



Introducing AceOn And Launching Our Virtual Power Plant

APSE Webinar 10 November 2020

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

AceOn Group

+44 (0)1952 293 388

Unit 9B

info@aceongroup.com

Stafford Park 12

Telford

www.aceongroup.com

TF3 3BJ

INTRODUCING THE ACEON & RENEWERGY TEAM



Richard Partington – Managing Director of AceOn Energy. Previously over 30 years in local government including 8 years as Managing Director of Telford & Wrekin Council.

Mark Thompson – Director. Over 30 years’ experience in Battery Energy Storage and the design, manufacture and supply of batteries and battery packs.

Loic Hares – Partner. Over 6 years’ experience working for ‘Big 6’ energy providers, acting as a consultant in the UK energy industry, and helping energy start-ups build successful operations

Alex Thompson – Sales Director. 8 years’ experience in Energy storage, batteries and battery packs

“AceOn and Renewergy have a unique combination of a wealth of experience across the public and private sectors as well in-depth knowledge of the battery storage and energy sectors”

CONTENTS OF TODAY'S WEBINAR

THE FORMAL LAUNCH OF RENEWERGY – ACEON'S VIRTUAL POWER PLANT

1. **Overview of the Electricity Market, Issues, Challenges & Opportunities – Dr Neil Williams**
2. **Overview of AceOn & Introducing RENEWERGY, Our Virtual Power Plant – Richard Partington**
3. **How RENEWERGY Works In Detail – Loic Hares**
4. **Explaining The Hardware Behind RENEWERGY – NOT ALL BATTERIES ARE THE SAME! – Alex Thompson**
5. **Summary of The Benefits of RENEWERGY – Richard Partington**
6. **Questions**

DR NEIL WILLIAMS

Our Special Guest today – DR NEIL WILLIAMS

Neil is an investor and advisor in the energy, cleantech and mobility sectors. He has worked exclusively in the energy sector since 2012 and is passionate about the digital/smart transformation of energy and is a respected expert in this field.

Overview of the electricity supply and trading market place – a look at current issues, challenges and opportunities, likely cost of electricity over the coming two decades and an assessment of the role virtual power plants can and will play in the domestic energy market.



Energy has changed forever

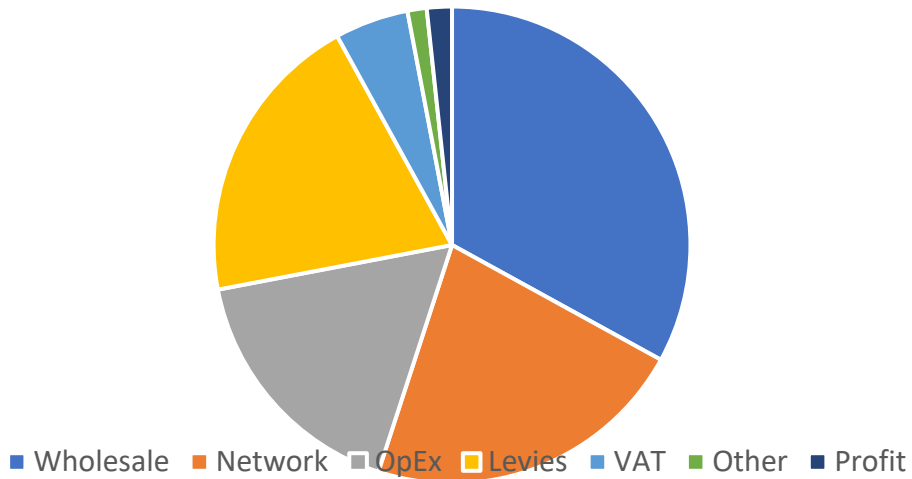
Dr Neil Williams
CxO & Founder
Tilix - Innovation & Marketing

- Digital
- Decarbonised
- Decentralised
- Dependable

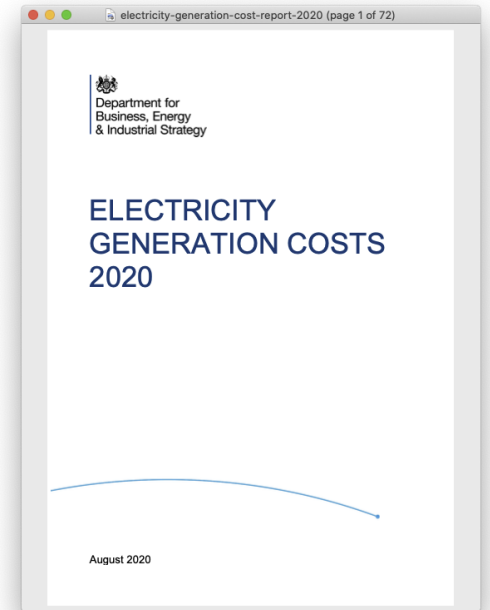
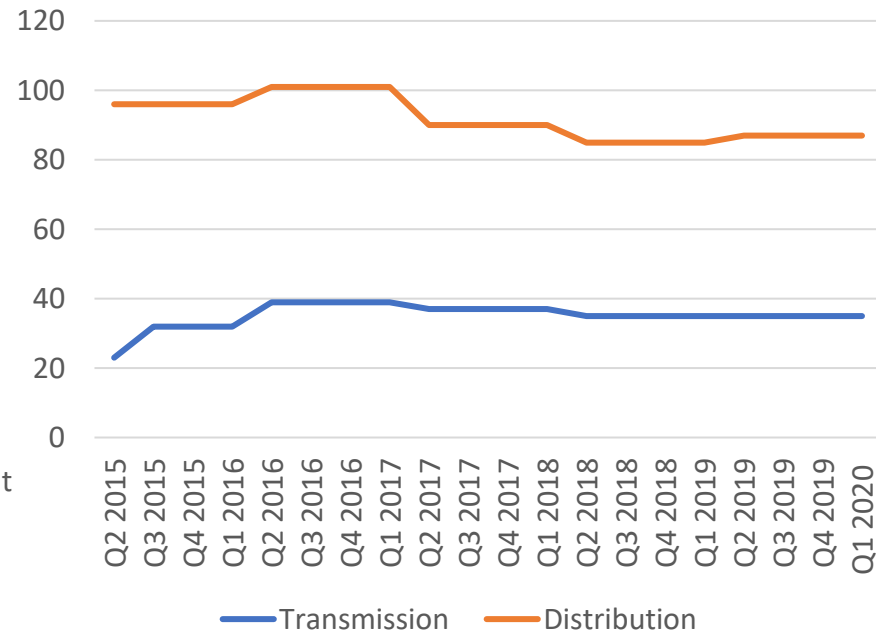


Predictions are difficult

Electricity Bill



Network Costs



<https://www.ofgem.gov.uk/data-portal/breakdown-electricity-bill>

<https://www.ofgem.gov.uk/data-portal/estimated-network-costs-domestic-customer-gb-average>

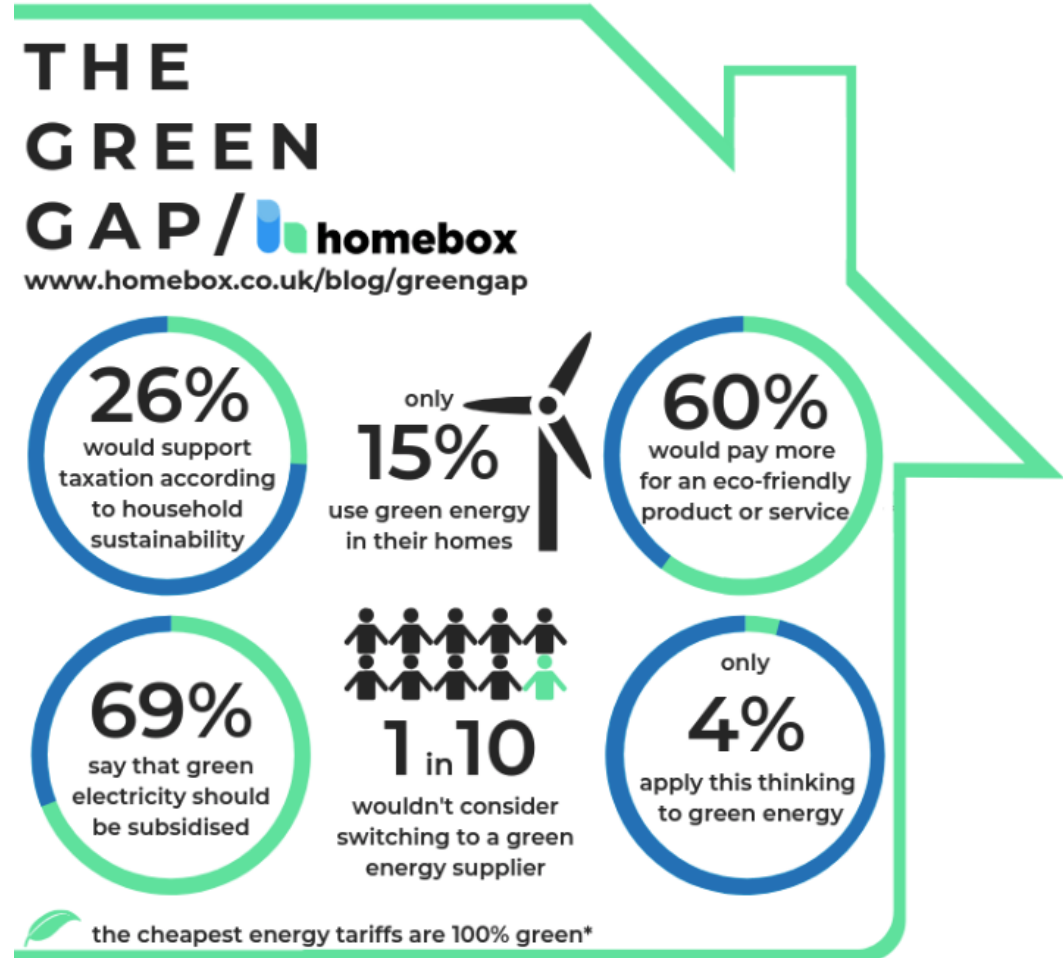
<https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020>

In energy, the customer's voice is loud & clear



Whitepaper

The Changing Tides and Currents of the Energy Market



*as available on Homebox as of April 2019

Competition is fierce



Borlänge Energi



HELSINGE *Elhandel*



TESLA

octopus
energy

bulb



How we govern, create, move, meter, regulate, sell, buy & use energy is being disrupted

Electrification
of transport
& heat

Distributed systems,
smart grid, smart
cities

Renewables: solar,
wind & hydro

Hydrogen, AD,
biogas, syngas, heat
networks etc

Energy storage:
compressed air,
batteries, etc

Demand side
management, load
shifting, aggregation
etc

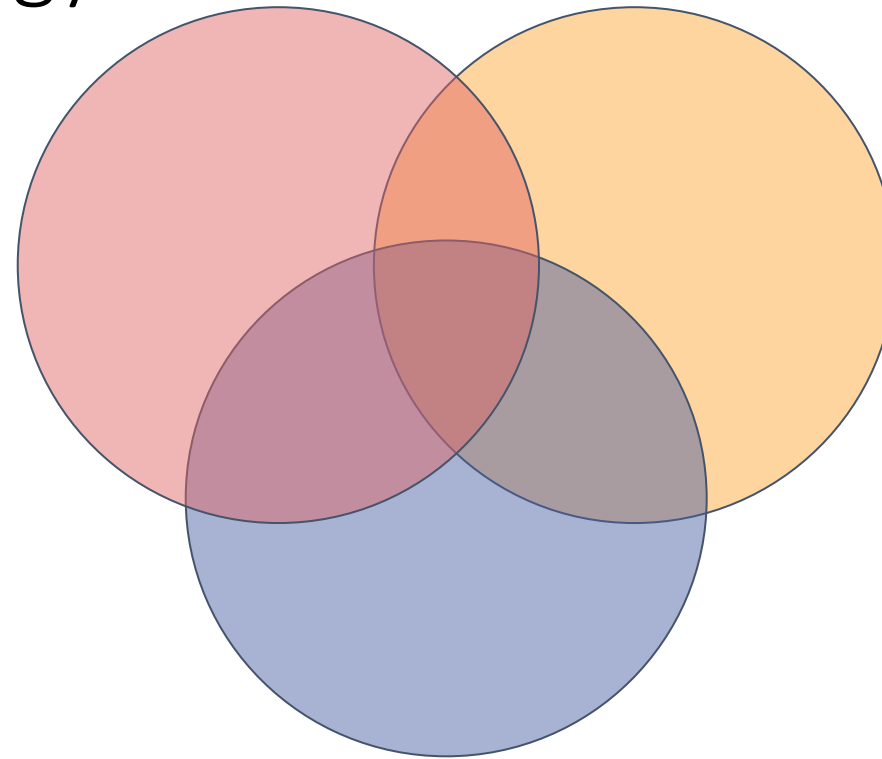
Low effort, risk free
switching of supplier

Smart homes,
prosumer, P2P, etc

Inter-mingled challenges for public utilities & public servants

Technology

Innovation



Environment

Energy has changed forever....



- Reduce cost
- Increase revenue
- Improve resilience
- Reduce GHG emissions
- Improve air quality

VPPs are more than a pawn in the game

ACEON – PROUD TO BE APSE ENERGY’S APPROVED PARTNER



Due to our expertise in the battery energy storage field, AceOn Group have been selected as key partner and supplier to:



Approved Partner

Association for Public Service Excellence -
Exclusive Approved Energy Storage Partner to **114 member councils**



National Housing Federation -
Exclusive Energy Storage Sector Supplier to **800 Housing Associations**



Microgeneration Certification Scheme (MCS) -
Helped **create and develop** the Battery Storage Standard (MIS 3012)



Solar Trade Association -
Influential **member and partner** shaping Government policy

“The Telford Company taking on Tesla!”

ACEON'S VISION, GUIDING PRINCIPLES & VALUES



“Offering solutions today for tomorrow’s world - to be a leader in the development, research, manufacture and delivery of cutting-edge value-for-money products, services and technology which aim to protect and better people’s lives and promote environmental and energy sustainability”

- An ethical company – offering a fair value-for-money price and no ‘profiteering’
- Excellent Customer Service
- Operate to high standards of Environmental Sustainability
- A good, caring employer
- Proud to have our origins in Telford and the West Midlands – ‘The Birthplace of the Industrial Revolution’ – and to be at the forefront of the new ‘Green Revolution’
- Innovative, Entrepreneurial and Enterprising
- Agile and ambitious
- We would rather under-promise and over-deliver than over-promise and under-deliver

ACEON WORKING IN PARTNERSHIP – ONE STOP SOLUTION PROVIDER



DOMESTIC BATTERY ENERGY STORAGE SYSTEMS - New-Build & Retrofit
VIRTUAL POWER PLANT – Saving & Making Money for Investors in Renewable Energy Technology



GRID SERVICES - Energy Aggregation and Trading, Grid balancing
ROOF-INTEGRATED SOLAR PANEL ROOF TILE - Marley SolarTile®, Viridiansolar
COMMERCIAL & INDUSTRIAL BATTERY STORAGE - MWh container batteries
RENEWABLE ENERGY INFRASTRUCTURE - Solar farms, Electric Vehicle Forecourts/Hubs



ELECTRIC TRANSPORT - Smart EV Charging: Home & Work, Electric Bike Shelters

RENEWABLE TECHNOLOGY – Ground & Air Source Heat Pumps, Solar PV, Wind Turbines



LAUNCHING OUR VIRTUAL POWER PLANT (VPP)



RENEWERGY – Helping to Save Money, Turning Capital Investment into Revenue And Helping to Save the Planet

OVERVIEW OF KEY BENEFITS OF RENEWERY: OUR VIRTUAL POWER PLANT



- A network of houses each operating as a micro-energy regeneration centre through the installation of Solar Panels and Energy Storage battery with remote intelligent controls – ***making batteries work harder and smarter!***
- As a VPP, we manage that energy smartly and proactively to predict demand and supply, meeting the needs of the householder and enabling spare energy capacity to be aggregated together and traded with the Grid
- Our VPP not only **contributes to Net Zero Targets**, it also **turns capital into an on-going revenue stream for a council/company**
- Our VPP can deliver an on-going significantly **cheaper electricity bill to the homeowner** and also enables the homeowner to have **greater control and certainty over future electricity prices** – it is expected that, as demand rises, electricity prices will increase significantly in the future
- Our VPP enables the **‘lights to stay on’** if there is a Grid power cut – not all battery systems do that
- Our VPP can also help to **reduce Grid stress** by providing flexibility and reducing peak demand
- Our VPP will create installation jobs in Renewables, supporting a local economy
- Our VPP is very much delivered as a partnership and can be branded locally.

RENEWERGY WORKING IN PARTNERSHIP – FOR ALL HOUSING TYPES



RENEWERGY can be delivered in partnership with a Council, Arms-length Council company, Housing Association, Private Home Owner or Private Landlord.

RENEWERGY can be delivered as an integrated package in new-build homes for purchase or rent – AND retro-fitted into existing homes.

If you're also planning a major re-roofing programme on your social housing, it's the perfect time to consider RENEWERGY.

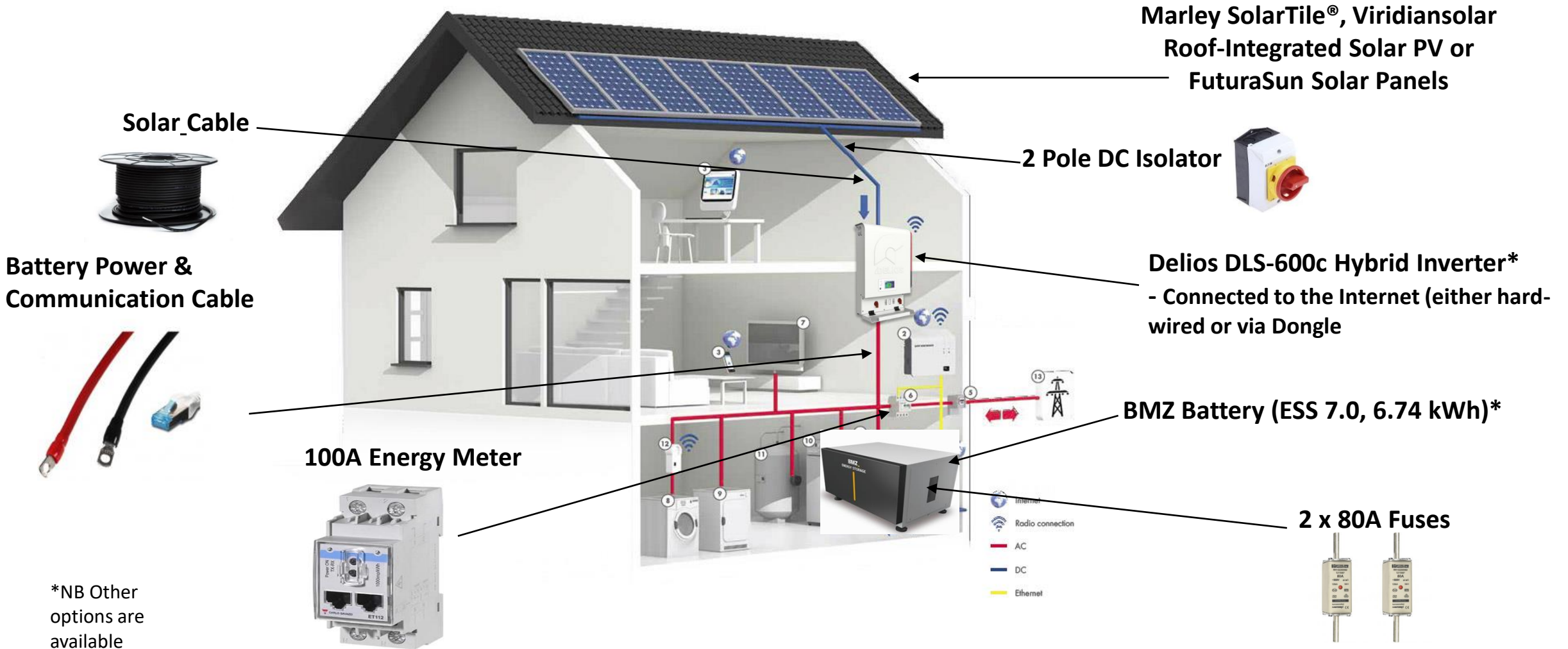
RENEWERGY can work for you and...

- **Your Social Housing Tenants**
- **Your Private Rent Tenants**
- **Your Employees as a Salary Sacrifice Scheme**

We have different operating and funding models for different types and forms of housing – we'd be happy to talk to you about these.

We can also supply and install an Electric Vehicle Charging Point into the home too and you can take advantage of the Office for Low Emission Vehicle (OLEV)'s Grant of £350 per install to lower the cost.

Example of The RENEWERGY Home



OUR RENEWERGY PLATFORM: 4 SMALL STEPS, 1 GIANT LEAP FORWARD!



Our Virtual Power Plant (VPP) called “RENEWERGY®” is a pioneering Smart Energy Management Platform that is designed to generate extra revenue through selling spare capacity in each battery system in the VPP to the grid, whilst also reducing CO2 emissions through optimising the use of solar generation to minimise the amount of energy imported to site.

Effortlessly connect a home energy storage system to our RENEWERGY Platform and we can do the rest...



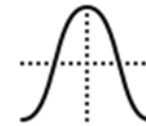
CONNECT

The Platform connects easily via API to battery storage, PV panels, electric heating and EV chargers. Once connected **the consumer and owner is able to monitor the performance of their assets tracking generation, consumption and savings.**



LEARN

Once connected, **we learn the consumption and generation pattern for the site.** This includes the usage patterns of the electric heating and EV charger.



OPTIMISE

Our advanced algorithm forecasts consumption and generation using weather data. Each asset connected to the platform is then scheduled to operate **to minimise energy import into the site maximising savings and carbon reduction.**



MONETISE

The RENEWERGY Platform learns when there is spare capacity in each system. **The spare capacity across the RENEWERGY Platform is then traded with the National Grid, and Local Distribution Operators. We share this revenue with our partners.**

RENEWERGY – THE SMART ENERGY PLATFORM



RENEWERGY – VIRTUALLY CONNECTING HOMES TOGETHER TO MAXIMISE THE BENEFITS

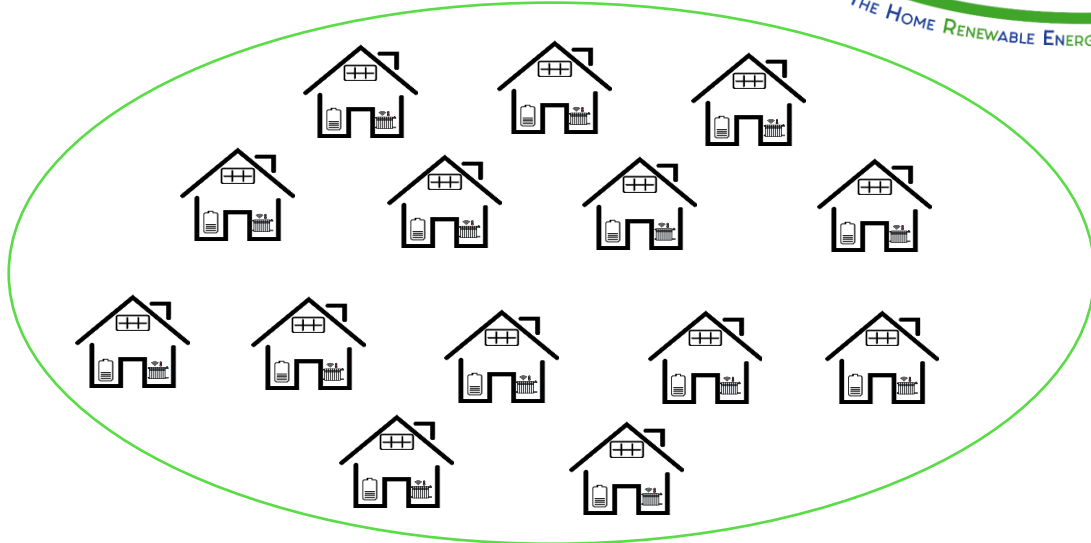
- The price of electricity has increased by 7% pa – 2005 – 2018.
- For a home using 3,500 kWh pa, this equates to £694/yr.
- Following a 7% pa increase, bills would rise to £1,192; then £1,633.
- Our VPP protects tenants from this increase AND create a Revenue stream from the capital investment for the Landlord



- Grid Services could deliver gross income of up to £300 /yr.
- Over 10 years, this could equate to £3,400; rising to £5600 after 15 years



- Our RENEWERGY VPP enables tenants to use more of the electricity generated by the solar PV.
- Our Smart software makes the battery work smarter and harder.



- RENEWERGY aims to reduce a tenant's electricity bill by 30-40%.
- A specific Service Charge or Rental Top up provides a secondary revenue stream for the landlord.
- Landlord could generate c.£4,000
- The Tenant still save over £6,000

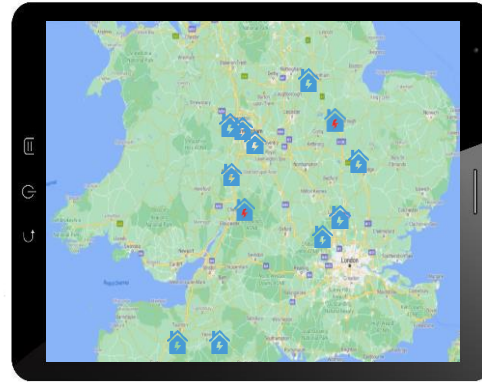


- By maximising renewable energy usage the carbon footprint of each individual household is reduced by on average 60%.

BENEFITS TO THE COUNCIL HOUSING PROVIDER

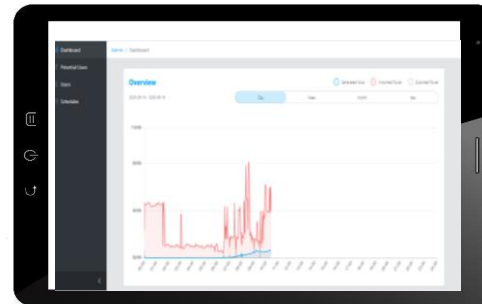
Portfolio Management

- The RENEWERGY platform proactively monitors the portfolio.
- Faults are detected early.
- Systems are bench marked against each other and issues managed.



Optimisation

- Use of the RENEWERGY optimisation algorithm.
- The platform will dynamically set the charge schedule for the battery based on forecasted consumption behaviour and weather patterns at the individual house level.



Data Visualisation

- Generation, Import, Export and state of charge of the battery.
- Updated at 2 min intervals at a portfolio, street or individual asset level.

Monetising

- RENEWERGY will procure the aggregation contracts needed to make the most of the flexibility in your energy system.
- The RENEWERGY Platform integrates into the aggregator system.

REAL LIFE EXAMPLE



Battery Charge

2020-06-29 - 2020-06-29

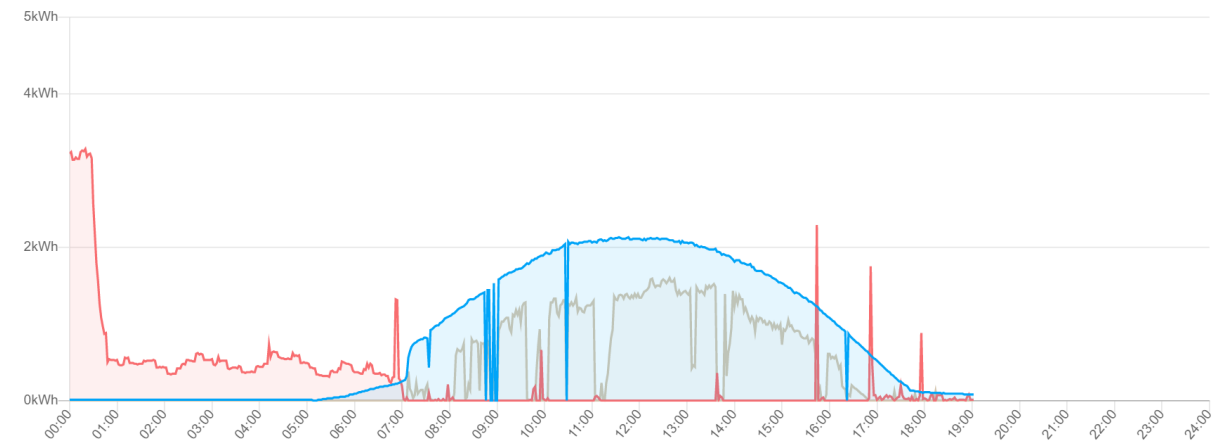
Day Week Month Year



Overview

2020-06-24 - 2020-06-24

Day Week Month Year



WARNING!

NOT ALL BATTERIES AND ENERGY STORAGE COMPANIES ARE THE SAME!!

ACEON'S ENERGY STORAGE SOLUTION – THE SAFE, RELIABLE 'ENGINE ROOM' OF RENEWERGY



Best in class partnerships:

- AceOn selected as the UK partner by German battery manufacturer experts BMZ, and inverters by leading Italian manufacturer Delios.
- BMZ, +£500 million turnover, 3000 employees, leading European battery pack manufacturer.



One stop energy storage solution provider:

- Dedicated and experienced UK training & service centre for both battery and inverter products
 - AceOn talented engineers support you during the lifetime of the product for both maintenance and fault fixing.
- AceOn provide one stop shop storage solution delivering; Solar panels, BMZ battery, Delios inverter, cabling, energy meter and all necessary components
 - End to end ownership distribution, training and servicing



REASONS TO CHOOSE ACEON AS YOUR VPP & ENERGY STORAGE PARTNER



Experience:

- AceOn are **battery experts** and understand what is required for a safe and reliable Energy Storage System
- AceOn, BMZ & Delios have over **20 years' experience** in their respective fields
- BMZ turnover of **+€500 million and 3000 employees**, therefore no risk of BMZ liquidating due to warranty claims which is commonplace in the renewable industry
- AceOn are **industry leaders**, selected by National Housing Federation & APSE Energy as Energy Storage sector suppliers and MCS and Solar Trade Association as members & partners

UK-Based Service Centre:

- Dedicated **UK based** service, training and distribution centre providing a **one stop shop** for your energy storage needs.
- Designed so **all parts are easily replaceable** with technical support from a UK based field engineer team
- **Free recycling** of battery at end of life & disposed in correct manner

Best in class Energy Storage products:

- **5000 cycles** with 80% Depth of Discharge to extend battery life
- One of the **lowest cost** ESS based on Cost per warranted kWh throughput - 12p per kWh
- Up to 10 year warranty for battery and inverter , **20 year** service life on the battery
- Battery **manufactured in Germany** with top battery engineers
- One of the **highest** charge (90A) & discharge (18kW) capability in the market
- **All in one Hybrid** solar PV & battery charger inverter, reducing installation time.
- Inverter manufactured in Italy with **20 years'** inverter experience

High Level of Safety – We Know that SAFETY in the Home MATTERS:

- **Double steel box** to contain catastrophic failure in the unlikely event
- Only ESS system to have a pyrofuse for **secondary safety** if relays fail
- Intelligent BMS **developed over many years** of building battery packs

BMZ BATTERY ENERGY STORAGE - BENEFITS

- **World class product quality and support:**

- 20 year service life, 10 year warranty for 5000 cycles, with 60% still left in the battery.
- Made in Germany, high quality engineering components.
- Battery product quality/reliability proven with 000's of installations world wide.
- Innovative design to enable parts to be quickly and easily replaced if required.
- Immediate parts availability as AceOn stock all spare parts.

- **Unrivalled product performance:**

- Lowest total cost per warranted kWh when compared to other major manufacturers (see page 8)
- Vast experience in developing the battery management systems over 30 years to optimise performance.
- High charge capability - 90A, allowing you to take full advantage of solar generation.
- High discharge capability - 300A (18KW), allowing you to deliver increased peak power when required.
- Can parallel up to 12 x ESS 7.0/X (120kWH battery system).
- The flexibility to increase the size of your battery system up to 1 year from date of install.
- Safety is paramount as battery is uniquely protected by a fire resistant double steel box thus meaning protecting from both external or internal fires. Direct current relay and 2nd protection (chemical fuse) for a redundant battery cut off. We believe that this is the safest battery on the market.

DELIOS DLS INVERTER - BENEFITS

- **World class product quality and support:**

- 5 or 10 year warranty
- Made in Italy, high quality engineering components.
- Inverter product quality/reliability proven with many installations world wide with the BMZ battery.
- Innovative design to enable parts to be quickly and easily replaced if required.
- Immediate parts availability as AceOn stock all spare parts.

- **Unrivalled product performance:**

- 20 year experience in designing, developing and manufacturing inverters in Italy.
- Hybrid inverter to control energy from the solar panels and also charge and discharge the battery.
- High charge & discharge capability on a single unit (100A charge & 6kVA discharge)
- High efficiency from panels and batteries (>97%)
- Two independent MPPT trackers creating maximum yield from PV panels in all conditions.
- Graphic touch screen interface with remote monitoring via smart phone or PC.
- Back up function to allow the battery to operate in case of a power cut.
- Chosen by BMZ as their inverter of choice due to excellence of performance.

THE TRUE COST/VFM OF BATTERY STORAGE – UNDERSTANDING THE NUMBERS



- The marketplace INCORRECTLY calculates the cost of a battery by dividing the cost of the battery with the kWh stated on the datasheet (battery size column in table).
- The total cost of a battery should be calculated using how much energy the battery will produce during its life span, not on one charge and discharge cycle.
- We have calculated the total cost of the battery by using the warranted manufacturer’s minimum stated energy throughput of the battery.
- Looking at Battery Storage of a minimum of 4kWh and warranted to do at least 10,000 cycles, you can see in the table below that using this method proves that BMZ comes out as **the lowest total cost per warranted kWh.**

Product	Battery Size (kWh)	UK Cost £	Total warranted kWh (1 cycle per day)	Cost per warranted kWh (1 cycle per day)
BMZ X	10.06	£3,928	32200	£0.122
BMZ 7.0	6.74	£2,876	21700	£0.133
BYD B Box Pro 10	10.24	£4,400	31700	£0.139
SolaX 6.5	6.8	£2,700	19200	£0.141
Powerwall 2 **	14	£6,100	37800	£0.161
LG Chem Resu 10	9.8	£4,100	24300	£0.169

Formula: UK Cost/Total warranted Energy Throughput = Cost per warranted kWh

** prices are today's market estimates and warranties may change*

***includes AC inverter*

BMZ ESS 7.0

MAXIMUM POWER FOR YOUR BUSINESS



ESS 7.0: Lithium-Ion Power

GET A LONG BENEFIT WITH 5,000 CYCLES

GENERAL PROPERTIES	ESS 7.0
Energy (nom./usable)	6.74 kWh/5.39 kWh
Nominal voltage	55.5 V
Charge end voltage	61.5 V
Discharge end voltage	45.0 V
Capacity (nom./usable)	121.5 Ah/ 97.2 Ah
Max. charge	90 A
Max. discharge current	300 A (3 sec.)
Max. discharge power	18 kW*
Weight	95 kg
Dimensions (mm) W x H x D	638 x 421 x 487 mm
Communication	CAN – SMA ready
Battery chemistry	Li-Ion NMC
Discharge depth	80% DOD
Full cycles	5,000
Battery Management System	Monitoring of cell voltage, cell temperature, current, derating and passive balancing

PERFORMANCE DATA	
Energy density (weight)	71 Wh/kg

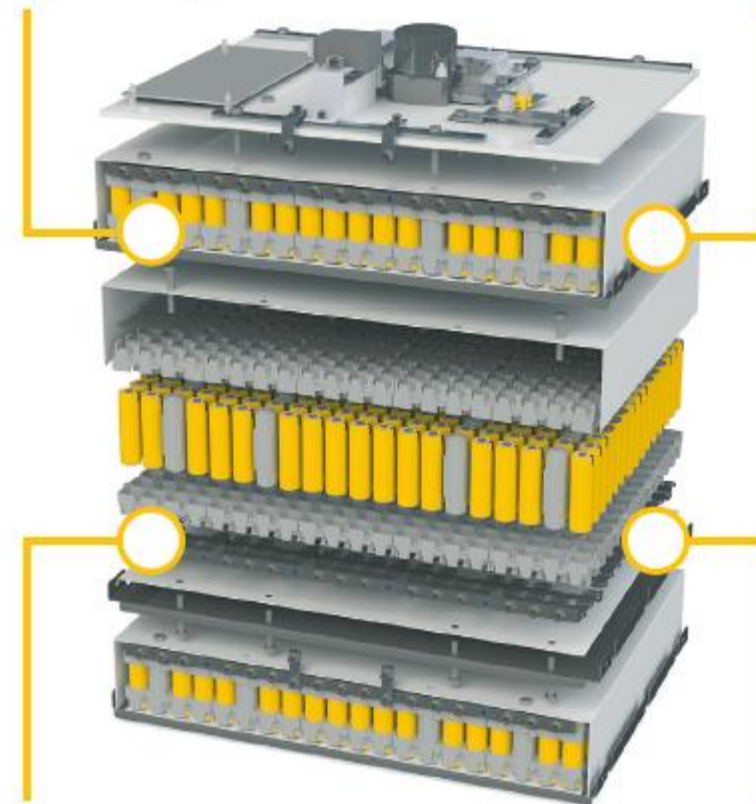
BMZ ENERGY STORAGE SYSTEM SAFETY

MULTI-LEVEL-SAFEETY CONCEPT

- Short circuit proof relay and 2nd protection (pyro fuse) for a redundant battery cut-off
- Overvoltage and low voltage monitoring for each cell string with redundant battery cut-off
- Temperature monitoring for each cell string and current interrupt device (CID) in each cell
- Protection against a reboot after deep discharge or any other serious error
- No insecure parallel connection of cells without current interrupt device (CID) in each cell
- Active current control as a function of cell voltage and temperature (derating)
- Double metal housing

Intelligent Battery Management System

Future proof solution



High operational safety

Robust and compact design

DELIOS DLS INVERTER



	DLS-600C - COMPACT	DLS-600L / DLS-600
Input (PV)		
Max. DC power	6.3kW	6.3kW
Max. DC voltage	600v	
PV-voltage range, MPPT	100V - 550V	100V - 550V
PV-voltage range, MPPT - Independent Operation	100V - 550V @ 3kW	100V - 550V @ 4kW
PV-voltage range, MPPT - Parallel Operation	100V - 550V @ 4.7kW	100V - 550V @ 6.3kW
DC nominal voltage	400V	
Max DC power x MPPT	3kW	4kW
Max DC power x MPPT - Unbalanced operation	4kW @ MPPT1 + 2.3kW @ MPPT2	4kW @ MPPT1 + 2.3kW @ MPPT2
Min. DC voltage	115v	
Max. input current x MPPT	20A	20A
Number of MPP trackers (DLS I-Track)	2	
Battery (BATT)		
Battery Current	35A	66A / 100A
Battery Max Charge/discharge power	2.3kW	3kW / 4.5kW
Input (AC GRID)		
AC input voltage	230Vac ± 15%	
AC input frequency	50/60Hz	
Output (AC)		
Rated Output AC power - (PV + BATT)	6kVA (4.5kVA VDE AR-N 4105)	6kVA (4.5kVA VDE AR-N 4105)
Max Output AC power - (PV + BATT)	6kVA (4.5kVA VDE AR-N 4105)	6kVA (4.5kVA VDE AR-N 4105)
Rated Output AC power - (BATT)	2.2kVA	3kVA / 4.5kVA
Max Output AC power - (BATT)	2.2kVA	3kVA / 4.5kVA
Nominal output current (RMS)	26.1A	26.1A
AC output voltage	230Vac ± 15%	
AC output frequency	50/60Hz	
System Operating Mode		
BACKUP MODE operation	automatic	
Efficiency (PV - AC output)		
Max. efficiency	97%	
Efficiency (BATT - AC output)		
Max. efficiency	94%	
Protection devices		
AC safety interlock system	◆	
Manual AC GRID BY-PASS switch	◆	
Ground fault monitoring	◆	
Grid monitoring & synchronization	◆	
BATT DC Galvanically isolated	◆	
General Data		
Dimensions (W / H / D) in mm	480 / 730 160	710 / 650 / 150
Weight	21KG	< 30kg
Operating temperature range	-25°C...+60°C	
Power derating temperature range	40°C...+60°C	
Storage temperature range	-30°C...+70°C	
Features		
PV DC connection	MC4 quick connector	
DC BAT connection	screw terminal block	
AC connection	screw terminal block	
Ingress protection	IP 21	
Graphic display touch screen	◆	
Interfaces: RS485/RS232/CAN/ USB/ Ethernet / WiFi	◆/◆/◆/◆/◆/◇	
Warranty:	5 Year Standard / 10 year Optional	
Certificates	IEC 62109-1 (Safety), IEC 62109-2 (Safety), IEC 61000-6-2 (EMC), IEC 61000-6-3 (EMC)	

Features & Benefits:

- Made in Italy
- Dual Independent MPPT Input
- Adaptive Battery Charger
- Smart Battery Manager
- On & Off Grid Power Inverter
- Built-in Distribution Board
- Touch Screen Interface
- Web Portal and App
- Programmable Energy Controller
- UK Service Centre
- Emergency Stop
- All in One Hybrid inverter that includes solar inverter, battery inverter/charger
- Delios offer both AC and DC coupled inverters

SUMMARY OF THE BENEFITS OF OUR RENEWERGY VPP - 1



- Industry-leading warranty and guarantee on all hardware/software
- AceOn are battery storage specialists. We believe we have the best quality battery at the best price – and we can evidence that
- Our State of the art RENEWERGY Platform makes the Renewable Energy generated work hard for the benefit of the resident/home owner, Council, Council Company, ALMO, Council employee – and for the Grid AND the Planet
- A discounted energy price = guaranteed lower bills and certainty in a volatile future electricity market
- An investment that pays a ‘green dividend’ – creates a revenue stream from capital funding
- A future-proofed model – both Wholesale Trading-Ready AND Firm Frequency Response (FFR)-Ready to ensure best £ returns for Grid Services based on industry knowledge and expertise
- Renewergy can create employment in your local economy

SUMMARY OF THE BENEFITS OF OUR RENEWERGY VPP - 2



- A future-proofed model – can be upgraded to integrate with EV Charging and Heat pumps within our VPP
- One stop UK shop for customer support
- Working with national partners on board – UK MCS, Solar Trade Association, Association of Public Service Excellence, National Housing Federation
- Off-grid electricity independence for household in the event of Grid power cut
- End of life battery recycling by AceOn
- Delivering on local and national Net Zero Carbon, Climate Emergency and Future Home Standards targets
- Supporting the demands of the Energy network and the need/demand for more ‘green’ electricity
- The more homes that we can include within the RENEWERGY Partnership, the more **EVERYONE CAN SAVE AND EARN**



“Offering solutions today for tomorrow’s world”

THANK YOU FOR YOUR TIME

ANY QUESTIONS?

AceOn Group

Unit 9B

Stafford Park 12

Telford

TF3 3BJ

+44 (0)1952 293 388

info@aceongroup.com

www.aceongroup.com