



Carbon Bite Night 1

12.05.2021

The background of the slide features a low-angle, black and white photograph of several modern glass skyscrapers. The buildings are viewed from below, creating a sense of height and scale. The glass facades reflect light, and some windows are illuminated from within. The image is partially obscured by a large, dark blue diagonal banner at the bottom.

Demand Side Response



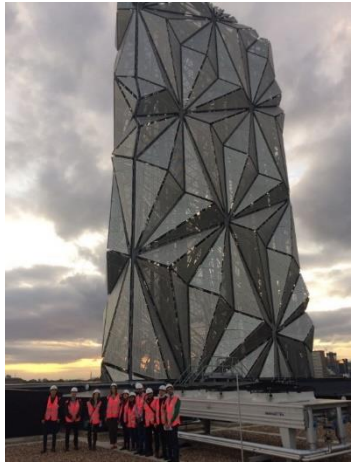
OUR TEAM



OUR MISSION

- To improve the energy performance of buildings and reduce their carbon footprint.
- To reach out to young professionals and those aspiring to join the industry, supporting them in their professional development.
- To provide a forum for discussion, enabling networking opportunities and promoting collaboration amongst members.

OUR EVENTS



Demand Side Response

Given that we are moving towards an electricity-powered future to achieve Net Zero targets, can our current grids accommodate the emerging demand in electricity as well as the anticipated unpredictability from increased renewable generation?

With the increased uptake of storage solutions as well as onsite generation, how can these be utilised and integrated with the grid to decrease electricity bills and better manage the peak electrical loads?

AGENDA

Sam Do (UKPN) – Smart Grid Flexibility Engineer

The benefits of flexibility services in managing distribution networks and facilitating the Net Zero transition

David Watkin (Solar Edge) – Technical Sales Manager

Demand side response and critical power integration at a building level



Flexibility Services

An introduction to distribution network Flexibility Services

Sam Do, Smart Grid Flexibility Engineer



About UK Power Networks



19M people served

29% of GB Total

9.5GW Distributed Generation Connected

32% of UK Total

16GW Peak Demand

An
Employer
of Choice

A
Respected
and Trusted
Corporate
Citizen

Sustainably
Cost
Efficient



What is flexibility?

- A flexible solution has the ability to **change either their generation or consumption** in response to a signal
- The generator/consumer responds within a specified **time frame** and **sustains the instructed response**

Examples of flexible solutions include:

- Distributed generation
- Energy storage
- Demand side response e.g. EVs, building management systems
- Aggregation

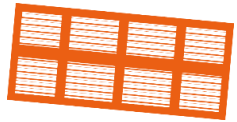


Why Do We Need Flexibility?



Increasing peak loads with EV and heat pump uptake

Procuring flexibility can be more cost-efficient than investing in infrastructure upgrades.



Increasing levels of inflexible renewable generation (like solar and wind)

Flexible solutions needed to manage increasing unpredictability and magnitude of peak loads.

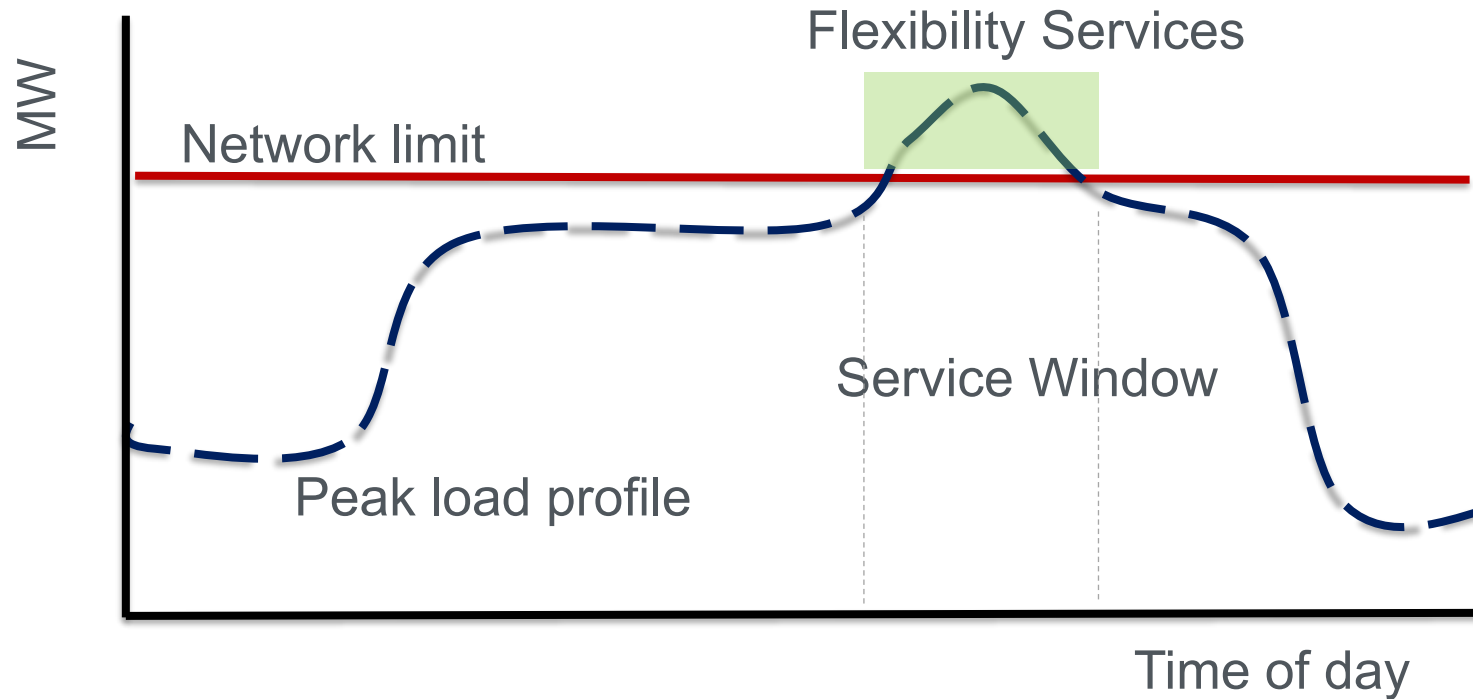


Facilitate the transition to zero carbon at minimum cost

Flexibility can deliver reliability at minimum cost to the consumer



Why Do We Need Flexibility?



Distribution Future Energy Scenarios

The four scenario worlds are structured as follows:

<p>Steady Progression:</p> <p>General progress towards decarbonisation continues; however, the rate of change is not sufficient to meet net zero carbon emissions by 2050.</p> 	<p>Consumer Transformation:</p> <p>Meets net zero emission by 2050 with significant engagement at an individual level and a high degree of electrification.</p> 
<p>System Transformation:</p> <p>Meets net zero driven primarily by centralised initiatives and transformation of existing infrastructure, including the production of low-carbon hydrogen, requiring less change for individuals.</p> 	<p>Leading the Way:</p> <p>Achieves net zero before the 2050 target, thanks to use of both electric and hydrogen decarbonisation technologies, as well as a high level of consumer engagement.</p> 

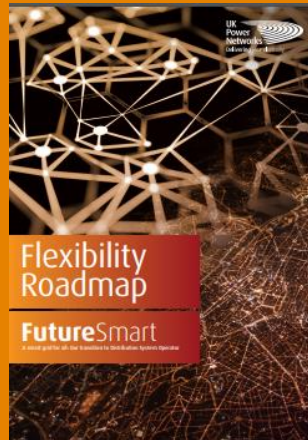


Our journey began by defining a Distribution System Operator



2017

Jul-17 Future Smart consultation



2018

Aug-18 Flexibility Roadmap consultation
Oct-18 stakeholder event
Flexibility Roadmap published

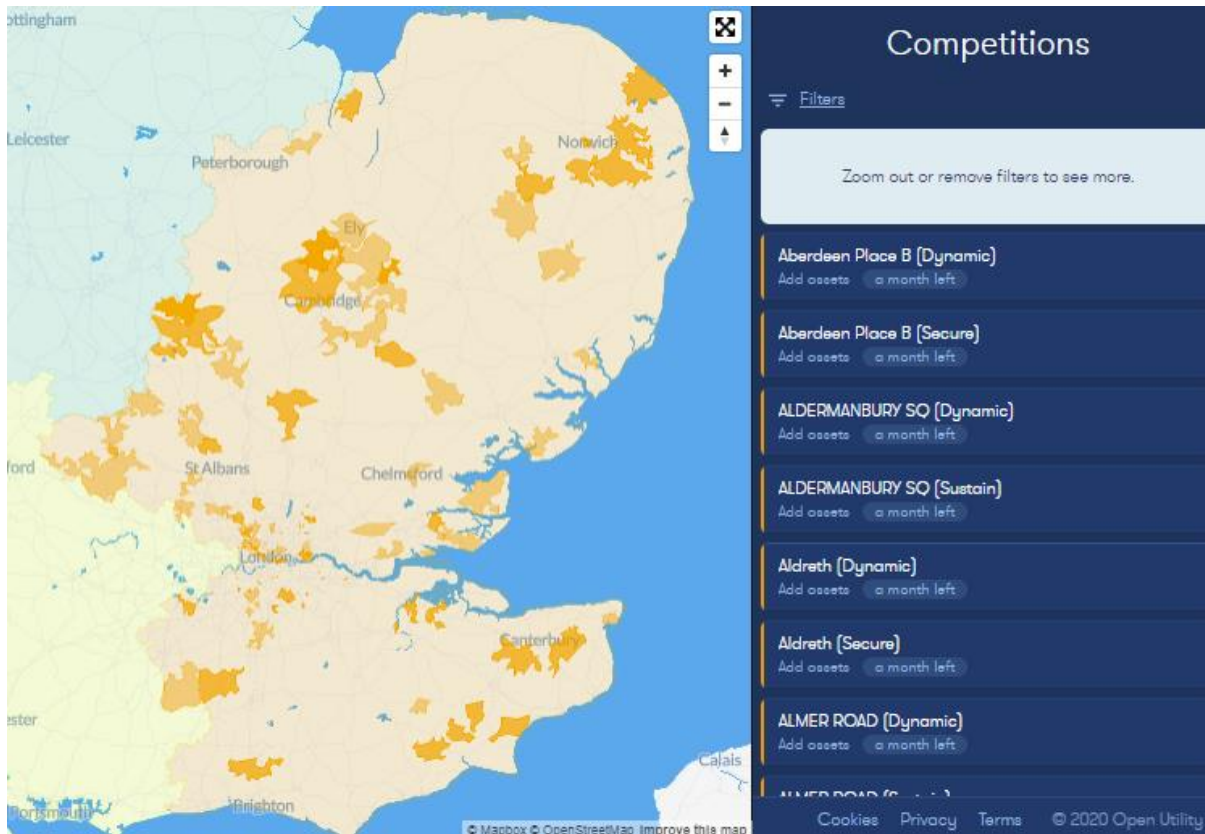


ENA

Open Networks
Project Flexibility
Commitment

Sotiris Georgiopoulos
became chair of the
Open Networks
Project 4th March 2021

Piclo Flex platform launched Sept 2018



Map showing April 2020 competition

- UK Power Networks is using the online platform Piclo Flex to host the bidding process.
- Piclo Flex is an online platform which matches energy providers' resources with the network operator's local need for flexible distributed energy resources.
- Piclo enables flexible energy resources to explore an interactive map that matches providers with specific areas of high demand on the network, places where UK Power Networks is seeking flexibility to add capacity.

Why participate?

**Competitive
Price Offer**

**Minimum of
10kW
flexible
capacity**

**Stackable with
other non-DSO
services**

**1-7 year
contracts**

**Open to existing
and planned
solutions**

**New DSO Markets,
New Revenue
Opportunities**



Services we're procuring

Secure

Reduce peak load on HV substations

- >6 month-ahead commitment
- Availability/utilisation payments
- Close to real-time activation

Sustain

Reduce peak load on LV substations

- Month-ahead commitment
- Fixed service fee
- Scheduled activation

Dynamic

Reduce peak load on LV/HV substations

- Optional service provision
- Utilisation payments
- Close to real-time activation



Results from our April 2020 Flex Tender

£14m

Total value awarded

123MW

Total capacity awarded

Up to 7 year

Contracts awarded

1,200

Stakeholders engaged with

57 =

Zones awarded

42 HV

15 LV#1 

(a world-wide first)

Visit our website for Post Tender Report

smartgrid.ukpowernetworks.co.uk/flexibility-hub



UK
Power
Networks
Delivering your electricity

The flexibility services customer journey

1 - prepare

Flex providers **register** for an account, **complete** the Dynamic Purchasing System (DPS) application and **upload** solutions onto Pico Flex.

2 - qualify

Flex providers **submit** pre-qualification questionnaire to flexibility@ukpowernetworks.co.uk for assessment.

3 - bid

Once the competition opens, Flex providers submit their **bid(s)** on Pico Flex by the competition closing date.

4 - deliver

Contracts are **awarded**. After the Tender, services will generally begin in 6 months ahead



View zones on Pico Flex

Picoflex.com/dashboard

Visit our website

smartgrid.ukpowernetworks.co.uk/flexibility-hub



UK
Power
Networks
Delivering your electricity

How to find out more



Sotiris
Head of Smart Grid Development

Join the flexibility mailing list

flexibility@ukpowernetworks.co.uk

Visit our website

smartgrid.ukpowernetworks.co.uk/flexibility-hub



Evangelos



Sam



Stathis



Kellie



Zahin

Energy Markets Team





Demand Side Response Critical Power / Energy Storage

David Watkin
UK SolarEdge Critical Power
Technical Sales Manager

May 2021

Disclaimer

Critical Power Division

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SolarEdge: One-Stop-Shop for Smart Energy Solutions

- Global leader in Smart Energy Technology
 - Solar division** inverters, power optimizers, smart modules, storage energy monitoring & control, grid services
 - Critical Power division** UPS systems, battery backup, energy management
 - Kokam ESS division** Li-Ion based storage solutions
 - E-mobility division** powertrain solutions for electric vehicles



SolarEdge in Numbers

> 2.0M

Monitored systems
around the world

28

Countries
Presence

366 Awarded
Patents and **364**
Additional Patent
Applications

#1 
Solar
Inverter
Company *

3,400
employees



5

R&D
Centers

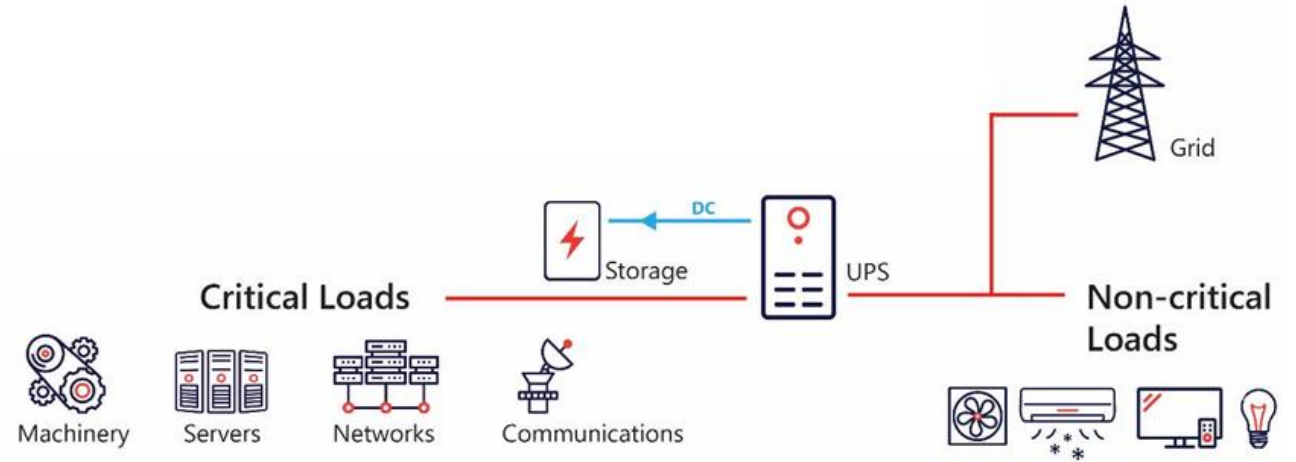
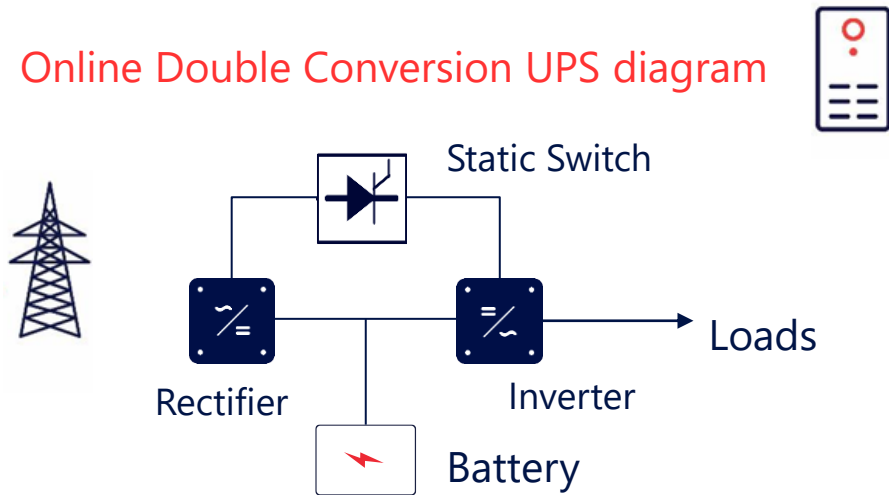
24.0GW

of our systems
shipped worldwide

* PV Inverter Market Tracker - Fourth quarter 2020, January 2021 update

The Role of a UPS System

Online Double Conversion UPS diagram



- Protection against power outages and power disruptions that can endanger critical equipment & computers

PV & UPS Technology Synergy



DC/DC Converter



DC/AC Inverter



AC/DC Rectifier



Battery Pack

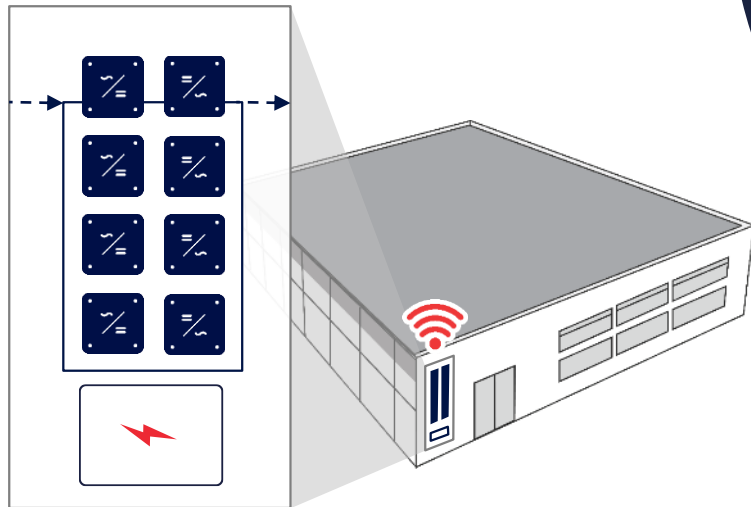


Management Software

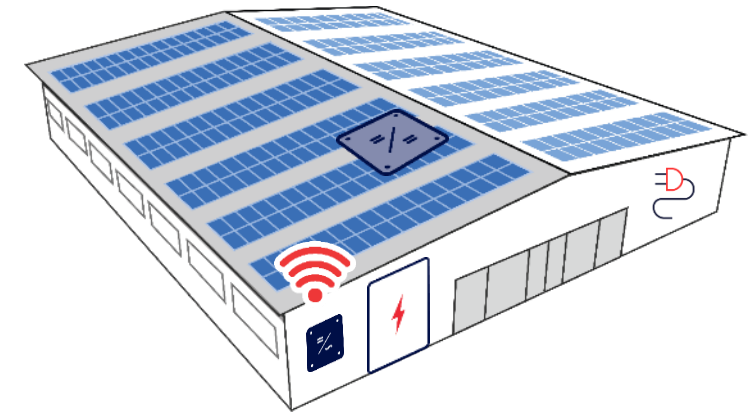


Communication and Monitoring





Modular AC Online UPS



PV

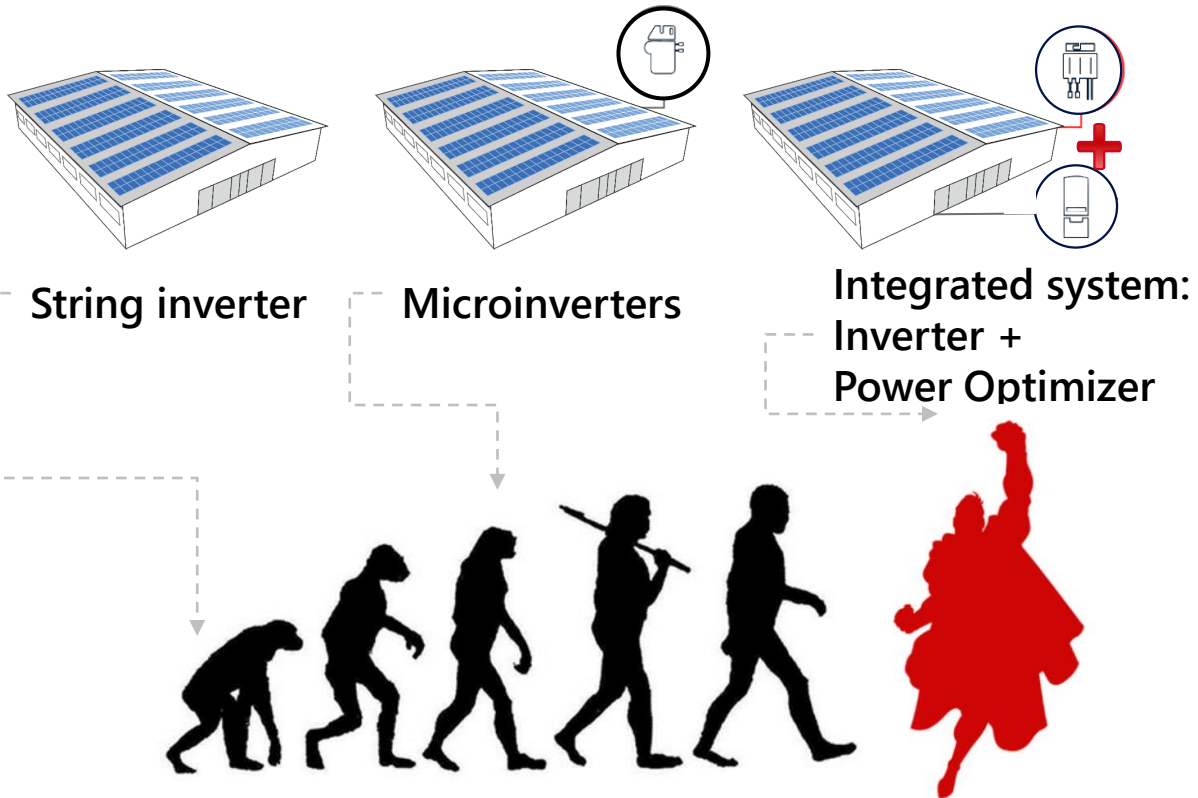


The Benefits of SolarEdge Modular Approach

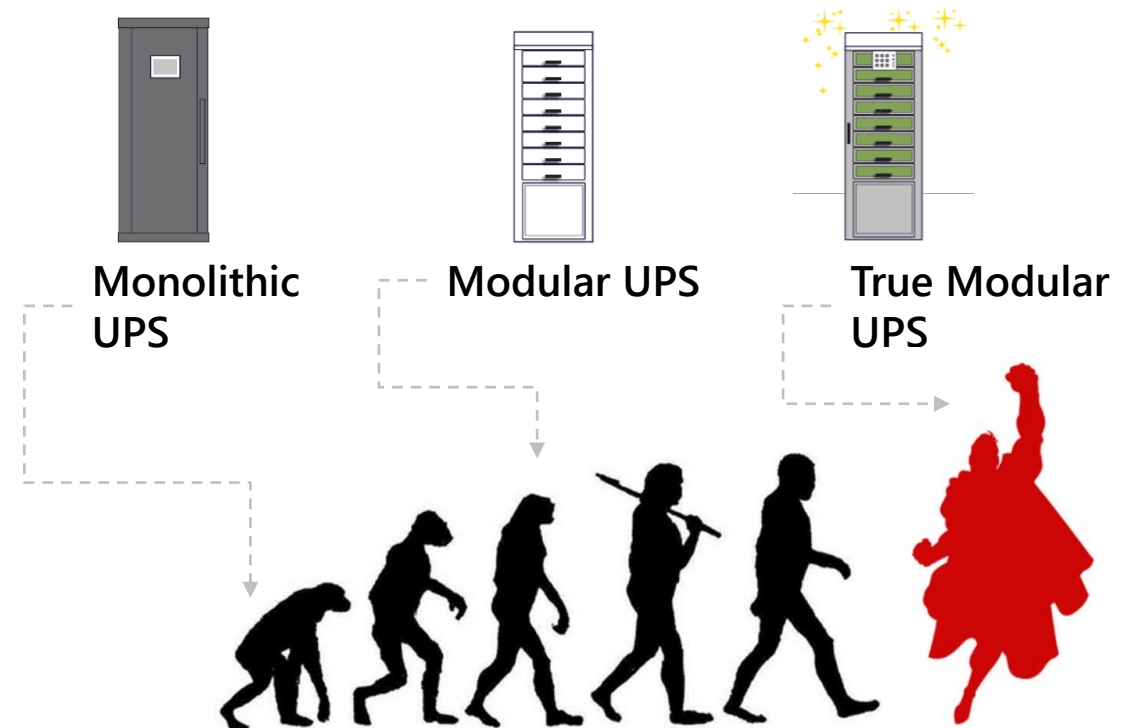
	PV	UPS
	Maximizing energy production	Maximizing business uptime with built-in redundancy and live module replacements. Low MTTR
	Lower O&M with module-level monitoring	Reduced costs with pay as you grow approach, lower investment in infrastructure & labour
	Higher safety with SafeDC™ mechanism	Lower risk of downtime with fully autonomous modules, main control panel and static switch can fail whilst still staying in VFI mode (B300), true modular.
	Design flexibility	Scalability, start at X – grow to Y Allows designers headroom if exact load TBC

The Modular Evolution

Not all MLPE solution are alike



Not all Modular UPS are alike



What UPS True Modularity Means

Greater Client Satisfaction & Peace of Mind

■ Higher uptime

- Fully autonomous module operation
- Improved fault resilience
- Reduced electrical shock risk thanks to a hot swap
- Low MTTR (Mean Time to Repair): Even a single user can replace a light module (<20kg)

■ Ideal investment

- Most cost effective way to provide redundancy
- Scalability, grow within the same footprint
- Easy to upgrade system if originally undersized

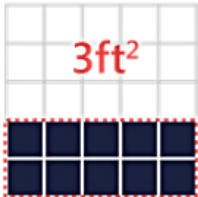






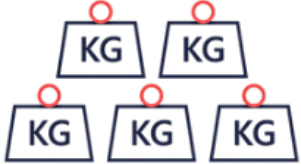




UPS Battery Technologies is Crucial

Traditional batteries technologies

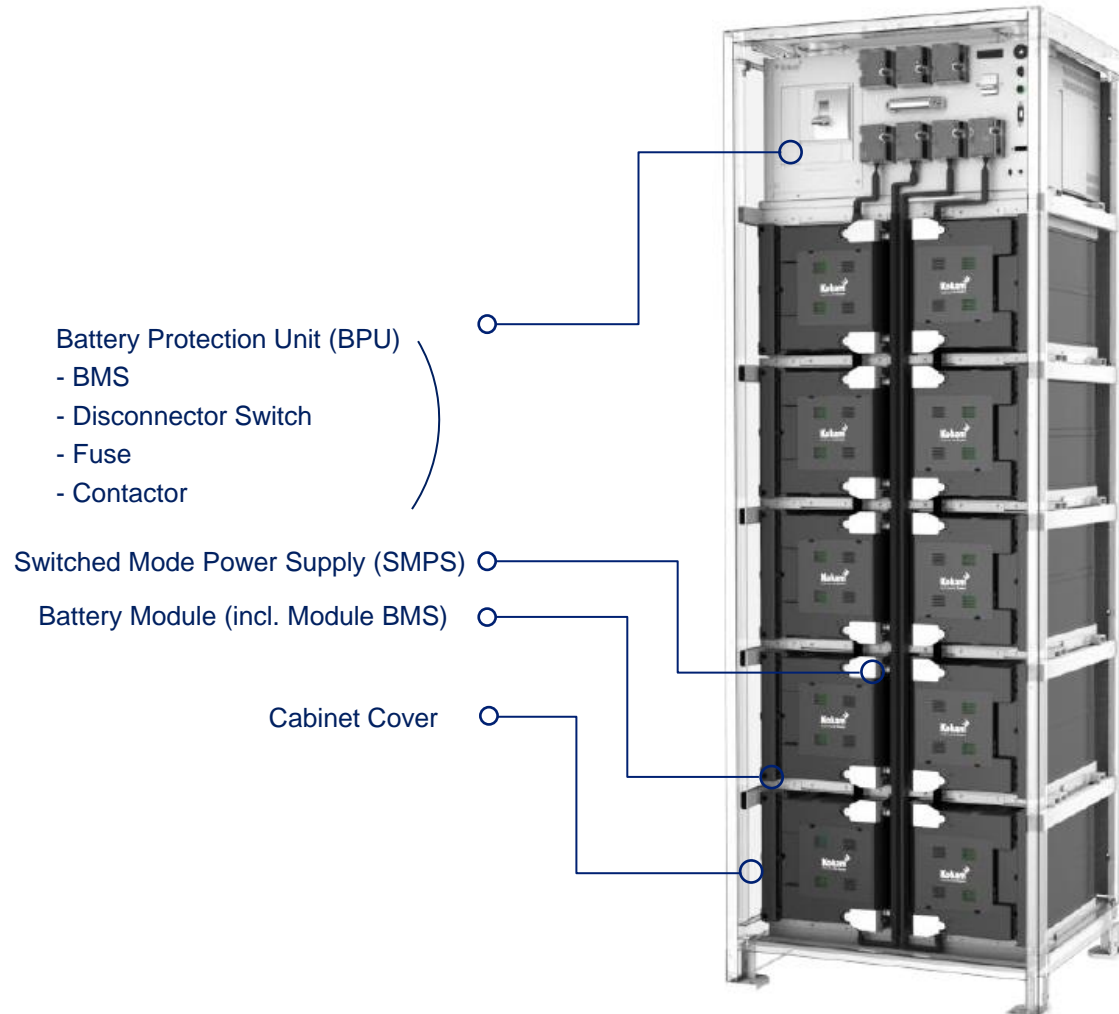
	Lead Acid	Nickel Metal	Nickel Cadmium	Lead carbon	Sodium Nickel
Advantages	<ul style="list-style-type: none"> • Mature • Low Cost • High power 	<ul style="list-style-type: none"> • Fast charge • Low volume • High power 	<ul style="list-style-type: none"> • Fast charged • Long shelf life • High tolerance for over charge & over-discharge 	Many cycles	<ul style="list-style-type: none"> • Wide temperature range • No cooling required
Disadvantages	Large volume	High cost	<ul style="list-style-type: none"> • Memory effect • Low specific energy 	Cannot work in float mode	Internal 350°C BMS needed
Commercial use	1970 (sealed)	1990	1950	Few years	Few years

VRLA (valve regulated lead–acid) has the majority market share in UPS systems

Li-ion Batteries Are Starting to Pick Up

	Small Footprint	Light Weight	High Power	Long Life Cycle	Wide Temperature Range	Low Maintenance & No Hydrogen Emission
Li-Ion	 <p>3ft²</p>	 <p>KG</p>	 <p>X5 Times (10C-Rate)</p>	 <p>15 Years</p>	 <p>Wide Temperature Range</p>	 <p>Low Maintenance & No Hydrogen Emission</p>
Lead-Acid	 <p>10ft²</p>	 <p>KG KG KG KG KG</p>	 <p>Low Power</p>	 <p>3-5 Years</p>	 <p>Narrow Temperature Range</p>	 <p>High Maintenance & Hydrogen Emission</p>

Li-Ion UPS Battery Benefits Recap



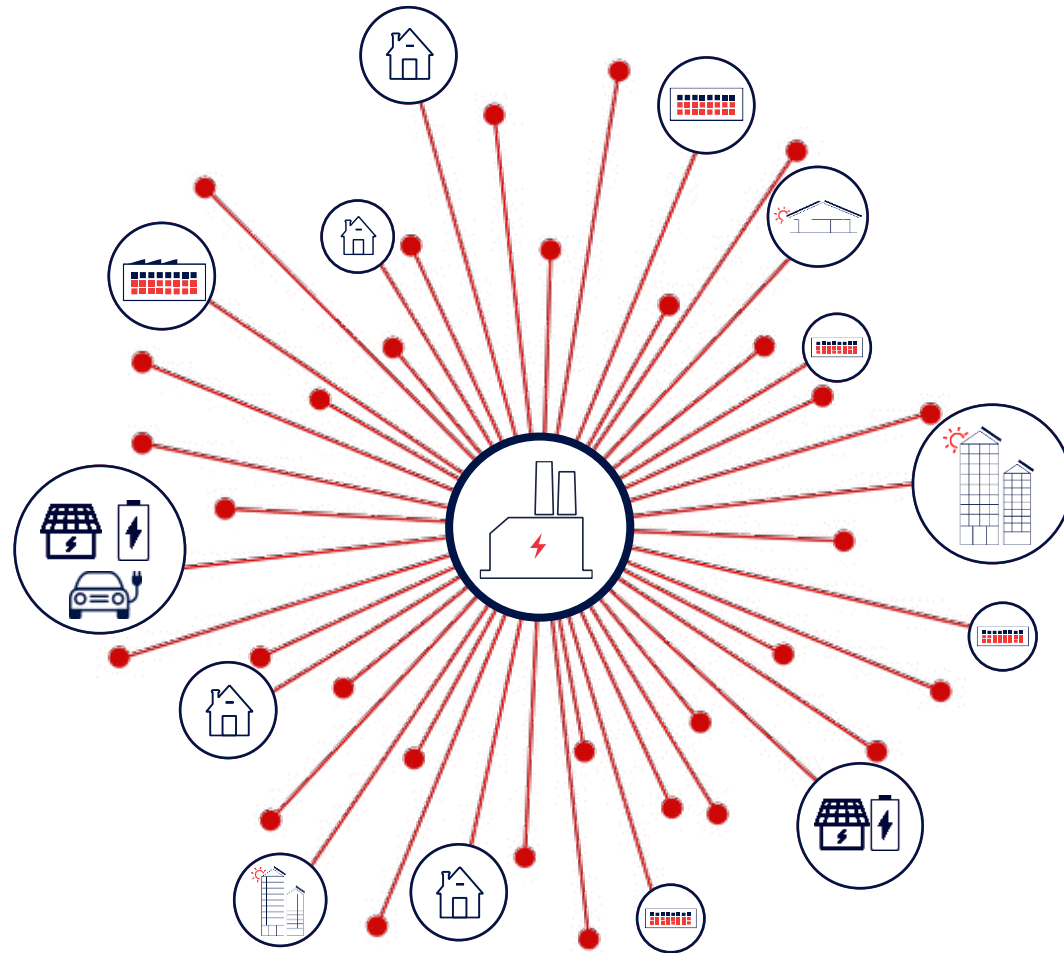
- Higher energy density & lighter weight → faster and more reliable UPS installation and start-up
- Up to 5 longer lifecycle and high power density than lead-acid battery
- No degradation with shallow cycles
- No open-circuit failure mode during normal operation
- No hydrogen generation
- Integrated monitoring of individual cell's voltages & temperatures

Smart Energy Trends

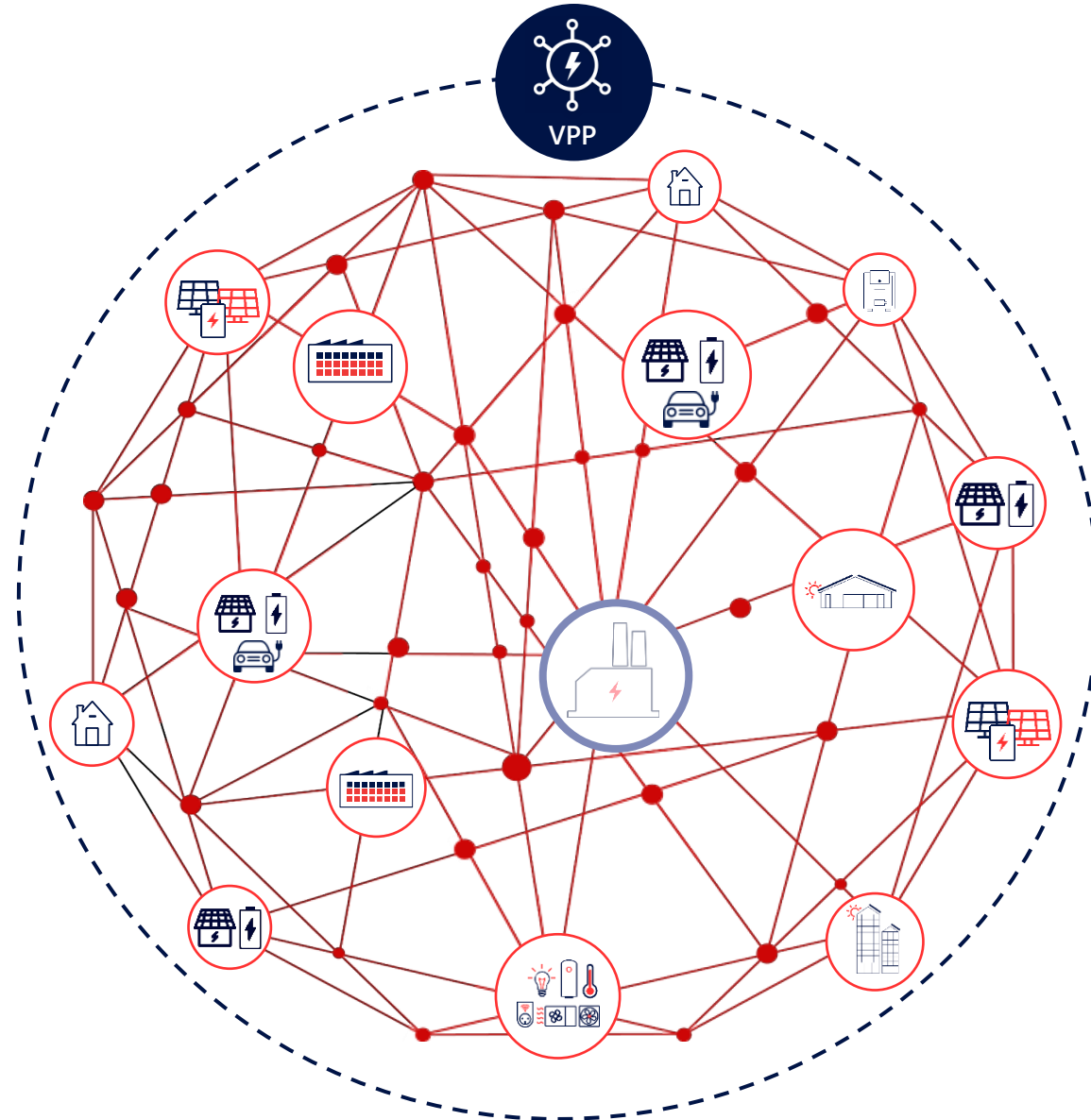
- Grid facing extreme conditions more frequently, requiring new solutions for resiliency
- Energy storage becoming an integral aspect of solar
- E-mobility altering electricity consumption patterns
- Increased connectivity of devices creates demand-side flexibility
- Industries require more energy and better power quality for critical processes
- Power is becoming more and more important as IOT devices become the norm



Moving From a Centralized Grid...



...To a Distributed Grid of the Future

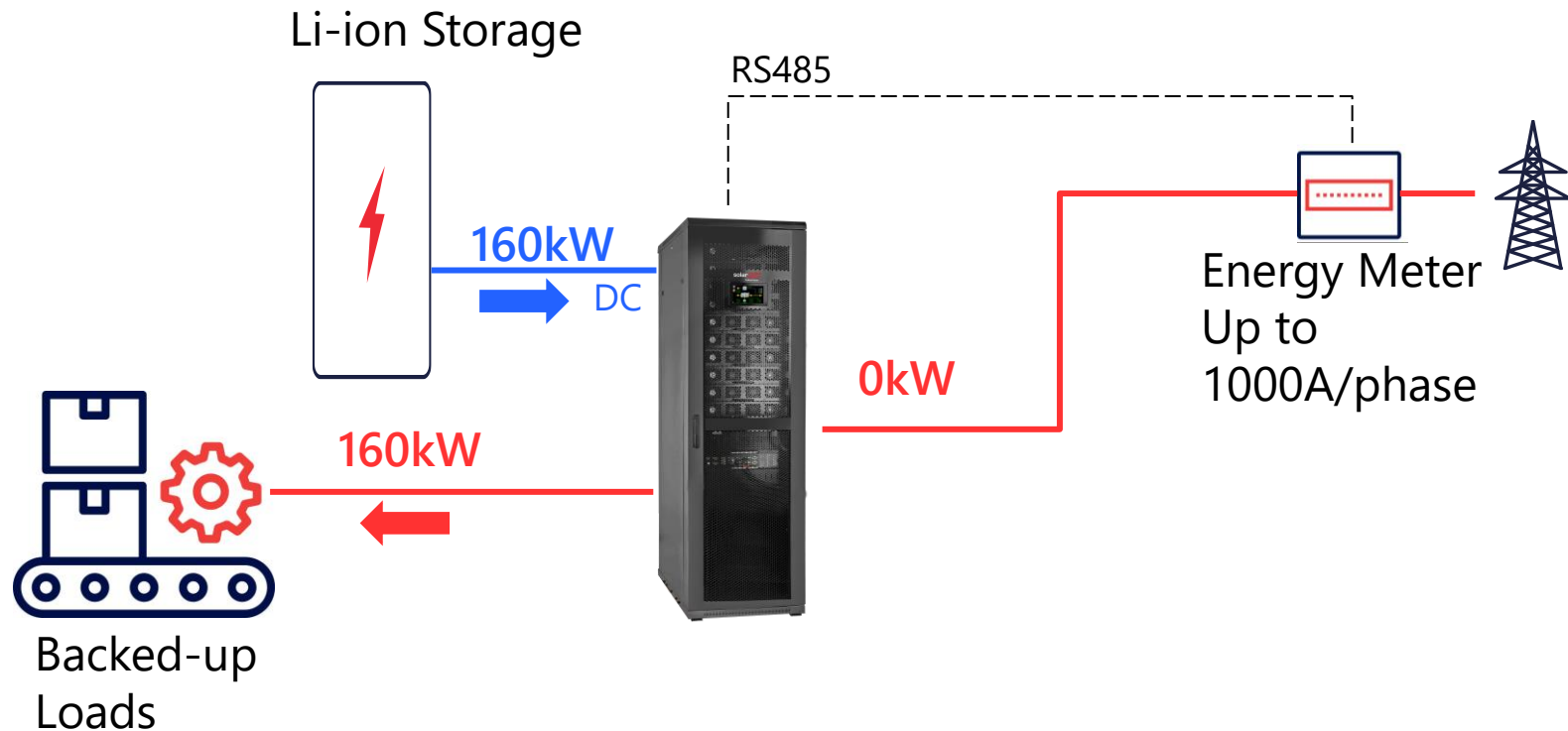
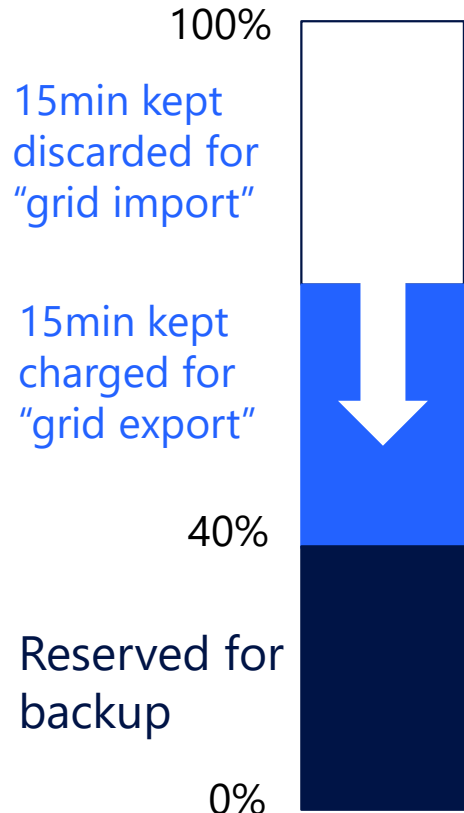


Future Energy Vision

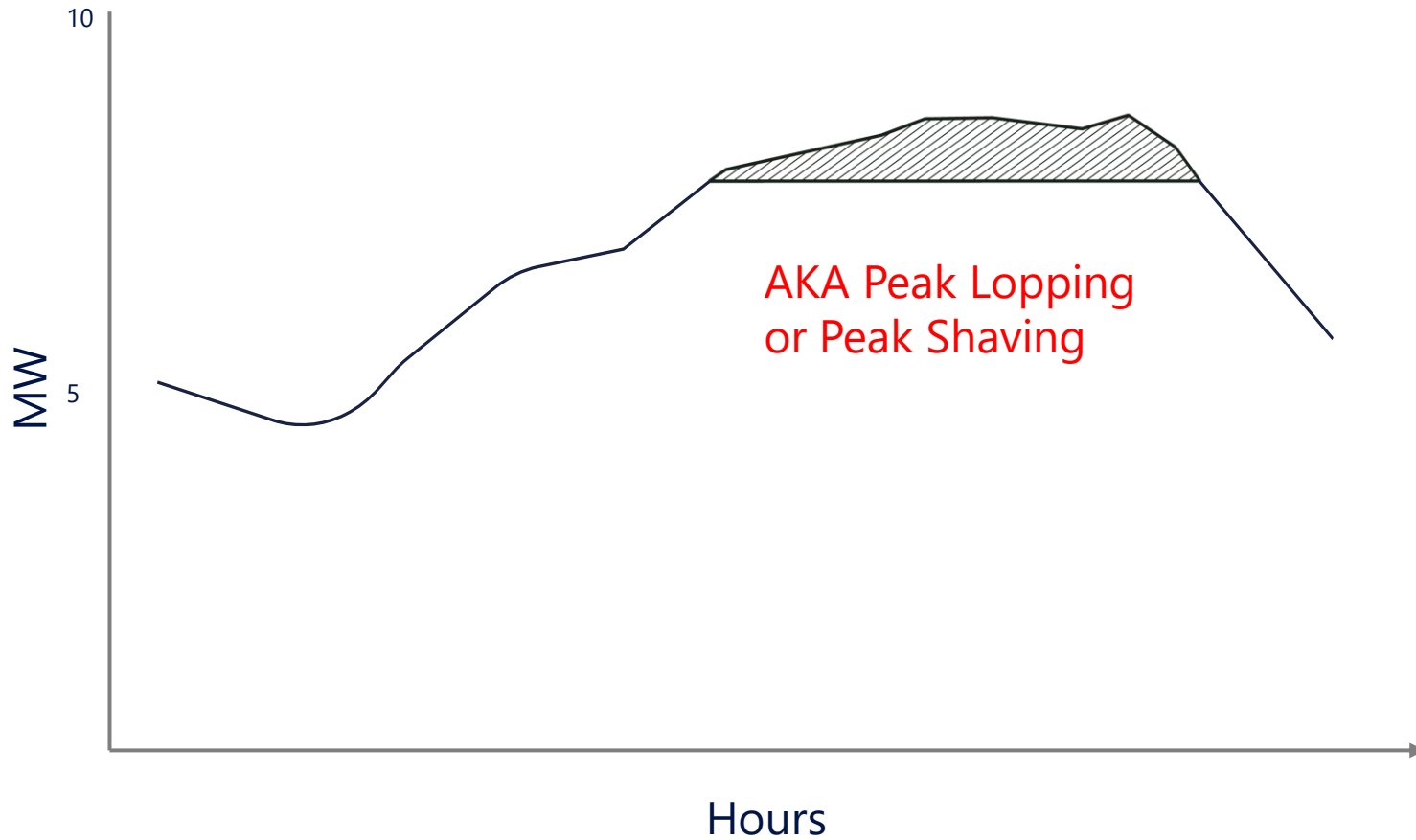


- We believe that the way we consume and produce energy will look very different in the future
- SolarEdge has a strategy to be a leader in this transition from centralized, polluting energy, to clean, distributed, renewable energy

Hybrid UPS Concept - Example



Energy Supply to Overcome Shortage / Peak Rates





Stay in touch!
Be updated with
professional learning
opportunities and
LIVE demonstrations!



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- ✉ SalesUK.CP@solaredge.com

Key Takeaways

- ▄ SolarEdge can help you with Smart Energy & Critical Power Requirements
- ▄ Modular Design Ethos Key for Success
- ▄ Distributed Grid is the Future
- ▄ Grid Support is Needed Right Now and Will Increase
- ▄ UKPN, DNO's and Aggregators have Numerous Schemes
- ▄ Client will receive financial and resilience benefits, a rare Win Win!
- ▄ Watch for Future Synergy between Critical Power & Energy Storage

Thank You!

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Q and A