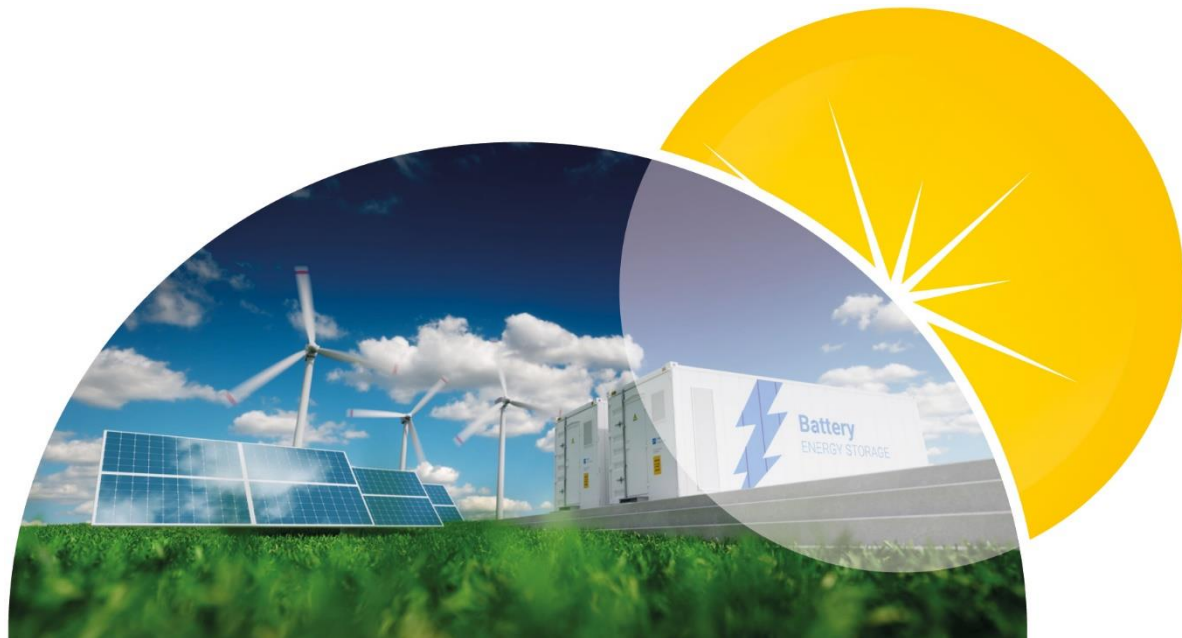


Aurora Battery Storage and Flexibility Conference 2018

#AuroraBattConf

@AuroraER_Oxford



Aurora Battery Storage and Flexibility Conference

It was my great pleasure to welcome you to Aurora's Battery Storage and Flexibility Conference 2018. This was our third annual event dedicated to flexible energy, batteries and energy storage. These topics are very much top of the political and business agenda, as we move towards a decarbonised, decentralised and digitalised energy system.

Joined by distinguished speakers and panellists, in particular Sir Edward Davey MP, former Secretary of State for Energy and Climate Change, and informed by Aurora's unique analysis, the conference brought the insights and perspectives of the organisations and people who will shape this radically different future system.

From a personal perspective, one of the main highlights for me was to host Sir Edward at our conference. At such a critical time of national

debate about big issues like climate change and Brexit, we were privileged that he chose to share with us his perspectives on current and future energy market developments and policy.

Aurora's latest analysis on flexible energy helped frame the debate on the day and we then heard business leaders, government, and experts discuss and debate the issues central to the low carbon energy transition.

We are very grateful for the support of all our speakers and sponsors: Anesco, Clarke Energy, Flexitricity, Fluence, Osborne Clarke.



John Feddersen
Co-Founder and CEO
Aurora Energy Research

Conference Overview

Aurora's third Battery Storage and Flexibility Conference brought together leading industry figures, in particular Sir Edward Davey, former Secretary of State on Energy and Climate Change to debate and discuss the highly topical issues of flexible energy and battery storage.

New analysis presented at the conference suggests an investment opportunity in the region of £6 billion between now and 2030 for the development of around 13GW of distributed and flexible power generation and storage assets in the GB power market.



Click [here](#) to view the conference press release

Click [here](#) to view highlights video on the Aurora YouTube page

Click [here](#) to listen to the podcast

Links to all presentations are included in the following booklet

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Business models for deploying flexibility

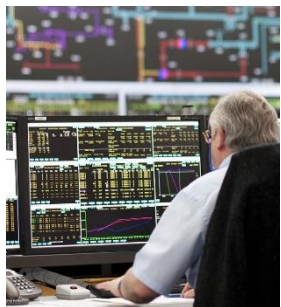


What are promising **alternatives to FFR** for batteries?

What role will batteries play in **EV charging** infrastructure?

Will **co-location with renewables** enable more flexible assets?

Managing volatility of returns

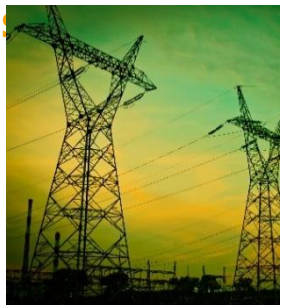


What can be learn from market **volatility of recent years**?

How to **quantify volatility** of returns of flexible energy assets?

Can **portfolio diversification** provide an effective hedge?

Flexibility required for the future energy



How will flexible energy play a role in the **DNO to DSO** transition?

What market design will **best enable the clean energy transition**?

How will assets **provide flexibility to local grids** in practice?

The year in review

A look-back on noteworthy energy industry headlines in 2018

Click [here](#) to view the 'Year in Review' presentation

Part 1: One-on-one interview and Panel 1

One-on-One Interview:



Speakers:

Sir Edward Davey

Former Secretary of State for Energy and Climate Change

John Feddersen

Co-Founder & CEO, Aurora Energy Research

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Panel 1 Discussion:



Panellists:

Saskia Baker, Flexitricity

Marek Kubik, Fluence

Steve Shine OBE, Anesco

James Watson, Osborne Clark

Hugo Batten, Aurora Energy Research

Click [here](#) to view presentation

Part 2: Keynote and Panel 2

Aurora Insight: Keynote



Speakers:

Dr. Felix Chow-Kambitsch, Aurora Energy Research

Click [here](#) to view presentation

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Panel 2 Discussion:



Panellists:

Suleman Alli, UKPN

Mark Futyan, Centrica

Joe McDonald, Limejump

Frances Warburton, Ofgem

Richard Howard, Aurora Energy Research

Click [here](#) to view presentation

Speaker and delegate feedback

"I was here last year and it was brilliant, I wanted to have a repeat experience"

Katya Peremanova,
Moody's Investors Service



"Great opportunity to learn about the work going on in storage"

Faithful Chanda, Western
Power Distribution



"My highlight was gaining an insight into various stakeholders' views as to the development of this sector"

Ross McHardy, Axpox



"I think next year's event needs to look more closely at V2G and its potential to disrupt the market"

Jo Wall, Verve Commercial



"I look forward to the next one!"

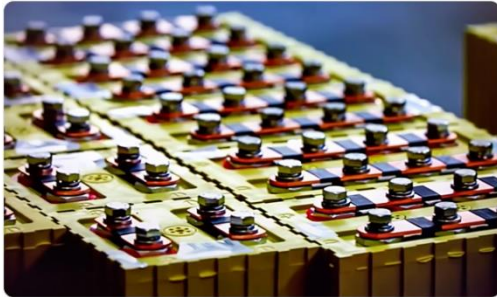
Hugh McCowen,
NatWest Bank



#AuroraBattConf on social media

Aurora
@AuroraER_Oxford

.@EdwardJDavey: If I have a political message for people, it's that we have a policy environment that very much favours centralized generation and we need to think through whether that's still fit for purpose
#AuroraBattConf #decentralization @theADEuk



Clarke Energy
@ClarkeEnergy

Following

Very interesting day at @AuroraER_Oxford Battery Storage and Flexibility 2018 conference hearing about the future of flexible energy and storage. #AuroraBattConf



Hugh Taylor
@RoadnightTaylor

Follow

My fave line from the brilliant @AuroraER_Oxford #AuroraBattConf today belonged to @JFed1 "Flexibility is going to be a really big market over the next decade". Nice...



Aleksandra Klassen • 1st

Business Development Manager at Solar Trade Association
6d

"Flexibility will be cheap as chips in 10 years" ... but ... "some policy would be nice."-
Sir Edward Davey is on the ball. Fantastic content as always at #AuroraBattConf
Solar Trade Association



James Watson • 2nd

International Sector Leader, Energy & Utilities, Osborne Clarke LLP
5d

Great to be on the panel at the Aurora Conference yesterday discussing the future of #battery storage alongside Saskia Barker Marek Kubik Hugo Batten steve shine
OBE MBA DMS DipM MCIM MBIM FIOD #AuroraBattConf



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Media takeaways




Britain's power market will need investment of 6 billion pounds (\$7.9 billion) between now and 2030 in flexible generation and storage such as batteries to support the transition toward an economy that emits less carbon, a study showed.

Bloomberg (11 October 2018)

Richard Howard, research director at Aurora, said: "Over the period to 2030 we expect balancing and ancillary power markets to double in size to around £2 billion per year – opening up opportunities for flexible generators and storage to access new revenue streams."

Current+ (11 October 2018)




New analysis from Aurora Energy Research predicts around 13GW of flexible and distributed generation assets set to be deployed through to 2030

BusinessGreen (11 October 2018)

"Gas engines and renewables provide a natural hedge to one another, lowering the volatility of investor returns on a year-to-year basis," Chow-Kambitsch notes in the research released today.

Argus Media (11 October 2018)



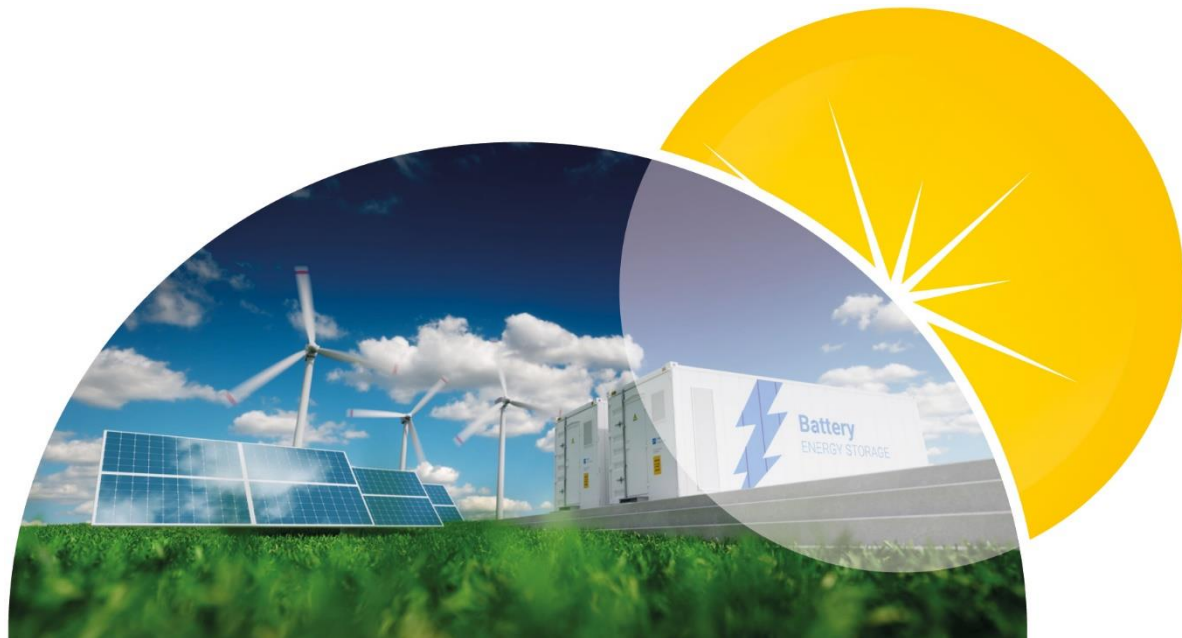
Cheap flexibility from storage, demand-side response and distributed generation poses a "huge threat" to the nuclear industry, according to former energy secretary Ed Davey, speaking at a conference held by Aurora Energy Research in London yesterday

Utility Week (11 October 2018)

Conference Partners 2018

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We develop, construct, finance & operate renewable energy

A history of solar and energy storage innovation in the UK

- 1st commercial solar in the UK
- 1st commercial battery (2014)
- 1st batteries operating under FFR and Balancing Mechanism
- 1st OFGEM accreditation for batteries on RO solar site
- 1st subsidy free solar farm

For more information please contact Nick Johnson at nick.johnson@anesco.co.uk

ANESCO SOLUTIONS



Battery storage –
grid, commercial



Solar – grid,
commercial, domestic



Asset Management



Commercial and
Industrial



Domestic energy
efficiency



ClarkeEnergy[®]

A KOHLER COMPANY

Engineer - Install - Maintain

UK Peaking Plants

- Over 400MW of UK peaking plant installations
- High efficiency, low switch on price
- Increased electrical output
- Rapid start times
- Planning application assistance
- Electrical & gas connection assistance
- Emissions & noise data
- Optimal engine configuration assistance

Contact Ben Wilson, UK Sales Director:
ben.Wilson@Clarke-energy.com – 07760 175 072



Unlock new revenue.

Flexitricity+ Energy Supply.



UNIQUE ENERGY SUPPLY CONTRACT WITH
ACCESS TO THE BALANCING MECHANISM

Flexitricity is the demand response pioneer – we created and now operate the first, largest and most advanced demand-response portfolio in Britain. Flexitricity provides clarity amidst complexity, and an assurance of delivery backed by our unbeatable track record in the industry.

[Flexitricity+ Energy Supply](#) is the natural next step in progression towards a user-led decentralised energy system, supported by customer-side flexibility, fair competition and innovation.

It opens the door to National Grid's [Balancing Mechanism](#) which is a major new revenue opportunity for electricity customers, small generator owners and battery storage developers to optimise their flexibility on the day.

Flexitricity+ will officially be launched on 31st October by Paul Wheelhouse MSP, Minister for Energy, Connectivity and the Islands.

flexitricity.com

0131 221 8100

Fluence is the leading global energy storage technology and services provider.



700

TOTAL MW



16

COUNTRIES



>70

PROJECTS*

FLUENCE

A Siemens and AES Company

*Deployed or Awarded

Helping your smart energy projects succeed



Our Energy team is one of the most experienced in the legal industry. For over 20 years, we've helped clients deliver their most innovative and successful projects.

That's why businesses turn to us for advice on complex and innovative power management and smart energy infrastructure solutions.

"Osborne Clarke are thought leaders in the decentralised energy and energy technology market"

Chambers 2018, Energy

For more information, please contact: james.watson@osborneclarke.com

Energy storage and batteries

Energy balancing and reserves

Energy efficiency

Electric vehicles and infrastructure

New business models for the delivery of energy services

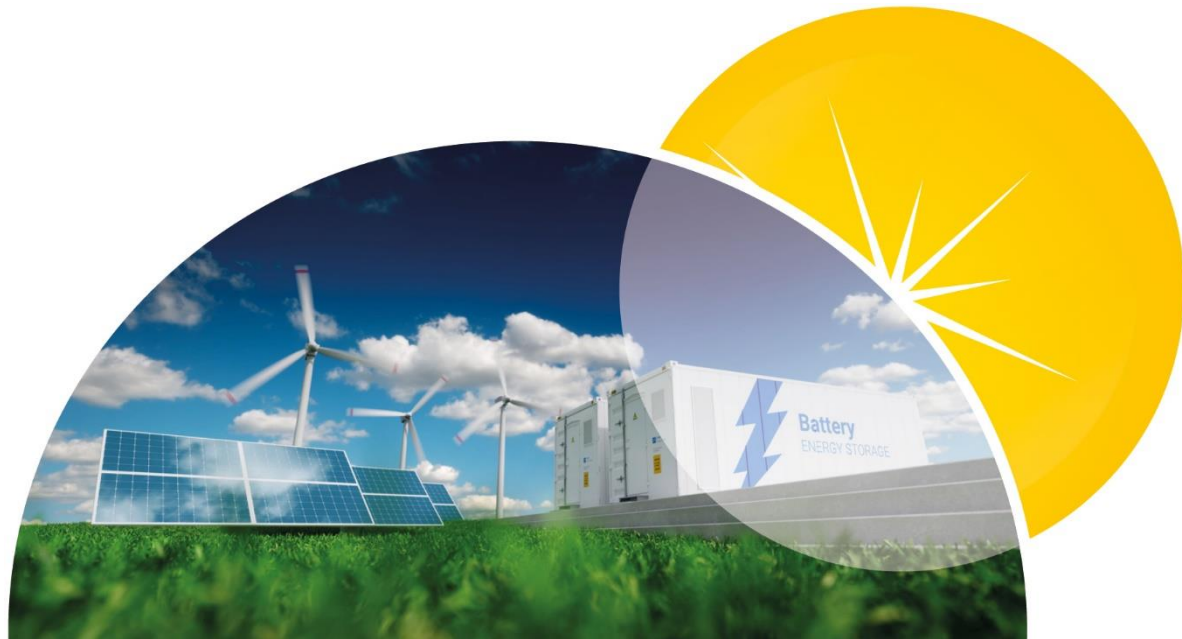
Energy Innovation (blockchain, AI and data)



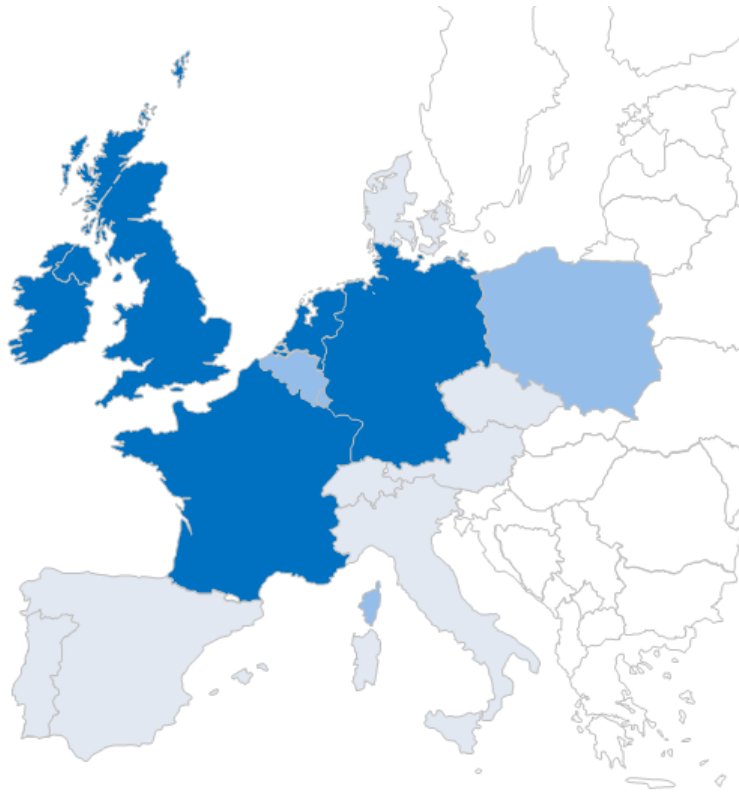
Aurora Services and Expertise

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Power market offerings:



Comprehensive Power Market Services

- ✓ Power market forecast reports
- ✓ Forecast data in Excel
- ✓ Global energy market forecast reports
- ✓ Strategic insight reports
- ✓ Regular subscriber group meetings
- ✓ Bilateral workshops
- ✓ Analyst support

Power Market Forecast Reports

- ✓ Power market forecast reports
- ✓ Forecast data in Excel
- ✓ Analyst support

Bespoke forecasts

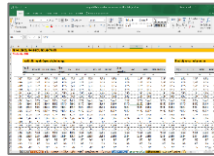
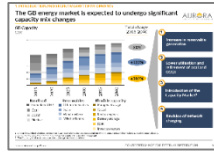
- ✓ Aurora can provide power market forecasts upon request



Aurora's flexibility service offering



GB Distributed and Flexible Energy Service



Regular provision of up-to-date revenue stream forecasts for wholesale, BM, capacity market, ancillary services and applicable embedded benefits



Investment case data for battery storage, gas peakers and DSR under various business models and market scenarios



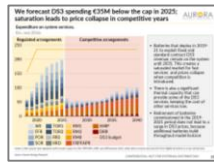
Plenty of interaction with the Aurora team to discuss our analysis



Bankable forecasts used by more than 60 subscribers, who comprise >80% of CM contract issued to flexible technologies



Ireland Power Market and Flexibility Service



Detailed forecasts of outcomes in wholesale, balancing, ancillary markets, and embedded benefits available to flexible technologies until 2040



Investment case analysis for battery storage, peakers and DSR under the main business models, reflecting revenue-stacking opportunities



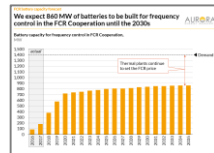
In-depth review of policy and regulatory frameworks & relevant uncertainties



All information you need for your business case and to successfully participate in the upcoming DS3 auctions



Frequency Containment Reserve (FCR) Service



Forecast of FCR prices, supply stack, price formation and key drivers



Bidding economics of participating technologies and expected further battery storage capacity buildout



Impact of procurement reform (4h products, daily auctions) including assessment of upside and downside cases



Our FCR forecasts are bankable and have been used for several major transactions

Examples of Aurora's transaction and financing support for flexible assets



Gas peaker debt financing, supported Green Frog Power's £100m debt financing of gas peakers by Lloyds, HSBC and NIBC, including reliance



Gas peaker and battery storage portfolios, sell-side market advisory for Green Frog Power and UK Power Reserve



Gas peaker debt financing, supported a bank in building their lending case for gas engines. The bank now provides regular loans to gas engine projects



Battery storage, sell-side market advisory of the largest operational battery storage portfolio in Europe. STEAG's 90 MW bid into the FCR market



Battery storage, supported successful equity and debt raise, first battery storage debt financing in UK



Flow battery storage, provided secondary reserve forecasts and business case assessment for a flow battery to project developer and main investor



Battery storage, supported a private equity fund as part of the acquisition of a battery storage developer, investment volume ~£35m



Battery storage, provided modelling of all major ancillary markets to inform DS3 bidding and optimal revenue stacking for a major Irish generator



Pumped hydro, buy-side valuations including forecasts of multiple ancillary services and operational optimisation analysis for First Hydro assets



Hydro power, acquisition of the Murkraftwerk Graz by Energie Steiermark – advised the buyer on power price development and uncertainties



CCGT, sell-side market advisory for Orsted's Enecogen plant, including forecasts for revenues from FCR and Dutch secondary reserve (FRR)



OCGT, provided a sell-side valuation and capacity market bidding strategy for two OCGT projects of a major utility. Both projects successfully sold



Heat storage, business case assessment for a reversible power-to-heat energy storage, valuing arbitrage opportunities for power, heat and steam

For more information, please contact

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We would be pleased to see you at our next events

Aurora Spring Forum



The Aurora Spring Forum is the leading private gathering of the energy industry in Europe. It brings together industry leaders in an exclusive setting at the University of Oxford to engage on key issues impacting GB, European, and global energy markets.

March 2019, Oxford

Aurora Summer Renewables Summit



Aurora's inaugural Summer Renewables Summit brings together leading industry figures to debate and discuss the policy and investment issues surrounding renewables and a subsidy-free future.

June 2019, London

For more information, contact:
Amy Hewick, Events Manager

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☎ **+44 (0) 7789 234 981**

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