AURORA ENERGY RESEARCH

Low RESS: how the picture got blurred?

RESS3 results and implications for the future

12 October 2023

Aurora provides market leading forecasts & data-driven intelligence for the global energy transition

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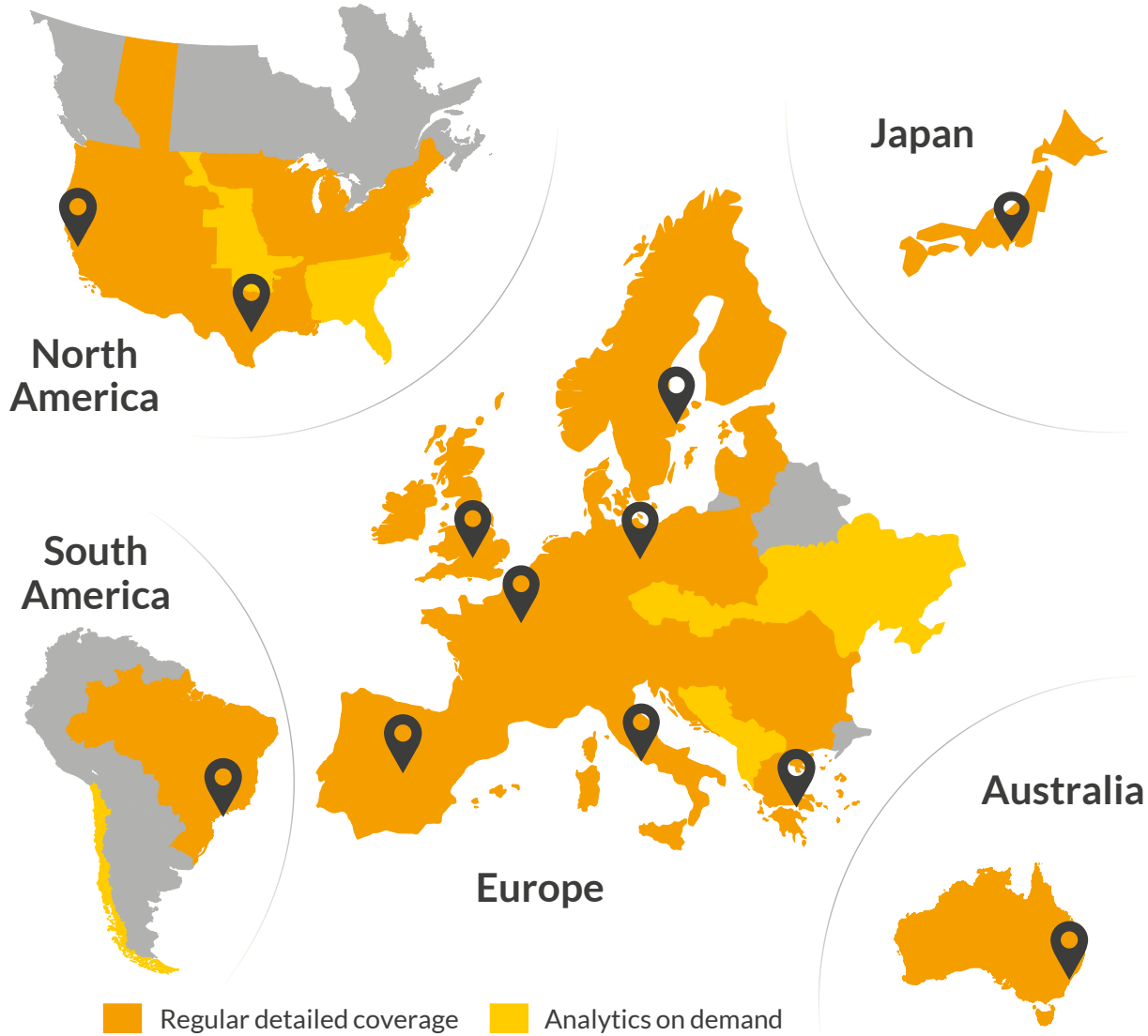
- Power markets
- Renewables
- Storage
- Electric vehicles
- Hydrogen H_2
- Carbon CO_2
- Natural gas



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Source: Aurora Energy Research

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:

1. Select your wind data
2. Select your turbine data
3. Select your scenario
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What can Amun be used for?

- Transactions
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- Portfolio Valuation
- PPAs

Trusted by industry leaders:

equitix, Statkraft, Global Infrastructure Partners, BelltownPower, Barclays, BlackRock, OW Ocean Winds, Energy Infrastructure Partners, Vestas, Macquarie, Green Investment Group, acciona, mirova, Greencoat Capital, Infinergy, BlackFinch, low carbon, NTR, edp renewables, Peel L&P, Shell, Ontario Teachers' Pension Plan, IMCO, ESB, Foresight, CIP, enel, Ørsted, Banks Group, Eurus Energy, amp

To reach renewable generation targets, the Republic of Ireland formed the Renewable Electricity Support Scheme (RESS)

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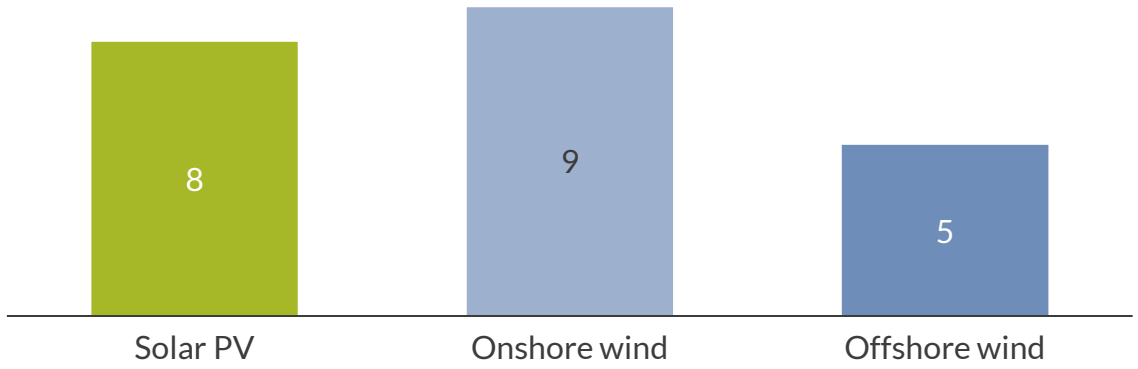
The Republic of Ireland has a target of 80% renewable generation, which will require significant renewable buildout

Republic of Ireland 2030 capacity targets

GW



This buildout can be encouraged by:

- Increasing power demand
- Strong policy support and Government ambition
- Rising fuel and carbon prices
- Phase out of thermal capacity

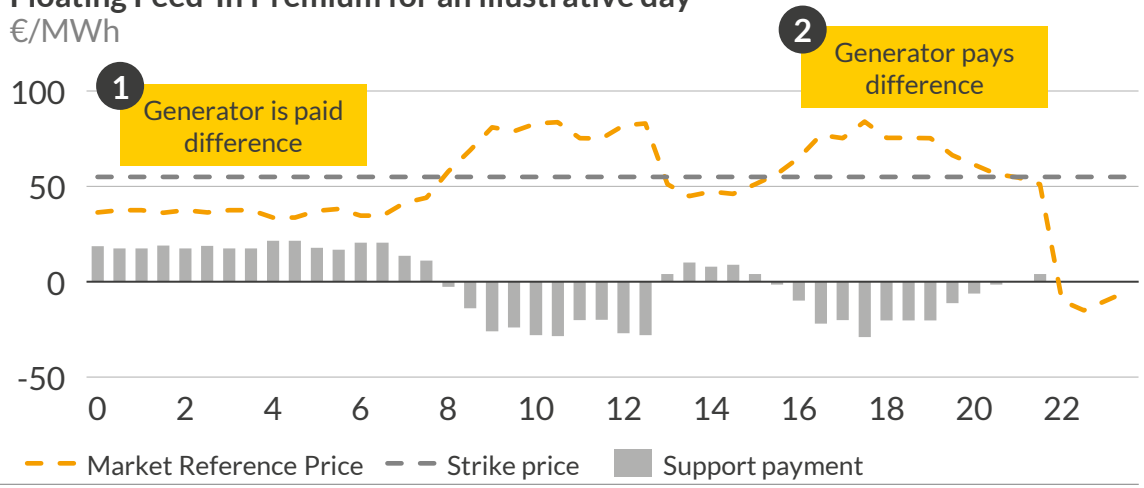
To mitigate merchant risks and incentivise renewable build, the Government introduced RESS, a two-way floating feed-in premium

However, there are risks that come with exposure to the merchant market:

- Price risk
- Weather risk
- Cost of Capital
- Policy and Regulatory risk

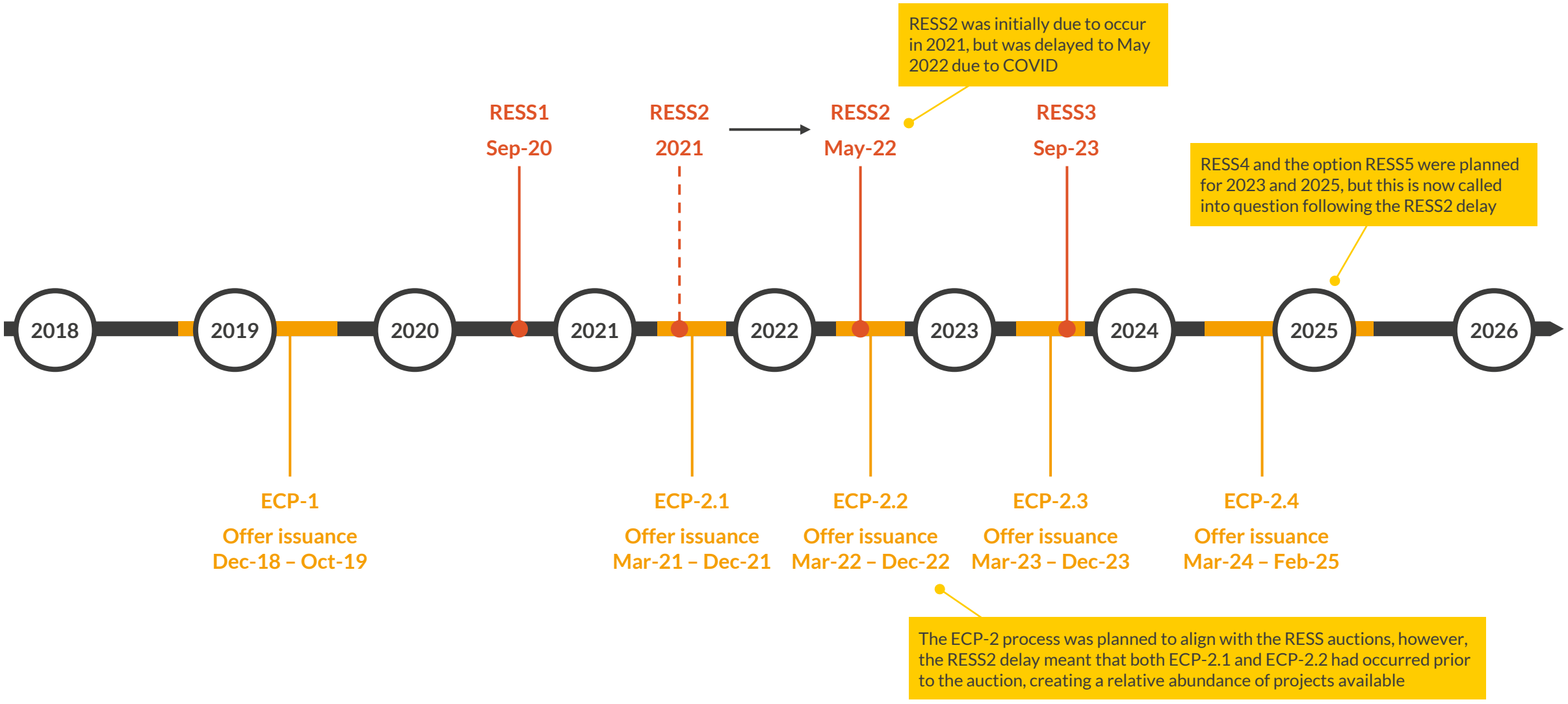
Floating Feed-In Premium for an illustrative day

€/MWh



Sources: Aurora Energy Research, DECC

The RESS scheme procures predetermined volumes of new-build onshore renewables through a series of competitive auctions



Sources: Aurora Energy Research, DECC

Compared to previous auctions, RESS3 includes UAEC remuneration and indexation of the strike price but requires a grid connection and planning

Auction feature	RESS3 terms and conditions	Change from RESS2
Delivery deadline	▪ 31 Oct-24 if project is ready, final go-live no later than 30 April 2027	▪ Final go-live no later than 31 December 2025
Procurement target	▪ New build capacity with a deemed energy quantity of 500-1500GWh to be procured (originally 2000-3500GWh)	▪ New build capacity with a deemed energy quantity of 1000-3500GWh to be procured
Preference categories	▪ No preference categories, with qualified applicants submitting eligible offers on the basis of a single preference category which applies to all	▪ Community Preference Category of up to 200GWh ▪ All Projects Preference Category of up to 3,500GWh
Support lifetime	▪ Variable depending on project start date, with a longstop date of 30 Apr-27, with support of up to 16.5 years	
Support format	▪ 2-way Floating Feed-In Premium (CfD) ▪ Unrealised Available Energy Compensation (UAEC) remunerates unrealised generation due to oversupply or curtailment[2] at the strike price	▪ No compensation in **any** negative price periods
Price setting	▪ Index-linked strike price, amounting to c. 30% of the annual change in HICP[1] ▪ Pay-as-bid	▪ Non index-linked strike price
Eligible technologies	▪ Solar, onshore wind, hydro, CHP[3], and hybrids (wind and solar, wind and storage, solar and storage)	
Eligibility requirements	▪ Project must secure grid connection and planning permission within 90 days of the issued support start date to qualify for the auction ▪ Project has an investment threshold of €300/kW	▪ Only required a grid connection offer or processed under an ECP and did not explicitly require acceptance
Evaluation correction factor	▪ ECF of 0.85 for solar PV	▪ ECF of 0.9 for solar PV

1) Harmonised Index of Consumer Prices 2) Network constraints are not compensated 3) CHP includes High Efficiency CHP boilers fuelled exclusively by Waste (Waste to Energy HECHP), High Efficiency CHP boilers fuelled by Biomass (Biomass HECHP) and High Efficiency CHP boilers fuelled by Biogas (Biogas HECHP).

Sources: Aurora Energy Research, DECC

The RESS3 auction only procured 646MW of capacity with only 33 projects qualifying following the new eligibility requirements

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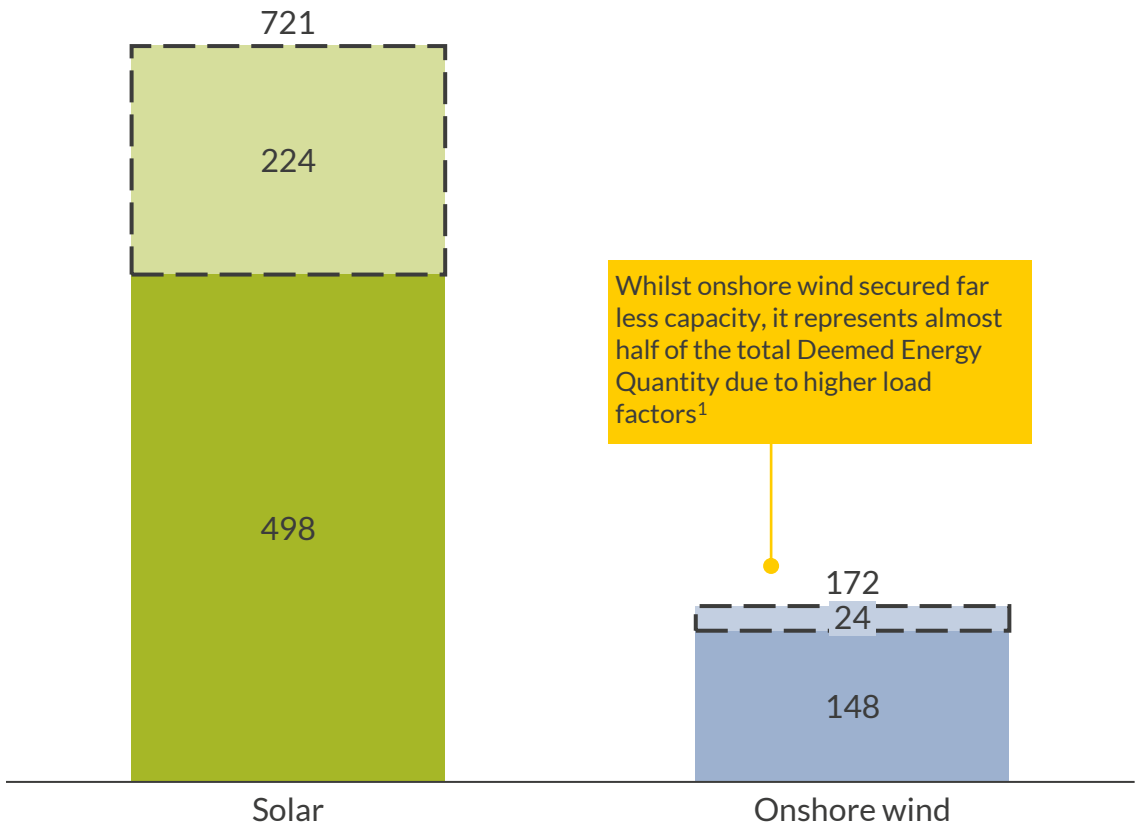
The auction only procured 646MW, with solar PV dominating the auction with 498MW successful

Final offer quantity

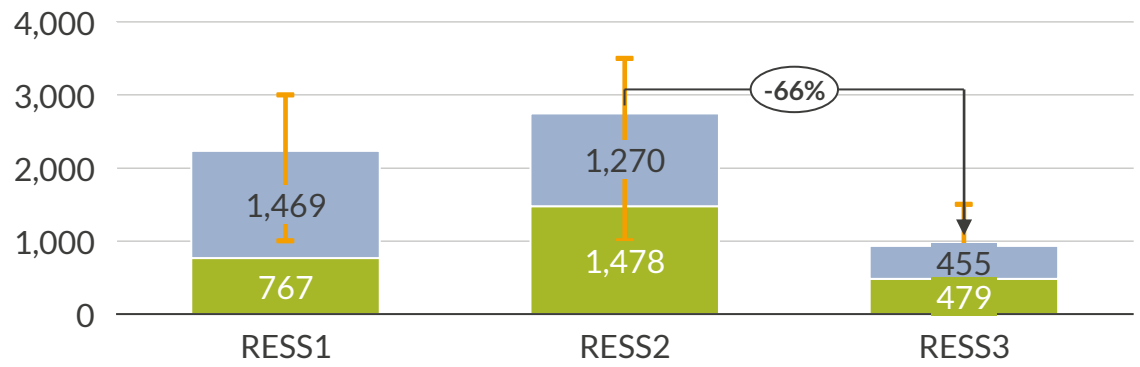
MW



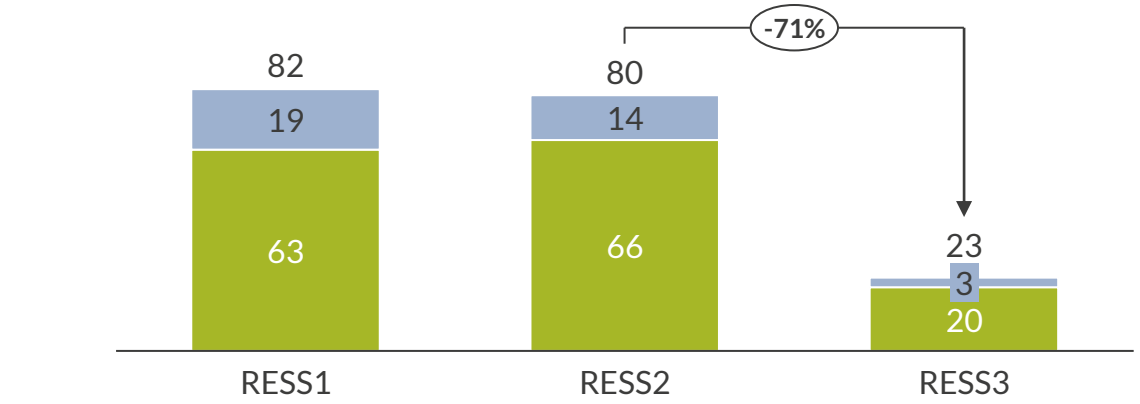
RESS3 brought in less than half the deemed energy quantity procured in RESS1 or RESS2

Final successful deemed energy quantity

GWh



Number of successful projects



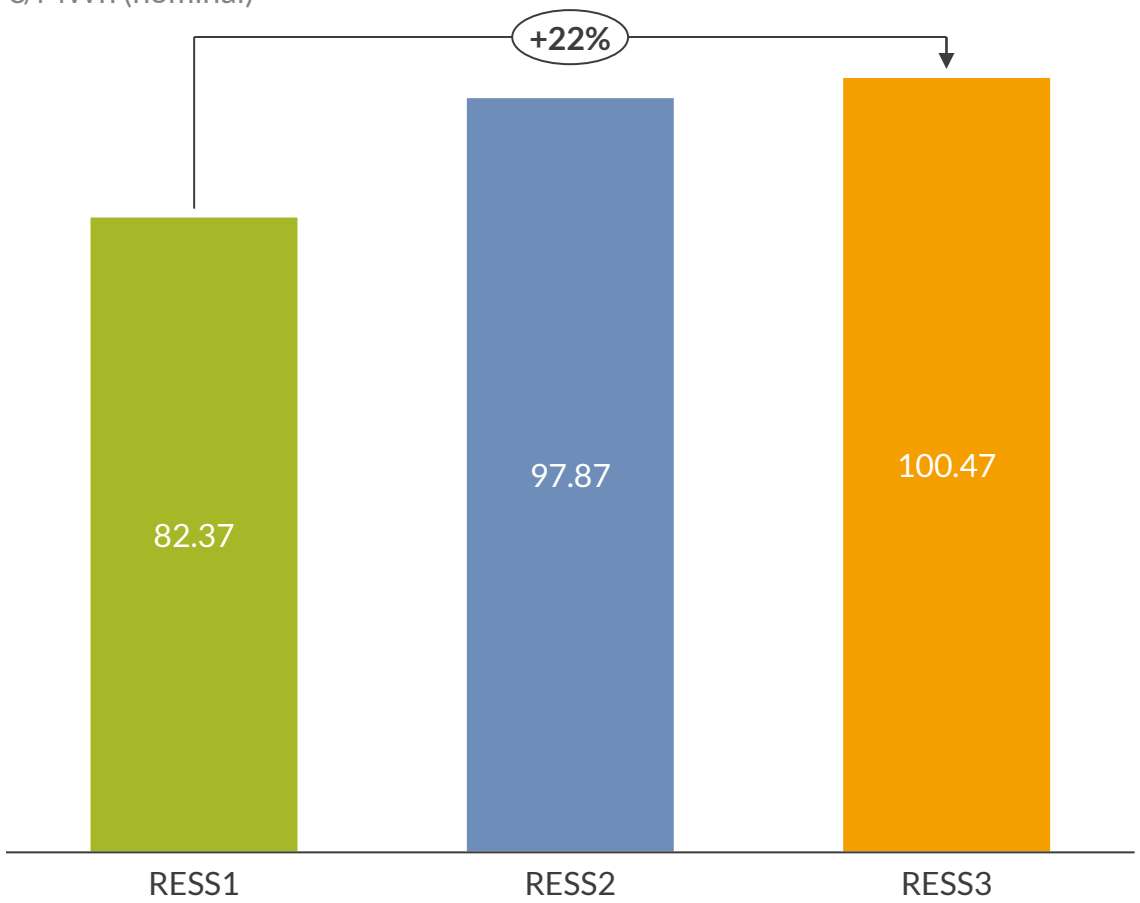
1) The RCFt was determined by Eirgrid and SONI for all eligible renewable technologies prior to RESS 1 and RESS 2, including onshore wind (35%) and Solar PV (11%).

Sources: Aurora Energy Research, DECC

RESS3 cleared at record high price of 100.47 €/MWh, as difficult market conditions make new generation increasingly costly to procure

Weighted average strike prices of successful offers for All Projects preference category

€/MWh (nominal)



Across the globe, renewable auctions have cleared high, or projects have otherwise struggled to finance, resulting in under procured auctions

The 2022 Polish auction sees the highest strike price since 2019, at 265 PLN/MWh, while procuring only 730MW of capacity

The 2022 Spanish renewables auction, only procured 46MW of wind, after tendering for a total of 3.3 GW, with an average clearing price was 42.78 €/MWh, more than double the previous auction's price

Since November 2021, 3 of the last 4 French renewables auctions (PPE2) have under procured capacity and cleared at high average prices, with the last auction achieving a record high average price of 85 €/MWh

In February 2023, the German renewable auction for onshore wind, continued to be undersubscribed, with only 1.5GW entering the tender against a target of 3.2GW. The auction achieved a record high average price of 73.40 €/MWh

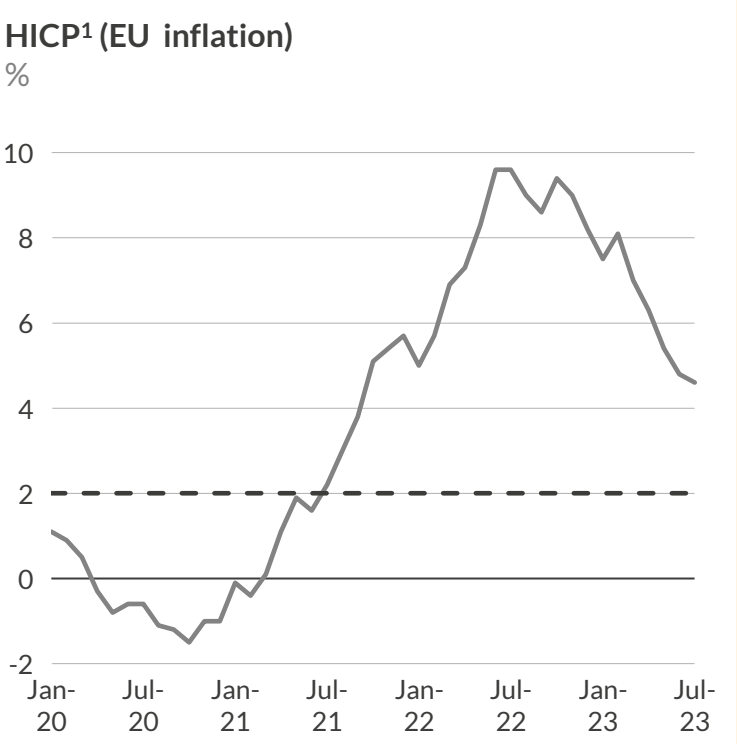
The GB CfD Allocation Round 5 (AR5) failed to procure offshore wind capacity, with overall capacity procured falling by 66% compared to AR4

Sources: Aurora Energy Research, DECC

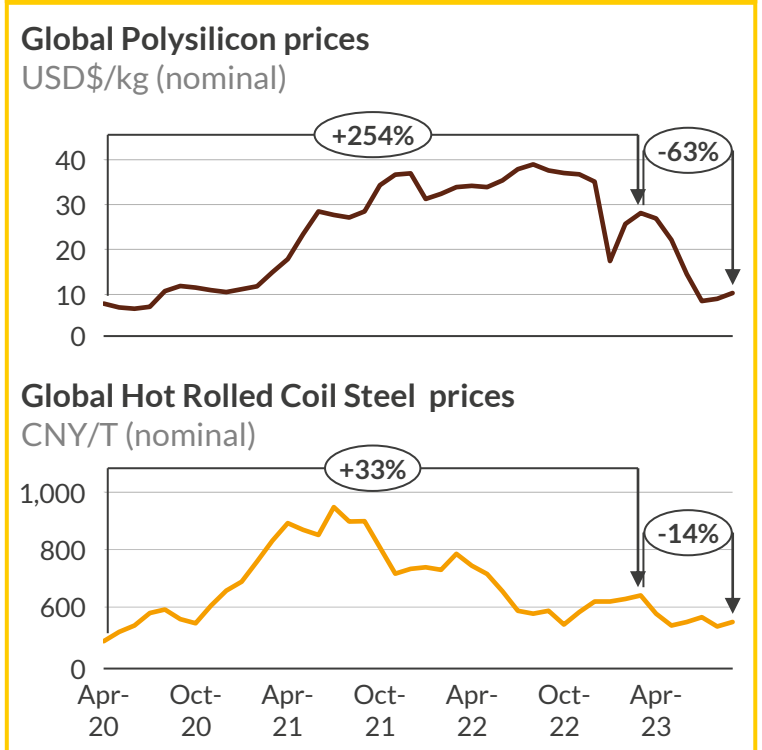
Renewables costs have continued to rise due to high inflation, raw material costs and high demand for components

Globally, renewable costs have increased since the recovery of lockdowns due to supply chain disruptions which have contributed to high inflation and high raw material costs. With global energy transition ambitions, supply chain tightness may persist due to high demand for materials

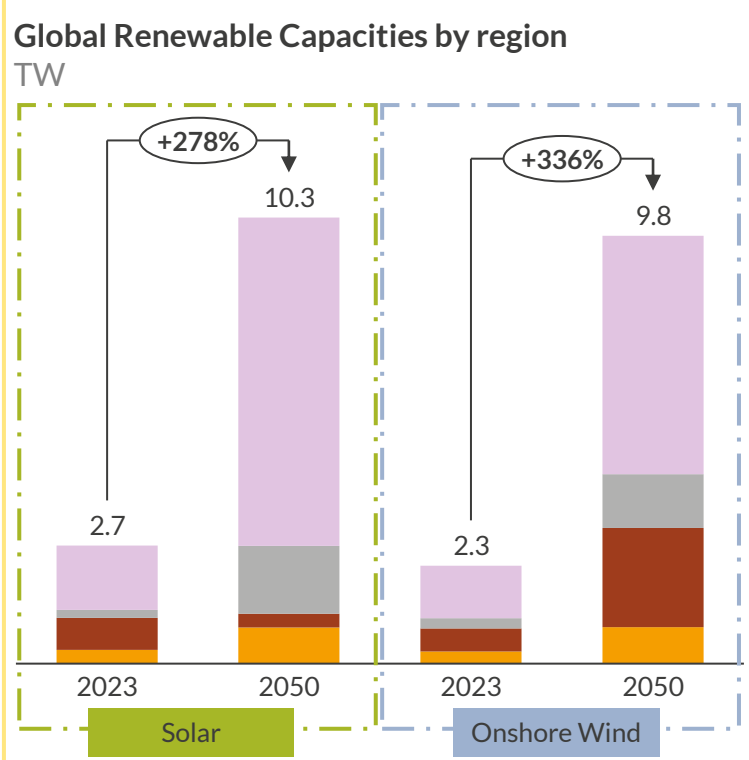
Inflation continues to drive up renewable costs as suppliers hedge against inflation



Key renewables raw material prices continue to drive up renewable costs



Global renewable capacity growth is expected to increase pressure on raw material supply



HICP (EU inflation) — Target inflation — Global Hot Rolled Coil Steel prices — Global Polysilicon price — Europe — Asia — Americas — Rest of World

1) Harmonised Indices of Consumer Prices (HICP) is a measure of inflation in the EU

Sources: Aurora Energy Research, Central European Bank, Investing.com

Long lead times in securing grid connections, limited the pool of projects eligible for RESS3 under the new terms and conditions

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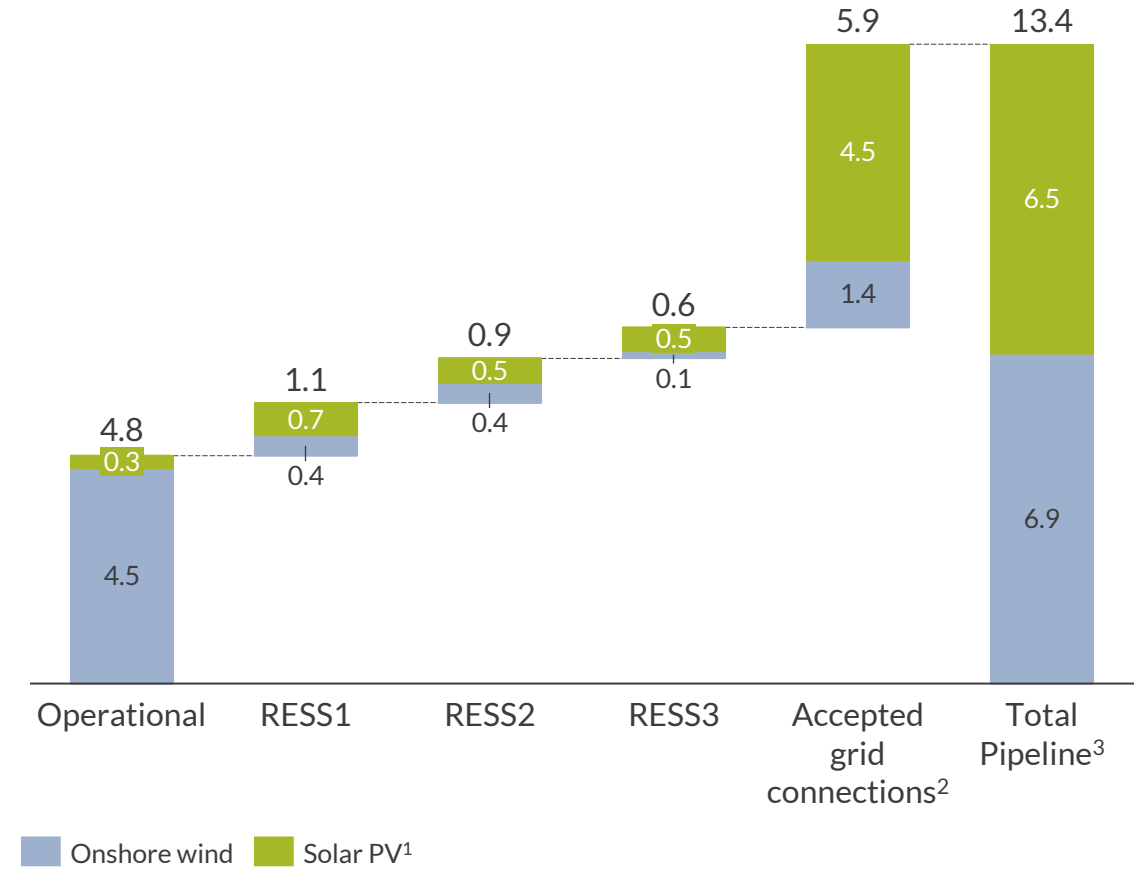
Procurement in the latest RESS3 auction has fallen below previous auctions

Republic of Ireland onshore renewable capacity pipeline

GW



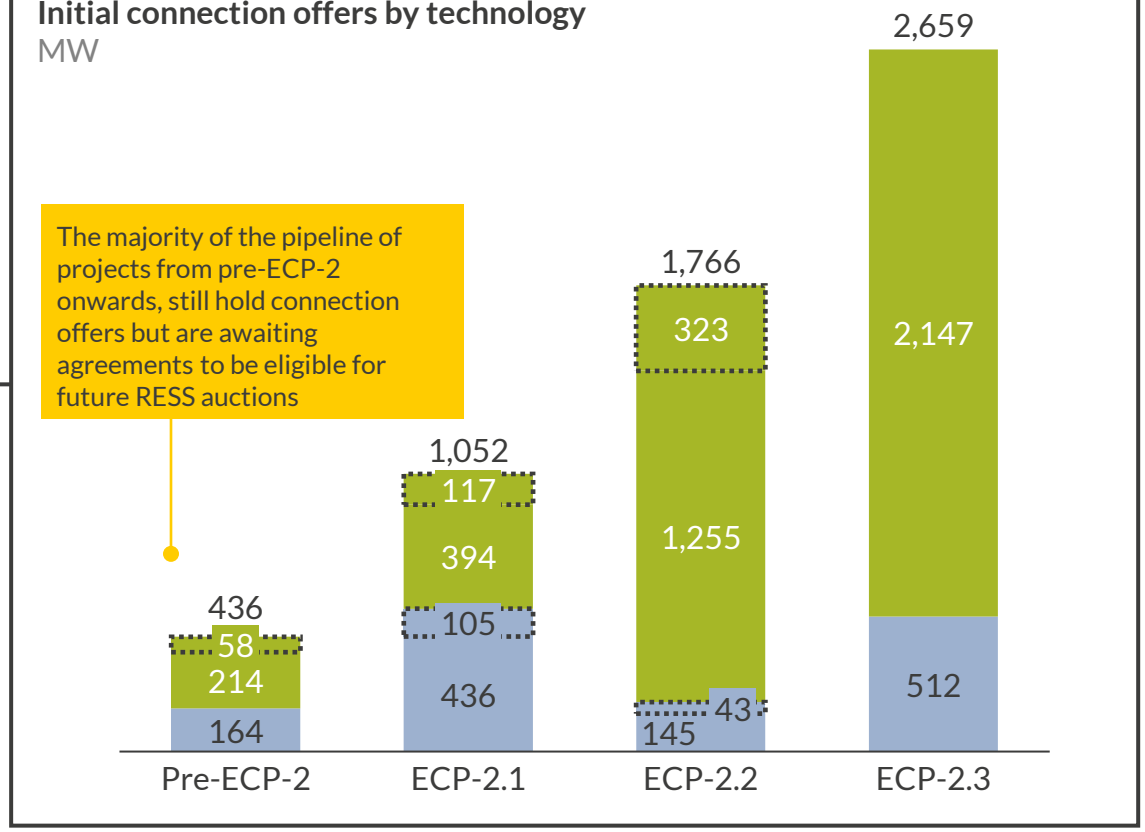
Onshore wind Solar PV[1]

The update to RESS3 T&Cs meant from the projects with a connection offer, only a small pool of projects with a connection agreement qualified

Initial connection offers by technology

MW

The majority of the pipeline of projects from pre-ECP-2 onwards, still hold connection offers but are awaiting agreements to be eligible for future RESS auctions



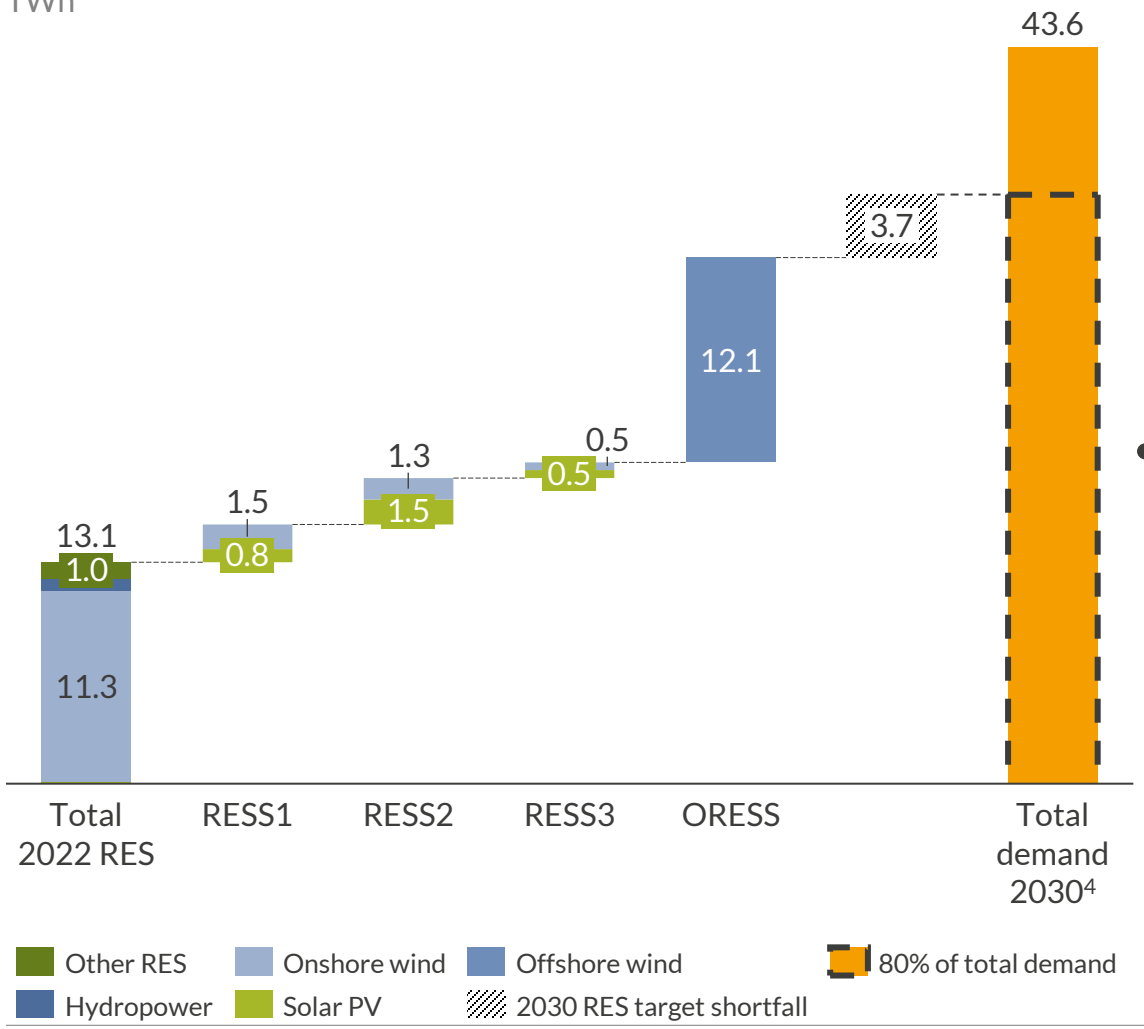
Successful RESS3 Onshore wind[4] Successful RESS3 Solar PV[4]

1) Not including rooftop solar. 2) Projects successful in ECP-1 and ECP-2, however excludes those with PPA contracts, local opposition or projects otherwise ineligible to participate in the RESS3 auction. 3) Excludes projects still in concept phase. 4) These are projects that have been successful in the latest RESS 3 auction

Sources: Aurora Energy Research, SEM, CRU

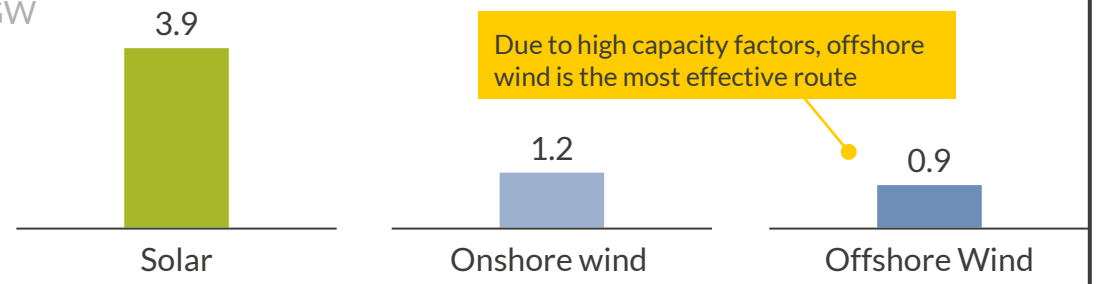
If RESS4 has similar procurement levels to RESS3, Ireland will not reach its 2030 target of 80% renewable generation

Annual renewable generation in the Republic of Ireland[1]
TWh



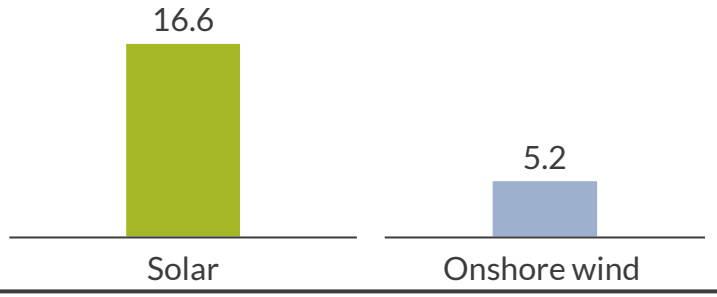
To meet the 2030 80% RES target, capacity would need to be procured from the next ORESS and RESS auctions. The additional 3.7TWh required would equate to the following capacities:

Required capacity by technology to match 3.7TWh[2]
GW



Given the uncertainty in the delivery of offshore wind, if no offshore wind delivers by 2030, the Government needs procure high volumes of either solar or onshore wind to meet the 2030 RES target, which are unlikely to be achieved through RESS4 and RESS5 alone.

Required capacity by technology to match 15.8TWh[2]
GW



1) Not including rooftop solar 2) The RCFt was determined by Eirgrid and SONI for all eligible renewable technologies prior to RESS 1 and RESS 2, including onshore wind (35%), solar PV (11%), offshore wind (45%).

Sources: Aurora Energy Research, DECC, SEM

Due to high capacity factors, offshore wind can play a crucial role in fulfilling the shortfall to the renewable generation target

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Across Europe, offshore wind development takes 7-11 years from concept to commission, with risks at every stage of the process

7 -11 years

Planning (1 -5 years)
- Lack of planning frameworks
- Long waiting periods for permits to be issued
- Planning disputes

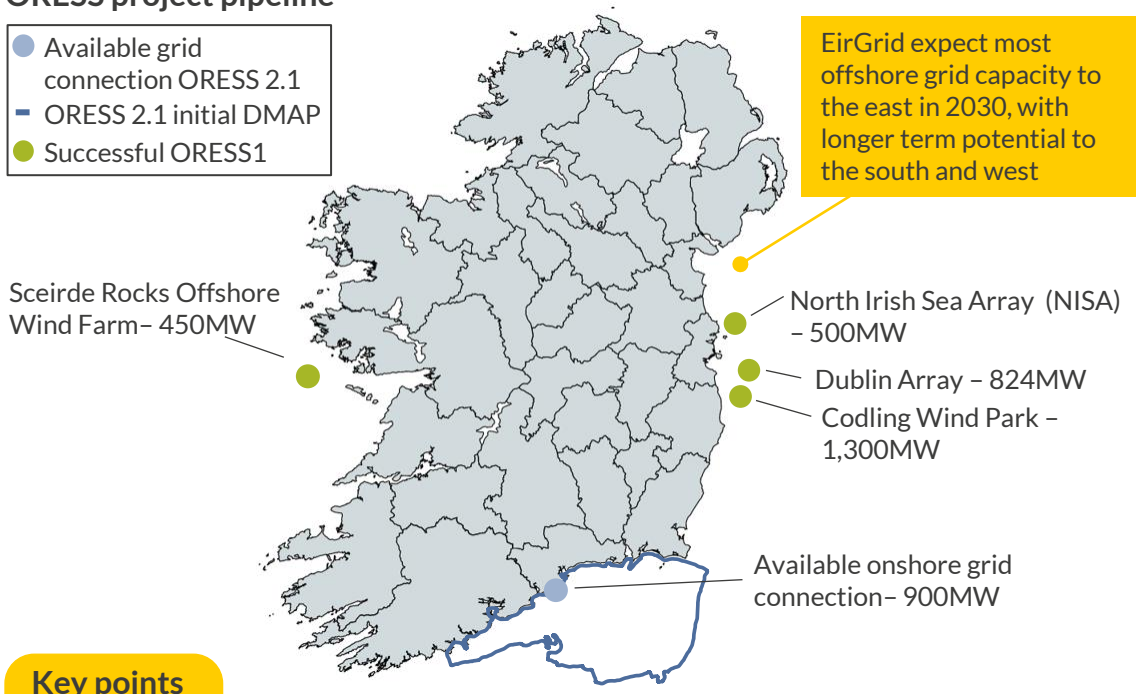
Sea bed leasing (1 -2 years)
- Competition for sites
- Multiple leases given to same location of projects
- Separate auctions for seabed leasing and government support

Grid Connection (2+ years)
- Grid congestion
- Availability of grid access
- Low levels of interconnection

Government Support (2+ years)
- Lack of policy certainty in regards to auction timelines, formats & procurement targets
- High competition with other projects

ORESS2 is set to procure lower capacities than ORESS1 with a change from competition between projects to competition for a specific project

ORESS project pipeline



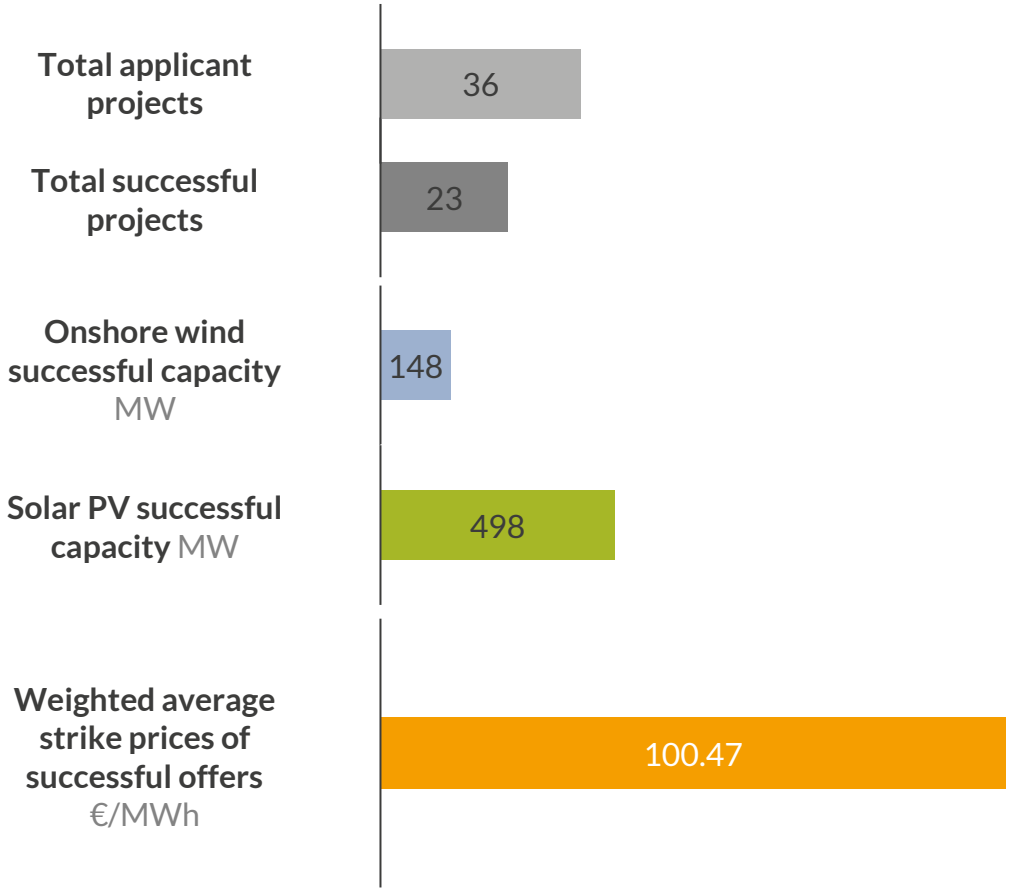
Key points
- Phase 2 ORESS projects should be connected to offshore substations geographically aligned with onshore connection availability
- DECC's March 2023 offshore wind policy paper[1] requires future offshore wind farms to be built in Designated Marine Areas approved by MARA
- ORESS 2.1 will select 900MW capacity located in a DMAP approved area of seabed on the southern coast of Ireland

1) DECC has published a Policy Statement on the Framework for Phase Two Offshore Wind, outlining Phase Two policy.

Sources: Aurora Energy Research, DECC

Key takeaways

RESS3 summary



1. The RESS3 auction cleared at a record high price with a procurement of under half of RESS2
2. High strike bids are a result of high renewables costs due to high inflation, high raw material costs, and high demand for plant components
3. Low procurement was driven by stricter eligibility requirements than previous auctions, with projects requiring both a grid connection and planning permission to qualify
4. Without renewable deployment outside of the RESS auctions, it is unlikely that the 80% renewable generation target will be met

Sources: Aurora Energy Research, DECC

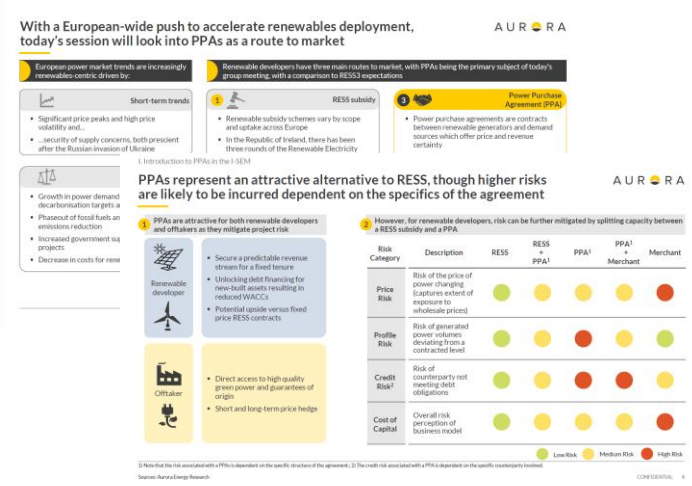
What's next in the I-SEM?

Alternative routes to market

With strict eligibility requirements to enter RESS, renewable asset owners may consider other routes to market instead.

Aurora recently released a **Strategic Insight Report** on '**The Role of PPAs in the I-SEM**' which explored:

- The types of PPA on the market
- Recent PPA market trends
- PPA policy in Ireland and the EU
- PPA fair price analysis

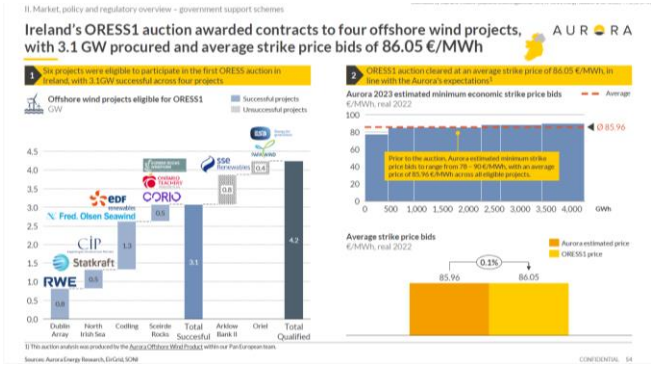


ORESS2

The next stage of offshore wind deployment in the I-SEM is through the upcoming ORESS2 auctions in 2024/25.

As part of the Aurora subscription analytics, the team will produce reports outlining terms and conditions and providing **auction prediction analysis**.

Aurora's advisory team can also provide **bespoke auction support** and analysis.



Aurora's **AMUN** service allows users to assess site specific capture prices for both onshore and offshore wind assets.

Investment cases

Aurora's subscription analytics regularly asses the policy landscape and market movement to produce our long term market outlook, including forecasts for:

- Technology and region-specific capture prices
- Technology specific curtailment, split by **oversupply, MinGen and SNSP curtailment**
- Wholesale, balancing, CRM and DS3 **gross margins** for solar, onshore wind and offshore wind
- Weather sensitivity analysis

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