



LARGE SCALE ENERGY STORAGE FOR LOCAL AUTHORITIES

ALEX THOMPSON

*“Offering solutions today
for tomorrow’s world”*

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INTRODUCING ACEON



- ✓ AceOn are an **Approved Partner of APSE Energy**.
- ✓ *“AceOn have a unique combination of a wealth of experience across the public and private sectors and draw on an in-depth knowledge of the battery storage and renewable energy sectors.”*
- ✓ *“UK Battery Specialists”*: we are a **one-stop solution provider** offering everything from a AA battery all the way up to multi-mega-watt hour battery energy storage products:
 - ❖ Residential Battery Energy Storage Systems and Renewables, including our income-generating models – RENEWERGY
 - ❖ Portable Energy Storage Systems
 - ❖ Battery Pack Design & Manufacture
 - ❖ **Commercial & Industrial Energy Storage**





Understanding Electricity: Reducing costs and increasing income for local authorities



Local Authority Strategies:

1. Reduce your electricity costs: Procurement & Usage
2. Target Energy Generation – Solar, Water, Wind
3. Engage in Electricity Trading

Extracts -

Battery storage is currently the most exciting area of renewable energy, as it offers the prospect of overcoming one of the largest hurdles of renewable energy generation: its intermittent nature. Solar farms, by definition, only work in the day; wind turbines only turn when the wind is blowing; hydropower plants cannot work in drought conditions. However, when storage is added to the mix, suddenly renewable energy can compete with the consistency of fossil fuel power delivery.

For local government, much has been learnt from private sector counterparts in terms of development of renewable energy schemes. Whilst private companies have blazed the trail, local authorities have cautiously followed in their wake. Solar farms and other renewable energy facilities are not now considered to be outside of the preserve of the public sector.

This report shows that this topic is a fast moving feast. Having become comfortable with the notion of building their own renewable energy facilities, local authorities now need to be considering adding battery storage to their plans and exploring the innovative routes for much higher rewards for the energy that they produce.

To go down this path will transform the income generation available to the authorities concerned and offer more scope to increase the number of projects under consideration. This will enhance the move towards a decentralised and decarbonised energy system and greatly improve the health and wellbeing of their areas.

There is something in this agenda for every authority and it is the hope of APSE Energy that this report will stimulate greater activity across this agenda.

“local authorities now need to be considering adding battery storage to their plans...”

BATTERY STORAGE AS PART OF A COUNCIL'S ENERGY STRATEGY



Battery storage can offer the following benefits:

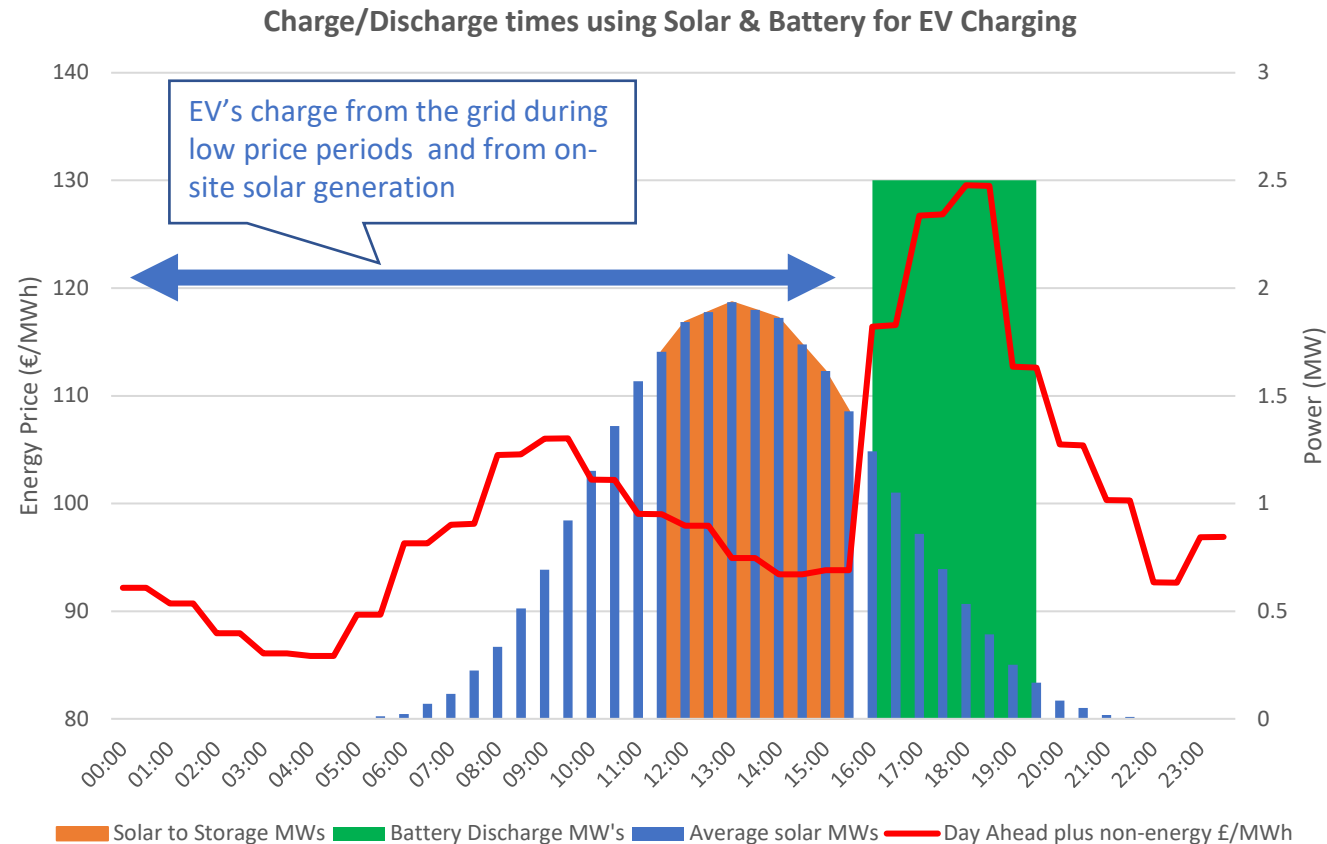
1. **Tackling Climate Change** (when combined with other Renewables)
2. **Reducing electricity bill & operating costs** of buildings and services
3. **Generating income** from trading surplus energy and working to support the operation and balancing of the Grid

Some Examples of How Battery Storage – WITH OR WITHOUT RENEWABLES -can work for local authorities...

SMART SOLAR: USE SOLAR & STORAGE TO OPTIMISE CHARGE TIMES



Avoid charging your fleet at times of peak prices through dynamic price optimisation of generation

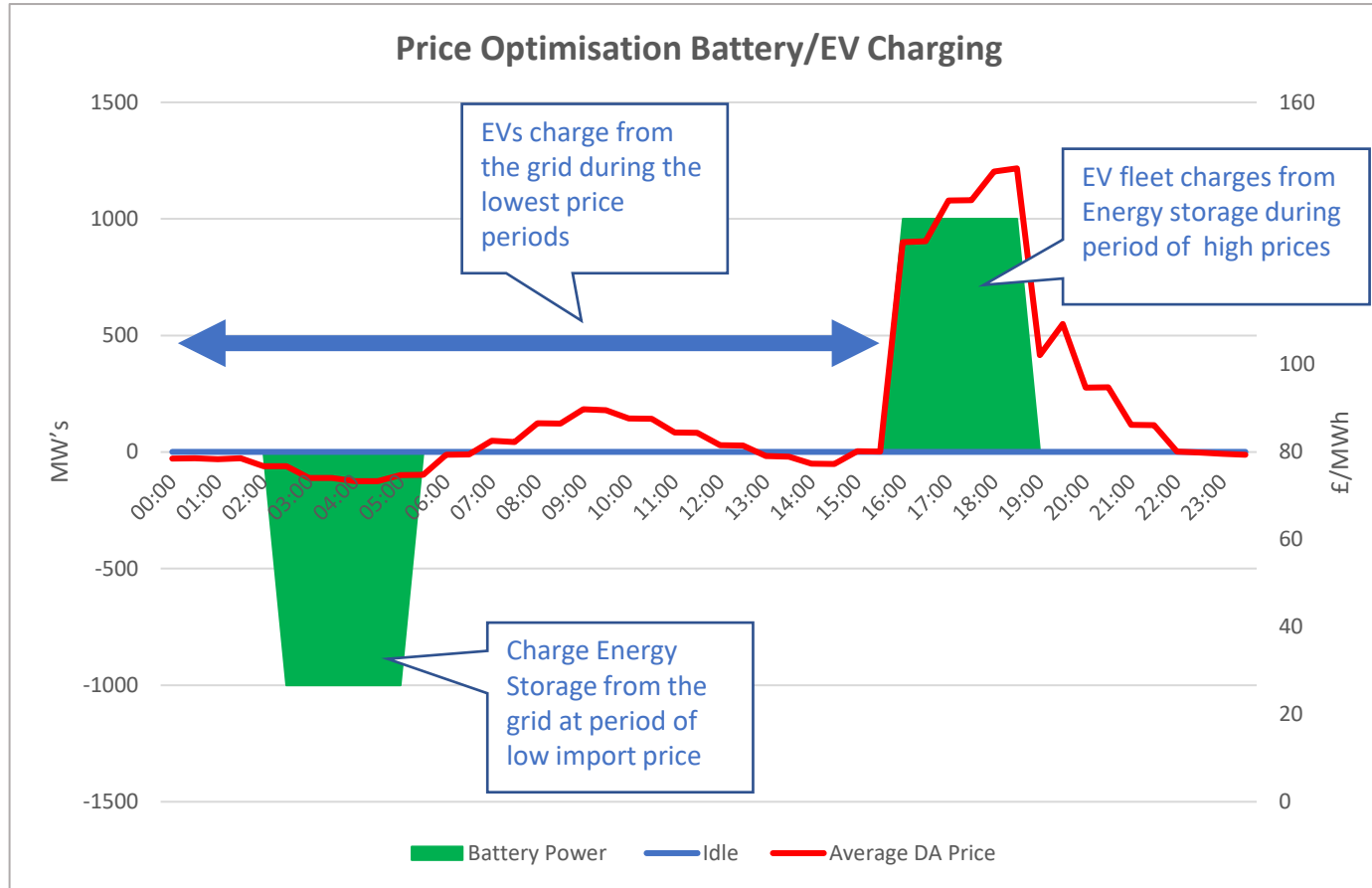


Optimise charge times against Electricity price

- Combine on-site solar generation with on-site battery storage
- Store solar generation in the battery and use when there is an EV charging requirement at high prices.
- Avoid importing at prices of up to **£150/MWh**
- Maximise benefit of on site generation and avoid low value exports to the grid.
- Similarly, store solar at weekends for weekday use in Offices and buildings

SMART TARIFFING: CHARGE TIME OPTIMISATION

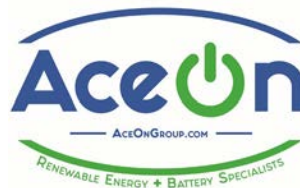
Avoid charging your fleet at times of peak prices through dynamic price optimisation. Charge up your batteries at off-peak times for use in Offices and buildings during main Office hours.



Fleet Charge Price Optimisation

- Add **energy storage** to ensure peak price charging is always avoided.
- There is ~ £71.60/MWh difference between peak prices and lowest prices.
- Annual Savings of **£26,123** for a 1MW 1MWh battery

GENERATING REVENUE THROUGH AN AGGREGATOR



AceOn work with Grid Aggregators to trade your battery on a variety of markets to generate revenue. Below is an example of revenues generated in 2021 for a 1MW 1MWh battery. Smaller than 1MWh batteries can also enter the trading market via a VPP.

2021 Performance:

	1MW / 1MWh
D Containment	£140,932
D Moderation	£0
D Regulation	£0
Frequency Response	£140,932
Trading	£32,984
Capacity Market	£3,239
FR Charging	-£1,060
Total Revenue in 2021	£176,095

Potential of a 3 year payback whilst only using 280 cycles of a 5000 cycle life battery – plenty of life left in the battery for future profits

Dynamic Containment Value has increased since procurement changed from daily to EFA block late Summer 2021.

Capacity Market revenue is relatively low in 2021, however the CM is seeing notable up turns in value. T1 auction for 2022/23 is set to clear at £75,000/MW. This would provide a net value of £16,725 for a 1 hour battery. (derating factor is around 0.22 for a 1 hour battery).

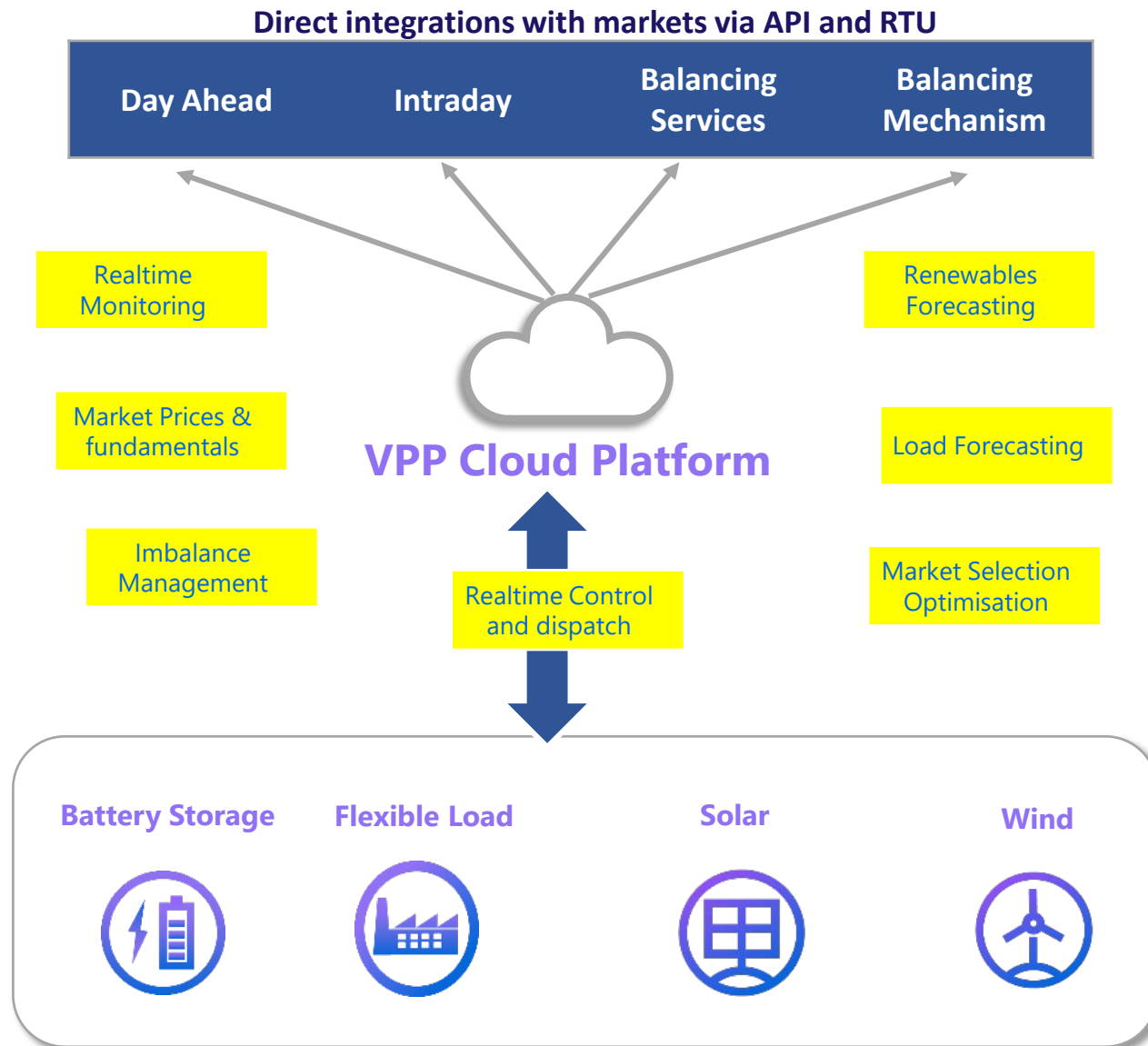
The Balancing Mechanism has hit record highs of over £4,000/MWh in recent months. The Day Ahead market has seen prices touch £1,000/MWh. All great opportunities for a battery to take advantage of when managed effectively.

Triad savings not included in the table. £40K / £50K /MW additional benefit.



The aggregators trading platform generates Market Forecasts for Ancillary, Day Ahead, Intraday and Balancing Mechanism on a continuous basis to determine the best market to trade your battery asset in.

MONETISING FLEXIBILITY: VIRTUAL POWER PLANT

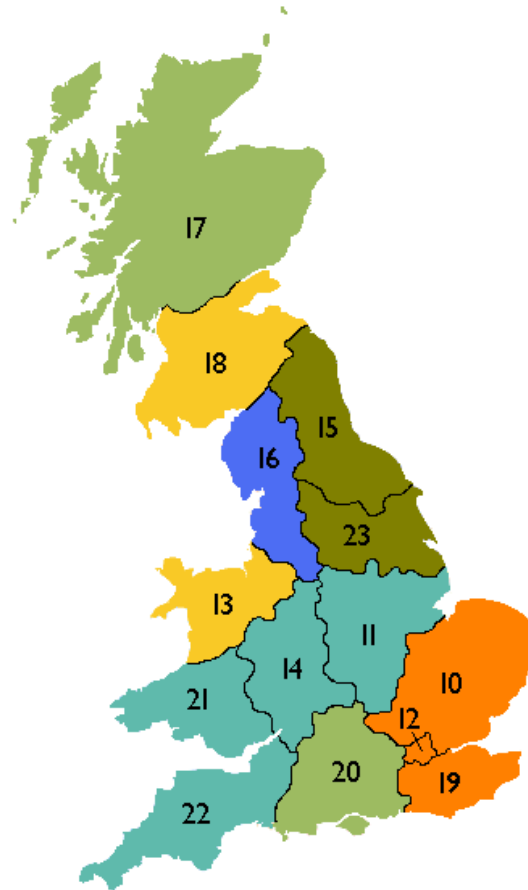


Working with our Energy Partners, we can create a high performance portfolio for you by aggregating renewables with Batteries and Flexible load:

- **We use flexibility in the portfolio**, provided by controllable load and storage, to offset the risk of renewable imbalance.
- **Wholesale market access** – Day Ahead and Intraday
- Access to lucrative **Balancing services** and the **Balancing mechanism**
- **Accurate renewable power forecasting**
- **Real-time monitoring** of production load profiles and forecasts
- **Off-the-shelf integrations** with Epex spot and TSO for data scraping and operational requirements.

DYNAMIC PROCUREMENT & TRADING: GSP ZONES & VPPs

- All new dynamic schemes to be procured on a GSP (**Grid Supply Point**) **Group** level.
- Aggregation is done **virtually** and batteries managed **remotely**.
- Aggregation of multiple battery assets to make up the whole **1MW procurement unit**.



- Assets have multiple markets to dispatch which are becoming highly volatile.
- Many possible trading solutions. **Algorithmic trading is the solution**
- State-of-the-art forecasting coupled with Optimisation solvers
- Ensuring your assets are traded to maximize market value

We can help your Council to lead the development of a Virtual Power Plant that can support and be utilised by any business or organisation looking to add battery Storage in your local area.

ACEON'S MEDIUM - LARGE SCALE ENERGY STORAGE SYSTEMS RANGE



AceOn Flex ESSmini - 50 or 88kW 3 Phase Inverter with 71-284kWh battery racks. This is to be housed indoors

AceOn Flex ESSmicro - 50 or 88kW 3 Phase Inverter with 71-284kWh battery racks. These systems are housed in a GRP housing that are designed for outdoor installations.

AceOn Flex ESS250 - 250kVA 104-832kWh All in One Battery Storage System with 1MWh Battery Storage expansion boxes available

AceOn Flex ESS500 - 500kVA 104-832kWh All in One Battery Storage System with 1MWh Battery Storage expansion boxes available

AceOn Flex ESS1000 – Utility Scale 1000kVa 1MWh+ modular Battery Storage System

AceOn Flex ESS-EV - 300kW DC EV charging with 416kWh Battery Storage and additional 220kW of AC charging available (Coming soon)

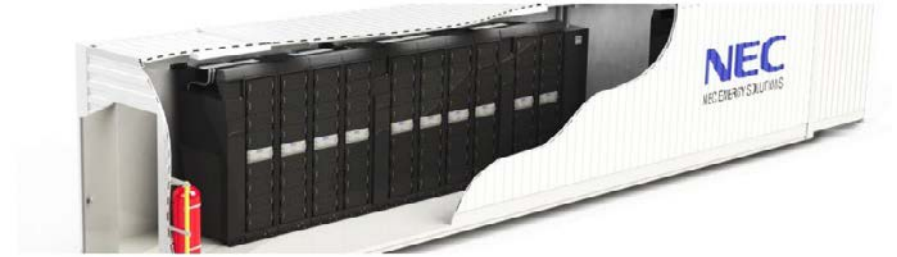


WHAT MAKES ACEON'S SYSTEMS DIFFERENT FROM OTHER 'BIG BATTERIES'



Conventional BESS:

- All component parts curated by EPC contractor on project by project basis
- Typically 1-2MWh site built system
- 45' shipping container
- Footprint: 33m²
- Density: 61kWh per m² (max)



Advanced Integration BESS:

- Greater off-site build content
- Site assembly & testing
- Common solution for multiple applications
- Increased density



AceOn Flex ESS Systems:

- Pre-Integrated, factory built & tested
- Plug & play installation
- Common design, high versatility
- Footprint: 5.1m²
- Maximum density : 204kWh per m²



AceOn offer a One-stop Solution – Energy storage plus Expert Grid Aggregators, System optimisers and OFGEM-Regulated Energy Supply Company Partners

ACEON FLEX ESS ENERGY DENSITY



Energy Density – The AceOn Flex ESS has been engineered to be one of the most energy dense systems in the world. Below is a comparison of our product compared to competitor products



1.04MWh pre integrated ESS
Custom GRP enclosure
Footprint: 5.1m²
Density: 204kWh per m²



Typical 1- 2MWh site built system
45' shipping container
Footprint: 33m²
Density: 61kWh per m² (max)



AceOn Proposition – 40MW / 80MWh (highlighted in green)
Competitor Proposition – 40MW / 40MWh (highlighted in red)

2 x Storage capacity
½ Footprint
½ Site remains for use

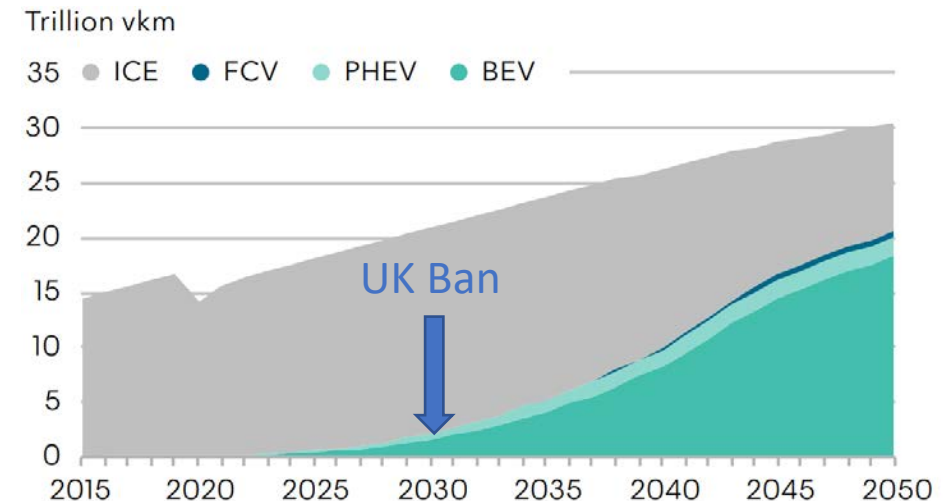


ACEON FLEX ESS-EV – COMING SOON!



AceOn Flex ESS-EV - 300kW DC EV charging with 416kWH Battery Storage and additional 220kW of AC charging available

- Choice of DC fast/rapid charging configurations from 6 x 50kW to 1 x 300kW
- Additional capacity for up to 10 x 22kW and 35 x 7kW AC chargers
- Modular for progressive investment
- Reduces or avoids grid upgrades
- Solar ready
- Ultra low footprint - 2.5m x 3.4m x 1.5m (HxWxD)
- Easily transported on site by forklift or Hiab
- Factory-built and tested
- Enables 20+ daytime fast top up charges plus 20+ overnight 7kW charges from same box



SUMMARY



- **There are significant opportunities to invest in and utilise Battery energy storage, with or without connected Renewables, to both reduce costs and generate a significant revenue stream.**
- **Battery storage can reduce the cost of charging your EV fleet and powering your buildings and facilities.**
- **Battery storage can play a key role in supporting the Grid and, in doing so, delivering a significant long-term revenue income. As an illustration in 2021, 1MW could deliver a net income of c.£170,000pa. This has the potential for a 3 year payback whilst only using 280 cycles of a 5000 cycle life battery – plenty of life left in the battery for future profits.**
- **There are many private investors around looking for suitable opportunities to invest in medium – large scale battery storage. If you have appropriate land or space, you may be able to lease this to them for locating a Grid-supporting/trading battery as an alternative income opportunity instead of investing yourselves.**
- **AceOn, working with our Energy Management partners, have the experience, expertise and technology to help you achieve both your Energy Strategy and Service & Financial Strategies.**

AceOn know that all projects are different, with customers having varying requirements. Our business is to help develop and understand those requirements and offer bespoke solutions that meet your needs.

Contact the Renewable Energy & Battery Specialists



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