

A U R O R A

# Spring Forum

Oxford 2023

Wednesday 29 March  
Examination Schools, University of Oxford



FACING NEW REALITIES:  
Rethinking energy use,  
supply, and policy in the wake  
of the global energy crisis

In partnership with:



**Clarke**  
**Energy**<sup>®</sup>  
A KOHLER COMPANY

Engineer - Install - Maintain

HILL2E  
CHANGE THE GAME OF ENERGY!

LAZARD | 175  
YEARS

MUFG

Osborne Clarke

RWE

Schroders  
greencoat



# Spring Forum

Oxford 2023



## DEAR FRIENDS AND COLLEAGUES

It was my great pleasure to welcome you to Oxford this year for the 9th edition of the Aurora Spring Forum. What a fantastic day!

Europe has managed the energy crisis of 2022 better than expected, and yet last year also brought into view just how important the energy sector remains for humanity globally.

Lord John Browne summarised the current situation very clearly during his keynote: "We are the world's largest industry, we are vital to modern life, and we are complex... remember our purpose, to improve humanity's lot."

Thanks to our collective engagement and discussion, I feel I made progress in my thinking on how our industry can improve humanity's lot. I very much hope you share my sense of progress from the day on some of the most challenging questions our industry faces right now. It was also simply brilliant to see so many friends in person and in Spring(!) after so long.

Many people deserve thanks for the critical role that they played in bringing the 2023 Spring Forum into existence. Our speakers were brilliant, including Ignacio Galán, Executive Chairman of Iberdrola, who opened the event with a distinguished keynote based on his unique and influential position within the global energy sector. I'm also extremely grateful to our keynote panellists Hunter Hunt, Chairman & CEO, Hunt Energy; Markus Krebber, CEO, RWE; Michele Crisostomo, Chair, Enel; Sinead Gorman, CFO, Shell; Amber Rudd, Former Secretary of State for Energy and Climate Change; Cameron Hepburn, Professor of Environmental Economics, University of Oxford; Greg Jackson, Founder & CEO, Octopus Energy; and Miguel Stilwell D'Andrade, CEO EDP & EDP Renewables.

Our generous sponsors are due special appreciation. The partnerships with Barclays, Clarke Energy, HH2E, Lazard, MUFG, Osborne Clarke, RWE, and Schroders Greencoat are built on many years of fruitful cooperation, and we would like to thank them for supporting the Aurora Spring Forum 2023.

Finally, thank you to my own team at Aurora, especially Narcisa-Camelia Danila and Ethel Chiodelli, for their diligence, commitment, and adaptability in staging the Aurora Spring Forum 2023.

We look forward to welcoming you again next year on Tuesday 26 March in Oxford to continue the discussion!

John Feddersen, Founder & CEO, Aurora



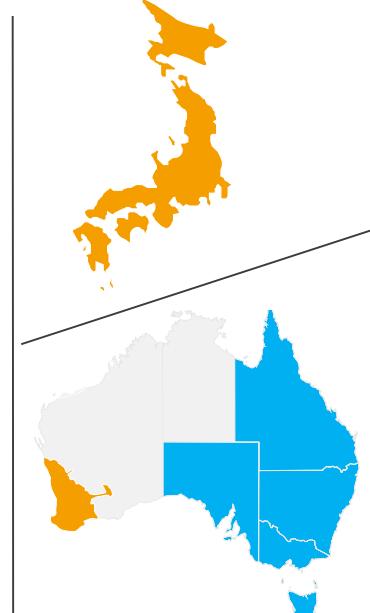
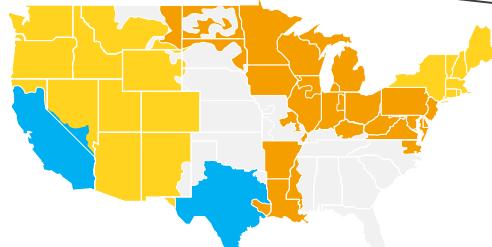
Click [HERE](#) to view the presentation

Tweet: @AuroraER\_Oxford #auroraspringforum

# AURORA'S POWER MARKET SUBSCRIPTION SERVICES

## MARKET ANALYSIS AND FORECASTS FOR ALL POWER MARKET PARTICIPANTS

Subscribe to powerful forecast and data services for tailored research in market developments, policy interpretation, and topical insights on energy markets issues



**POWER AND RENEWABLES + FLEXIBLE ENERGY MARKET SERVICE**



**POWER AND RENEWABLES SERVICE** ● COMING SOON



**BESPOKE FORECASTS**

### POWER AND RENEWABLES SERVICE

Power and renewables market and forecast reports

All relevant forecast data for a renewables business case in Excel

Strategic insight reports

Regular subscriber group meetings

Policy updates

Bilateral workshops

Analyst support

### FLEXIBLE ENERGY MARKET SERVICE

Detailed forecasts on wholesale, balancing, ancillary services & capacity markets

Battery storage gross margin forecasts under revenue stacking models

Regular policy and market updates

Bilateral workshops

Analyst support

### BESPOKE FORECASTS

We can provide power & renewable market forecasts upon request

Get in touch, book a demo and hear more about our services:

**Tom Wilson, Commercial Manager**  
**[tom.wilson@auroraer.com](mailto:tom.wilson@auroraer.com)**



Explore our offerings:  
Scan the QR code



# Aurora Spring Forum

Oxford 2023

## SOCIAL MEDIA, FEEDBACK & IN THE NEWS



**Jonathan Brearley** • 2nd  
Chief Executive Officer at Ofgem  
1w • 10

It was great to take part last week in The Aurora Spring Forum.

This year, the leading annual gathering of the European energy industry was focused on decarbonisation and rethinking energy use, supply and policy in the wake of the Global Energy Crisis.

A highlight was joining experts from across the sector for a panel session to discuss:

- ✓ Energy security; reflecting on the learnings from our work this winter with industry, National Grid, and Government to ensure the security of supply and discussing the need for the transition and reshaping of our energy markets.
- ✓ The infrastructure development required for low carbon delivery and the rapid pace at which this needs to occur in order to meet Government's Net-Zero targets.
- ✓ The scale of investment needed to deliver net zero and the work Ofgem is already doing to challenge companies to be more cost-efficient whilst setting tough standards on service quality.
- ✓ The role and suitability of our energy institutions and the need for more regional planning and close coordination with local leaders.
- ✓ Affordability, our welcoming of the government review of retail price regulation framework and the case to be made for a social tariff.



**Hanns Koenig** @HannsKoenig • 29 Mar  
Ignacio Galan, Exec Chairman of @iberdrola, encourages governments to trust markets, stressing that interventions always cause pain down the road. I hope the policymakers attending the #auroraspringforum listen carefully...



**Enel Group**  
610,831 followers  
1w • Edited • 10

"We need to tackle global challenges, diversifying the energy supply chains and creating a favorable environment for investments in Europe."

Our Chair **Michele Crisostomo** joined the conversation during "The future of energy security in the wake of the global energy crisis" panel organized by **Aurora Energy Research** #AuroraSpringForum2023 🎉



Tweet: @AuroraER\_Oxford #auroraspringforum

**Anesco Ltd** @AnescoLtd • 3 Apr

Our CEO Hildagarde McCarville had the pleasure of attending the #AuroraSpringForum in Oxford last week, discussing the vital role that grid scale batteries have in accelerating the energy transition: linkedin.com/feed/update/u... @AuroraER\_Oxford #auroraspringforum #BESS



**Hans Koenig** • 1st  
Managing Director, Central Europe at Aurora Energy Research  
1w • 10

All-star first panel at the **Aurora Energy Research** Spring Forum 2023, with **Shell's Sinead Gorman**, **RWE's Markus Krebber**, **Enel Group's Michele Crisostomo** and **Hunt Energy's Hunter Hunt** discussing the links between decarbonisation and security of supply.

Takeaways:

- \* We have been underinvesting in energy, especially clean energy, for the past decade, and have been paying the price for the past year
- \* Energy security and energy transition do not have to be in conflict; rather, there are big synergies regarding diversification and reduced dependence on fossil fuel suppliers if done right
- \* Europe needs to reduce its reliance on others when it comes to clean energy supply chains, but this won't happen without conscious and concerted action by government



**Anu Omojola** @AnuOmojola • 29 Mar  
Insightful discussions on delivering Europe's energy transition - Financing is one of the biggest challenges!!! The market needs to provide long term price signals for both consumers and investors.

#AuroraSpringForum #EnergyTransition #RePowerEU #Fitfor55



**Hildagarde McCarville** • 3rd+  
Actively accelerating the circular economy and energy transition  
5d • Edited • 10

On Wednesday, I had the pleasure of attending the #AuroraSpringForum in Oxford, where I joined an expert panel discussing the vital role that grid scale batteries have in accelerating the energy transition, and ensuring energy security not only in the UK, but across Europe.

Thank you to my fellow panellists for an interesting debate: **Kenneth Ryan**, **Miriam Bueno Lorenzo** and **Paul Stormo**.

What really stood out to me from those discussions – and indeed, was a central theme across the day - was how despite the acceleration of the energy transition over the last 12 months, there is a very credible risk to realising energy security and net zero, due to grid congestion.

Examples were given during the day by various speakers of connection dates originally planned for 2024 being extended out to 2036, due to investment upgrades being required in advance.

There is a very pressing and pertinent need to fundamentally overhaul the current CPA, permitting and queue management policies within the UK and across Europe. Speed is of the essence in this matter.

As an island nation, we need physical control of our energy supplies and so removing barriers to the deployment of renewables and storage is going to be crucial.

#energytransition #BESS #netzero Aurora Energy Research Anesco Ltd Alan Smallwood



# Spring Forum

Oxford 2023

**CLICK ON EACH IMAGE TO GO TO ARTICLE:**

Menu Look for  Economy | Europepress newsletters subscribers

Europepress / economy finance / energy and environment

Galán (Iberdrola) ratifies the British Government's commitment to offshore wind energy with contracts for 1,500 million



Published: Wednesday, March 29, 2023 18:22  
@epeconomia

Europa Press Economy Finance

MADRID, March 29 (EUROPA PRESS) - Iberdrola has formalized one of the largest contracts in its history for a value of 1,300 million pounds (about 1,500 million euros) for the construction of 95 Siemens Gamesa wind turbines for the East Anglia Three offshore wind farm, the second largest in the world, as ratified by the president of the company, Ignacio Sánchez Galán, in his speech at the Aurora forum at the University of Oxford.

SOLAR POWER PORTAL

News Markets & Finance Large-Scale Commercial & Residential Storage Market Research Resources MORE

Connection dates branded 'unacceptable' as Octopus offered 2036 date for solar and storage site



Click on the logos below to read more:



Tweet: @AuroraER\_Oxford #auroraspringforum

periodico de la energía

Galán (Iberdrola) gains muscle in the United Kingdom with a billion-dollar investment in offshore wind power

The contract for 95 turbines with Siemens Gamesa for the Easat Anglia III wind farm is valued at 1,500 million euros



Iberdrola has formalized one of the largest contracts in its history for a value of 1,300 million pounds -approximately 1,500 million euros- for the construction of 95 Siemens Gamesa wind turbines for the East Anglia Three offshore wind farm, the second largest in the world .

This was announced by the president of the company, Ignacio Galán, in his speech at the Aurora forum at the University of Oxford. Subsequently, Galán was received in Downing Street

CURRENT ± SUPPLY EMOBILITY TECH REGULATION NETWORKS HEAT

Investment needed to drive 'industrial renaissance,' says Iberdrola's Galán

By Molly Lempriere



"Investment can drive an industrial renaissance," enabling the transition to a decarbonised energy system, Ignacio Galán executive chairman of Iberdrola stated in his keynote address at the Aurora Spring Forum this morning.

Energy Live News

Iberdrola and ScottishPower strike clean energy agreements

The energy giants have announced a £1.3bn contract for East Anglia Three offshore wind farm and a global power purchase agreement with Amazon





# Spring Forum

Oxford 2023

## PROGRAMME HIGHLIGHTS

### DISTINGUISHED OPENING KEYNOTE ADDRESS & INTERVIEW

Speakers:

- Ignacio Galán, Executive Chairman, Iberdrola
- John Feddersen, Founder & CEO, Aurora

#### Summary:

In his distinguished opening keynote speech, Ignacio Galán, Iberdrola's Executive Chairman, highlighted the urgency of ramping up the renewable build-outs as demand is expected to double, and the 2030 target can only be reached if implementation starts today. Clean electrification is crucial in order to overcome the structural issues caused by the reliance on fossil fuels, and boosting investments in green hydrogen can be one way of achieving a clean industrial renaissance. In his view, despite having the necessary money, the issue lies in the allocation. He also spotted public feedback indicating a desire for more intervention. Regardless of policy interventions aimed at addressing the direct impacts of the war and promoting the integration of renewable assets into the market, the EU's market design reform lacks the clarity needed to incentivise a fourfold increase in efforts to achieve this goal, in contrast to the US Inflation Reduction Act.

During his speech, he emphasised that demand response and domestic residential batteries are also integral for transition, but without strong networks, there can be no transition.

Furthermore, Ignacio Galán announced that Iberdrola has recently formalised its largest-ever clean energy contract in the UK, along with a new global power purchase agreement (PPA) with Amazon to develop large-scale renewable projects.

"In recent months, commodity price volatility has shown the benefits of long-term contracts. PPAs allow more customers to benefit from stable prices and producers to have lower costs of capital. Our new global alliance with Amazon will involve PPAs in Europe, the US, and Asia-Pacific. The first step is a long-term contract to supply Amazon with more than 1000 GWh of green energy from our offshore wind farms at the German Baltic Sea".

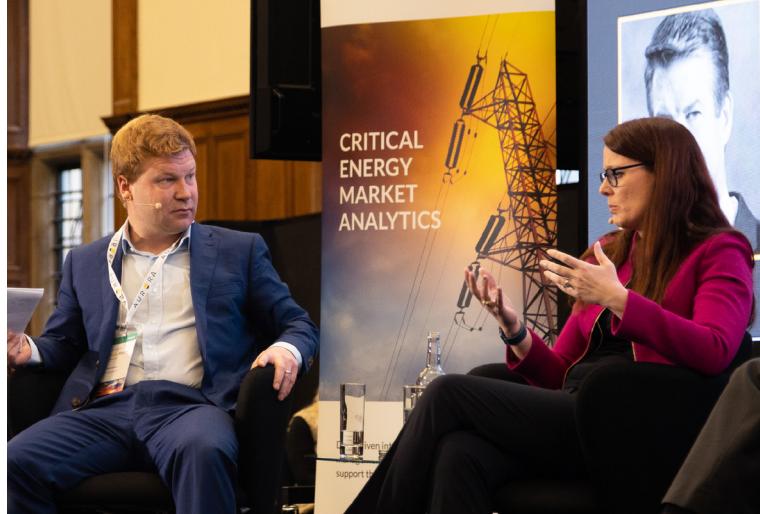
Click [HERE](#) to read more about this announcement





# Spring Forum

Oxford 2023



## PLENARY SESSION

### THE FUTURE OF ENERGY SECURITY IN THE WAKE OF THE GLOBAL ENERGY CRISIS

Chair: **John Feddersen**, Founder & CEO, Aurora

Speakers:

- **Hunter Hunt**, Chairman & CEO, Hunt Energy
- **Markus Krebber**, CEO, RWE
- **Michele Crisostomo**, Chair, Enel
- **Sinead Gorman**, CFO, Shell

## Summary:

"Energy security has been front and centre in Europe's discussion on energy this year, where the concern is that supply of energy and power is at risk as a result of multiple factors." This plenary session considered mainly the dichotomy of security and decarbonisation; whether energy independence at the state level is desirable; and supply chain concentrations.

When security of supply is under pressure, the other points of the energy trilemma become secondary priorities—this was a key insight and a demonstrable reality this year that the panel agreed on.

In the context of the recent supply squeeze, many countries were motivated to protect their respective low-cost environments. A consensus that this is not an efficient solution and a mutual motivation to design and deliver a better solution would benefit the wider European collective.

Supply chain concentration, especially in China, was a concern. Whilst manufacturing centres within Europe were considered important, even in the context of limited natural resources, the difficulty in navigating EU financial support was noted—especially in relation to the comparably simpler Inflation Reduction Act.

Lastly, commercial adaptability was seen both as an increasing area of concern and improvement. LNG contracts are becoming shorter and more flexible, thereby hedging the volatile nature of the oil and gas industry.



Tweet: @AuroraER\_Oxford #auroraspringforum

# Discover your next business move in Europe with the European Battery Markets Attractiveness Report

**Analysis across 24 European countries:**

- Great Britain\*
- Ireland (I-SEM)\*
- France\*
- Belgium\*
- The Netherlands\*
- Germany\*
- The Nordics\*  
(Denmark, Finland, Norway, Sweden)
- Iberia\*  
(Portugal, Spain)
- Italy\*
- New Poland
- New Greece
- Hungary
- Romania
- Bulgaria
- New Serbia
- New Slovenia
- New Croatia
- New The Baltics (Estonia, Lithuania, Latvia)

**2<sup>nd</sup> EDITION**



**New features in the 2<sup>nd</sup> edition:**

- 6 new regions covered
- Business cases for 2 new markets: Greece and Poland
- Updated BESS cost projections
- Analysis of recent EU market reforms

For markets (\*) Flexible Energy Service with detailed forecasts & business case analysis available

## Access the report for:

### European Battery Market Trends – Market Size and Opportunity

- Installed capacity, battery investment trends, and near-term pipeline
- Forecast volumes for battery deployment by year and country

### Policy and Regulatory Environment analysis

- European and national battery strategies, targets, and plans
- Analysis of anticipated regulatory changes impacting battery markets
- Assessment of policy risks including aggregation of demand side assets

### Battery Storage Business Models and Value Drivers

- Summary of attainable markets and revenue stacking opportunities
- Comparison of value drivers across markets including renewables penetration and daily wholesale market spreads, balancing services, and capacity market auctions
- Assessment of saturation risk for each country

### Battery Economics and Business Cases. See above plus:

- Revenue stacking opportunities and gross margins (1, 2, and 4 hours)
- Investment cases (estimated IRRs) for hybrid business models (optimised between energy arbitrage and ancillary services)

**Find out more:** Scan the QR code or contact **Shakti Singh, Commercial Associate:** [shakti.singh@auroraer.com](mailto:shakti.singh@auroraer.com)





# Spring Forum

Oxford 2023



## AURORA KEYNOTE

### THE EUROPEAN ENERGY CRISIS: WHAT ARE THE LEARNINGS AND OUTLOOK?

Speaker:

Richard Howard, Research Director, Aurora

#### Summary:

In 2022, Europe faced the difficult challenge of navigating a year with reduced Russian gas supplies. While the situation panned out quite similarly to our No Russian Gas scenario in Q1 2022, there were several positive unforeseen events that helped Europe, such as milder winter weather thereby reducing the demand for gas heating. As a consequence, reduced gas supplies, gas prices, and by extension wholesale power prices reached an all-time high and prompted several countries to intervene in the electricity markets with limited success. The Iberian price cap, while successful in reducing wholesale prices, cannot be feasibly implemented across the European Union.

On an EU-wide level, inframarginal revenue caps were implemented on low-carbon generators at various price points as a measure to protect consumers from high power prices as well as to raise revenue. This resulted in a relatively little gain for a lot of pain, causing delays in merchant buildout of renewable assets.

Delivering the ambitious renewables build-out targets set out by REPowerEU remains a significant challenge, costing an estimated EUR 800 billion, reaching over EUR 1,000 billion after accounting for required improvements to grid infrastructure over the next 7–8 years to facilitate the green transition. The difficulty in obtaining grid connections for new-build assets remains a common theme across Europe, especially in Great Britain where projects near to financial close are being pushed back by upwards of 5 years due to their inability to secure a grid connection.

Click [HERE](#) to view the presentation





# Spring Forum

Oxford 2023



## PLENARY SESSION

### HAS THE GLOBAL ENERGY CRISIS ACCELERATED DECARBONISATION?

Chair: **Laurie Fitch**, Non-Executive Director of EDP & Strategic Advisory Group Partner, PJT Partners

#### Speakers:

- **Amber Rudd**, Former Secretary of State for Energy and Climate Change
- **Cameron Hepburn**, Professor of Environmental Economics, University of Oxford
- **Greg Jackson**, Founder & CEO, Octopus Energy
- **Miguel Stilwell D'Andrade**, CEO EDP & EDP Renewables

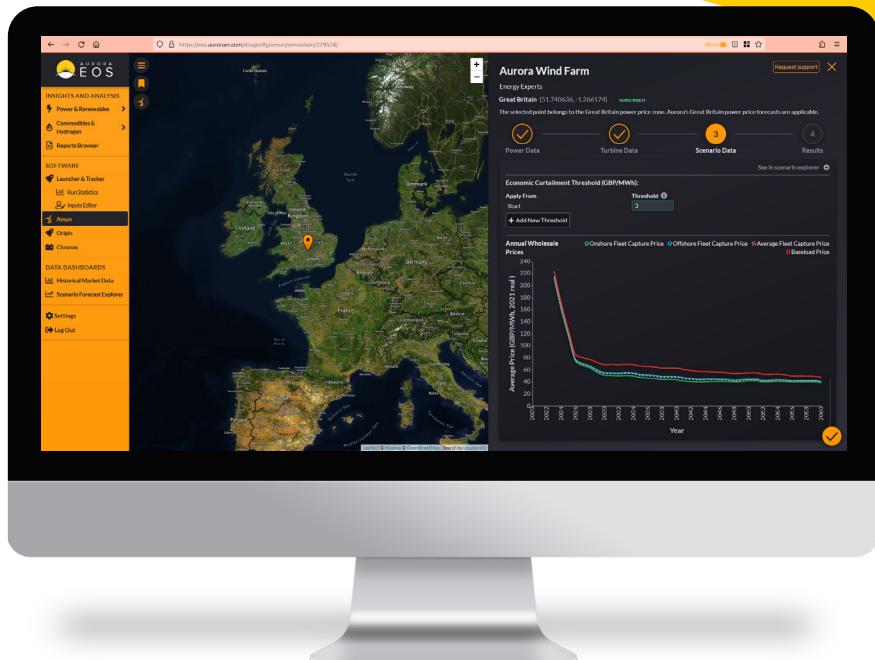
#### Summary:

The panel opened with a statement “are we living in an energy crisis vs energy crunch” then followed with the panel’s title question “has the global energy crisis accelerated decarbonisation?” Cameron Hepburn, Professor of Environmental Economics at the University of Oxford added perspective covering 3 dimensions: “temporal, geographic, and value chain” and approached the question with a long-term and short-term perspective. He highlighted that it is true that attention towards the urgency of decarbonisation has been accelerated from a policy and demand side response point of view, however, there is a lack of direct measures in place to make it feasible in the short term.

Greg Jackson, Founder & CEO of Octopus Energy highlighted that it is surprising how quickly Governments acted in building infrastructure to increase the flexibility of gas supply to Europe while putting little attention on eliminating bureaucratic processes that are the key bottleneck for renewable deployment to bringing projects online.

Miguel Stilwell d'Andrade, CEO of EDP & EDP Renewables noted that we must be mindful of consumers’ reactions to volatility and rather ensure stability and credible prices, leading to many Government interventions throughout the last year.

Amber Rudd, Secretary of State for Energy and Climate Change spotlighted the following “The public is more engaged. Climate change talks were a niche if we compare the Paris Agreement with the Glasgow Climate Change Conference. It is no longer about climate change; it is about costs and security.”



# The #1 Wind Valuation Software

**Looking for the most accurate and efficient way to value your wind farms?**

Aurora's Amun will bring you bankable asset-specific revenue forecasts for wind assets in seconds.

Our proprietary wind atlases ensure unparalleled precision for both offshore and onshore valuations, and our market-leading wind valuation tool has been trusted in the biggest transactions and portfolios.

Invest with confidence and stay ahead of the competition with our cutting-edge wind valuation solution.



**AMUN** - A global benchmark in valuations

For a free demo, find the Software team at:  
<https://auroraer.com/software/amun/> or **scan here**





# Spring Forum

Oxford 2023

## AURORA KEYNOTE

### ENERGY TRANSITION IN EUROPE: REVOLUTION OR EVOLUTION?

Speaker:

Hanns Koenig, Managing Director for Central Europe, Aurora

#### Summary:

"It took 20 years to build the current market design—overhauling the market design in half a year might not be the best idea".

Despite a recent slowdown in prices, price pressures over the past year led policymakers to question the current market design. In his keynote speech, Hanns Koenig, Managing Director for Central Europe at Aurora, addressed the three key focus areas in the EU market design reform proposal published in March 2023: i) promotion of long-term energy markets via CfDs, PPAs, and long-term hedging, ii) emphasis on flexibility (capacity markets and peak shaving products), and iii) measures on consumer protection. Additionally, concerns regarding the most notable absences in the proposal, such as measures on capacity adequacy and locational pricing, were raised during the session.

The session highlighted some of the key risks and challenges from the measures announced including the following:

- The EC proposal includes the use of two-way CfDs, strengthening PPA markets and long-term hedging. While CfDs can enable the deployment of renewable technologies, they are difficult to combine with PPAs. There are, however, examples such as Poland where this is happening. Whether this is desirable will depend on price outlooks. Under the current price outlook, a mix can lead to a higher short-term PPA price followed by a lower CfD price, compared to a higher CfD price for a longer period.
- While these measures facilitate participation in markets of smaller assets and opening support schemes for BESS and DSR (capacity markets, peak shaving products), there is a risk that, by separating products, peak shaving could raise system costs.
- Measures such as allowing peer-to-peer trading and giving consumers the right to choose between fixed or variable retail tariffs can ensure consumer production. However, inappropriate tariff structures can disincentive the deployment of flexible technologies.

Click [HERE](#) to view the presentation





# Spring Forum

Oxford 2023



## PLENARY SESSION

### WILL 2022 BE SEEN AS THE YEAR THAT ACCELERATED OR HINDERED EUROPE'S ENERGY TRANSITION?

Chair: Ana Barillas, Head of Iberia, Aurora

Speakers:

- Bernhard Günther, CFO, Fortum
- Pierre Jeremie, Deputy Chief of Staff to the French Minister for the Energy Transition
- Vera Pinto Pereira, Executive Board Member, EDP

#### Summary:

The panellists, consisting of both industry members and policymakers, discussed how events in the past year affected Europe's energy transition. The discussions touched upon how the war in Ukraine and the subsequent energy crisis have led to accelerated renewables buildout to reduce energy dependency while creating a new set of issues such as market intervention and supply chain constraints.

Throughout the session, the panellists delved into an array of topics concerning Europe's energy transition, such as the mobilisation of capital towards this transition, the challenges associated with permits, the EU's industrial policy, and the implications of the US Inflation Reduction Act (IRA) on the competitiveness of the EU.

The following are among some of the major takeaways from the panel:

- The best way to ensure consumer protection is to address what consumers want. Therefore, optionality is key, and having voluntary choices (both fixed and dynamic pricing) is valuable.
- A lot has been done at the EU level in terms of regulation and targets to enable the energy transition. Participants agreed that the main challenge that remains is financing: predictability of support schemes, regulatory stability, and further details on the EU's plans would help significantly to mobilise capital.
- Panellists discussed the impact the IRA could have on the EU's competitiveness to attract investment. Industry members highlighted that support from the IRA is not only material but also straightforward. As opposed, in the EU, the lack of detail and having to navigate across legislation in numerous member states makes it harder to compete. On the other hand, the EC is setting a fair mechanism for countries to compete and decide on policies to draw investment and set their own path for decarbonisation.



# Spring Forum

Oxford 2023

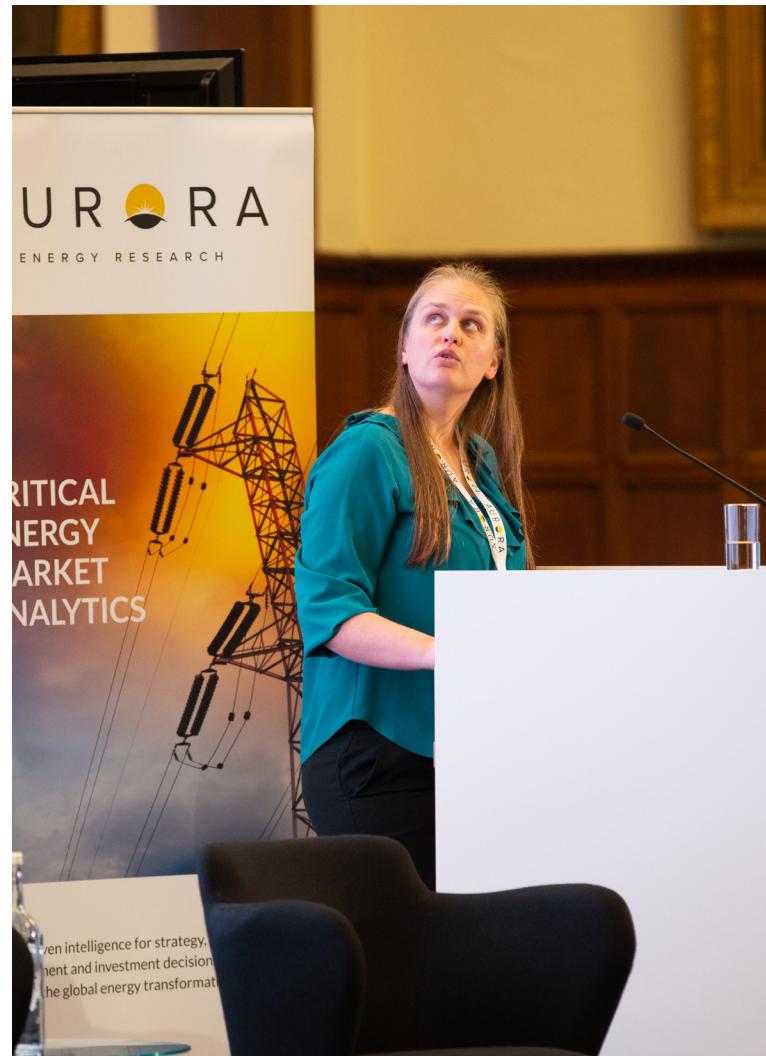


## AURORA KEYNOTE

### GREAT BRITAIN'S ENERGY TRANSITION: THE GOOD, THE BAD, AND THE UGLY

Speaker:

Emma Woodward, Project Leader Advisory, Aurora

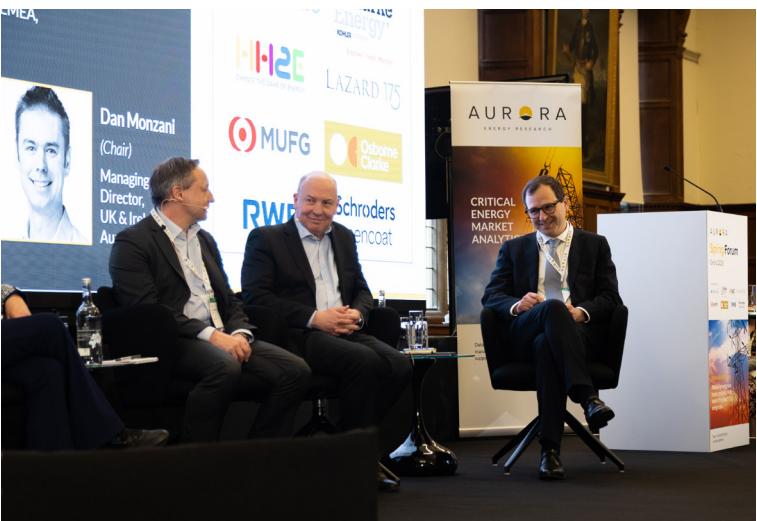


Click [HERE](#) to view the presentation



# Spring Forum

Oxford 2023



## PLENARY SESSION

### IS GREAT BRITAIN READY TO DELIVER A SECURE, AFFORDABLE, DECARBONISED ENERGY SYSTEM?

Chair: Dan Monzani, Managing Director UK & Ireland, Aurora

Speakers:

- **Caroline Lytton**, Managing Director, Head of Power & Renewables Global Structured Finance EMEA, SMBC
- **Fintan Slye**, Executive Director, National Grid ESO
- **Jonathan Brearley**, CEO, Ofgem
- **Simone Rossi**, CEO, EDF Energy

## Summary:

In this session chaired by Dan Monzani, Managing Director UK & Ireland in Aurora Energy Research, it was discussed whether the GB energy system was ready, both structurally and financially, to meet the goal of decarbonisation. Among the topics discussed were the lessons for the grid from this past winter, the role of demand flexibility in improving the security of supply, whether there is enough investment interest in the energy transition, improvements needed in market design, and how the queue for grid connections can be sped up.

"A lot of investors want to put money in the energy transition, especially in generation. Developers, oil majors, and utility providers all want megawatts on their balance sheet." Caroline Lytton, Managing Director, Head of Power & Renewables Global Structured Finance EMEA, SMBC.

The following are among some of the key takeaways from the session:

- There is great interest in investing in the energy transition, so much so that developer yields are falling. System and government support is needed to ensure that sustainable returns can be maintained.
- The different stakeholders in the energy sector need to work together to form a collective agenda and a holistic plan for a way forward in terms of improved market design.



## Navigating the Global Energy Crisis and Delivering on the Energy Transition.



has agreed to sell its Clean Energy Business to



US\$6.8bn EV

Exclusive Financial Advisor to Con Edison

Pending



has agreed to sell a 49% stake in a portfolio of 1.3 GW of solar and onshore wind assets to



€1.2bn EV  
Exclusive Financial Advisor to Iberdrola

January 2023



Green Convertible Bond

€300m 5-year Offering due 2027

Joint Global Coordinator

September 2022



Initial Public Offering

€205m

Joint Global Coordinator

July 2022



has agreed to sell a 60% stake in National Grid Gas to Macquarie and BCI

£9.6bn EV

Financial Advisor, Sole Sponsor and Corporate Broker

March 2022



A KOHLER COMPANY

Engineer - Install - Maintain

## Minimise Your EPC Risk

Multinational power project delivery company, specialising in low carbon, hybrid and flexible energy solutions.

Renewable gas fuelled engines, BESS and hybrid power, backed by strong balance sheet and aftersales support.

- >£3b power projects delivered globally.
- >£700m and 1.8GWe of generation assets deployed in the UK.
- 400 UK employees with 24/7 national service support coverage.
- Project feasibility, specification, and planning assistance to detailed design, construction & aftersales support.



Supporting  
Net-Zero

Tel: +44 (0)151 546 4446  
[uk@clarke-energy.com](mailto:uk@clarke-energy.com)  
[www.clarke-energy.com](http://www.clarke-energy.com)





# Spring Forum

Oxford 2023



## BREAKOUT SESSION

### FRAGMENTING SUPPLY CHAINS, RISING CAPEX, AND IMPLICATIONS FOR PROJECT DELIVERABILITY

Chair: Hugo Batten, Managing Director APAC & California, Aurora

Speakers:

- **Bobby Chada**, Equity Investment Analyst, Capital Group
- **David Swindin**, CEO, Cubico
- **Luba Kotzeva**, Managing Director, European Energy & Renewables, Lazard
- **Moritz Borgmann**, Chief Commercial Officer, Meyer Burger



## Summary:

In light of the ongoing Russian gas crisis and the risks associated with over-reliance on a single unpredictable country, there has been a notable trend toward reshoring renewable energy supply chains. This is particularly challenging as margins are being squeezed, in addition to the cost of debt across Europe rising by up to 200 basis points, depending on the project portfolio. In the near future, CAPEX for wind manufacturers is unlikely to decrease.

Large companies, and vertically integrated companies especially, are generally doing a better job of hedging against the price of raw materials across their project portfolio, particularly for large projects such as offshore wind farms, where small mistakes have a large implication on costs. Offshore wind projects are impacted to a greater degree as the lead time between the final investment decision and construction is about 2–4 years longer than onshore wind projects. In addition to raw material cost, labour costs and the rate at which they have been increasing has been increasing across renewable projects as well as conventional generation projects.

Moving the supply chain away from China will come at a significant cost and cannot be done by solely relying on government support and political will. The Inflation Reduction Act in the USA is more effective at addressing this and offers tangible support compared to any policies thus far in Europe. Governments, manufacturers, and offtakers collectively need to make supply chains more resilient, which will drive CAPEX upwards, but is an investment towards the future. Overall, there needs to be a greater focus on labour costs for projects, and governments need to embrace the associated structural change of shifting from the fossil fuel industry to the renewables industry.





# Spring Forum

Oxford 2023



## BREAKOUT SESSION

### THE FUTURE OF MARKET DESIGN IN EUROPE: OPTIONS AND IMPLICATIONS FOR MARKET PARTICIPANTS

Chair: Evangelos Gazis, Market Lead for South Eastern Europe, Aurora

Speakers:

- Guy Newey, Chief Executive Officer, Energy Systems Catapult
- Lena Kitzing, Associate Professor, Technical University of Denmark (DTU)
- Tom Glover, UK Country Chair, RWE

## Summary:

This panel agreed the current market design is not fit for purpose and enjoyed lively debate over preferences for radical vs incremental changes to adapt for the future. The central challenge discussed was balancing the need for rapid, greater investment in renewables to meet the ambitious decarbonisation targets with requirements for a consistent and reliable grid.

With hundreds of gigawatts of new generation to be added to the grid rapidly, care needs to be taken to add the right assets in the right order, both when it comes to demand management and grid interconnection systems.

System operation will increase in complexity, and investor confidence in revenues needs to be strengthened so new capacity is deployed on time and at a low cost of capital. Some panellists argued for moving from 30-minute, market wide pricing to 15-minute Locational Marginal Pricing (LMP) like we see in US markets. Others had less faith in markets to effectively manage deployment of billions of euros worth of assets and advocated for greater central planning, including expanded and updated use of CfDs to effectively boost long-term, stable investment without distorting the market.

- There are and will be opportunities for market-based long-term investment stability through PPAs, but there will be volumes unmet that need market reform or government intervention to fulfil.
- Technical merits of CfDs and LMP were discussed in detail, with panellists looking to examples of each across Europe, the UK, and the US.



Tweet: @AuroraER\_Oxford #auroraspringforum



# Let's look forward to better times. With 100% renewable energy.

HH2E developed the green power station of the future. The HH2E-Werk transforms a variable input of sun and wind power into a stable flow of cost-effective green hydrogen, heat and carbon-free electricity to supply industries and municipalities. Ready to change the game of energy.

For more information visit [hh2e.com](http://hh2e.com)



[info@hh2e.com](mailto:info@hh2e.com)

HH2E

LAZARD | 175  
YEARS

Innovation & Thought Leadership  
based on Experience

## Mergers & Acquisitions | Debt & Equity Capital Raising | Strategic Advice

>140 transactions in last 3 years in power & energy transition | Active in fixed & floating offshore wind, onshore wind, solar, batteries, gas, nuclear, networks, water, waste, retail, biofuels, carbon capture, hydrogen & e-mobility. Recent UK & European deals include:

### Renewables & BESS

<b>AMARENCO</b> €300m growth capital from <b>ARJUN Infrastructure</b> 2023	<b>greenvolt</b> €200m convertible bonds from <b>KKR</b> 2023	<b>DIF CAPITAL PARTNERS</b> buying largest UK co-located solar & battery portfolio from <b>cero</b> & <b>enso energy</b> 2023	<b>CONSTANTINE</b> £400m BESS platform investment with <b>AIMCo</b> & <b>RAILPEN</b> 2022	<b>QEnergy</b> c.€1bn sale of c.5GW renewable platform to <b>Verbund</b> 2022
--	---	---	---	---

### Large caps energy crisis response

<b>uni per</b> €16.5bn stabilization package & acquisition 2022	<b>edf</b> c.€3.2bn capital raise with preferential subscription 2022	<b>ENERGY INFRASTRUCTURE PARTNERS</b> consortium acquisition of c.20% in <b>fluxys</b> 2022	<b>bulb</b> on the sale to <b>octopus energy</b> 2022	<b>Haffner Energy</b> Making Hydrogen Super Green IPO advisory 2022
---	---	---	---	--



# Spring Forum

Oxford 2023



## BREAKOUT SESSION

### GRID SCALE BATTERY DEVELOPMENT IN EUROPE: WHAT ARE THE DRIVERS BEHIND EFFECTIVE ROLLOUT, AND HOW CAN BOTTLENECKS BE OVERCOME?

Chair: Marise Westbroek, Project Leader, Aurora

Speakers:

- Hildagarde McCarville, CEO, Anesco
- Ken Ryan, Co-Founder and Partner, Sandbrook Capital
- Miriam Bueno Lorenzo, Head of Sub directorate General for Strategy and Regulation in Energy, MITECO
- Paul Stormoen, CEO, OX2



## Summary:

The European energy sector continues to rapidly deploy renewables at a higher scale in a cost-effective manner. However, the rise of intermittent generation brings new challenges, in particular grid stability. The unique capability of a battery to discharge and charge, to and from the grid, enables it to support system inertia, manage constraints and reduce renewable curtailment. In this breakout session, the panelists discussed the key drivers and bottlenecks battery developers and investors face today.

Key issues discussed:

- Over the past year, bottlenecks have evolved from supply-chain issues to grid connection queues, adversely affecting battery business cases. Hildagarde McCarville, the CEO of Anesco, highlighted a need for improved policy that recognises the system-level value battery projects offer in order to clear development pipelines.
- The panelists voiced the current inability of some EU markets to adequately reward battery operators for the ancillary services they can provide, noting that GB's maturing ancillary service markets are an exemplary case, demonstrating how operators can diversify their revenue stream with a net-benefit to system welfare.
- Limited grid capacity in the EU has left developers struggling to find connections, necessitating collaboration with DSOs. However, at the distribution network level, DSOs are still unsure of how to classify batteries: as consumers or producers. In this way, there are cases where operators are paying double tariffs, despite operations providing welfare to the system and, thus, the consumer.





# Spring Forum

Oxford 2023



## BREAKOUT SESSION

### AN EMERGING HYDROGEN MARKET: ARE WE THERE YET?

Chair: Dilara Caglayan, Senior Associate for the European Hydrogen Service, Aurora

Speakers:

- Alexander Voigt, Co-Founder and Board Member, HH2E
- Ed Craddock, Director, Energy, MUFG
- Hannah Roscoe, Partner, Osborne Clarke
- Sopna Sury, COO Hydrogen, RWE Generation SE

#### Summary:

The panel kicked off with a discussion of the new EU definition of green/renewable hydrogen. While the panellists agreed on the utility of a standardised definition in clarifying the eligibility of various production methods for support schemes, a number of concerns were raised around the complexity of the legislation.

Next, the conversation turned to the barriers to Final Investment Decisions. It was generally agreed that there is “no lack of appetite from financiers” in H2 investments; the challenge is the negotiation of bankable off-taker agreements.

Reducing the cost of green hydrogen will require further renewable deployment, development infrastructure, and the rollout of support schemes. The latter should include measures such as CfD-style schemes, CAPEX, and OPEX support.

The discussion on hydrogen transportation, shipment, and trade centred on the high cost of processing hydrogen compared to derivatives. Hence, the panel considered ammonia as having significant potential as a near-term source of demand for green hydrogen.

The panel concluded with a brief mention of the application of hydrogen as an energy storage vector in the power system, and the need for geological storage in facilitating both flexible and baseload electricity production from hydrogen.

Overall, the discussion seemed to suggest that the market has progressed from concerns around the fundamentals of production of green hydrogen to now addressing questions around off-taker contracts, transportation, final investment decisions, and scaling up. Challenges remain, but it seems “the market is tipping”.

# Committed to empowering a brighter future.

MUFG has a strong track record for financing clean-energy and energy-smart technologies.

Having set a target of providing ¥35 trillion in sustainable finance between 2019 to 2030 as part of our commitment to the UN's Sustainable Development Goals, we have also committed to achieve net-zero greenhouse gas emissions in our own operations by 2030, and finance portfolio by 2050.



**MUFG Bank, Ltd.**

A member of MUFG, a global financial group.

[www.mufgmea.com](http://www.mufgmea.com)

©2023 Mitsubishi UFJ Financial Group. All rights reserved.



## Making energy deals happen

Combining transformational insight, energy sector knowledge and legal expertise to deliver results.

[osborneclarke.com](http://osborneclarke.com)





# Spring Forum

Oxford 2023

## BREAKOUT SESSION

### ARE EUROPE'S 2030 RENEWABLE ENERGY TARGETS WITHIN REACH? WHAT WILL IT TAKE TO GET THERE?

Chair: Ryan Alexander, Research Lead, European Power Markets, Aurora

#### Speakers:

- Rasmus Errboe, EVP & CEO Europe, Ørsted
- Richard Nourse, Partner, Schroders Greencoat
- Rosheen McGuckian, CEO, NTR
- Stefan Kapferer, CEO, 50Hertz

#### Summary:

Challenges in reaching Europe's 2030 renewable energy targets for power generators across different European countries were the focal point of the panel.

Here are the most important insights gained from the discussion:

- Revenue caps have not generated the amount of revenues that were expected—in some cases even less than the transaction costs of implementing the bureaucracy to collect them.
- Merging Germany's four TSOs has been mooted as a way to ensure that networks can raise the financing necessary to support the continued expansion of the grid. While this might generate efficiencies in the long run, it risks slowing momentum at a time when the deployment of renewables needs to speed up.
- The process for managing grid connections in many countries is not working well and requires a change in TSO processes. Reforming connection rules, as has been done in Spain, to prioritise ready-to-build projects would be disruptive in the short term, but it would ultimately accelerate the build-out of renewables in the medium term.
- In the Nordic and Baltic regions, there needs to be more emphasis on mutually beneficial cross-country initiatives. There are win-win opportunities for countries with abundant wind or renewable resources, like Denmark, to act as effective power plants for demand-intensive neighbouring countries such as Germany.
- Lastly, to maintain buy-in from customers whose continued support for the 2030 targets is critical, incentives for how they can benefit from greater renewable build-outs need to be more clearly established, for example through variable tariffs when charging electric vehicles during off-peak hours. Some retailers in the United Kingdom have already developed innovative business models in this respect.





# Spring Forum

Oxford 2023



## BREAKOUT SESSION

### THE STATE OF US POWER MARKETS POST IRA (INFLATION REDUCTION ACT)

Chair: Julia Hoos, Head of USA East, Aurora

Speakers:

- Henrik Tordrup, Managing Partner, Glentra Capital
- Julia Perrier, Director, Investments, Copenhagen Infrastructure Partners (CIP)
- Pat Wood III, CEO, Hunt Energy Network
- Tyler Kopp, Principal, ECP

#### Summary:

A year ago, the Spring Forum's US panel topic was whether the US market was an "emerging" green giant. Since then, the Inflation Reduction Act has driven wide-ranging supply- and demand-side support for new energy asset development, most notably, through security of tax credits through 2032. This year, the panelists reflected upon the wide-ranging impacts of the Act on the investment landscape for renewables, battery storage, and emerging hydrogen and carbon capture opportunities.

Dispatchable generation and the need for reliability and resiliency on decarbonised grids was a running theme, from the hot battery storage market in Texas driven by ERCOT's volatile prices to the continued need for thermal peaking generation across markets, despite their relative absence in interconnection queues. Panelists provided a variety of perspectives on appetite for merchant risk versus contracted revenues, particularly as it relates to the variety of opportunities available to different technologies across the US. From capacity market/resource adequacy payments in PJM/CAISO to the energy-only wholesale & ancillary service markets in ERCOT, investors have a range of revenue constructs to consider and underwrite.

- Money is chasing projects across the US with renewed federal incentives for new solar, wind, and battery storage, as well as domestic manufacturing.
- The market eagerly awaits guidance from the IRS, clarifying incentives for hydrogen electrolyzers, domestic manufacturing, and energy communities.
- Nodal pricing is viewed as the correct economic system to ensure the market pays for the true value of power, but some processes could be improved.

Tweet: @AuroraER\_Oxford #auroraspringforum

# RWE

We produce power  
to keep things running.  
And running. And running.  
And running.

We're working hard to make it happen and are investing more than 50 billion euros gross by 2030. In offshore and onshore wind, solar, storage technologies, flexible back-up capacities and hydrogen. Or, to put it more simply, in the green energy world of tomorrow.

[rwe.com](http://rwe.com)

You'll like this one —  
an investor, a developer,  
and an independent  
third-party forecaster  
all walk into a bar...

Schroders  
greencoat

Happy sponsors of  
the post-dinner drinks



# Spring Forum

Oxford 2023



## BREAKOUT SESSION

### IS GB ENERGY SECURITY POSSIBLE WITHOUT GAS?

Chair: Caroline Still, Senior Associate, Aurora

Speakers:

- **Annant Shah**, Director of Strategy & Route to Market, SSE Renewables
- **Irene Di Martino**, CEO, Amp X
- **Keith Anderson**, CEO, ScottishPower
- **Robert Hewitt**, Deputy Director of Energy Security, Department of Energy Security and Net Zero



## Summary:

In the last couple of years, “energy security” has been redefined beyond our simple framework of supply-meets-demand. In this session, the panelists reframed its definition, shedding light on the effects of rapid decarbonisation on grid stability and how geopolitics seemingly act as a catalyst for energy independence. In addition, the challenges we face removing natural gas and its potential alternatives were hereby discussed.

Key messages include the following:

- The lack of alternatives remains the largest challenge, wherein some panelists suggested that it may be more realistic to switch our mindset from replacing gas with a clean-gas alternative, such as hydrogen. Furthermore, increasing capacities of long-duration storage, nuclear power, and hydrogen CCS may be able to significantly reduce gas dependencies.
- Irene Di Martino argued for the role of demand-side flexibility (DSF) to help “push gas out”, stating that “we are going to have to rely on demand, otherwise we will never decarbonise”. However, intelligent digitisation platforms and distribution systems, capable of connecting consumers to DSOs, that make it easier for the customer/consumer to enter the market are vital to success. Keith Anderson added that a “monumental amount of investment is needed for the distribution network in order to make this a viable option to manage system demand”.
- The panel additionally considered the risk of displacing our natural gas dependency with a dependency on rare earth metals, necessary to build clean green-tech such as wind turbines and BESSs. Annant Shah was quick to add that recycling materials from aging wind turbines will continue to be practiced on the long-term.

“They just need to get on with it”—Keith Anderson on GB’s ongoing Electricity Market Reform.





# Spring Forum

Oxford 2023



## BREAKOUT SESSION

### EVS—THE STATE OF PLAY AND OUTLOOK FOR THE ELECTRIFICATION OF TRANSPORT

Chair: **Richard Howard**, Research Director, Aurora

Speakers:

- **Claire Miller**, Advisor, formerly Director of Tech & Innovation, Octopus Electric Vehicles
- **Katie Black**, Joint Head, The UK Office for Zero Emission Vehicles
- **Mat Moakes**, Chief Commercial Officer, OVO Energy
- **Robert Llewelyn**, Presenter, Fully Charged Show

#### Summary:

Click [HERE](#) to view the presentation

This panel explored how the EV consumer proposition, the state of charging infrastructure, and the interplay between EVs and the power system are shaping the electric mobility sector.

While EVs can offer a better driving experience and save on fuel duty, their main attraction for many consumers continues to be social prestige. However, enthusiasm seems to have plateaued in recent years due to inflation, commodity prices, and production challenges, resulting in severe supply chain problems. The recent spike in energy prices is harming the EV consumer proposition and accentuating the benefits of flexible charging on smart contracts. Furthermore, car-sharing must play a significant role in the future mobility system; successful schemes are operational in Berlin and Utrecht.

On the challenge of electrifying trucks, three options were mentioned: hydrogen, overhead wires, and batteries. The latter technology was deemed most promising based on the success of existing use-cases.

The panel agreed on the importance of expanding the EV charging network, improving the maintenance of existing charging-points and implementing effective solutions for ‘roaming’ across charging networks. Katie Black, UK Office for Zero Emission Vehicles, outlined three areas of priority for the Government: installing rapid chargers at motorway service stations, expanding local charging networks (a growing number do not have the option to driveway charge), and improving the consumer experience by mandating reliability, payment method, and pricing transparency standards.

EVs have significant potential in providing the power system with a source of flexibility, but concerns were raised around their contribution to grid congestion, which must be addressed through the accelerated digitisation and registration of grid assets.

Tweet: @AuroraER\_Oxford #auroraspringforum

# Introducing Aurora's Japanese Power Market Coverage

New office coming soon!

Continuing on our path to global power market coverage, Aurora is expanding into Asia, with an office coming soon in Tokyo.

The Japanese energy market is set for an opportunity filled 2023:

- Subsidy schemes are being overhauled, with feed-in premiums replacing feed-in tariffs
- The introduction of a 20-year support mechanism for low-carbon assets
- Offshore wind auctions are due in mid-2023
- Interest in storage, hydrogen and ammonia is growing due, in part to the country's long, thin grid

Similar to our European, US and Australian services, the upcoming Japanese Power and Renewables Service will comprise of both quantitative and qualitative analysis of one of Asia's largest markets, spanning the nine major Japanese price regions.

Working with a suite of subscribers, we are building our first Power Market Forecast, due for release in May 2023.



Find out more, contact

**William Lewis**  
Head of Commercial – APAC  
[william.lewis@auroraer.com](mailto:william.lewis@auroraer.com)

A U R O R A



# Spring Forum

Oxford 2023





# Spring Forum

Oxford 2023



**WATCH THE HIGHLIGHTS VIDEO**





AURORA

## Renewables Summit

London 2023

**Wednesday 14 June**

A jam-packed half day event, featuring leaders from across the renewable energy sector. Join this unmissable event to hear how key players are pushing the renewables agenda.



AURORA

## Spring Forum

Oxford 2024

**Tuesday 26 March**

The Aurora Spring Forum will return for its 10th edition in 2024! This is the leading annual gathering of the European energy industry, bringing together thought-leaders from across the globe.

For more information about our events, please get in touch:

**Narcisa Danila**, Senior Manager, Events, Aurora  
M: +44 (0)7510 325161   [ukevents@auroraer.com](mailto:ukevents@auroraer.com)

**Ethel Chioldelli**, Events Logistics Coordinator, Aurora  
M: +44 (0)78 53 195647   [ukevents@auroraer.com](mailto:ukevents@auroraer.com)

Find out more, visit: <https://auroraer.com/events>



OXFORD | PARIS | MADRID | BERLIN | STOCKHOLM | ROME

ATHENS | SYDNEY | AUSTIN | OAKLAND



CRITICAL  
ENERGY  
MARKET  
ANALYTICS

