

AURORA

# Battery Conference

London 2023



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WEDNESDAY 8 NOVEMBER | CHURCH HOUSE WESTMINSTER



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## DEAR FRIENDS AND COLLEAGUES

It was my pleasure to welcome you to London for the Aurora Battery Conference 2023. I hope you enjoyed it as much as we enjoyed the dynamism and enthusiasm from everyone there on the day.

In the context of the battery sector's rapidly increased systemic significance, sophistication, and European scale, the Conference unpacked the best ways to construct Europe-wide portfolios of storage assets and explore how leading companies in the sector are using software to optimise performance as well as the challenges ahead to create a truly digital electricity system.

It was also our pleasure to introduce Chronos to the audience—our bankable battery analytics software—and to showcase how our cutting-edge proprietary battery dispatch engine allows everyone to value any storage asset or project with ease.

I hope this pack helps to give a good summary of the Aurora team's main takeaways from the day. It is obviously not feasible to do justice to the experience of being there, the excellent quality of the discussions in the room, and the value of the new connections made in the drinks reception, but we hope this serves as a useful synopsis.

Many people merit thanks for the critical role they played in delivering the Aurora Battery Conference 2023.

All of our guest speakers were brilliant, insightful, and engaging. A big thank you to Kayte O'Neill, Andy Hadland, Laura Sandys, Mike Ryan, Ralph Johnson, Ben Guest, Hildagarde McCarville, Steve Hunter, and William Evans.

Our generous Partners, Anesco and Habitat Energy, as well as our Branding Partner, Clarke Energy, deserve particular appreciation. We would like to thank them for their contributions to the success of the event!

Finally, thank you to the team at Aurora, including our panel chairs Tom Smout, Mateusz Wronski, and Christina Rentell, and our keynote speakers, Caroline Still and Matteo Coriglioni, but especially to Narcisa-Camelia Danila, Ethel Chiodelli, and Ángel Cervera, who delivered another seamlessly organised event, for their commitment, expertise, and good humour.

We look forward to welcoming you again at the Aurora events next year to continue the discussion!

**Dan Monzani,**  
Managing Director, UK & Ireland, Aurora





# Introducing CHRONOS

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become overwhelming.

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the answers are at  
your fingertips.**



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**Scan hundreds of sites**

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**Compare hundreds of trading strategies**

**Assess your sites for co-location**

Chronos is powered by Aurora's bankable curves, giving you reliance-ready results for due diligence, transactions, and financing.

Supported by world-class storage and market experts from Aurora, Chronos empowers you to get it right.



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CHRONOS  
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We've had a fantastic day at the **Aurora Energy Research Battery Conference** London - hosted at the impressive **Church House Westminster**. Some really interesting discussions taking place, addressing many of the key challenges and opportunities the storage industry is facing today.

Our CEO, **Hildagarde McCarville**, was also delighted to share her views as part of an expert panel (pictured), exploring the best European markets, technologies and business models for flexibility.

Our thanks to the Aurora team for such a well organised event and we look forward to an evening of networking ahead.

**Alexander Kebby-Jones Alan Smallwood Jack Christie Sarah Webb**  
**#batterystorage #BESS #energystorage #storageconference Narcisa-Camelia Danila Ángel Cervera López de Ayala**



Kevin Galle • 2nd  
Solar-Energy by greentech 🌱⚡  
6d • 🌐

Yesterday we had the chance to attend the **#Chronos #Battery** conference hosted by **Aurora Energy Research** at the lovely location **Church House Westminster**. Together with my local colleagues **Yaw Ofori** and **John Hill greentech UK** and **Moritz Daniels** from **E.R. Capital Holding** we were listening to interesting keynotes and panels about Europe's battery 🌱 markets and used the opportunity to exchange with fellows from the market.

Today : greentech 🌱⚡  
greentech 🌱⚡🌱



Pelion Green Future  
4,054 followers  
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Insights from the **Aurora Energy Research BESS** conference in London! 💡

Our team was on-site to discuss **#BESS** (Battery Energy Storage Systems) 🌱

From deployment challenges, market scenarios, and the evolving role of optimization software and asset management to the diverse European markets for BESS and the importance of strategic diversification and timing. Great learnings on how these elements shape the future of green energy investments!

**#Energytransition #Investinginwhatmatters #Storage #aurorabatteryconference**



Vitalii Mainarovych • 2nd  
Senior Associate (Cross-Border M&A/JVs) at CMS London | Board Member a...  
4d • 🌐

It was great to attend some sessions at the Battery Storage Conference by **Aurora Energy Research** earlier this week. A few key takeaways are as follows:

- Batteries with extended duration require a greater upfront CAPEX, influencing short-term profitability. However, they exhibit reduced vulnerability to market risks and promise sustained, stable returns over the long term through favorable spreads.
- Initiatives aimed at decarbonizing power systems underscore the growing demand for storage. Projections indicate a substantial surge in overall battery capacity in Europe, set to multiply nearly sixfold, transitioning from the current 6 GW to an estimated 42 GW by 2023.
- The industry swiftly transitioned from a startup phase to an operational phase. One of the pivotal factors is the resilience of the system, and the National Grid has expressed that it is open to adopting new technologies to address emerging challenges and seeks transparent data from market participants for continuous improvement.
- Embracing a portfolio approach holds the potential for diversification benefits, stemming from distinct revenue structures in different countries. The drivers for diversification encompass factors such as weather conditions and country-specific regulatory frameworks. Operators can effectively mitigate volatility linked to weather patterns by strategically diversifying geographically, whether it be across countries or within specific zonal markets.
- Proximity to demand locations enhances the profitability of batteries.

**#CMSlaw #CMSCorporate #energy #investment #energytransition**  
**#decarbonisation #Europe #AuroraBatteryConference #energystorage**  
**#batterystorage #BESS #innovation**

Lydia Westmore (She/Her) • 2nd  
Portfolio Manager at Thrive Renewables  
6d • 🌐

Great attending the **Aurora Energy Research Battery Conference** today in London with **Otis**. An interesting event in a beautiful building.





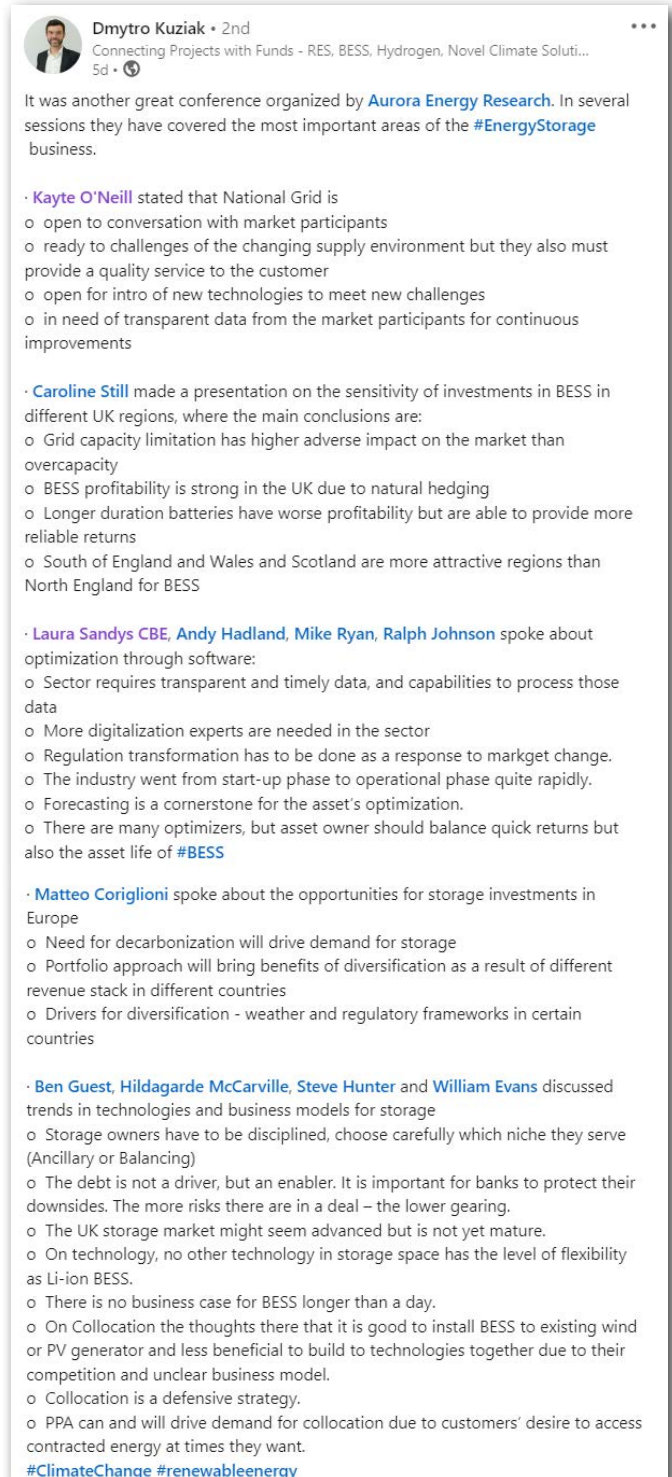
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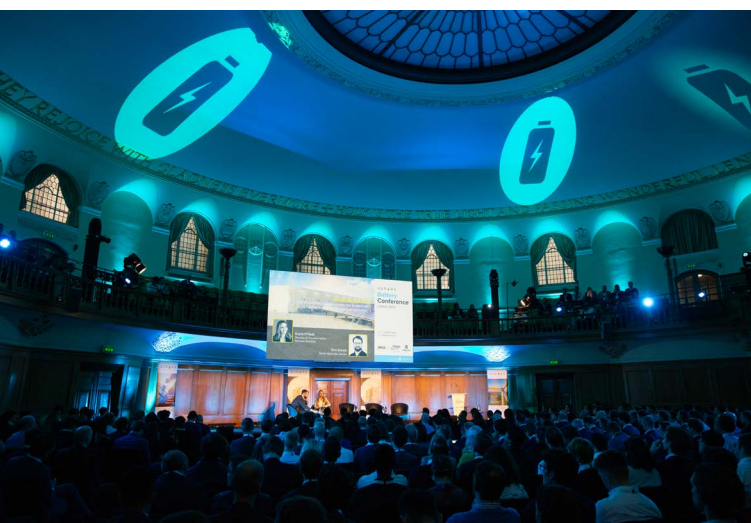




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## PROGRAMME HIGHLIGHTS

### INTERVIEW AND Q&A:

#### THE TRANSFORMATION TO ENABLE THE TRANSITION: WHAT'S NEXT FOR THE SYSTEM OPERATOR?

Speakers:

- **Kayte O'Neill**, Director of Transformation, National Grid ESO
- **Tom Smout**, Senior Associate, Aurora

### Summary:

"What has become increasingly important is examining the operating challenges going forward. The tools we have today aren't necessarily the set of tools we will employ in the future."  
– Kayte O'Neill

In July 2021, BEIS and Ofgem agreed to establish an independent entity, the Future System Operator (FSO), that will adopt a "whole system" and directive approach towards energy system planning. The FSO will not only continue the existing responsibilities of the ESO but will also strategise network and market planning across gas, electricity, and other energy sources, including hydrogen. The FSO aims to support policy directions in an independent and open way, creating new opportunities in markets, and provide energy security for consumers in an affordable manner.

Key messages include the following:

- Kayte O'Neill stated that batteries offer a distinct set of capabilities not found in other technologies, with the potential to minimise constraint costs and optimise transmission buildout.
- Addressing concerns over large-scale batteries getting "skipped" in the balancing market (BM), O'Neill emphasised the importance of enhancing the BM dispatch process. This involves introducing the operating balancing platform (OBP), leveraging insights from penetrable data, and maintaining ongoing collaboration with stakeholders.
- To ensure projects remain resilient and valuable to the system, O'Neill recommended that asset developers stay up-to-date with market developments, and collaborate with the FSO to maximise the flexibility of asset configurations. The FSO will enhance investment signals by offering insights into market demand and supply dynamics at both regional and national levels. This includes establishing the "Strategic Spatial Energy Plan" by 2025.

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## AURORA KEYNOTE

### THE SENSITIVITY OF BATTERY PROFITABILITY TO THE EVOLUTION OF GREAT BRITAIN'S POWER MARKET

Speaker:

Caroline Still, Senior Associate, Aurora

#### Summary:

In her keynote, Caroline explored the sensitivity of battery profitability within the evolving landscape of the GB power market. She examined fundamental assumptions likely to impact battery profitability, considering the role of location and duration in this context. The presentation categorised four key areas shaping the price and market size relevant to batteries:

1. Direct Competition: Oversaturation of the battery market
2. Indirect Competition: Changes in capacity from other storage technologies competing in similar markets
3. System Composition: Changes in capacity assumptions of intermittent or baseload technologies, altering flexibility requirements
4. Infrastructure: Changes to the grid itself, impacting the locational value of power

Linking these categories to risks currently faced in the industry, such as slower grid build-out than anticipated or delays to the nuclear fleet pipeline, increased PSH capacity or the current ambitious 60 GW pipeline of batteries, meant that the team could model and quantify the outcomes for batteries under these different scenarios.

Diving into the drivers of battery profitability across different durations and locations led to the following takeaways:

- Battery profitability is relatively robust to the evolution of the GB power market due to the natural hedging of the energy trading done within the wholesale market and balancing mechanism.
- Power markets that evolve with increased storage competition represent a downside risk for battery investments, but the cannibalisation only has a material impact on profitability at high saturation levels.
- Delays to transmission capacity buildout and nuclear capacity deployment will be an upside opportunity for battery investments.
- The higher CAPEX of longer duration batteries will limit profitability, but their ability to maximise favourable spreads will mitigate the variability of their returns.
- Batteries located in the South and in Scotland will benefit from locational imbalance the most, providing an uplift in profitability.

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## PANEL DISCUSSION

### WHAT'S NEXT? OPTIMISING PERFORMANCE THROUGH SOFTWARE

Chair: **Mateusz Wronski**,  
Global Software Solutions Director, Aurora

Speakers:

- **Andy Hadland**, Chief Strategy Officer, Eku Energy
- **Laura Sandys**, Non-Executive Director SSE Transmission, Highview Power, Ohme & Energy Systems Catapult
- **Mike Ryan**, Commercial Director, Constantine Energy Storage
- **Ralph Johnson**, Head of UK Business Development, Habitat Energy

## Summary:

"Batteries are one of the most complex and versatile technologies in the GB power system. This opens up vast opportunities for optimisation in terms of investment, operation, and whole system management. Winning or losing now depends on data and algorithms."  
- Mateusz Wronski

As it exists today, the energy system cannot accommodate the ever-increasing volume of assets, trades, and transactions without transforming its data management infrastructure. To maximise the potential of flexible and storage assets, the sector cannot simply digitise what already exists, but must radically re-design its information systems. These new systems should be smart, transparent, and automated, with human oversight. The question is, how can this be achieved?

- By engaging more with other sectors to utilise digital and supply chain tracking technologies that already exist elsewhere. Bringing in expertise from other sectors would address a general shortage of IT skills in the power sector.
- The need to interface with the legacy IT systems of the system operators is a key barrier to innovative software solutions. Rather than making new software compatible, the whole system should level up. Improving the capacity for TSOs and DSOs to manage very large data volumes is one key aspect.
- NGESO's transition to FSO is an important intervention that will accelerate the regulatory change needed to facilitate the transition of the flexibility space from start-up level to the scale of large platforms.
- Utilising algorithms will allow effective management of many distributed assets and complex configurations, such as co-located (co-optimised) systems, and will unlock new business models. However, human oversight will be critical, particularly in unprecedented market conditions. The sector must follow an "algorithm-led, human-supervised" approach.
- Using software to simulate many possible scenarios will give investors deeper insight into the range of possible outcomes of investment decisions.





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## AURORA KEYNOTE

### OPPORTUNITIES AND CHALLENGES FOR STORAGE INVESTMENTS IN EUROPE

Speaker:

Matteo Coriglioni, Head of Italy, Aurora

#### Summary:

“There’s quite a lot of heterogeneity with which we can expect European markets to approach storage deployment.”

Batteries represent an increasingly important opportunity in Europe. Throughout the continent, drivers of decarbonisation are reshaping the landscape of energy technologies. These drivers include increasing generation from intermittent renewable energy, phasing out of thermal capacity, and electrification of other sectors, all contributing to the growing need for energy storage. According to Aurora’s modelling, battery capacity in Europe is projected to grow almost six times, from 6 GW in 2023 to 42 GW in 2030.

However, the similarities between battery storage opportunities across Europe end here. Investment risk is likely to vary widely depending on country-specific factors, including various levels of policy support such as government-backed contracts and CAPEX grants. The variance in market landscapes in which battery storage operates across Europe presents a good opportunity for flexibility investors to diversify their revenues.

Locational variance across Europe can be leveraged in four ways:

1. Different markets present different breakdowns of revenue streams for batteries, which typically participate in four key markets: capacity market, wholesale market, balancing/frequency markets, and other ancillary markets. Investing in countries with different revenue stacks increases revenue diversification beyond any individual market.
2. Current battery investments have different degrees of exposure to negative market scenarios, which have a direct impact of the expected profitability of battery investments. Investors can reduce risk by balancing different degrees of exposure to negative market scenarios.
3. Timing of investments is crucial, as smaller markets such as Sweden, may see high short-term returns but may saturate earlier, while larger markets, such as Great Britain, trend upwards over time. Portfolios can be complemented with strategic investments in such markets to take advantage of both short- and long-term profitability.
4. Geographical diversification can hedge against weather-related volatility in different regions, allowing investors to achieve a better risk-return trade-off.

Click [HERE](#) to view the presentation





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## PANEL DISCUSSION

### WHERE NEXT? THE BEST EUROPEAN MARKETS, TECHNOLOGY AND BUSINESS MODELS FOR FLEXIBILITY

Chair: **Christina Rentell**, Senior Associate, Aurora

Speakers:

- **Ben Guest**, Managing Director, New Energy, Gresham House
- **Hildagarde McCarville**, CEO, Anesco
- **Steve Hunter**, Managing Director, Power Markets, Renewable Power Capital
- **William Evans**, Executive Director, Structured Finance Energy Europe, Santander

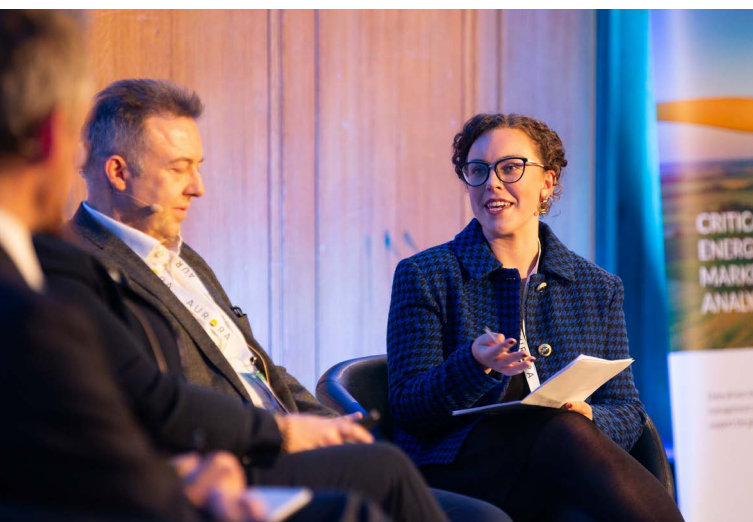
## Summary:

The panel covered various aspects of battery storage technologies across Europe, including different opportunities, considerations, risks, and business models. It was first discussed what should be considered before investors and developers enter into new European markets, then how business models should adapt once a market becomes more mature. The discussion then moved onto technology and whether other forms of battery will overtake lithium-ion before some final thoughts on the outlook for co-located assets.

Key discussion points included the following:

- Ben Guest highlighted the development risk when entering a new European market and that every country will have different standard business practices as well as different policies and regulations around planning permission, grid connections, and land agreements.
- Hildagarde McCarville added that wider market trends are important when assessing new markets. For example, in the Netherlands, the decision to shut down the Groningen gas fields will increase the need for electricity storage technologies. Meanwhile, in Sweden, the revenue stack is overly dependent on ancillary markets, which could quickly saturate.
- William Evans explained the methodology behind different battery financing arrangements and how Santander assess risks in each market. Whilst five years ago debt could only be secured with a high level of fixed revenues via capacity market contracts, financiers are now willing to provide debt for a greater variety of projects with a high level of merchant exposure.
- Steve Hunter highlighted how the most imaginative battery business cases have arisen in Spain, where a lack of interconnection and high level of solar penetration has forced developers to think differently, despite a lagging regulatory environment.

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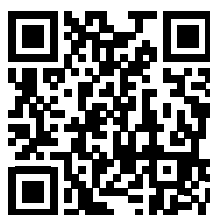


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