

# Overcoming Grid Constraints AceOn's DC-Coupled Solar & Battery Storage Solution



# One of UK's Leading Battery Manufacturers



Manufacturing Battery Packs



Distributing Battery Cells



Residential Battery Storage



2<sup>nd</sup> Life Battery Storage



Industrial/Utility Battery Storage



Portable Battery Storage

## 30+ Years of Battery Manufacturing Experience

# AceOn Credentials

## Renewable energy & battery solutions experts

- 30 years' battery experience.
- Offering a complete range of Battery Storage Solutions.
- End to end project management.

## Strong partner support

- Best in class partner network.
- Leaders in their respective fields.
- Deploying state of the art technology.

## Comprehensive data modelling capability

- Proven modelling simulation software to design the optimum solution.
- Creating bespoke outcomes for every project.

## Future focus

- We look beyond current technologies to develop new solutions which future proof projects and support partners long-term.



# Recognised as Leading Experts in the UK Battery Industry



## Secretary of State for Energy Security and Net Zero visits AceOn

Ed Miliband recently visited AceOn's headquarters and production facility in Telford, accompanied by Shaun Davies, the newly elected MP. During the visit, Mr. Miliband said... *"I am incredibly excited to be here. I can see the future here at AceOn."*



## AceOn at Downing Street

Mark Thompson of AceOn Group joins the Prime Minister in pivotal discussions on UK's business innovation and future scale up opportunities.



## AceOn invited for talks with UK Prime Minister

AceOn Group CEO, Mark Thompson, a member of the **UK Government's Faraday Battery Challenge Advisory Group**, was recently invited to meet the Prime Minister at 10 Downing Street to discuss the future of battery technology in the UK.

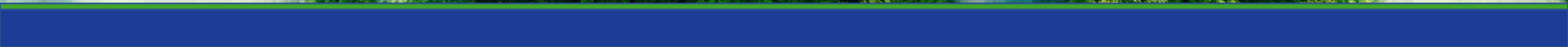
## Governor of the Bank of England Visits AceOn

Andrew Bailey's visit provided a unique opportunity to showcase AceOn's innovative energy storage systems. The Governor praised AceOn's commitment to innovation, commenting... *"This is real innovation here at AceOn. It's inspiring to see businesses like this leading the way, and it offers important lessons for the policies we shape nationally."*



Powering Innovation,  
Shaping the Future of Energy

# Offering Solutions for a Greener Future



# Industry Problem and Solution Overview

## Problem:

- Grid Constraints

– DNO's are currently restricting the amount of generation assets connecting to the network, typically allowing only a **999kW connection**.

## Solution:

- AceOn's DC-coupled solar-to-battery energy storage system (BESS) provides a strategic advantage

- By overcoming Grid constraints.
- Enabling larger solar PV installations.
- Efficiently storing surplus energy for optimal utilisation.

## Key Benefits:

- **Overcome Grid Constraints:** Install solar panels to the full potential of your available rooftop or ground space.
- **Cost Savings:** Minimise dependence on Grid electricity, leading to significant cost savings and faster return on investment.
- **Energy Independence:** Boost self-sufficiency by storing excess solar energy in a Battery system.

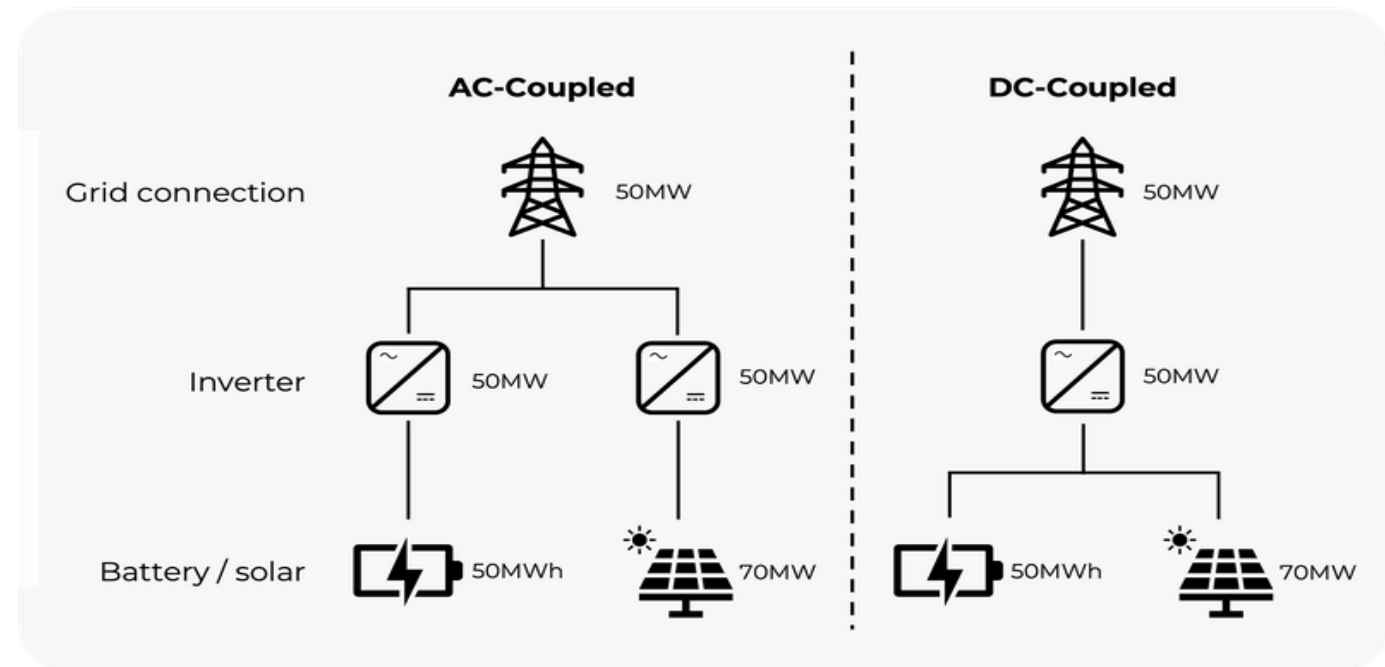
# Understanding DC-Coupling

## What is DC-Coupling:

- Solar PV panels produce direct current (DC). In typical solar installations, they connect to a DC/AC inverter, where the inverter's kW size must be declared to the Distribution Network Operator (DNO).
- Because batteries also store energy as DC, **we can connect the solar PV array directly to the DC Bus of a suitably sized battery system.**
- Our setup **eliminates the need for Solar AC inverters**, which count toward the grid connection limit. Instead, we use DC-DC converters, which don't require declaration to the DNO, **allowing a solar PV array of any size to connect directly to the battery storage system.**
- AceOn then connect the battery to the electricity network matching a battery storage DC/AC inverter **to the agreed grid connection size offered from the DNO.**

In this example, an AC-coupled system with a 50MWh battery and a 70MW solar PV array **would require a 100MW grid connection.**

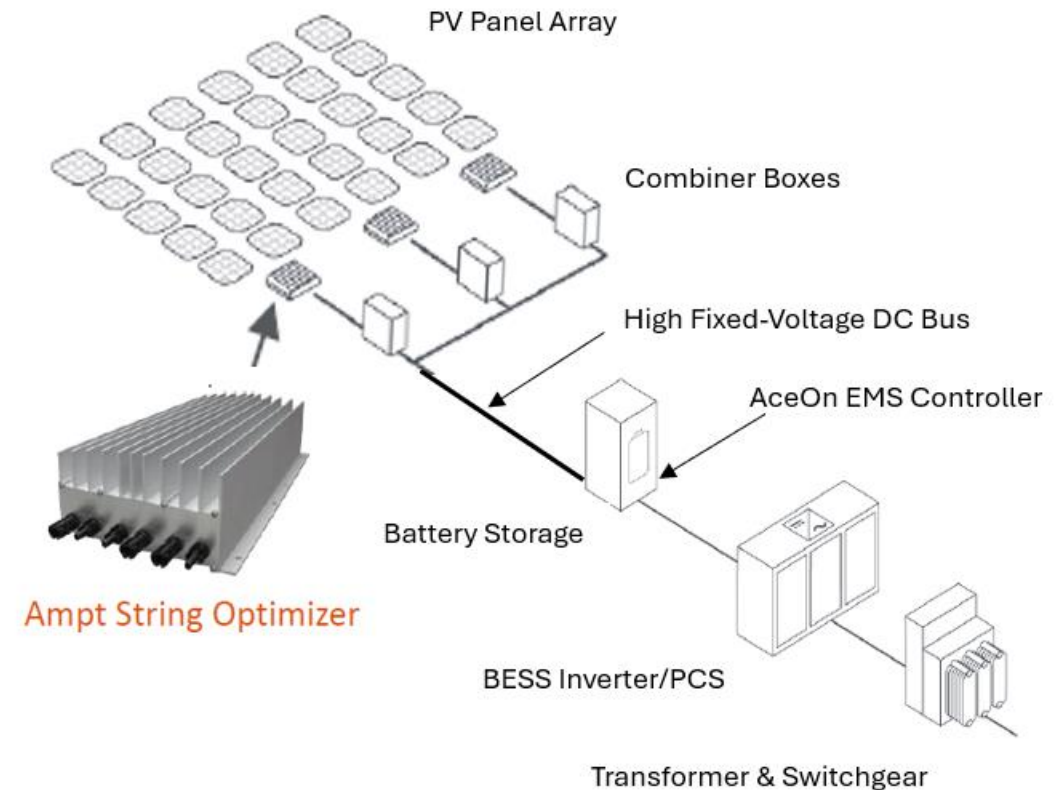
In contrast, our DC-coupled system **would only require a 50MW connection.**



# How does AceOn's system work

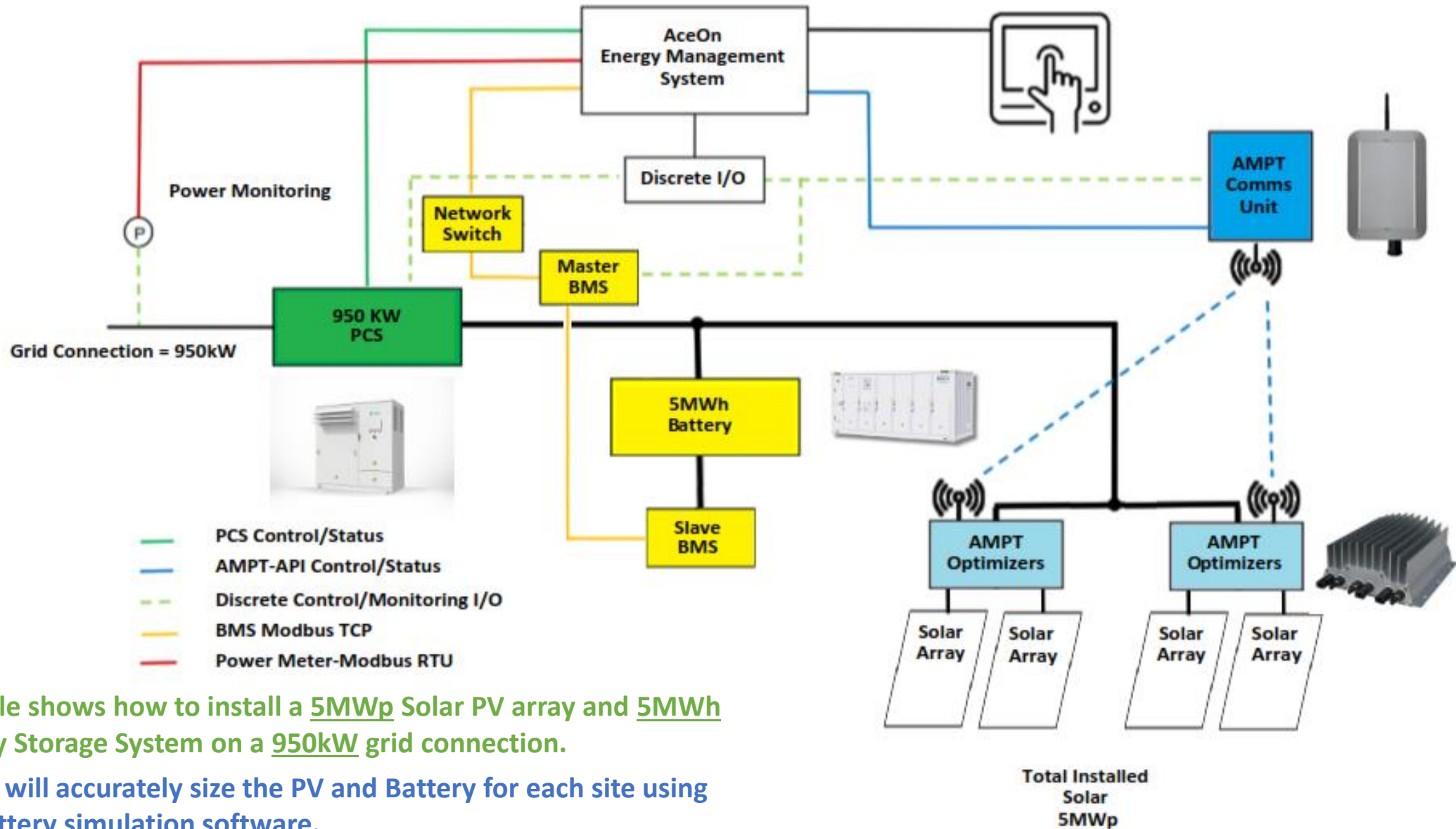
## DC-Coupling Solar directly to Battery Energy Storage System:

- Each solar PV string is connected directly to an Ampt DC-DC string optimizer, with two strings per optimizer. This optimizer takes the variable input voltage from the PV module strings and outputs a stable DC voltage.
  - Maximum Power Point Tracking on each string eliminates mismatch.
- The high fixed stable DC voltage can be connected directly to the DC Bus of the battery storage system.
  - Unlimited amount of PV can be installed as no requirement for AC Solar PV inverter to charge the battery or provide power to Load/Grid.
- AceOn's proprietary controller and energy management system (AceOn CommandOS™) seamlessly integrates solar generation with battery storage, precisely controlling energy flow to and from the battery. This ensures compliance with Grid export limits while optimising solar usage behind the meter.
  - Ensures Grid compliance with Grid export limits, while optimising solar usage behind the meter.
- The battery is charged via the DC Bus, storing excess solar energy and supplying AC power to the Load or Grid through the BESS inverter/PCS, selected to match the grid connection.
  - Increased performance efficiency of 8-24% compared to AC-coupled system.





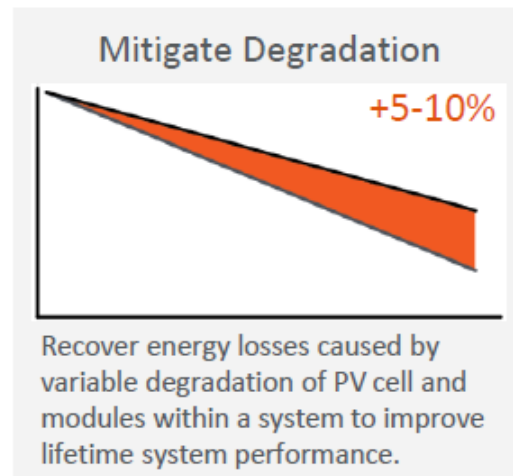
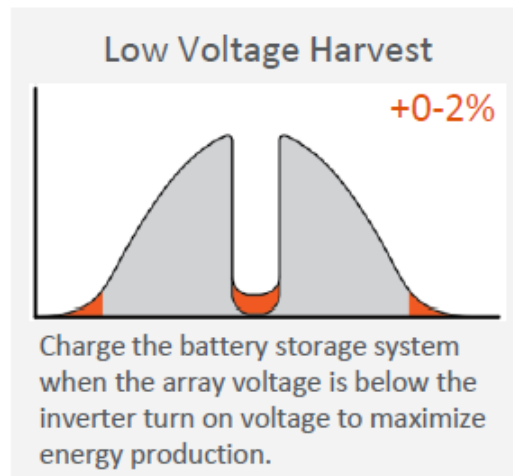
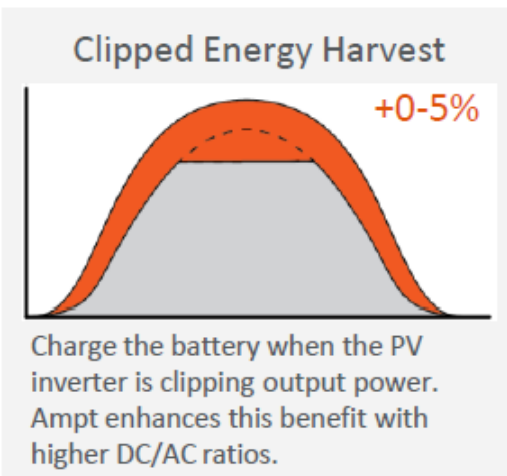
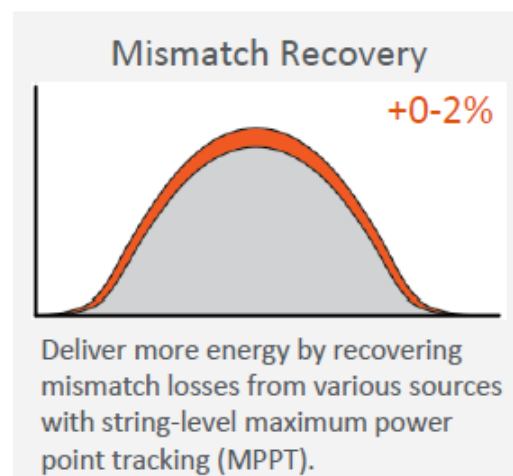
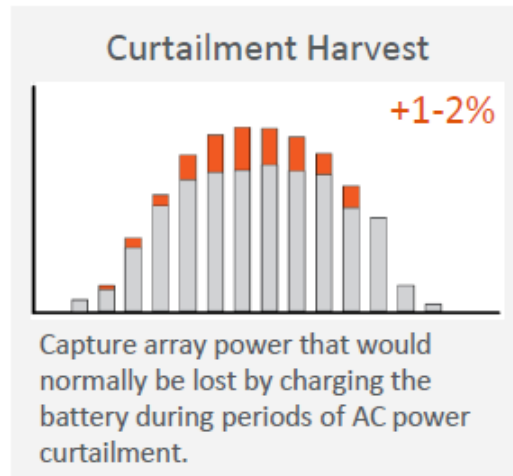
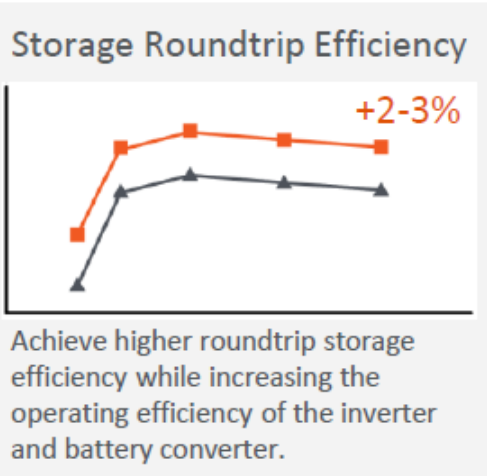
# DC-Coupled Solar Direct to Battery Storage Topology



Example shows how to install a 5MWp Solar PV array and 5MWh Battery Storage System on a 950kW grid connection.

AceOn will accurately size the PV and Battery for each site using our Battery simulation software.

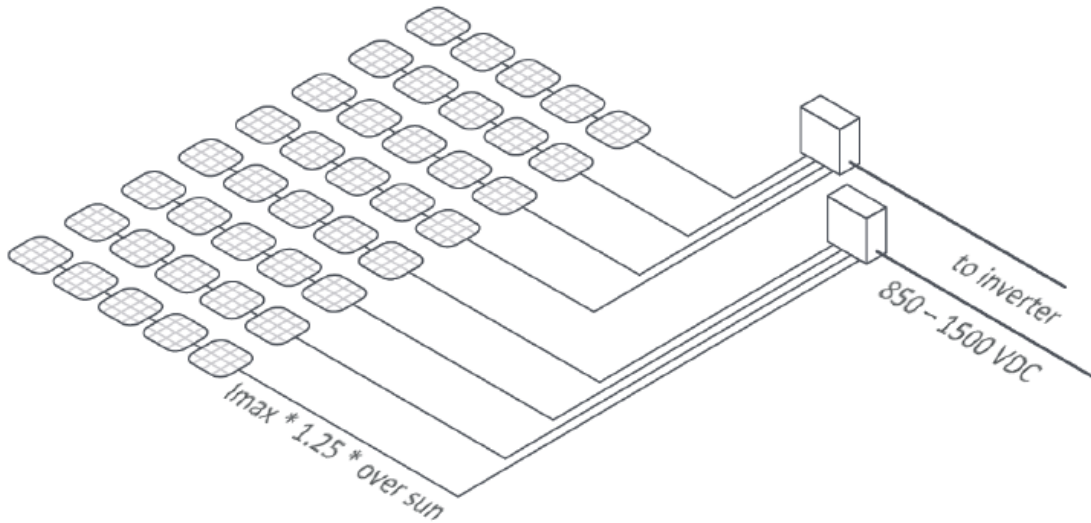
# DC-Coupled Performance Advantage



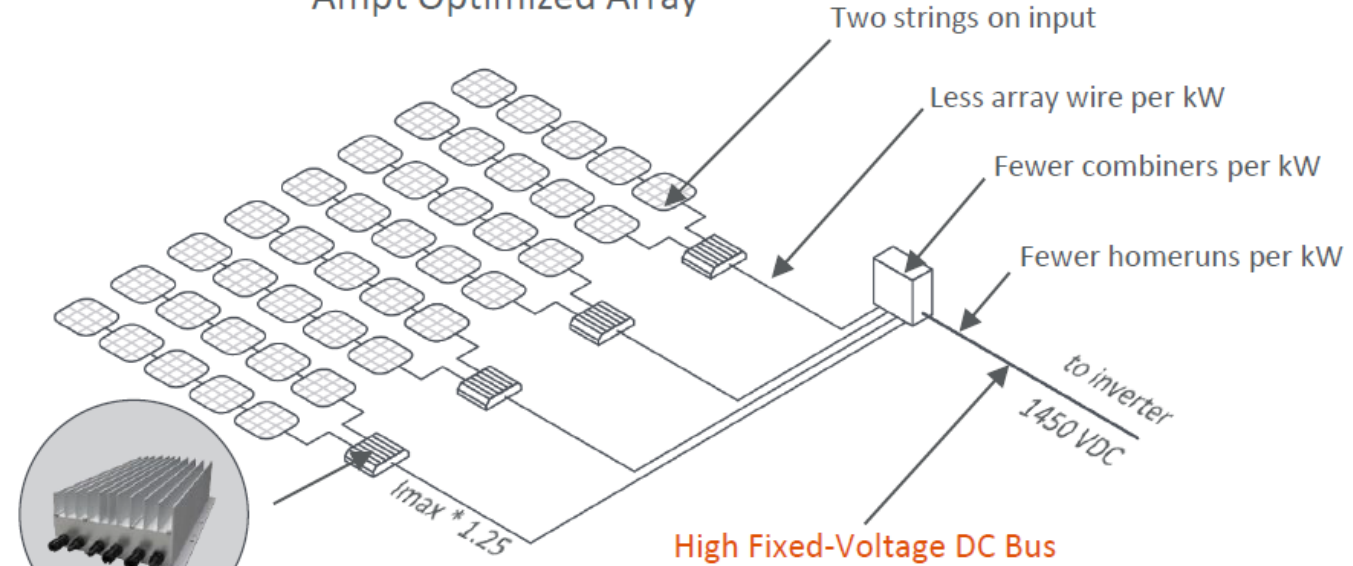
8-24% performance increase opportunity compared to AC-coupled solutions

# DC-Coupled Cabling & Combiner Savings

Traditional Array



Ampt Optimized Array



- Output current limits allow cable ampacity to be reduced as it no longer requires margin for “over sun” conditions
- High and fixed DC bus voltage lowers current ( $I=P/V$ )

Reduced number of combiners and minimised cabling to lower costs

# Working with Industry Leading Tier 1 Partners

AceOn is committed to delivering the highest-quality solutions through strategic partnerships with globally recognised Tier 1 technology leaders.

## Battery Energy Storage Partner



- **Top-Tier Reliability:** Our battery storage partner, recognised on **Bloomberg NEF's 'Tier 1 List 3Q 2024'**, has an impressive **2GWh** of battery systems installed in 2023. This partnership ensures AceOn provides proven and reliable energy storage solutions backed by one of the world's most trusted names in battery technology.



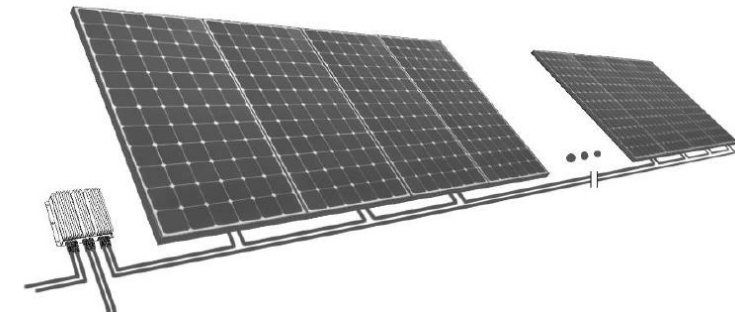
## Inverter/PCS Partners

- **Optimal Compatibility:** AceOn's storage systems seamlessly integrate with industry-leading inverter and PCS manufacturers, including **SMA, Power Electronics, and Delta Electronics.**
- **Each project is tailored with the most suitable inverter/PCS,** ensuring peak performance and compatibility across installations.

## DC String Optimizer Partner



- **World's #1 DC Optimizer:** AceOn collaborates with **ampt**, the world's top-ranked DC optimizer company for large-scale PV and storage systems. With over **3GW shipped and 10GWh+ of PV+Storage projects**, ampt's advanced technology optimizes energy flow, maximising efficiency and system output.



Together, these partnerships empower AceOn to deliver energy storage solutions that are robust, scalable, and future-ready.

# Battery Energy Storage Partner

- **One Of The Worlds Leading BESS Solutions Providers**

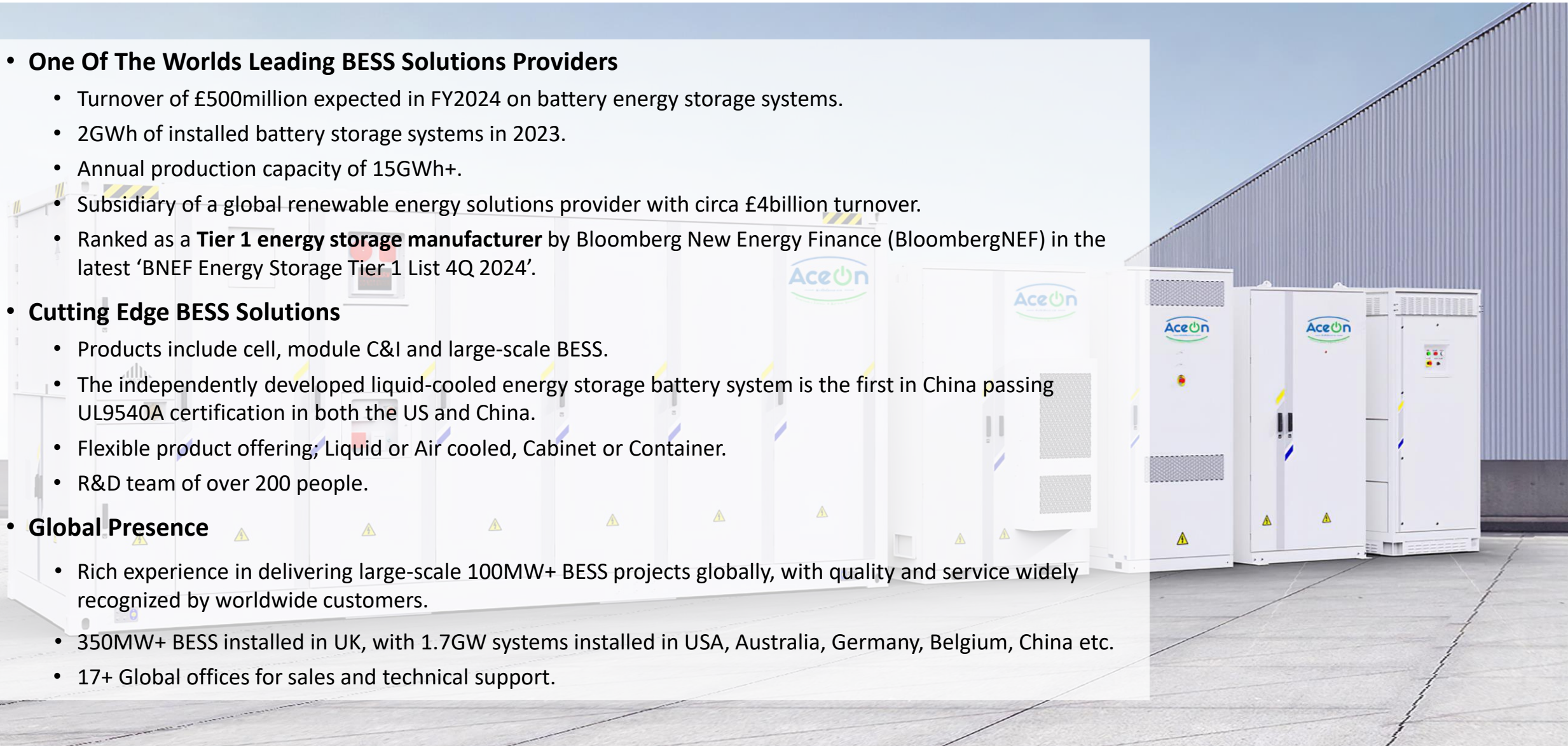
- Turnover of £500million expected in FY2024 on battery energy storage systems.
- 2GWh of installed battery storage systems in 2023.
- Annual production capacity of 15GWh+.
- Subsidiary of a global renewable energy solutions provider with circa £4billion turnover.
- Ranked as a **Tier 1 energy storage manufacturer** by Bloomberg New Energy Finance (BloombergNEF) in the latest 'BNEF Energy Storage Tier 1 List 4Q 2024'.

- **Cutting Edge BESS Solutions**

- Products include cell, module C&I and large-scale BESS.
- The independently developed liquid-cooled energy storage battery system is the first in China passing UL9540A certification in both the US and China.
- Flexible product offering; Liquid or Air cooled, Cabinet or Container.
- R&D team of over 200 people.

- **Global Presence**

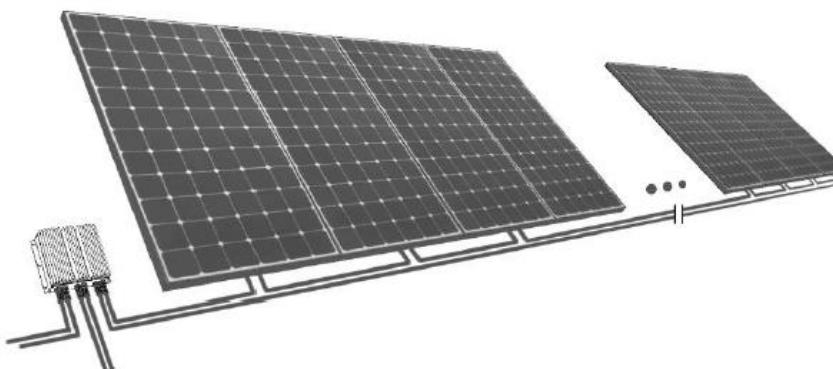
- Rich experience in delivering large-scale 100MW+ BESS projects globally, with quality and service widely recognized by worldwide customers.
- 350MW+ BESS installed in UK, with 1.7GW systems installed in USA, Australia, Germany, Belgium, China etc.
- 17+ Global offices for sales and technical support.



# DC String Optimizer Partner



- Founded in 2007
- Headquartered in Colorado, USA
- 10GWh PV+Storage with 3GW shipped
- 2+GW in projects 100MW or larger with 5 hours of storage
- Working with 5 of the top 10 global developers



- Optimize PV Systems
- DC-Coupled Storage
- Repower PV Systems
- Monitoring and O&M

## Market Leadership



i50 String Optimizer

System voltages: 600 – 1500 V  
Output currents: 32 – 50 A  
Output powers: up to 70 kW



i32 String Optimizer

System voltages: 600 – 1500 V  
Output currents: 20 – 32 A  
Output powers: 11 – 45 kW



i20 String Optimizer

System voltages: 750 – 1500 V  
Output currents: 16 – 20 A  
Output powers: 9.1 – 27.7 kW



i13.5 String Optimizer

System voltages: 600 – 1000 V  
Output currents: 12 – 13.5 A  
Output powers: 5.8 – 12 kW



i12 String Optimizer

System voltage: 600 V  
Output current: 12 A  
Output powers: 4.7 – 6.7 kW



Ampt CU

Two-way Wireless (RF)  
String-level data for O&M

# Key Benefits:

## 1. Overcome Grid Constraints:

- ✓ Install larger solar PV systems than Grid limitations currently allow.
- ✓ Break free from the restrictive DNO connection limit of installed solar and capture solar energy in line with your actual energy needs.
- ✓ Store excess solar energy in a battery size of your choosing.

## 2. Maximise Energy Efficiency:

- ✓ Ensure that no solar energy is wasted by storing surplus power and using it during peak demand times.
- ✓ Optimise energy flows and significantly reduce dependency on grid-supplied electricity.
- ✓ Increased performance efficiency of 8-24% compared to AC-coupled system

## 3. Achieve True Energy Independence:

- ✓ Move toward energy autonomy by producing, storing, and consuming your own solar power.
- ✓ This translates to lower operational costs and increased protection from volatile grid pricing.

## 4. Sustainability Leadership:

- ✓ By fully utilising solar energy, your business can drastically reduce its carbon footprint and make meaningful progress toward your sustainability goals.
- ✓ Enhance your corporate social responsibility (CSR) by showcasing a commitment to renewable energy and environmental stewardship.

## 5. Best-in-Class Partners for Reliable Technology:

- ✓ AceOn's DC-coupled system is powered by top-tier partnerships, including a Tier 1 energy storage manufacturer and worlds largest optimizer manufacturer, which ensure that you receive a proven, scalable, and cost-effective energy solution.

# Partnering with AceOn Group

**Tap into our expertise**



**Help navigate an emerging industry through introducing industry experts**



**Let us help create a bespoke solution for you**



**Successfully deliver complex renewable projects**



**Help you achieve your Net Zero Targets**



**Maximise your return on investment**





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# Renewable Energy & Battery Solutions Provider

