



argusmedia.com

Argus Global Energy Certificates

Weekly market prices, news and analysis

Issue 24-1 | Friday 5 January 2024

Argus Net Zero has been renamed Argus Global Energy Certificates. All content and data services remain unaffected.

MARKET HEADLINES

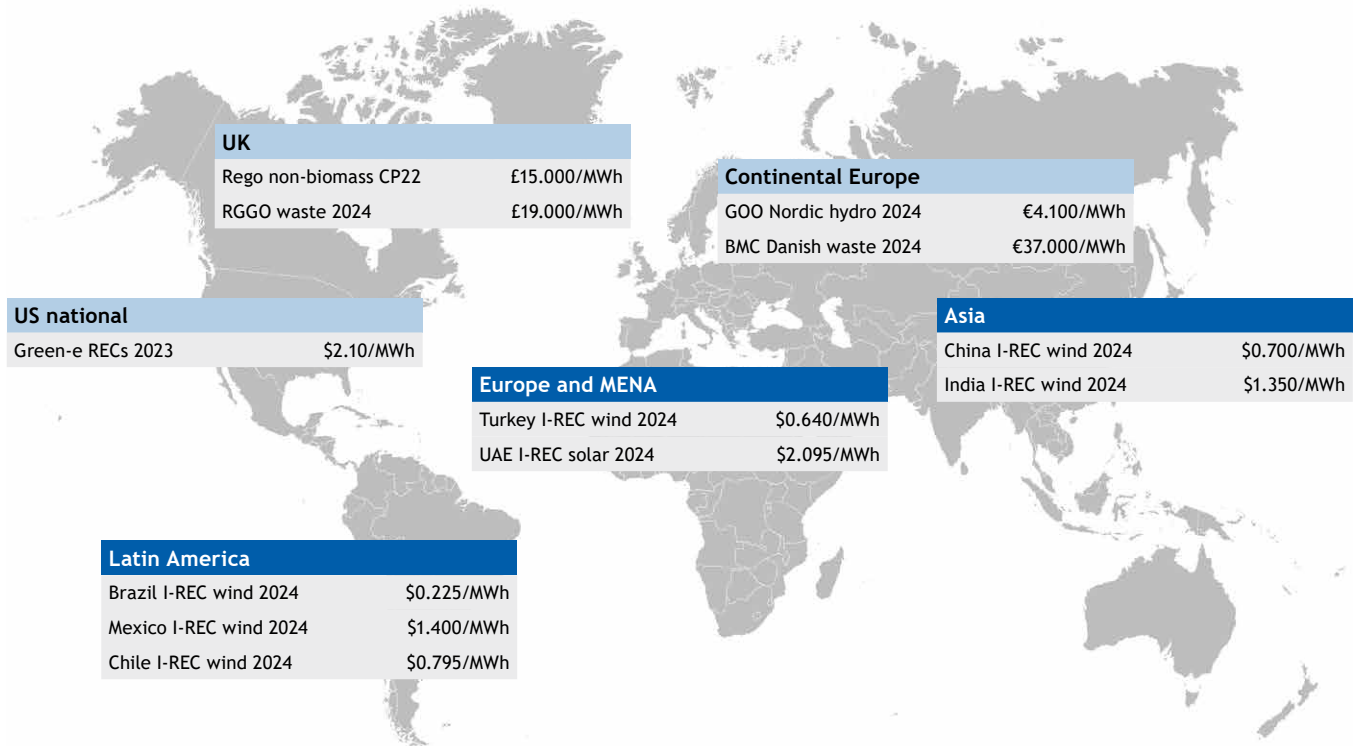
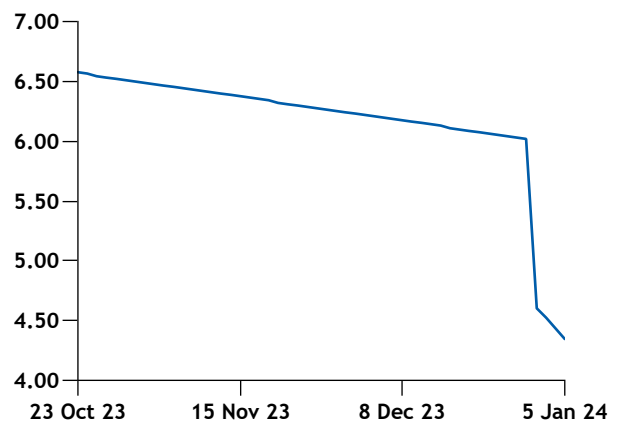
- European power GOOs: Liquidity recovers
- European biomethane GOOs: Interest in 2025 rises
- I-RECs: 2023 declines
- European 2023 trade favours generic products
- Corporate climate goals lacking ambition: CDP
- Brazil's power supply growth to outstrip demand
- UK Rego reserve below OTC market

CONTENTS

European GOO prices and market commentary	2–3
European biomethane prices and market commentary	4
I-REC prices and market commentary	5
News and analysis	From 6

Nordic hydro current-year GOO index

€/MWh



EUROPEAN GUARANTEES OF ORIGIN

Guarantee of origin certificates	€/MWh											
	Nordic hydro			Europe wind			Europe solar			Europe any renewable		
	Bid	Ask	±	Bid	Ask	±	Bid	Ask	±	Bid	Ask	±
2023	2.70	2.90	-0.150	2.70	2.90	-0.150	2.70	2.90	-0.150	2.65	2.85	-0.150
2024	4.00	4.20	-0.150	4.00	4.20	-0.150	4.00	4.20	-0.150	3.95	4.15	-0.150
2025	4.35	4.55	-0.150	4.35	4.55	-0.150	4.35	4.55	-0.150	4.25	4.45	-0.150
2026	4.50	4.60	nc	4.50	4.60	nc	4.50	4.60	nc	4.40	4.50	nc
2027	4.50	4.60	nc	4.50	4.60	nc	4.50	4.60	nc	4.40	4.50	nc

UK Regos	£/MWh					
	Non-biomass			Biomass		
	Bid	Ask	±	Bid	Ask	±
Compliance period 22	14.00	16.00	+0.250	13.50	14.60	+0.250
Compliance period 23	10.60	11.80	nc	9.45	10.95	nc
Compliance period 24	9.50	11.10	nc	8.80	9.80	nc
Compliance period 25	9.10	9.80	nc	8.40	9.40	nc

Spanish domestic	€/MWh		
	Any renewable		
	Bid	Ask	±
2023	2.60	2.80	nc
2024	3.95	4.15	-0.300

Liquidity recovers

Continental European GOO prices declined as liquidity increased towards the end of the week, but UK Regos increased for the current compliance period though activity was slow.

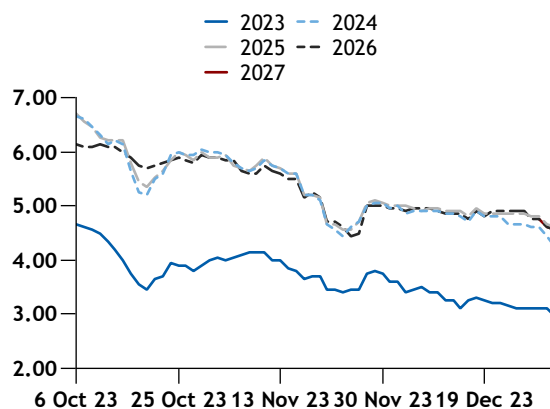
2024 Nordic hydro GOOs ended their first week as the current year at €4.10/MWh, down from €4.60/MWh at the end of December and the lowest price for 2024 vintage since late December 2022. 2024 Nordic hydro reached a high of €7.70/MWh in July last year and has declined steadily since late September. 2023 Nordic hydro fell below €3/MWh late in the week and was assessed at €2.80/MWh on Friday, while 2025-27 vintages were assessed at €4.45-4.55/MWh.

Liquidity in the OTC market increased at the end of the week with more than 1TWh trading on Friday, mostly European and Nordic hydro as well as several deals for European solar GOOs. Dutch wind 2023 GOOs traded at €4.11/MWh at the end of the week. Bulgarian wind/solar 2023 GOOs were offered at €1.65/MWh at the end of the week, while Serbian any renewable GOOs were offered at €1.25/MWh around the middle of the week.

Italy sold nearly 4.5TWh of 2023 GOOs in its bilateral auction for December, up from around 1TWh in the previous month. Weighted average prices for biomass and wind GOOs were at a premium to OTC prices, at €7.08/MWh and €3.74/MWh, respectively, while solar and hydropower traded below

Nordic hydro GOOs

€/MWh

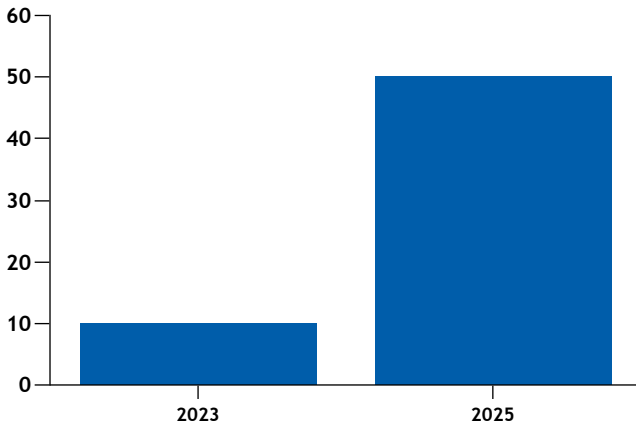


the OTC market at €3.15/MWh and €1.20/MWh (see separate story).

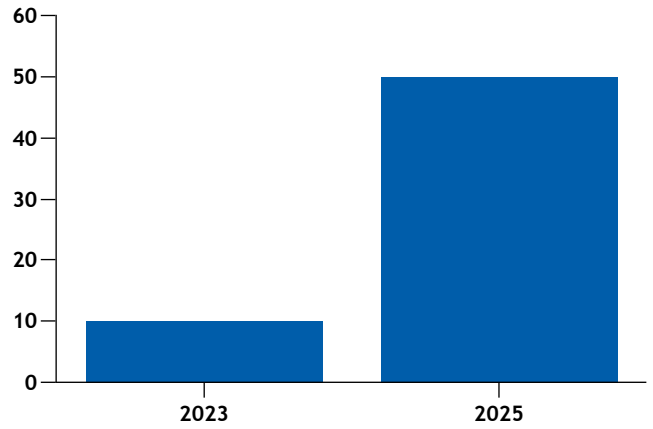
In the UK, activity on Regos was also slow throughout the week. Deals were done earlier in the week, with CP22 non-biomass trading at £14.95/MWh and £15.25/MWh in small volume deals, while offers increased to £15.75-16.00/MWh towards the end of the week. CP22 non-biomass was assessed at £15/MWh this week, up by £0.25/MWh week on week. The next Rego auction is due to take place on 18 January, with the reserve price for Regos generated in CP22 set at £8.50/MWh, down from £10/MWh at the last auction on 7 December.

GUARANTEES OF ORIGIN

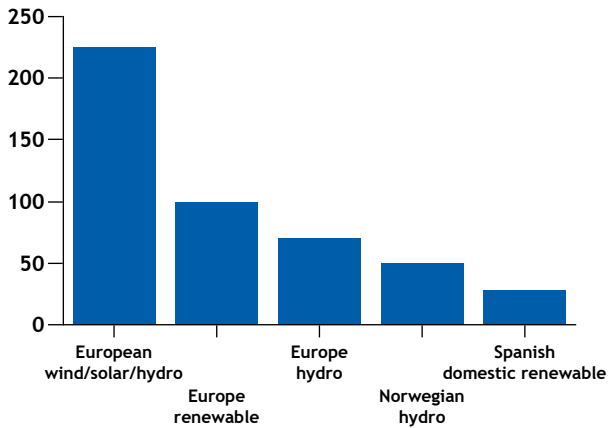
Nordic hydro monthly cumulative volume



Nordic hydro annual cumulative volume

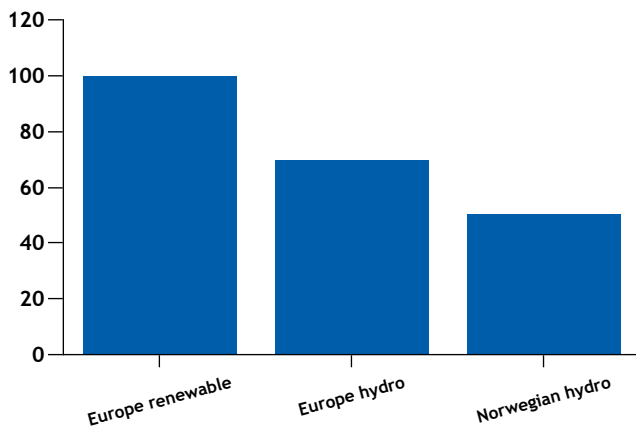


Monthly cumulative volume



*Top five most liquid non-assessed products, any vintage

Annual cumulative volume



*Top five most liquid non-assessed products, any vintage

European GOO current -year spot indexes €/MWh

Nordic hydro	4.350
European wind	4.350
European solar	4.350
European any renewable	4.288

UK Rego current compliance period spot indexes £/MWh

Non-biomass	12.988
Biomass	11.924

Spanish domestic GOO current -year spot index €/MWh

Any renewable	4.052
---------------	-------

Guarantee of origin deals

Day of trade	Product	Generation period	Volume MWh	Price €/MWh
4 Jan 24	GOO European wind/solar/hydro certificates	2024	50,000	4.240
4 Jan 24	GOO European wind/solar/hydro certificates	2023	50,000	2.900
4 Jan 24	GOO Nordic hydro certificates	2023	10,000	3.040
4 Jan 24	GOO Nordic hydro certificates	2025	50,000	4.520
4 Jan 24	GOO Europe renewable certificates	2025	50,000	4.510
4 Jan 24	GOO European wind/solar/hydro certificates	2024	50,000	4.280
4 Jan 24	GOO Europe hydro certificates	2023	20,000	2.970
4 Jan 24	GOO Norwegian hydro certificates	2025	50,000	4.650
4 Jan 24	GOO Europe wind certificates	2024	53,000	4.240
3 Jan 24	GOO Spanish domestic renewable certificates	2023	25,000	2.800
3 Jan 24	GOO European wind/solar/hydro certificates	2024	50,000	4.450

All chart volumes in GWh. Individual deal specifications available through the [Argus Direct platform](#)

EUROPEAN BIOMETHANE GUARANTEES OF ORIGIN

Interest in 2025 rises

Interest in RGGOs for 2025 vintage and beyond picked up in the first week of the new year, while activity for 2023 and current year certificates was slow.

Danish and Dutch certified waste RGGOs for 2024 shed €2.00-2.50/MWh on the week to €37/MWh and €37.50/MWh, respectively. 2024 crop RGGOs fell by €0.50/MWh in both markets to €20/MWh. RGGOs for 2025 vintage were valued at a €1/MWh premium to the current year.

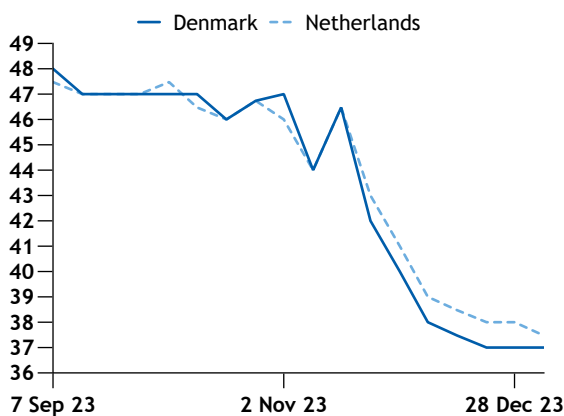
In the UK, uncertified crop and waste RGGOs fell by £1.50/MWh, with 2024 vintage at around £17/MWh and £19/MWh, respectively. There was interest for 2024 certified RGGO waste at around €33/MWh.

In France, utility Engie has this week asked Italian technology provider NextChem to design part of its Salamandre biogas plant, which will produce 11,000 t/yr of second-generation biomethane from 2026.

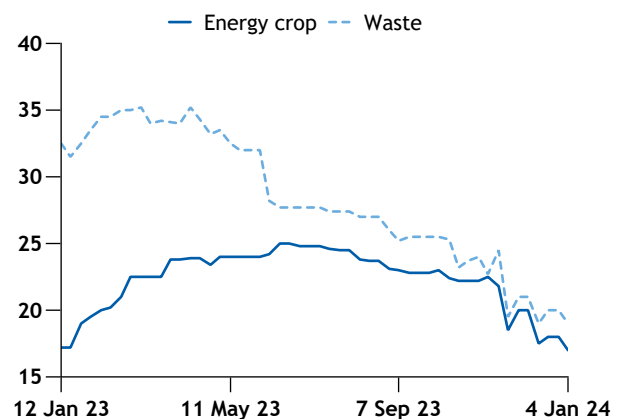
In Germany, the price for unsubsidised, RED certified and advanced biomethane with origin in Germany, a carbon intensity of minus 100gr CO2e/MJ and for delivery in 2024 held steady for the third consecutive week at €125-155/MWh in an illiquid market. Product with a CI of 10gr CO2e/MJ was also flat on the week at €75-85/MWh for delivery in 2024 compliance.

Renewable gas guarantees of origin					
	Unit	Bid	Ask	Mid	±
Denmark crop					
2023	€/MWh	18.00	20.00	19.000	+1.000
2024	€/MWh	19.00	21.00	20.000	-0.500
2025	€/MWh	20.00	22.00	21.000	nc
Denmark waste					
2023	€/MWh	35.00	37.00	36.000	-1.000
2024	€/MWh	35.00	39.00	37.000	-2.000
2025	€/MWh	36.00	40.00	38.000	nc
Netherlands crop					
2023	€/MWh	18.00	20.00	19.000	+1.000
2024	€/MWh	19.00	21.00	20.000	-0.500
2025	€/MWh	20.00	22.00	21.000	nc
Netherlands waste					
2023	€/MWh	35.00	38.00	36.500	-1.500
2024	€/MWh	36.00	39.00	37.500	-2.500
2025	€/MWh	37.00	40.00	38.500	nc
UK crop					
2023	£/MWh	16.00	17.00	16.500	-1.500
2024	£/MWh	16.00	18.00	17.000	-1.500
2025	£/MWh	17.00	18.00	17.500	nc
UK waste					
2023	£/MWh	18.00	19.00	18.500	-1.500
2024	£/MWh	18.00	20.00	19.000	-1.500
2025	£/MWh	19.00	20.00	19.500	nc

Danish, Dutch current-year waste RGGOs €/MWh



UK current-year crop and waste RGGOs £/MWh



INTERNATIONAL RENEWABLE ENERGY CERTIFICATES (I-RECS)

International renewable energy certificates (I-RECs)													\$/MWh
	Wind			Solar			Hydro			Biomass			
	Bid	Ask	±	Bid	Ask	±	Bid	Ask	±	Bid	Ask	±	
China													
2023	0.55	0.70	-0.075	0.55	0.70	-0.075	0.10	0.20	-0.015	na	na	na	
2024	0.65	0.75	nc	0.65	0.75	nc	0.15	0.30	nc	na	na	na	
UAE													
2023	na	na	na	1.91	2.10	nc	na	na	na	na	na	na	
2024	na	na	na	2.07	2.12	nc	na	na	na	na	na	na	
Brazil													
2023	0.15	0.20	-0.040	0.15	0.20	-0.040	0.09	0.17	-0.035	na	na	na	
2024	0.20	0.25	nc	0.20	0.25	nc	0.14	0.22	nc	na	na	na	
Mexico													
2023	1.25	1.35	+0.030	1.25	1.35	+0.030	0.98	1.15	+0.035	na	na	na	
2024	1.35	1.45	nc	1.35	1.45	nc	1.08	1.25	nc	na	na	na	
Chile													
2023	0.70	0.85	+0.025	0.70	0.85	+0.025	0.68	0.81	+0.025	na	na	na	
2024	0.73	0.86	nc	0.73	0.86	nc	0.70	0.85	nc	na	na	na	
Turkey													
2023	0.49	0.59	-0.055	0.49	0.59	-0.055	0.24	0.27	-0.070	0.20	0.27	-0.055	
2024	0.59	0.69	nc	0.59	0.69	nc	0.30	0.37	nc	0.27	0.30	nc	
India													
2023	1.10	1.30	-0.075	1.10	1.30	-0.075	0.73	0.93	-0.145	na	na	na	
2024	1.30	1.40	nc	1.30	1.40	nc	0.88	0.97	nc	na	na	na	

2023 declines

Prices for most 2023 I-RECs declined as liquidity remained low following the holiday period, while 2024 I-RECs were mostly assessed \$0.05-0.15/MWh premiums to 2023.

Brazilian wind/solar and hydro certificates with 2023 vintage inched down to \$0.18/MWh and \$0.13/MWh, respectively. The 2024 vintage was assessed for the first time, at a \$0.05/MWh premium for all technologies.

Brazil's power generation capacity is expected to grow at a rate faster than demand over the next four years amid lacklustre economic growth forecasts, according to data from the country's grid operator Ons. Wind power capacity is expected to reach 34.5GW at the end of 2027, up from 27.4GW in December 2023. Grid solar capacity is seen expanding at an even faster rate, reaching 19.2GW by the end of 2027, up from 10.7GW in December 2023, Ons said.

Elsewhere in the region, prices for Mexican and Chilean 2023 wind/solar I-RECs edged up to a respective \$1.30/MWh and \$0.77/MWh, with 2024 vintages for the same technologies slightly higher at \$1.40/MWh and \$0.80/MWh.

In Asia, Chinese wind/solar and hydro certificates with 2023 vintage inched down to \$0.63/MWh and \$0.15/MWh, re-

Weekly Green-e eligible REC market prices, 29 Dec					\$/MWh
	Vintage	Bid	Ask	Price	±
National any	2023	2.05	2.15	2.10	-0.15
	2024	2.75	2.95	2.85	-0.15
Texas wind	2023	2.15	2.25	2.20	-0.05
	2024	2.80	3.00	2.90	-0.15

Daily US REC pricing, news and analysis available in [Argus Air Daily](#)

spectively. The 2024 vintage was assessed at \$0.70/MWh for wind/solar and \$0.23/MWh for hydro. In India, 2023 wind/solar I-RECs moved down to \$1.20/MWh, while hydro was down at \$0.83/MWh. 2024 certificates were assessed at a \$0.15/MWh and \$0.10/MWh premium, respectively. Offers for Thai 2023 wind/solar I-RECs were around \$2/MWh, while 2023 Thai biomass certificates were offered at \$0.85/MWh.

In the Middle East, prices for 2023 UAE solar certificates were unchanged on the week at \$2/MWh, with offers as high as \$2.30/MWh. Turkish 2023 wind/solar I-RECs inched lower to \$0.54/MWh, with 2024 certificates assessed at a \$0.10/MWh premium. Turkish renewable energy firm Afken aims to install wind and solar projects of 158MW combined capacity across Turkey, the company said last month.

NEWS

European 2023 trade moves to generic products

European over-the-counter (OTC) guarantee of origin (GOO) product shifted towards more generic products last year as sellers opted for more flexibility in delivery and more speculative trading companies entered the market.

Nordic hydro products accounted for 16pc of OTC liquidity in 2023 compared with 29pc in 2022 and 38pc in 2021, according to data compiled by Argus – [see deals data](#). European hydro accounted for 25pc of trades in 2023, while European renewables and European wind/solar/hydro together made up 33pc of trades. Products labelled with a single country of origin decreased to 13pc of trades in 2023 from 26pc in 2022.

Some sellers opted for greater flexibility last year, after a drought in summer 2022 meant some companies were required to purchase higher-priced spot products to cover Nordic hydro GOOs that were sold forward for the second half of 2022. More speculative traders, with a preference for liquid generic products, have also entered the market in the past 18 months after outright prices and volatility increased. European hydro and European wind/solar/hydro have mostly traded at parity with Nordic hydro, while European any renewable, which often defaults to biomass, has retained a discount of about €0.10/MWh.

Market liquidity increased by 20pc year on year in 2023, while the total volume traded decreased by 5pc, according to Argus data. The number of trades for current and future vintages all increased in 2023, while trades for the previous year vintage decreased. The 2023 vintage represented 37pc of trades, 2024-27 vintages represented 46pc and 2022 represented 17pc of trades.

The volume of [GOOs traded at auction was down by 15pc in 2023 compared with 2022](#). GOOs sold at auction are for past production only.

By Emma Tribe

EU GOO auction trade declines in 2023

The number of EU guarantee of origin (GOO) certificates sold by auction fell by 15pc in 2023 compared with 2022, driven by lower trade in the larger European auctions in France, Portugal and Italy.

A total of 84TWh of GOOs were sold at auction last year compared with 99TWh in 2022. More than half of last year's volume came from monthly French primary auctions. Total sales in these auctions fell to 47TWh last year from 50TWh in 2022, as fewer GOOs were on offer.

About a quarter of the 2023 GOO auction volume came

from Portuguese primary auctions, of which there were six in 2023, compared with eight in 2022. The total volume sold fell to 20TWh from 25TWh in 2022.

The total volume sold in primary auctions of Italian GOO certificates fell for a fifth year to just 7TWh from 18TWh a year earlier. Italian state-owned energy agency GSE has had to roll over large volumes of unsold GOOs between auctions, and in the last auction of 2023 it [sold only 13pc of the total offered volume](#).

The number of GOO auctions increased to 53 from 43 in 2022 as two new monthly auction providers, Hupx and Epex Spot, held a year's worth of monthly auctions in 2023, compared with half a year's worth in 2022. Epex Spot increased the volume sold in auctions over the year to 5TWh last year from 0.2TWh in 2022, while Hupx volumes rose to 4TWh from 3TWh.

There was also approximately a 5pc decrease in the total volume of GOOs traded in the over-the-counter market in 2023 compared with 2022, as although 20pc more trades occurred, these were on average of a smaller volume.

By Emma Tribe

Italy's bilateral GOO sales at nine-month high

Guarantees of origin (GOOs) sold in Italy's monthly bilateral auction in December were more than four times higher than the volumes traded in November, with prices both above and below the over-the-counter (OTC) market.

Italy sold nearly 4.5TWh of GOOs with 2023 vintage in its bilateral auction for December, up from around 1TWh in the previous month and the highest since March, when almost 30TWh were sold. Hydro accounted for the majority of volumes traded last month with 2.9TWh, followed by wind at 902GWh, solar at 337GWh and biomass at 330GWh.

Weighted average prices for biomass and wind GOOs were at a premium to OTC prices, at €7.08/MWh and €3.74/MWh, respectively, while solar and hydropower traded below the OTC market at an average €3.15/MWh and €1.20/MWh. Argus assessments for Nordic hydro, European wind and European solar GOOs all averaged €3.30/MWh in December.

Biomass GOOs, which include biomethane, were introduced by Italian energy market operator GME in November within its exchange platforms following a decree published in July by the ministry for the environment and energy security. Decree 224 provides for the introduction of gas GOOs, which will be followed by hydrogen GOOs, as well as certificates for heating and cooling sources at a later stage.

By Giulio Bajona

NEWS

Polish GOO demand up in 2023 despite tax

Demand for domestic guarantees of origin (GOOs) on Polish energy exchange TGE grew by nearly a fifth year on year in 2023 despite a 97pc revenue tax introduced in August.

Cancelled GOO volumes reached 22.4TWh last year, up from 18.8TWh in 2022 and 14.8TWh in 2021. Domestic GOOs in Poland were subject to a 97pc tax on revenues for transactions concluded in 2023. The [tax was introduced in August](#), affecting the cancelled volumes for August-December that totalled 6.93TWh, compared with 7.97TWh for the same period a year earlier.

Traded GOO volumes for last year increased to 42.3TWh from 35,326 trades, up from 41.9TWh from 31,006 trades a year earlier. Monthly average traded volumes slowed following the levy's introduction to 2.6TWh, compared with 4.18TWh for January-July. GOO trades on the exchange relate to past renewable generation only.

The weighted-average price increased across 2023 to an all-time high of 24.66 zlotys/MWh (€5.55/MWh) in October, from 7.36 zlotys/MWh in January. Prices edged lower in November and ended that year at a weighted average of 22.53 zlotys/MWh in December. From October-December, Polish domestic GOOs switched to trading at a premium to continental European GOOs. Nordic hydropower GOOs for the 2023 vintage averaged €3.29/MWh in December.

By Emma Tribe

German solar additions double in 2023

Germany added a total of 17GW of renewables to the grid in 2023, the majority of which was solar capacity, according to grid regulator Bnetza.

The 17GW increase in capacity marks a 12pc rise from the end of 2022, bringing total installed renewable capacity to 170GW – [see installed renewable generation capacity data](#). Germany generated more than half of its power from renewables for the first time in 2023, according to Bnetza president Klaus Muller.

Solar additions totalled 14.1GW, with the expansion rate almost doubling on the year, raising total installed solar capacity to 81.7GW. But additions remain slower than the pace necessary to meet the 2030 target of 215GW of solar capacity, with 19 GW/yr needed to meet this goal. Bavaria was the state with the most installed solar capacity at 3.5GW.

Bnetza said that 70pc of solar installations in the country have a storage facility. The number of plug-in solar or “balcony” systems increased threefold on the year, with 260,000 such systems having been registered in 2023, although this accounts for only 1.5pc of total solar additions.

Net onshore wind additions rose by 2.9GW in 2023, raising total onshore capacity to 60.9GW. An additional 7.7 GW/yr would be needed to reach the 2030 goal of 115GW of installed capacity. But 80pc more permits were issued in 2023 than in 2022, with 8GW having been approved and waiting to be implemented in the coming years.

Schleswig-Holstein recorded the most onshore wind additions at 1.1GW. An analysis [published in late December](#) by non-governmental organisation Climate Neutral Germany Initiative and UK-based think tank Ember found that Bavarian wind capacity could increase sixfold if regulations for the installation of wind turbines were loosened.

Offshore wind additions totalled about 300MW in 2023, with the connection of the Arcadis Ost I wind farm to the grid. The pace of additions remained flat on the year, with total capacity in the Baltic and North seas having been raised to 8.5GW. An additional 21.5GW of additions are needed to reach the 2030 target of installed capacity. But [an analysis published in early December](#) by lobby group German Offshore Wind Energy Foundation pointed to the likelihood of bottlenecks in the expansion of offshore wind facilities at the end of the decade.

About 120MW of biomass additions were reported for 2023, a twofold increase on the year, with the commissioning of three combined heat and power plants. Total capacity has risen to about 9GW.

By Adrien Seewald

Wind lifts German renewables in December

Renewables increased their share of the German generation mix in December, driven by strong wind output in the second half of the month as renewable output increased on the year in 2023.

Renewables accounted for 62.5pc of the power mix in December, up from 60.4pc in November. Combined onshore and offshore wind output rose by 2.6GW on the month to the highest since February 2022 at 25.7GW, and the highest of any December in the past six years. Wind output's share of the power mix rose to almost 45pc, up from 41pc in November. Wind output increased sharply in the final two weeks of 2023, averaging 36.6GW. That pushed up total production by around 1.3GW month-on-month to an average of 57.7GW.

Total thermal output fell by 700MW on the month to 21.6GW. Coal fell by 230MW to average 5.3GW and lignite-fired output by 690MW to average 9.3GW. Gas-fired output rose above 7GW for the first time since February, with the German VTP gas contract averaging €7.87/MWh less than in November. Working day-ahead operating margins for 40pc-

NEWS

efficient coal-fired plants stood at a disadvantage to those of 55pc-efficient gas-fired plants from 4 December onward, with that widening throughout the month.

Minimum temperatures in Essen, Berlin and Munich decreased in December, with temperatures in Munich averaging below minus 1°C, down by 3°C month-on-month. But total demand remained flat on the month, suppressed by several public holidays.

Germany widened its net export position to an average of 3.5GW in December, up from 30.4MW in November. Germany switched to become a net exporter to Denmark, with net flows reaching 590MW, up by over 1GW on the month. And Germany's net export position to Austria widened by an average of more than 600MW from November. But Germany ended last year as a net importer, with average net inflows reaching 1GW in 2023 from average net exports of 3GW in 2022.

Renewables' share of the power mix in 2023 rose by 0.8 percentage points on the year to 63.9pc. Solar photovoltaic generation expanded its share by 1.35 percentage points to 12.3pc, while combined onshore and offshore wind increased its portion by around seven percentage points to over a quarter of total generation.

Germany's nuclear phase-out – [completed in April](#) – decreased nuclear output's split of the generation mix by five percentage points. And the share of thermal output also fell on the year, with coal decreasing by 2.6 percentage points to 8.8pc and lignite-fired generation decreasing by 3.1 percentage points to 17.3pc.

The country's nuclear phase-out and falling lignite-fired output combined to depress total generation by 6.5GW year-on-year, with lignite-fired output down by nearly 3GW to 8.9GW in 2023.

By Adrien Seewald

Greece to support renewables in Bulgaria, Italy

The Greek government has opened a tender to support renewable projects with 200MW of combined capacity installed in neighbouring interconnected countries.

Projects developed in Bulgaria or Italy can participate in this round, according to the government's decree. Wind farm projects of 6MW capacity or larger and solar photovoltaic (PV) plants of at least 1MW capacity can participate in the auction, and the maximum support level is set at €54/MWh for solar and €63/MWh for wind.

Projects should also have a grid connection agreement secured to participate in the tender. Solar developers should complete their projects within 30 months from the end of

the tender, and wind developers within three years.

Interested parties can submit their applications until 11 March, with the results of the auctions expected to be announced by 18 April.

Greece wants to [add 9.3GW of solar and 2.5GW of onshore wind capacity by 2030](#). The country [increased its interconnection capacity with Bulgaria](#) in the second half of 2023 and aims to [triple its existing interconnection capacity with Italy](#).

By Apostolos Tsarikas

Corporate climate goals lacking ambition: CDP

Statistics published by environmental non-profit group CDP last year show an increase in the number of organisations disclosing environmental data, but only a small percentage have set clear renewable energy targets.

The 2023 report shows that more than 23,000 companies in about 130 countries disclosed their environmental performance data to CDP, a 24pc increase from 2022 and more than 140pc increase from 2020. Europe leads the upward trend with a 193pc increase in 2023 to 7,682 corporate disclosures from 2020 levels, followed by a 172pc increase in Asia over the same time frame to 8,019 disclosures. Africa remains the region with the smallest number of disclosures at 205 following a 67pc increase in 2023.

Only about 56pc of companies disclosed their energy consumption levels, of which nearly 70pc – or about 9,000 – reported that they use renewable energy in their energy mix. But overall, only 10pc of all disclosing organisations – just over 2,000 – have set renewable energy consumption targets, with the majority of them aiming for 90-100pc renewable energy consumption by 2030 or earlier.

Most companies submitting their data to CDP in 2023 reported on Scope 1 and Scope 2 emissions, with 67pc and 62pc of disclosers, respectively. Only 37pc of companies disclosed emissions across all three scopes.

The report suggests that in moving towards a low-carbon economy, stakeholders – including investors – should push for more transparency in order to better understand companies' impact on the environment.

CDP last year called on companies to [improve the detail and scope of their climate transition plans](#) in order to better align with a 1.5°C limit on global warming.

By Giulio Bajona

EU coal burn at multi-decade low in 2023

Europe's hard coal-fired generation fell to a multi-decade low in 2023, eroded by coal-to-gas switching, improved

NEWS

French nuclear performance and coal plant phase-outs.

Hard coal-fired generation (non-lignite) in key European markets – Poland, Germany, Italy, Spain, France, the UK, Ireland, the Netherlands, Denmark, Finland, Croatia and the Czech Republic – fell by 31pc on the year to 16.5GW in 2023, grid operator data compiled by Argus show.

This was below the Covid-impacted 2020 level of 17.9GW, and around half the recent peak of 33.9GW recorded in 2018. Coal burn in 2023 was likely the lowest for several decades, although a full historic dataset stripping out hard coal generation (which is nowadays supplied by imported coal) from lignite generation (supplied by domestically-produced brown coal) is unavailable.

Eurostat data going back to 1990 shows EU hard coal consumption (including coking coal, anthracite and other bituminous coal but excluding brown coal) has fallen steadily from 390mn t in 1990 to 160mn t in 2022.

Last year's hard coal-fired generation is equivalent to 53.2mn t on NAR 5,800 kcal/kg product burnt at 40pc efficiency, down from 77.3mn t of implied burn in 2022.

Hard coal burn fell across all the countries surveyed in 2023. Poland was Europe's largest generator in 2023, with output slipping 14pc on the year to 7.5GW. German generation fell by 38pc to 4.4GW despite the country closing its final nuclear plants, with Italian and Dutch generation declining by 42pc and 43pc respectively to 1.4GW and 1.3GW. The Dutch data includes biomass co-firing.

Hard coal generation in Northern Ireland [ceased in September 2023](#) with the closure of the Kilroot plant. The West Burton and Drax plants in Great Britain (GB) also closed in 2023, and the [Ratcliffe-on-Soar facility is set to follow suit in September 2024](#). GB coal output dropped by 35pc on the year to 0.3GW in 2023.

Improved French nuclear availability last year was a key factor suppressing regional coal demand. Operator EDF [generated 36.5GW from the French nuclear fleet over 1-25 December](#), compared with 31.6GW during the same outage-affected period in 2022.

More favourable coal-to-gas-switching prices across Europe in 2023 compared with 2022 also drove the trend. Gas and coal prices decoupled in 2022, bringing coal burn in Europe into the money for long periods. This drove Europe's coal burn to a three-year high in 2022, and arrested the long-term trend of declining consumption.

German baseload 40pc efficient day-ahead clean dark spreads averaged minus €9.57/MWh in 2023, down from €92.31/MWh in 2022 and €24.72/MWh in 2021. Equivalent clean spark spreads for 55pc efficient gas plants using

TTF prices averaged €20.69/MWh in 2023, compared with €137.18/MWh in 2022 and €51.83/MWh in 2021.

Windy December dents German coal

Europe's hard coal-fired generation in December dropped by 13.9GW on the year to 17.3GW. Output also dropped by 7.1pc on the month.

A bumper month for German wind - which generated 25.6GW, some 9.8GW higher on the year - dented German fossil fuel generation last month. German hard coal output dropped 50pc to 4.9GW, gas output by 36.3pc to 10.1GW and lignite generation by 22.1pc to 9.7GW.

Hard coal-fired generation in December fell on the year across all countries surveyed, although the drop in Poland's generation (18.4pc to 8.3GW) was relatively modest compared to other countries.

GB coal-fired generation fell to 0.41GW from 0.8GW in November, when output was boosted by low wind output and colder-than-usual temperatures.

2024 outlook

Europe is [sitting on relatively high coal](#) and gas inventories heading into 2024, which could weigh on the continent's hard coal import appetite in the short term.

The pace of coal plant shutdowns across the region is likely to increase into 2024 and 2025, after several units received stays of execution in 2022. But this year's coal burn will again hinge on winter temperatures, renewables performance, gas-coal fuel-switching economics and French nuclear availability.

Argus Consulting is forecasting a recovery in Europe's coal demand (including Turkey) to 93.5mn t in 2024 from 87.6mn t in 2023.

By Alex Thackrah

Georgia opens second renewables tender

Georgia's government opened its second tender to support renewable projects of 800MW capacity – almost three times the capacity tendered in February last year.

More technologies will be supported in the second round, with hydro projects split between run-of-river and “regulated”, with the latter including pumped-storage hydropower plants. The tender also introduces the categories of hybrid solar and wind power plants combined with battery storage. “Other renewable energy sources” will also be supported for the first time.

Most of the capacity will be awarded to regulated hydropower plants, with 300MW expected to be allocated.

NEWS

Run-of-river projects may bid for a total of 100MW, and solar and wind power plants for a total of 125MW each. Some 140MW will be allocated to hybrid projects with battery storage, split evenly between wind and solar and 10MW for other renewables.

The regulated hydropower category will contribute to increasing Georgia's energy independence, deputy economy minister Romeo Mikautadze said.

Only new projects are permitted to bid, though some projects not yet under construction can split their capacities between the tenders and the state-supported power purchase agreements (PPA) which the government revived a year ago.

Interested parties have 45 days – until the middle of February – to submit their interest.

The first auction, with a total capacity of 300MW, [had been three times oversubscribed](#), with just under half of the tender volume – 149MW – awarded to a total of 14 hydro projects, and the remainder split almost evenly between 10 solar installations and two wind farms. The highest price of \$68.50/MWh was awarded to five hydropower projects, ranging in size from 1.5-21.1MW. The lowest price was awarded to a 6MW solar project, at \$53/MWh – raising questions on the project's viability.

A third tender will be held next year, though the economy ministry has not provided any further details.

Georgia faces a growing shortfall in domestic generation. The country aims to export power to the EU via the planned Black Sea interconnector, which will link the country's power system to Romania by 2030. The opening of Georgia's power market has been repeatedly postponed and is now scheduled for July 2024, though there is little optimism within the country's power sector on the latest deadline.

While the market opening is regarded as essential for providing price, and hence investment signals, the state-supported PPAs and tenders offer some compensation. PPAs get \$60/MWh, broadly mirroring the results from the first tender.

By Chloe Jardine

Danish CIP acquires 850MW Soltec PV portfolio

Danish investment firm Copenhagen Infrastructure Partners (CIP) will purchase Spanish solar developer Soltec's planned 850MW Danish solar photovoltaic portfolio.

CIP will acquire the projects for its Energy Transition Fund I (CI ETF I), intending to develop, build and operate the plants to provide electricity for its planned Fjord sustainable aviation fuel and Host ammonia/hydrogen facilities.

The proposed developments are planned for sites across the country, but most projects will be installed in Jutland, central Denmark. All projects are at an early development stage.

Copenhagen Infrastructure Partners (CIP) have recently moved forward with several renewable projects. It was one of two firms to be awarded up to [1.4GW of offshore wind capacity](#) in the Baltic Sea, in Estonia's first offshore wind tender last month.

By Daniel Craig

Engie's Salamandre biogas plant progresses

French utility Engie has asked Italian technology provider NextChem to design part of its [Salamandre biogas plant](#), which will produce 11,000 t/yr of second-generation biogas from 2026.

Maire-owned NextChem Tech will develop a Pre-Front End Engineering Design (Pre-FEED) for the gasification and methanation of waste wood at the Normandy-based plant, as well as a carbon capture unit.

The plant should produce around 20MW of biogas, NextChem said. Engie aims to produce 4TWh of biogas by 2030. It agreed to supply French chemical company Arkema with 300 GWh/yr of biogas for 10 years on 1 January 2023.

The agreement follows a successful engineering study in April 2023 for the gasification of waste wood and the purification of syngas to produce biogas.

While French biogas output is likely to rise, its share in total French gas consumption remains limited. France consumed roughly 455 TWh/yr of gas in 2020-22.

By Madeleine Jenkins

German emissions slump in 2023: Agora

Germany's greenhouse gas (GHG) emissions in 2023 slumped by around 10pc year-on-year on falling coal-fired power generation and a decline in industrial production, according to preliminary calculations published by Berlin-based think-tank Agora Energiewende today.

Germany last year emitted 673mn t of CO₂ equivalent (CO₂e), which was 10pc less than in 2022 and 49mn t CO₂e below the target level set in the country's climate action law, Agora found.

Only 15pc of the emissions reductions achieved last year can be attributed to "long-term savings" resulting mainly from the expansion of renewable energies, higher energy efficiency and the switch to low-carbon fuels or alternatives, Agora said.

NEWS

And half of last year's emissions savings are unsustainable as they are the result of short-term effects, Agora said. In the longer term power consumption could move back up again, or parts of Germany's industry production may shift abroad.

Falling coal-fired power generation last year accounted for a decline of 44mn t CO₂e, of which lignite contributed 29mn t CO₂e and hard coal 15mn t CO₂e, Agora calculated. The think-tank attributed the slump in coal-fired power generation to last year's significant decline in electricity demand, increased electricity imports from neighbouring countries and a corresponding decrease in electricity exports, and a slight increase in renewable power generation.

GHG emissions from Germany's industry fell by 12pc, or 20mn t CO₂e, on the year, Agora calculated. The country's energy-intensive production fell by 11pc in 2023 against a backdrop of a 0.3pc fall in Germany's GDP.

"We are on a very good path, particularly regarding power generation: coal-fired power generation is at an historic low, and the expansion of renewables has clearly increased thanks to the hard work of the last two years," German economy and climate action minister Robert Habeck commented on Agora's calculations.

Habeck also stressed the government is working on countering the negative effects of high energy prices on Germany's industry.

Agora data show the transport and buildings sectors hardly cut their emissions last year, as a result breaching their emissions limits set in the climate action law for the third year running for transport, and the fourth year running for construction. Environmental non-government organisation DUH slammed the lack of progress in these sectors, and called for "urgent and immediate measures".

The transport sector exceeded its limit by 12mn t CO₂e, posting emissions of 133mn t CO₂e. The buildings sector, at 101mn t CO₂e, exceeded its level by 8mn t CO₂e, although emissions sank by 3mn t CO₂e on the year, mainly on lower heat consumption from households with gas-fired heating systems.

By Chloe Jardine

Brazilian power capacity growth rises in 2023

Brazil increased installed power generation capacity connected to the grid by a record 10.3GW in 2023, consolidating its position as a global leader in renewable power.

With the new capacity, Brazil ended 2023 with nearly 200GW of installed capacity connected to the grid, of which roughly 84pc is renewable power. The expansion was the

largest since Aneel started recording new power capacity in 1997.

Wind generation contributed 4.9GW of new power generation to the grid last year, with 140 new wind farms entering operation. On-grid solar power capacity increased by nearly 4.1GW, with 104 new solar plants coming on line, according to the electricity regulator Aneel.

Thermoelectric capacity increased by 1.2GW, with 33 new plants coming on line. Roughly 1GW of new capacity came from fossil-fuel powered plants and the remaining 200MW was from biomass-fired generators.

Hydroelectric generation increased by 169MW, including both small- and medium-sized hydroelectric plants.

Northeastern Bahia state posted the largest capacity expansion at 2.6GW, followed by Rio Grande do Norte with nearly 2.3GW added and Minas Gerais with 2GW.

Distributed generation (DG) also posted solid expansion, with 7.4GW of new capacity added last year, down slightly from the 8.3GW of new DG capacity added in 2022, according to Aneel. With the new capacity, Brazil's total DG reached 25.8GW, the overwhelming majority of which is rooftop solar.

Brazil also added 5,481km (3,405 miles) of new transmission infrastructure in 2023. The government has sold a record level of build-and-operate power transmission concessions, which will result in the construction of 10,655km of new power transmission capacity and R37.4bn (\$7.6bn) in investments over the next six years.

Brazil's power supply growth to outstrip demand

Brazil's power generation capacity is expected to grow at a rate faster than demand over the next four years amid lacklustre economic growth forecasts, data from the country's grid operator Ons show.

Through the end of 2027, demand from consumers connected to the grid is forecast to grow at an annual rate of 3.2pc. With the increase in demand, power demand from the grid will reach an average of 108GW in 2027, up from an average of 96GW in 2023, according to ONS. The demand forecast is based on annual economic growth of 2.25pc for the period between 2024 and 2027.

Meanwhile, Brazil's total installed capacity, including both on and off-grid generation, is expected to climb by over 16pc to more than 250GW by the end of 2027 from 215GW at the end of 2023, ONS forecast.

Wind generation is expected to reach 34.5GW of installed capacity at the end of 2027, up from 27.4GW in December 2023. Grid solar capacity is seen expanding at an even faster

NEWS

rate, reaching 19.2GW by the end of 2027, up from 10.7GW in December 2023, Ons said.

Distributed generation, which has been expanding rapidly in recent years, is forecast to reach 40GW of installed capacity by 2027, up from 25.8GW at the start of this year.

Hydroelectric generation capacity is expected to remain practically stable, with installed capacity to remain at around 108GW. Biomass capacity is seen expanding modestly, reaching 16.7GW of capacity, up from 15.5GW currently, while fossil-fuel thermoelectric capacity will increase to 31.4GW from 26.3GW in December 2023.

The ONS said that the rise of intermittent power generation would make operating the grid increasingly complex, which will require significant investments in transmission capacity. Investment in the power transmission sector is forecast to reach R49bn (\$10bn) over the period, with R4.9bn forecast for this year.

Even with increased investments, the ONS estimates that power transmission capacity will remain insufficient to meet expanding generation capacity until 2029 or 2030, when transmission infrastructure will be sufficient to transport electricity generated in northeastern Brazil to consumers in other regions of the country.

The ONS also warned that demand will fall short of growing electricity supplies, which will require the grid operator to be increasingly flexible as it seeks to provide reliable power to consumers at the lowest cost.

Brazil's Orizon boosts Copergas biomethane deal

Brazilian waste management firm Orizon expanded its biomethane supply contract with northeastern Pernambuco state gas distributor Copergas.

The new contract is for an additional 50,000 m³/d of biomethane starting in the second quarter of 2025 under a 10-year contract and the option to purchase an additional 20,000 m³/d of the renewable gas, Orizon said.

Orizon has a 60,000 m³/d supply contract with Copergas that begins later this year. Orizon will now have contracts for 85-90pc of the installed biomethane production capacity at its waste management facility in Jaboatao dos Guarapes, in Pernambuco.

The companies also agreed to share the revenues from the future sale of any renewable energy certificates for the respective biomethane production.

Biomethane production at the Pernambuco landfill remains on track to begin in the third quarter of this year, Orizon said. It manages 16 landfills in 11 Brazilian states.

Mass. offshore wind farm starts up

The first utility-scale offshore wind farm in New England has supplied electricity to the regional grid for the first time, according to the project's developers.

A turbine from the Vineyard Wind I system yesterday delivered about 5MW of power to the grid overseen by ISO-New England, developers Copenhagen Infrastructure Partners (CIP) and Iberdrola said on Wednesday. The two expect further testing in the coming weeks and plan to have five of the project's 62 turbines operating "at full capacity" in early 2024.

Massachusetts governor Maura Healey (D) called the milestone a "historic moment for the American offshore wind industry."

CIP affiliate Vineyard Offshore expects the 806MW Vineyard Wind I to be fully operational by the end of the year.

When completed, the project will produce enough electricity to power more than 400,000 households. It has fully contracted its energy and Class I renewable energy certificates for a 20-year term to Massachusetts' three electricity distributors – Eversource, National Grid and Unitil.

Vineyard Wind in its construction and operations plan filed with US regulators estimated the project would have capacity factor exceeding 45pc, putting its minimum output around 3.18mn MWh/yr once fully operational. The capacity factor describes a project's actual generation relative to its theoretical maximum output, as influenced by factors like the components and the wind potential at the system's location, which can change from month to month depending on regional and seasonal weather.

Vineyard Wind I is the first utility-scale offshore wind project linked with the New England region and follows closely on the heels of New York's 132MW South Fork Wind project, which became the first large-scale offshore wind project to [deliver power](#) anywhere in the US last month.

Rhode Island's 30MW Block Island wind farm, which [began operating](#) in 2016, was the first commercial offshore wind farm in the US.

By Patrick Zemanek

Alternative fuel vessels 45pc of 2023 orderbook

Orders for vessels with alternative fuel capabilities accounted for 45pc of the gross tonnage of newbuilds ordered in 2023, Clarksons Research said in its latest Green Technology Tracker.

The largest proportion of these 539 orders are for LNG dual fuelled ships – 218 in total – while the remaining new-

NEWS

build orders were mostly for vessels to be methanol fuelled, LPG fuelled, or with battery/hybrid propulsion. Last year also saw an increase in newbuild orders for vessels that are alternative fuel 'ready', with 631 vessels in the orderbook that are either LNG, methanol or ammonia ready meaning there is greater optionality over fuel choice in the future.

Alternative fuelled vessels making up 45pc of gross tonnage ordered in 2023 is down compared with 2022, in which around 55pc of placed newbuild orders by tonnage were alternatively fuelled, but remains up when compared with 2021 when the figure was only 31pc. In all, nearly 49pc of the gross tonnage but only 23pc in terms of the number of vessels in the current orderbook is for newbuilds with alternative fuel capability, suggesting alternative fuel orders are concentrated in larger vessel sizes.

"Overall today, 6pc of global fleet capacity is alternative fuelled capable – up from 2.3pc in 2017 – which we project will increase to nearly a quarter of all fleet capacity by the end of the decade," global head of Clarksons Research Steve Gordon said.

Newbuild orders as a proportion of fleet capacity is 9pc for dry bulk vessels and 7pc for tankers as the average age of the world fleet increases to over 12.6 years compared with only 9.7 years in 2013, with 32pc of global tonnage aged over 15 years. As the age of ships increases, repairs and conversion projects to extend the longevity of ships could offer an opportunity to maximise the efficiency of the current fleet and reduce greenhouse gas emissions without the financial and environmental costs associated with newbuilds.

This increasing emphasis on alternatively fuelled ships comes as the maritime industry looks to reach the International Maritime Organisation's (IMO) decarbonisation targets of a 20-30pc reduction in GHG emissions by 2030, and 70-80pc by 2040.

By Olivia Young

UK Rego reserve below OTC market

The reserve price in this month's auction for UK renewable energy guarantees of origin (Regos) has been set at its lowest level in four months, remaining at a wide discount to the over-the-counter (OTC) market.

The reserve price for all technology Regos is set at

£8.50/MWh in the auction scheduled to take place on 18 January, down from £10/MWh at the last auction on 7 December. This is the lowest price since [September 2023](#), when it was set at £8/MWh. The auction will offer Regos generated within compliance period 22 (CP22), which spans April 2023-March 2024. During the December auction, about [55GWh of Regos sold at prices below the OTC market](#) for a weighted average price of £11.61/MWh.

Argus last assessed CP22 Rego non-biomass prices at £14.75/MWh in the week to 28 December, more than two times higher on the year. CP22 Rego biomass was last assessed at £13.80/MWh, also more than doubling from December 2022. Rego prices rose sharply last year after the ban on EU guarantee of origin imports to the UK from April. But the market has experienced significant volatility since the 14 November E-Power auction, when [only about a quarter of the 434GWh offered was sold](#).

By Giulio Bajona

Japan's Jera starts Hokkaido wind farm

Japanese utility Jera started commercial operations on 1 January of its 112MW Ishikariwan-Shinko offshore wind power farm in Japan's northernmost prefecture of Hokkaido.

The wind power firm consists of 14 turbines with 8MW capacity each off the coast of Ishikari city in Hokkaido. Electricity will be delivered to a substation equipped with 180MWh storage batteries, to be supplied to utility Hokkaido Electric Power's grid company Hokkaido Electric Power Network. The electricity will be sold to Hokkaido Electric Power Network under the country's feed-in-tariff scheme at ¥36/kWh (\$0.25/kWh) for 20 years.

Jera, Japan's largest power producer by capacity, will operate the wind power farm through the joint venture Green Power Ishikari with renewable energy firm Green Power Investment.

Green Power Investment and Hokkaido Electric Power are studying the use of surplus electricity produced at the wind power farm to [manufacture hydrogen](#). They will also explore consumption of hydrogen in Ishikari and Sapporo cities in Hokkaido with emerging demand from the transportation sector.

By Nanami Oki

New: Quick access to price history and charts

Dear Argus customer,

If you have a subscription to the online *Argus Direct* service, you now have quick access to a view of price history direct from this PDF.

Click on a price series value, and provided you are connected to the internet, you will be taken directly to the price series on *Argus Direct* in your browser, where you can view and chart the history.

In advanced PDF viewers, you can also hover over the price to see the underlying Argus PA code.

Global emissions pricing, 4 Jan

	Price	±
Global compliance carbon index \$/t	65.83	-1.29
Global green power index \$/MWh	5.51	-0.11



Argus Global Energy Certificates is published by Argus Media group

Registered office

Lacon House, 84 Theobald's Road,
London, WC1X 8NL
Tel: +44 20 7780 4200

ISSN: 3029-0333

Copyright notice

Copyright © 2024 Argus Media group
All rights reserved

All intellectual property rights in this publication and the information published herein are the exclusive property of Argus and/or its licensors (including exchanges) and may only be used under licence from Argus. Without limiting the foregoing, by accessing this publication you agree that you will not copy or reproduce or use any part of its contents (including, but not limited to, single prices or any other individual items of data) in any form or for any purpose whatsoever except under valid licence from Argus. Further, your access to and use of data from exchanges may be subject to additional fees and/or execution of a separate agreement, whether directly with the exchanges or through Argus.

Trademark notice

ARGUS, the ARGUS logo, ARGUS MEDIA, INTEGER, ARGUS GLOBAL ENERGY CERTIFICATES, other ARGUS publication titles and ARGUS index names are trademarks of Argus Media Limited. Visit www.argusmedia.com/Ft/trademarks for more information.

Disclaimer

The data and other information published herein (the "Data") are provided on an "as is" basis. Argus and its licensors (including exchanges) make no warranties, express or implied, as to the accuracy, adequacy, timeliness, or completeness of the Data or fitness for any particular purpose. Argus and its licensors (including exchanges) shall not be liable for any loss, claims or damage arising from any party's reliance on the Data and disclaim any and all liability related to or arising out of use of the Data to the full extent permissible by law.

All personal contact information is held and used in accordance with Argus Media's Privacy Policy <https://www.argusmedia.com/en/privacy-policy>

Publisher

Adrian Binks

Chief operating officer
Matthew Burkley

Global compliance officer
Vladas Stankevicius

Chief commercial officer
Jo Loudiadis

President, Oil
Euan Craik

Global head of editorial
Neil Fleming

Editor in chief
Jim Washer

Managing editor
Andrew Bonnington

Editor
Justin Colley
Tel: +44 20 7780 4666
justin.colley@argusmedia.com

Customer support and sales:

support@argusmedia.com
sales@argusmedia.com

London, Tel: +44 20 7780 4200

Houston, Tel: +1 713 968 0000

Singapore, Tel: +65 6496 9966



Power

illuminating the markets[®]