

Photon Energy

A growing global player in the renewable energy market place



We operate over 170MW of solar and hybrid power plants in Europe and Australia and growing.

www.photonenergy.com

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bai radio broadcast solar power supply, Muswellbrook NSW



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Getting the facts

- ▶ Data collection and analysis
- ▶ Modelling
- ▶ Return analysis
- ▶ Life-cycle costs
- ▶ Implementation

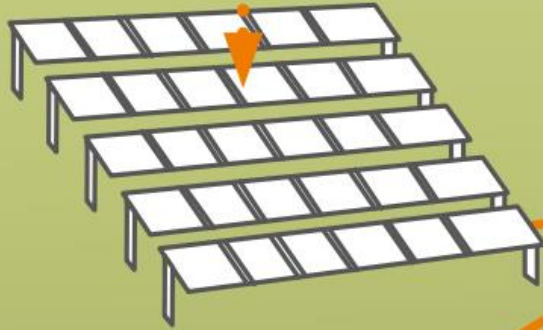


SOLAR POWER

Capacity: 39 kWp

156x Poly-Si 255 Wp panels installed at a higher slope to maximise output in winter.

Supplied by Q CELLS



BAI BROADCAST TOWER Muswellbrook NSW, Australia



BACK-UP GENERATOR

Capacity: 8 kVA

The back-up generator kicks in automatically in case the battery / solar energy supply is interrupted to ensure continuous supply.



STORAGE CONTAINER

Designed and Supplied by Photon Energy

Storage: 215 kWh

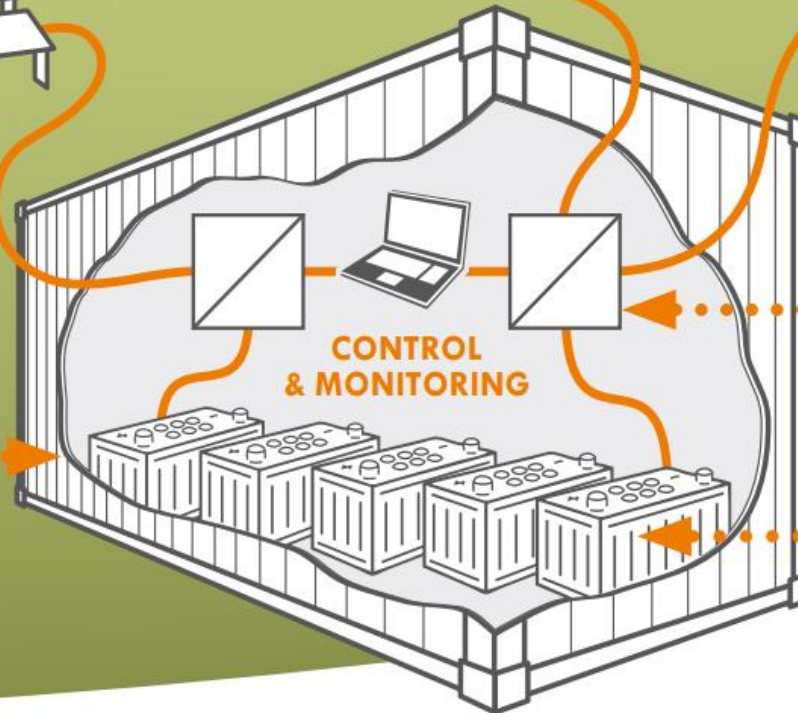
DC Charging: 39 kW multi-MPPT

AC Output: 400 V, 3 Phase

Rated AC Power: 13.8 kW

Control: PLC

Monitoring: Photon Energy 24/7 (remote access)



CONTROL & MONITORING

INVERTER

3x Sunny Island 6.0H pure-sine wave frequency generating inverters

Supplied by SMA Australia

BATTERY UNITS

72x BAE Batterien 10PVV1500 Solar Batteries, 1500 Ah, 2V

Supplied by R&J Batteries

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Why we used VRLA?

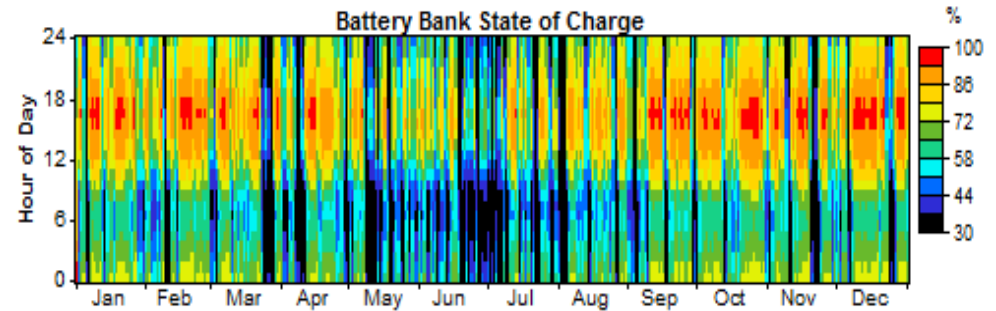
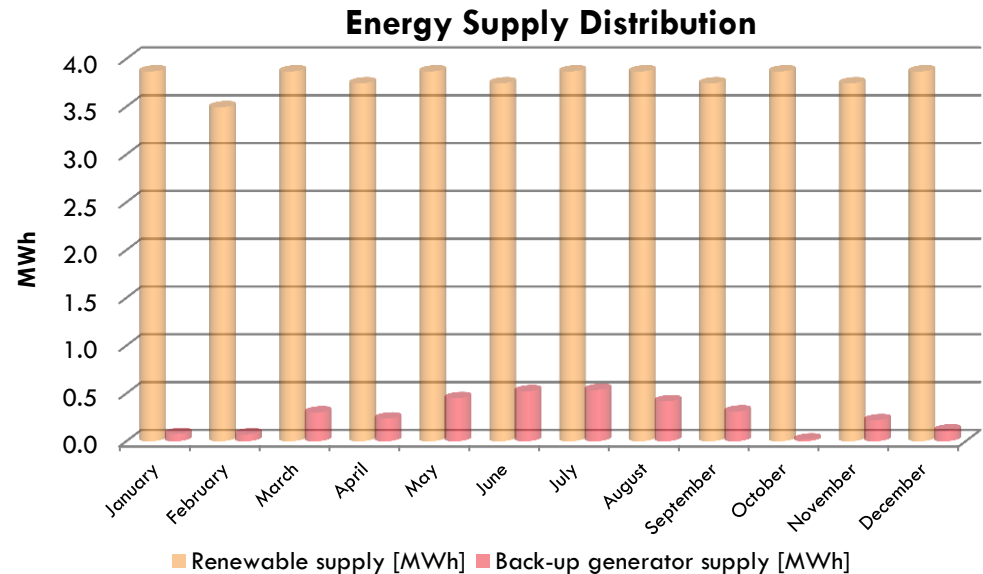
- ▶ Highly available
- ▶ Highly flexible charge and discharge
- ▶ Deep cycling
- ▶ Proven long life
- ▶ Low LCOE



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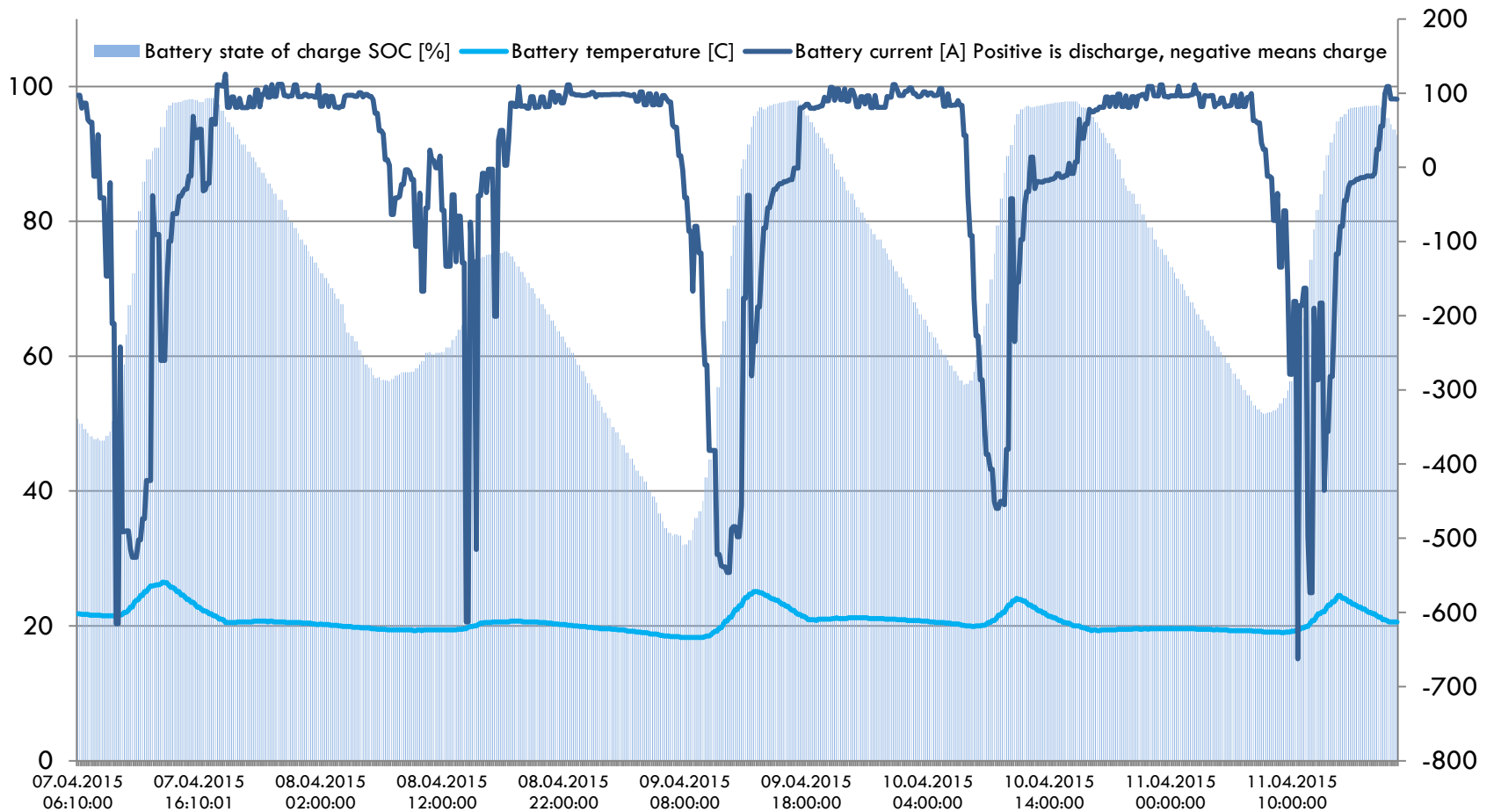
Muswellbrook solar storage performance to date

- ▣ Commissioned November 2014
- ▣ Designed autonomy 92.5%
- ▣ Solar storage use 5,022 hours
- ▣ Back-up use 90 hours (1.8%)
- ▣ Uptime performance 100%



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Musswellbrook solar storage performance to date



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Power storage cost drivers

- ▶ Capacity
- ▶ Output
- ▶ Purpose
- ▶ Location
- ▶ Operation and maintenance



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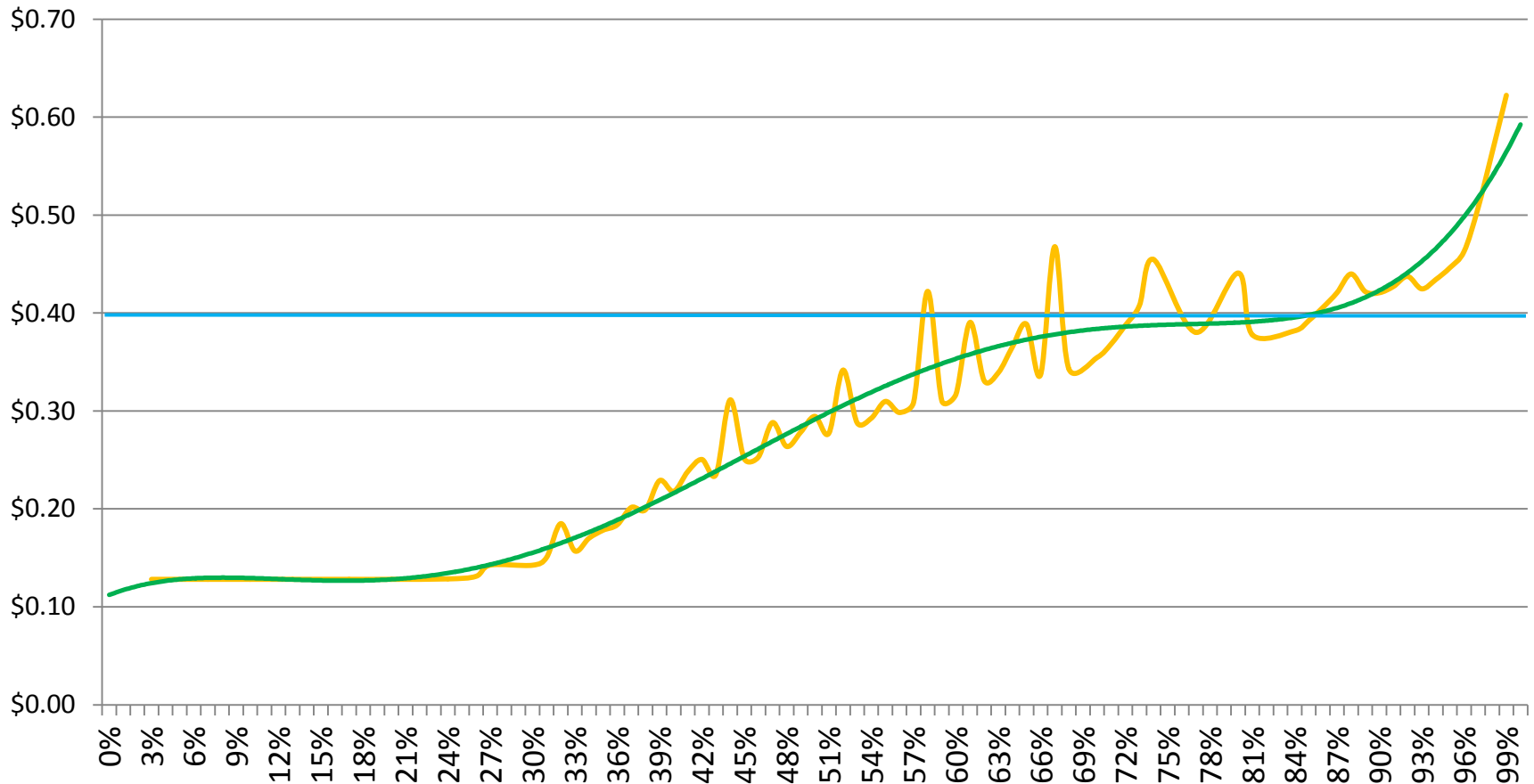
Power storage value drivers

- ▶ Alternative generator
- ▶ Service provided
- ▶ Time of use
- ▶ Behind the meter
- ▶ System control



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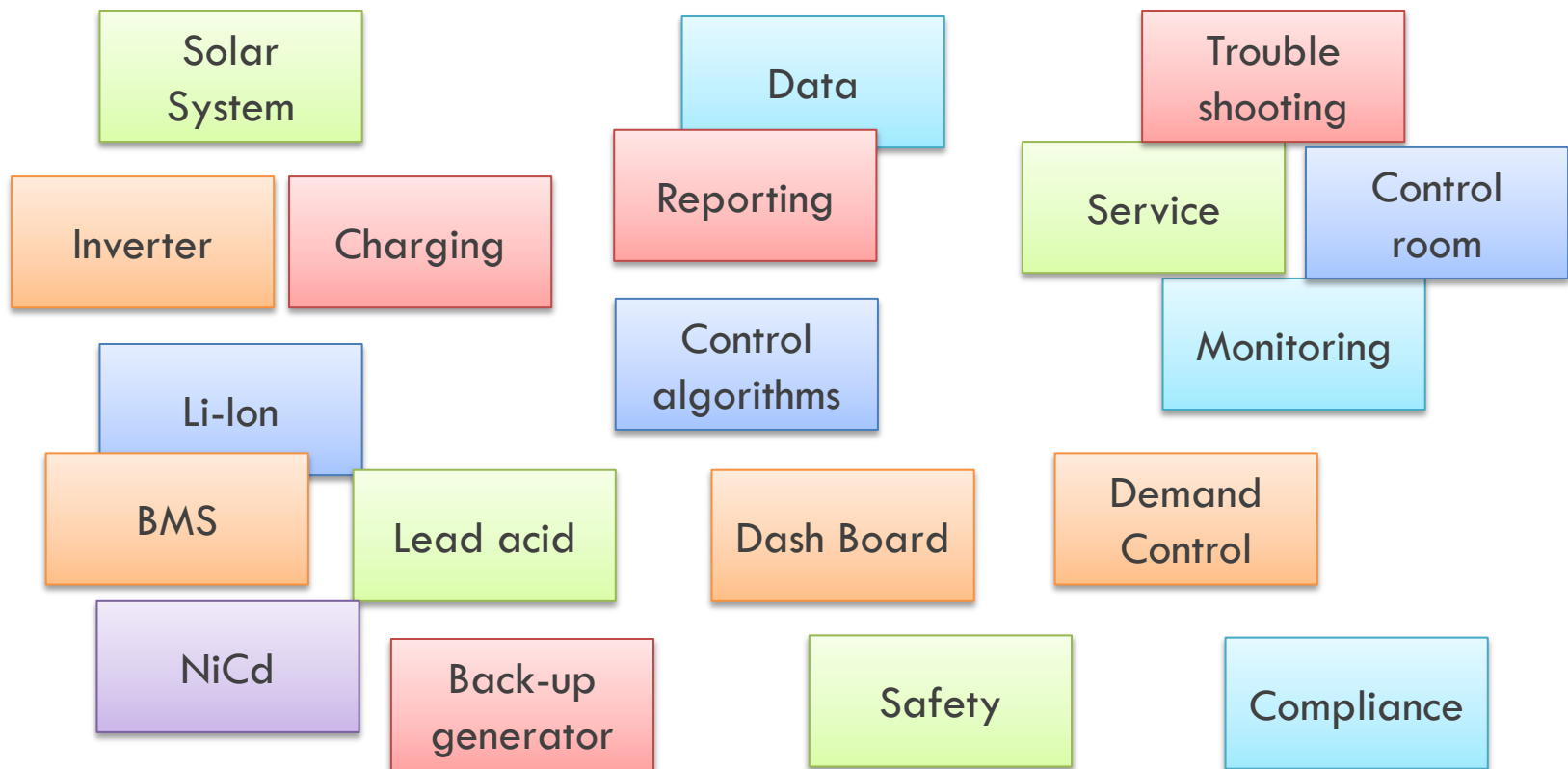
Solar VRLA storage LCOE of percentage of load covered



Outcomes may vary depending on utilisation of the system. Amounts in AUD, combinations of solar PV with storage VRLA, assumes battery replacement after 10 years © Photon Energy 2015

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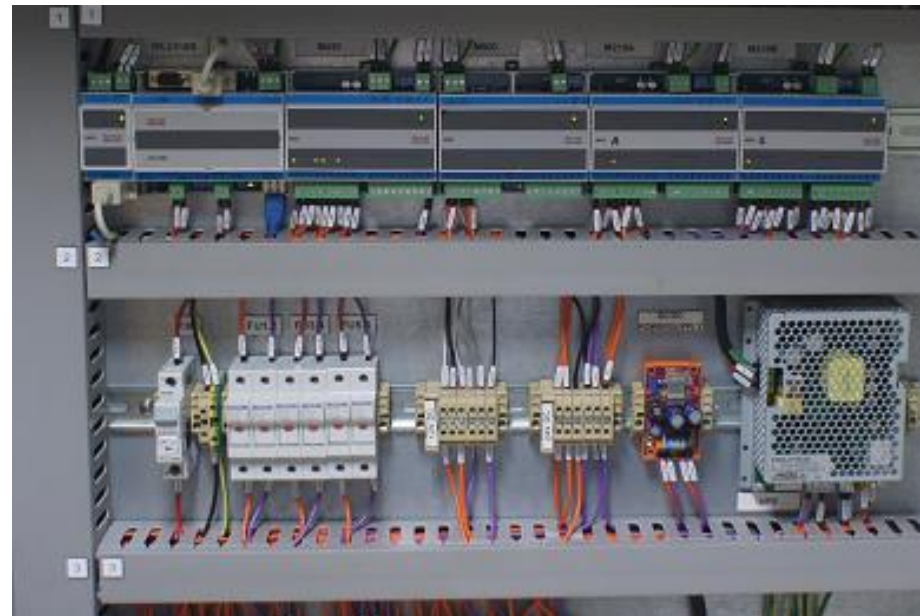
What else can we do to improve storage? „Hearing Cats“



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Integrated SCADA solution

- ▶ Communication & monitoring
- ▶ Adaptive algorithmic self control
- ▶ Remote control
- ▶ Signals & alarms
- ▶ One dashboard



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Smart industrial iPLC

Remote monitoring

Signals & alarms

Algorithmic control

Remote control



Solar (primary generator)

Power storage

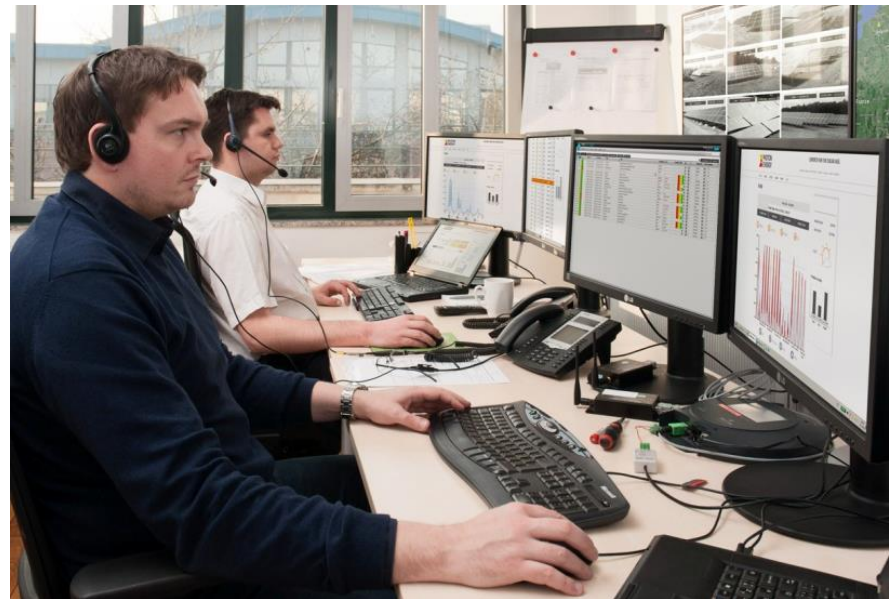
Demand control

Back-up generator

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Control Room

- ▶ 24/7
- ▶ Technical support
- ▶ Trouble shooting
- ▶ Programming
- ▶ Service despatching



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Where does solar storage makes sense?

- ▶ Remote infrastructure
- ▶ Network investment avoidance
- ▶ Residential
- ▶ Demand response
- ▶ Load shifting and peak shaving
- ▶ Power factor, active and reactive power



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Integrated solar storage solution PES1

- ▶ Cost effective
- ▶ Flexible
- ▶ Reliable
- ▶ Controlled
- ▶ Supported



READY TO GO TODAY

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EXPERTS FOR THE SOLAR AGE.

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