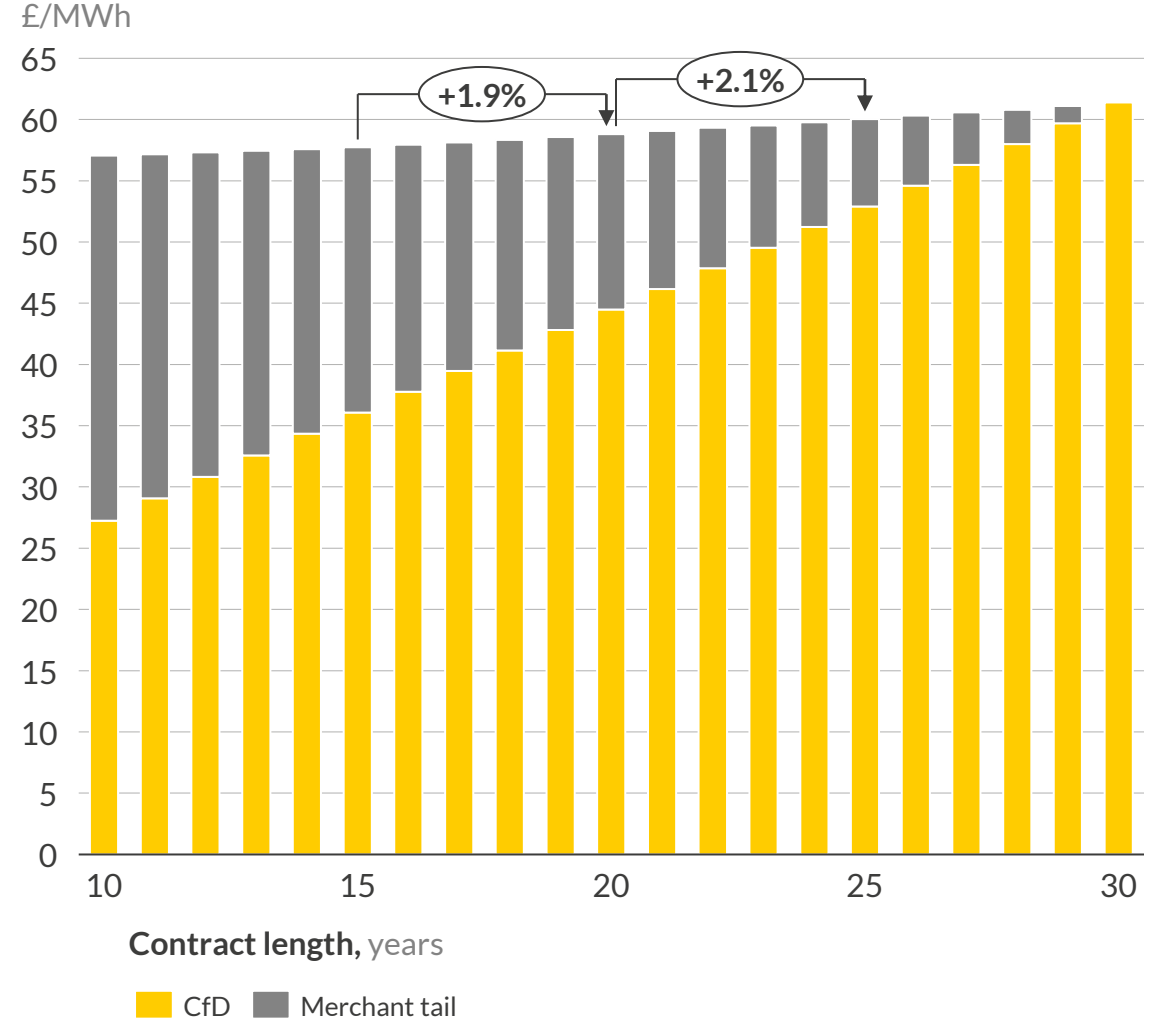
1) CfD payments indexed to CPI. 2) Project WACC is assumed to increase from 8% in the index-linked case to 9.5% if contracts are not index linked, because of increased risk (cf. assumed merchant WACC of 10.5%). All revenues are discounted at the social discount rate, assumed to be 3.5%.

Longer contracts reduce bid prices but increase the overall lifetime cost to the consumer

Bid price of a 10MW onshore wind farm¹



Annual average lifetime cost to consumer (undiscounted)²



1) Bid price calculated based on an NPV=0 business case. CfD revenues discounted at 8.5%; merchant revenues discounted at 10.5%. Assumes a 30-year lifetime. 2) Merchant revenues based on Aurora Oct-23 forecast. Assumes a 30-year lifetime.

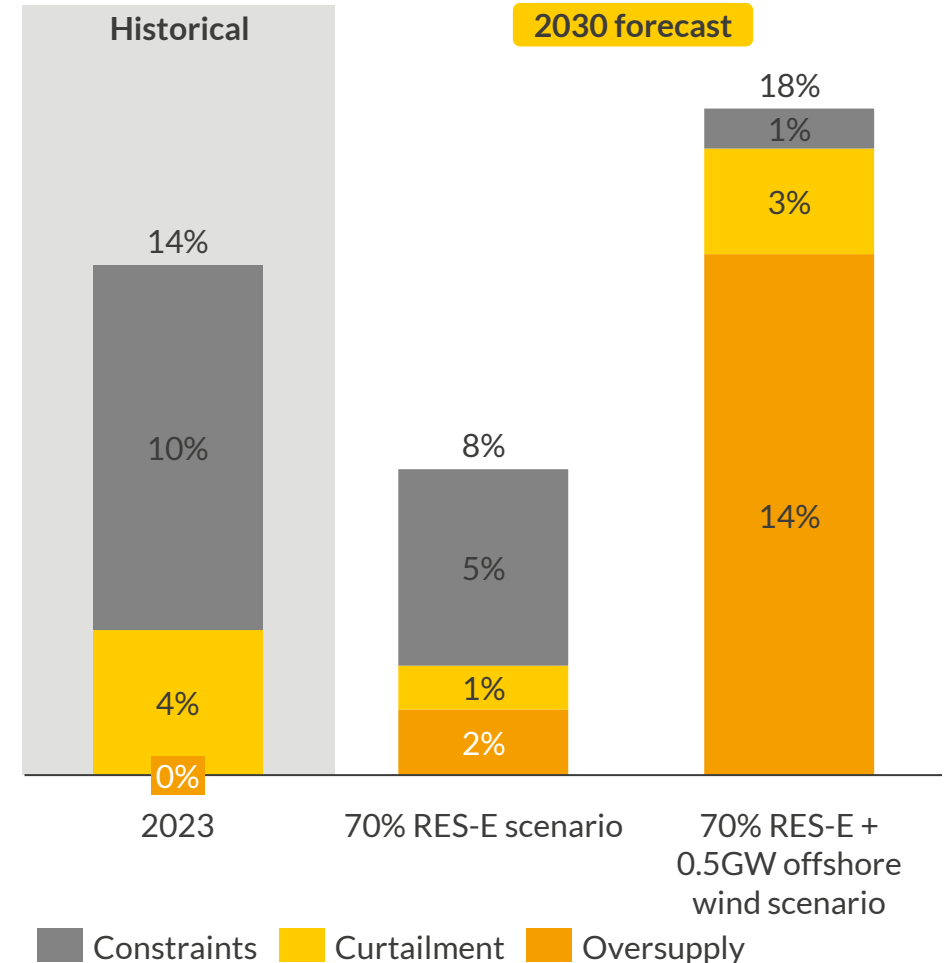


Compensating for oversupply during negative price periods and curtailment shields investors from risks beyond their control

Option	80% by 2030	Low Cost	Practicality	Total Score
All dispatch down	Attracts investment but congested grid	Inefficient system	Administrative burden	25%
Oversupply and curtailment only	Better system integration	More efficient system	Administrative burden	50%
No compensation	Less investment	Higher CfD bids	Simple to implement	0%

Country	Implemented option
GB	All dispatch down
Rol	Oversupply during negative price periods and curtailment only

Forecast dispatch-down compensation in 2030 by RES deployment scenario⁴, percentage of generators' total revenue



1) Cornwall Insights 2023, Design considerations. 2) DfE 2023 Design considerations consultation. 3) Cornwall Insight 2023 Renewable LCOE in NI. 4) Northern Ireland Constraints Report, SONI, 2023.

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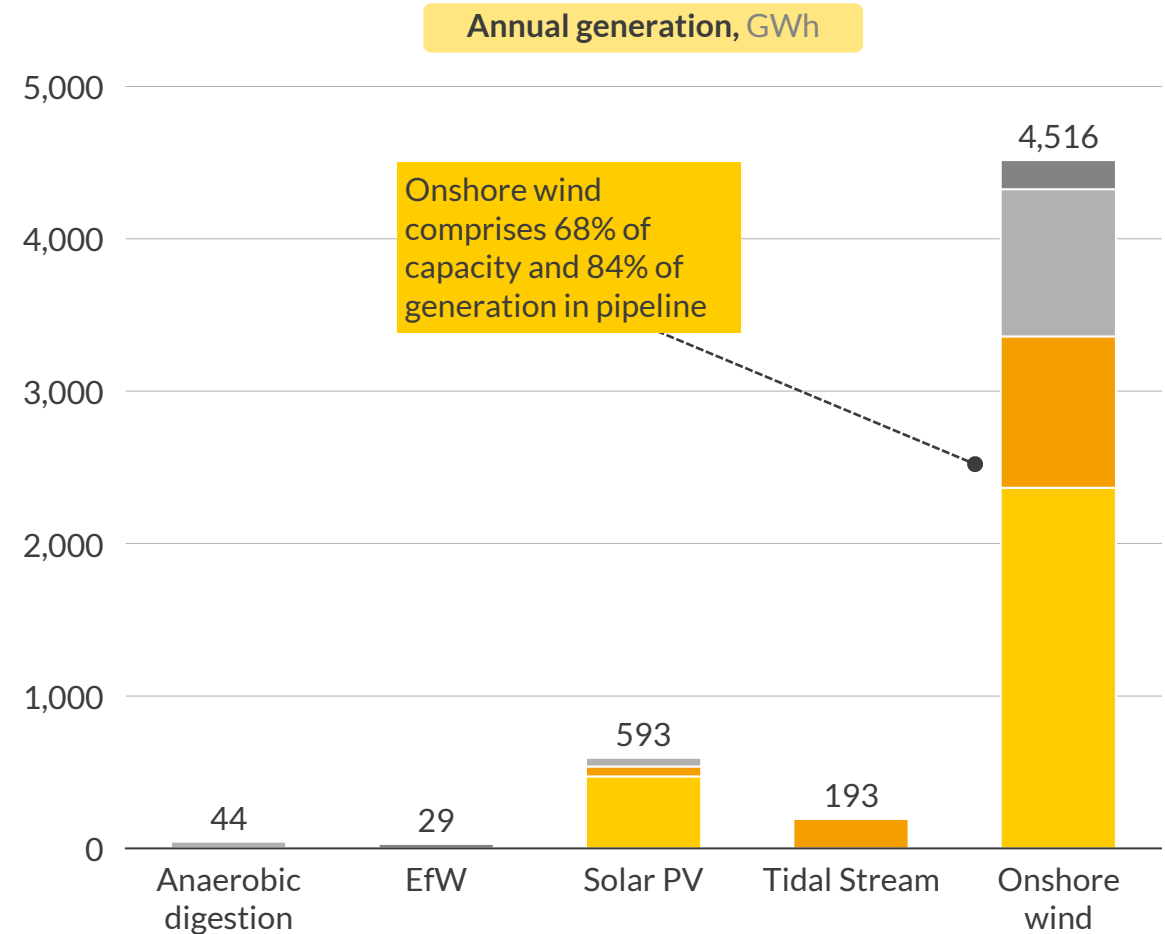
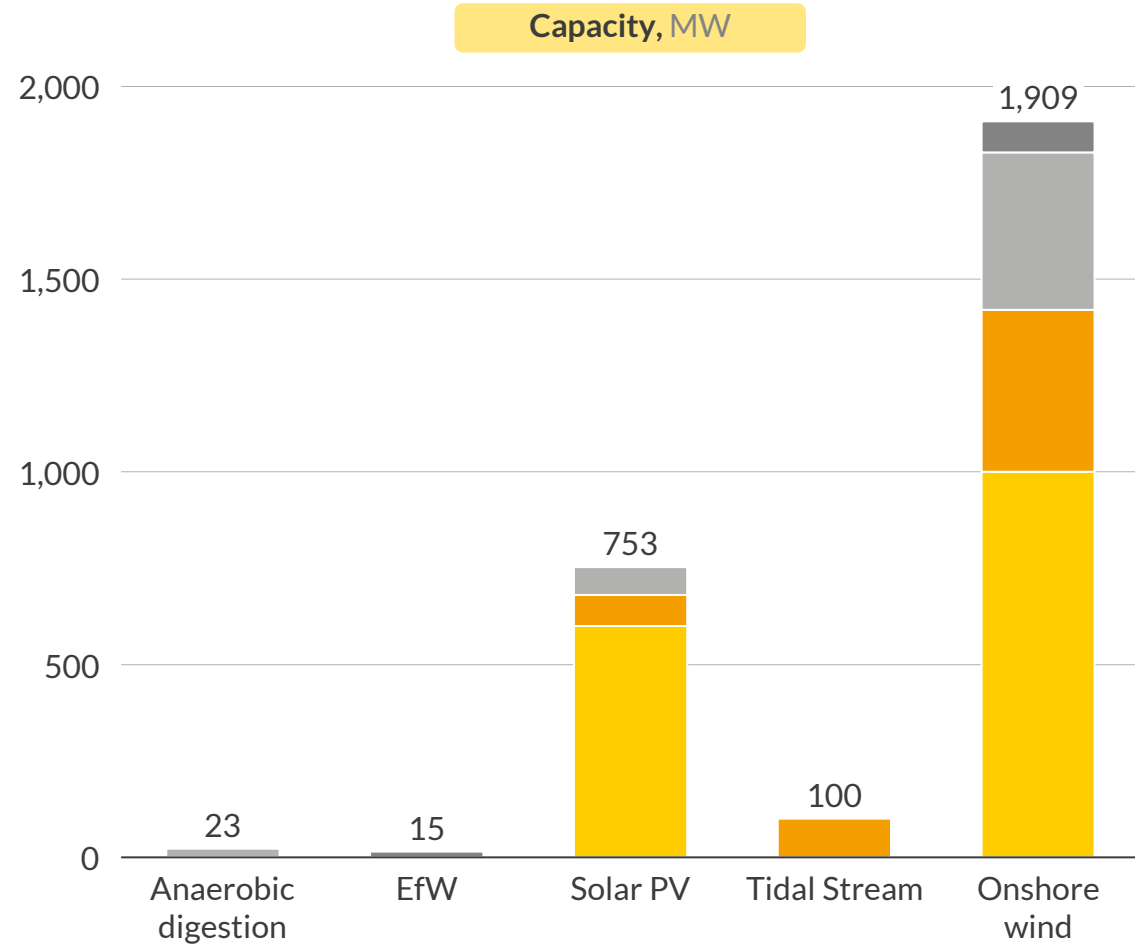
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The renewables pipeline in Northern Ireland is dominated by onshore wind, which accounts for 84% of annual generation volumes in the pipeline

Pipeline renewables projects in the Renewable Energy Planning Database (REPD) in 2023¹



■ Pre-planning²
■ Planning
 ■ Connection
 ■ Under construction

1) NB. Due to limited data availability on pipeline offshore wind projects, further analysis is required to validate the proportion of offshore wind in the auction roadmap. 2) Pre-planning information provided by RenewableNI.

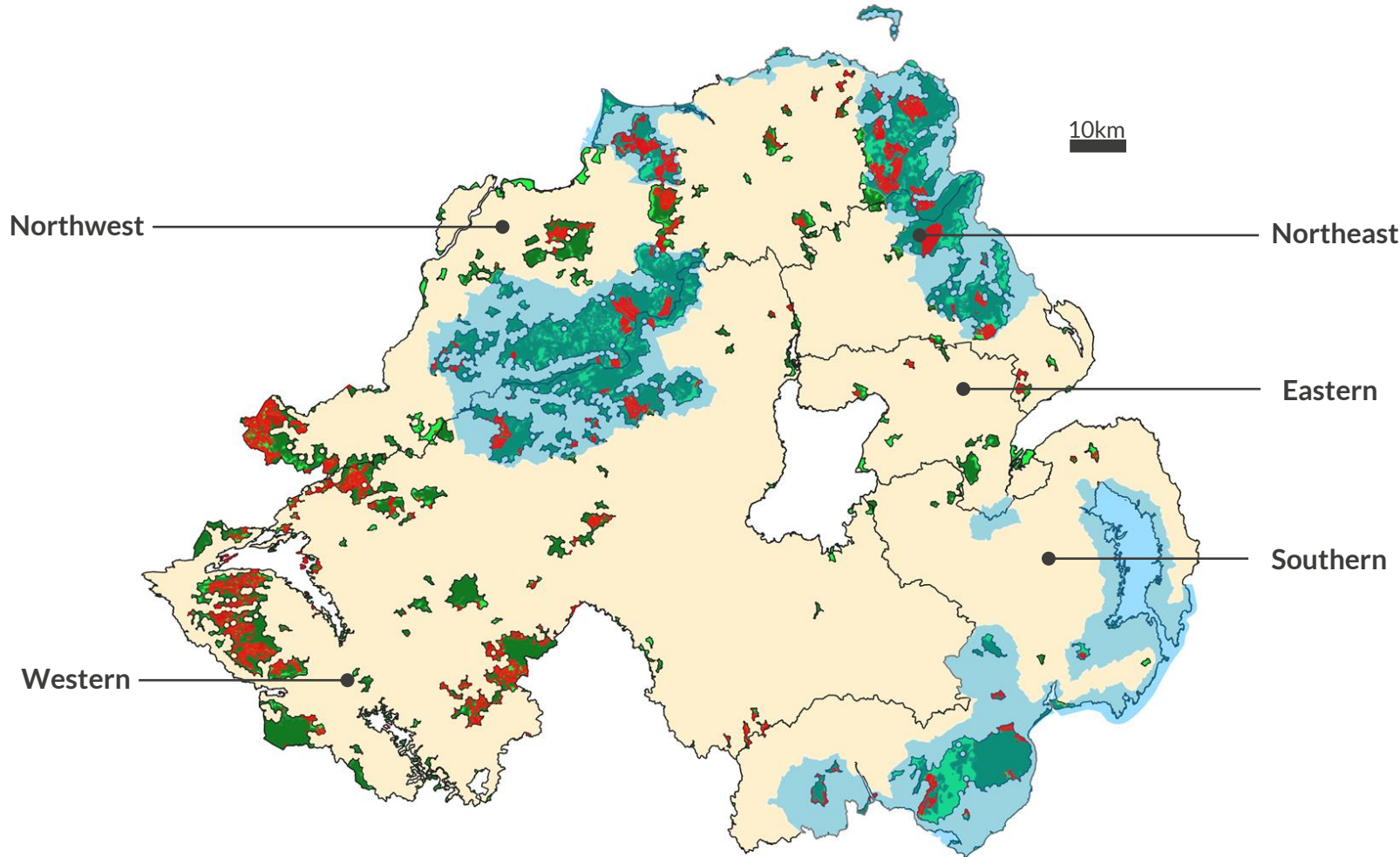
The first two auctions of the scheme are likely to be dominated by onshore wind – future integration of offshore wind is being prepared

Provisional auction dates and illustrative outcomes			
		Auction 1	Auction 2
Auction year		2025	2027
Delivery year		2027	2030
Total volume	GWh	1,000	2,500
Illustrative pot sizes			
Pot 1	GWh	1,000	2,200
Pot 2	GWh	0	300
Pot 3	GWh	0	0
Illustrative outcomes			
Onshore wind	GWh	800	1,760
Solar	GWh	200	440
Biomass	GWh	0	210
Tidal	GWh	0	60
Anaerobic Digestion	GWh	0	30

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Current phase of the project explores the renewable potential in Northern Ireland to validate or revise the high level design



Key aims and focus

- Validate, refine, or revise design based on more in depth analysis
- Focus areas include auction roadmap and renewable potential

Key restrictions of potential

- Land availability: minimum distance to residential buildings, protected areas (left)
- Grid connections: limited amount of spare capacity on the network and extended timelines of grid reinforcement

Further key research areas

- Cost faced by renewable projects, variation by location
- First auction modelling on a plant by plant basis
- Maximum strike price methodology

■ Available after 500m housing buffer
 ■ Unavailable: restricted area¹
 ■ Unavailable: AONB
 ■ Unavailable: State forestry

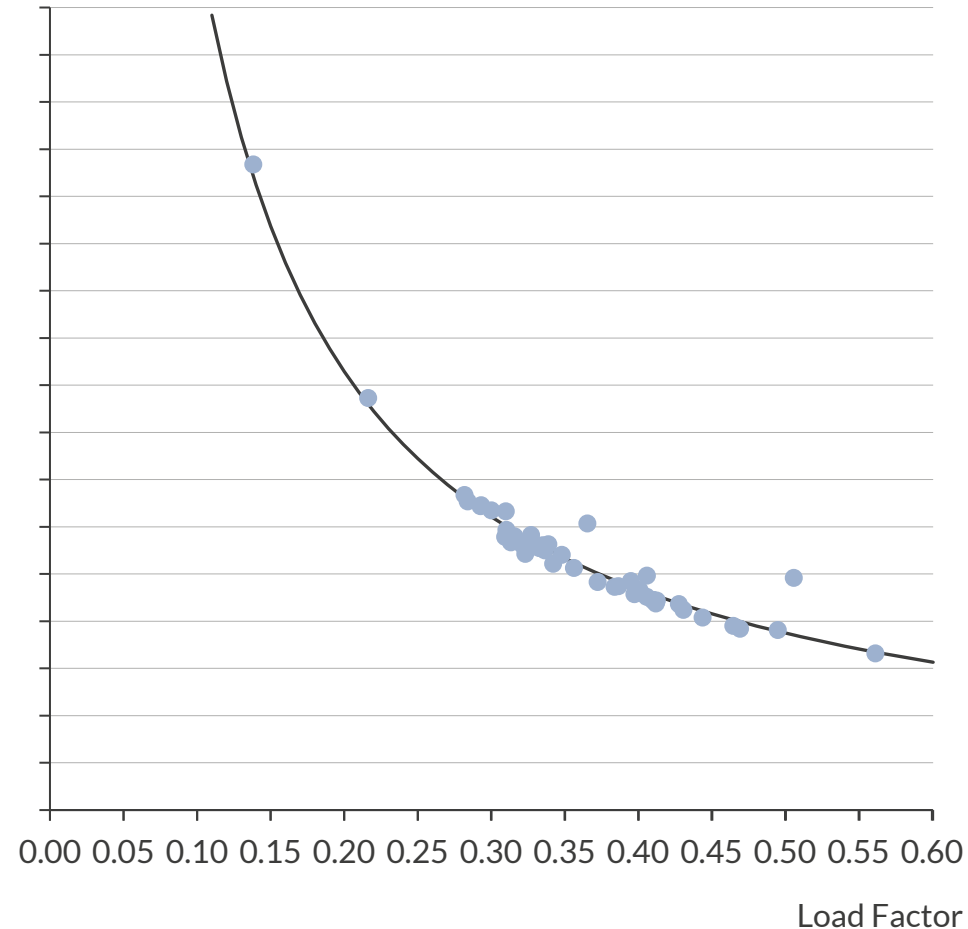
1) Waterbodies, Scheduled Zones, Special Areas of Conservation, Peatland, and Priority Habitats (fens, grassland, heathland, woodland). 75 hectares (space required for a 5MW site), is considered the minimum area for development; areas under 75Ha are excluded. 2) Assuming all available area is used to develop onshore wind at 52.5Ha/MW; using region-specific load factors. Sources: Aurora Energy Research, OpenDataNI.Gov.UK, DAERA-NI, JNCC, Pointer

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Aurora has developed turn key solutions to support bidders in renewable auctions

Minimum Economic Bid Price of Onshore Wind Assets³,
£/MWh



Average Wind Speed by Location, Aurora
Amun Wind Atlas²
m/s



Summary

- Turn key solution to support bidders in renewable auctions
- Can be packaged with bespoke modelling and advisory services
- Deliverables include configurable model of auctions

Insights and outcomes

- Insights into auction dynamics and financials of all participants
- Development and valuation of bidding strategies

Method

- Plant by plant modelling of auctions using Aurora wind evaluation software Amun (compare left hand graphs and following slide)
- Optionality to rerun model under range of bespoke scenarios

1) excluding network charges



AMUN The #1 wind valuation software

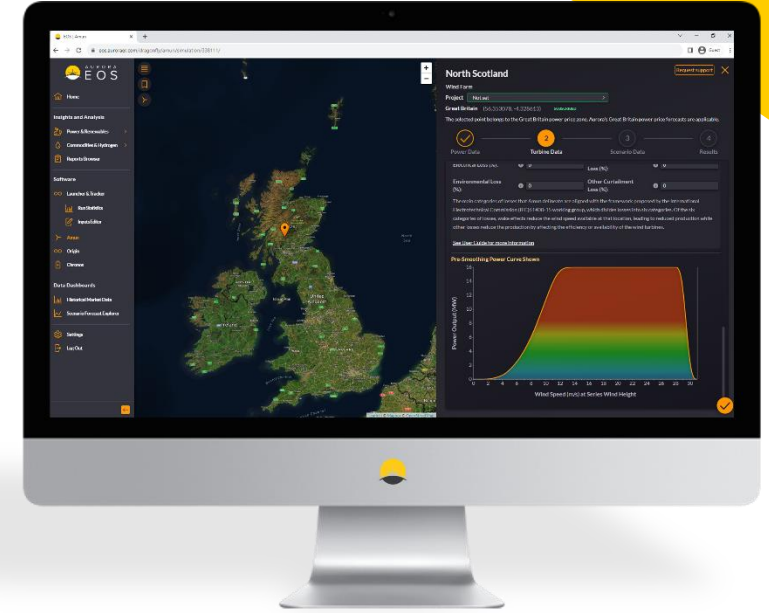
Amun delivers bankable asset-specific revenue forecasts for wind assets in minutes

Power your key decisions: Amun combines your unique asset profile with Aurora's detailed, tried and tested price data

Valuing the biggest portfolios in the world: Amun is used on the largest wind transactions in the world, including Hornsea One

Relied on and used by industry leaders: Amun enables you to identify the hidden bankable value in wind assets

Save time: Amun does everything consultants do, instantly, whenever you need



Intuitive 4-step process:



What can Amun be used for?



Trusted by industry leaders:



Aurora advises the Northern Irish Government in developing a new renewable support scheme

Aurora have undertaken extensive analysis to structure the support contract auctions and provide recommendations through an ongoing comprehensive auction design and commercial advisory project with the Department for the Economy Northern Ireland.

- **Key recommendations** in the high level design phase include: 15 year fixed length support contracts, linking support contracts to inflation, and compensation for dispatch down due to curtailment and oversupply
- **Auction roadmap:** 5 TWh of additional renewable generation are required to reach the Government's 2030 target. 3.5 TWh of these are likely to require a support contract. Given the status of the renewable pipeline it is recommended to allocate contracts in two auctions: one in 2025 with a 1 TWh volume, and another one in 2027 with a 2.5 TWh volume.
- **Phase 2** of the project is currently ongoing and focuses on validating, refining, and revising the high level design, in particular the auction roadmap, based on more in depth techno-economic modelling
- **Aurora's offer** for Irish power market stakeholders include the wind evaluation software Amun and turn key solution packages for renewable auctions alongside bespoke advisory services



Thank You

For further information on the project please contact:

rebecca.cabrera@auroraener.com

For further information on Aurora please visit:

www.aurorer.com



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