

Energy Storage Systems



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Interact seminar:
Sustainable energy solutions for Arctic research stations'
December 15th

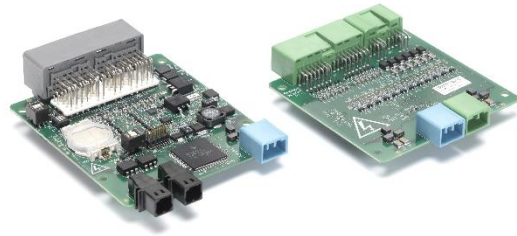


X O L T A

XOLTA – a division of LITHIUM BALANCE

LITHIUM BALANCE

- Battery Management Systems
- Since 2006



Safe - optimal operation – long life



XOLTA

- Energy Storage Systems
- Since 2015



Lower electricity bill – stable grid - more sustainable energy



Energy Storage Systems

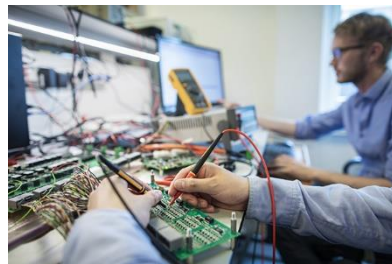
X O L T A

XOLTA – a division of LITHIUM BALANCE

- 50 employees in greater Copenhagen
- R&D, Production, Technical service
- 50% annual growth

Owners

- Global
- All within energy
- 100 BDKK annual turnover



Sensors, fuses, relays



Battery cells & Battery packs

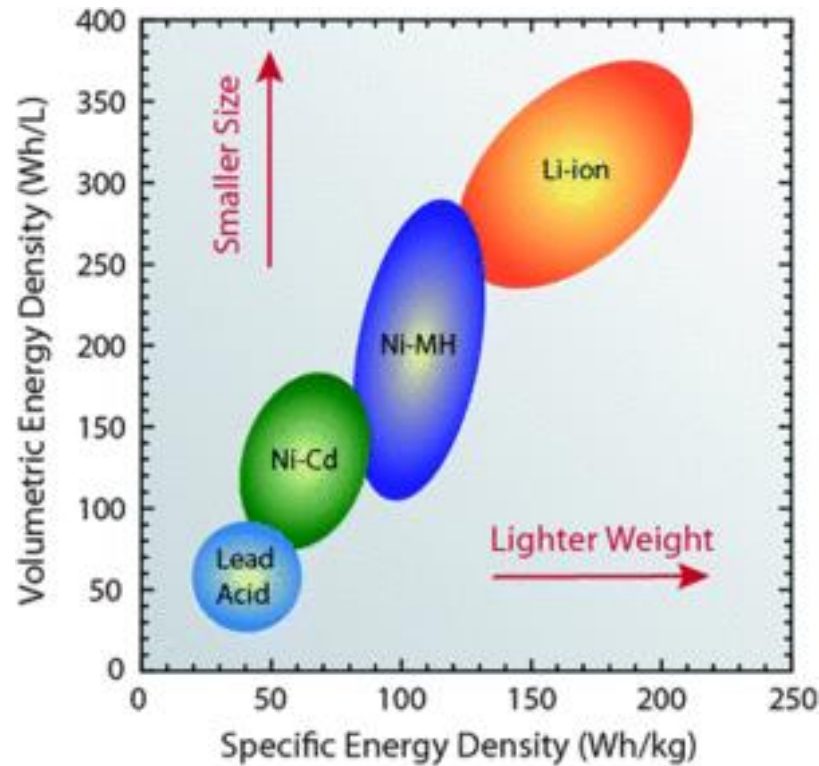


Sustainable energy

X O L T A

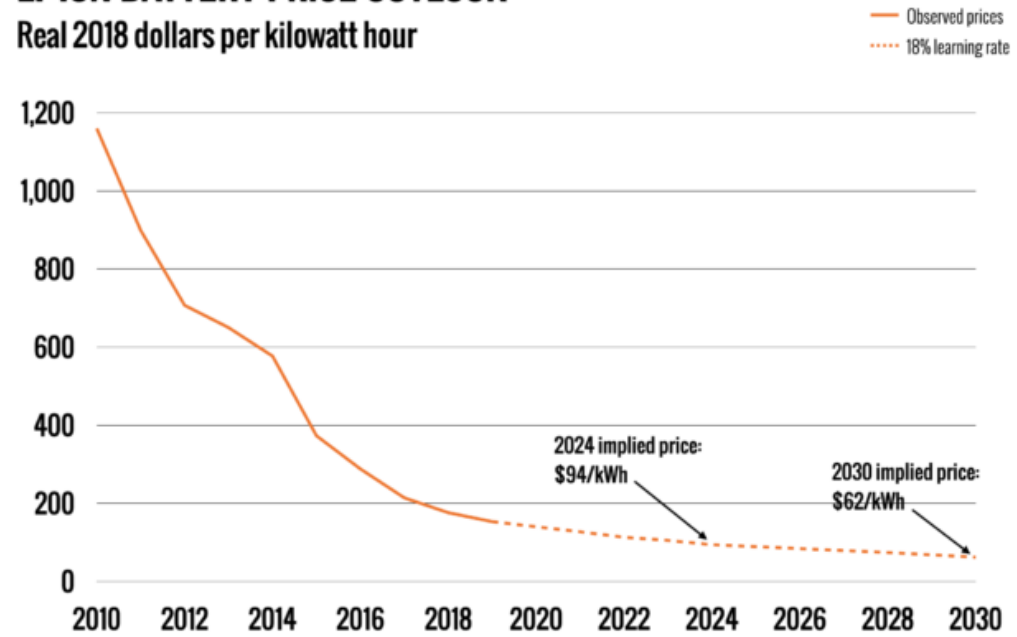
Lithium-ion battery advantages

Weight/Volume - Lifetime - Maintenance-free - Environmentally friendly - Price



LI-ION BATTERY PRICE OUTLOOK

Real 2018 dollars per kilowatt hour



Source: BloombergNEF



Lithium-ion, the energy storage leader

From 2000



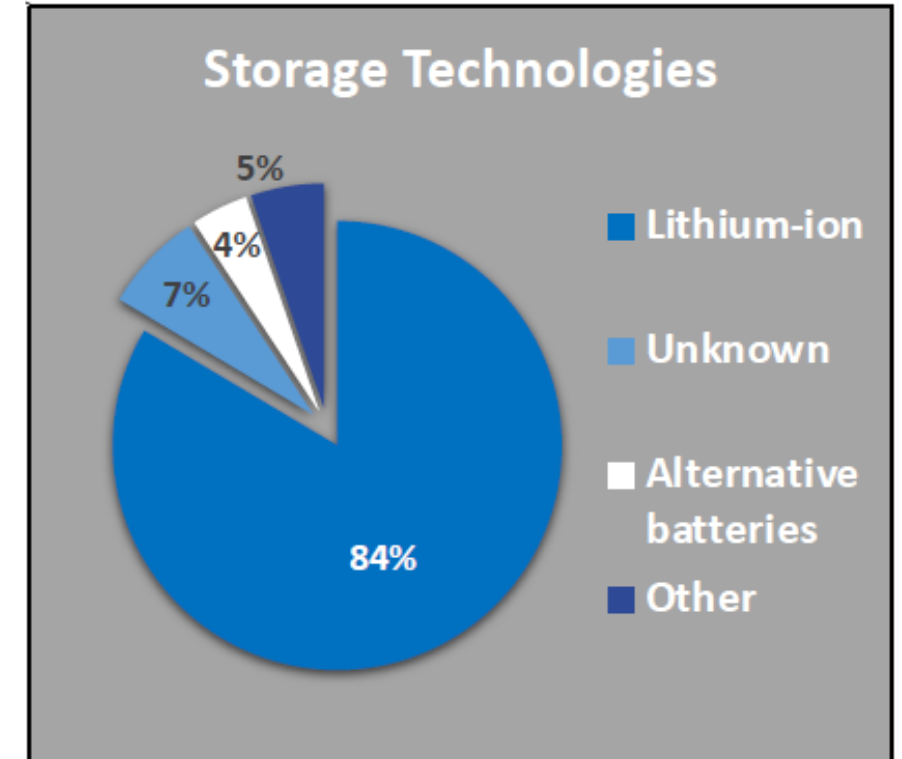
From 2010



From 2015



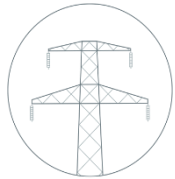
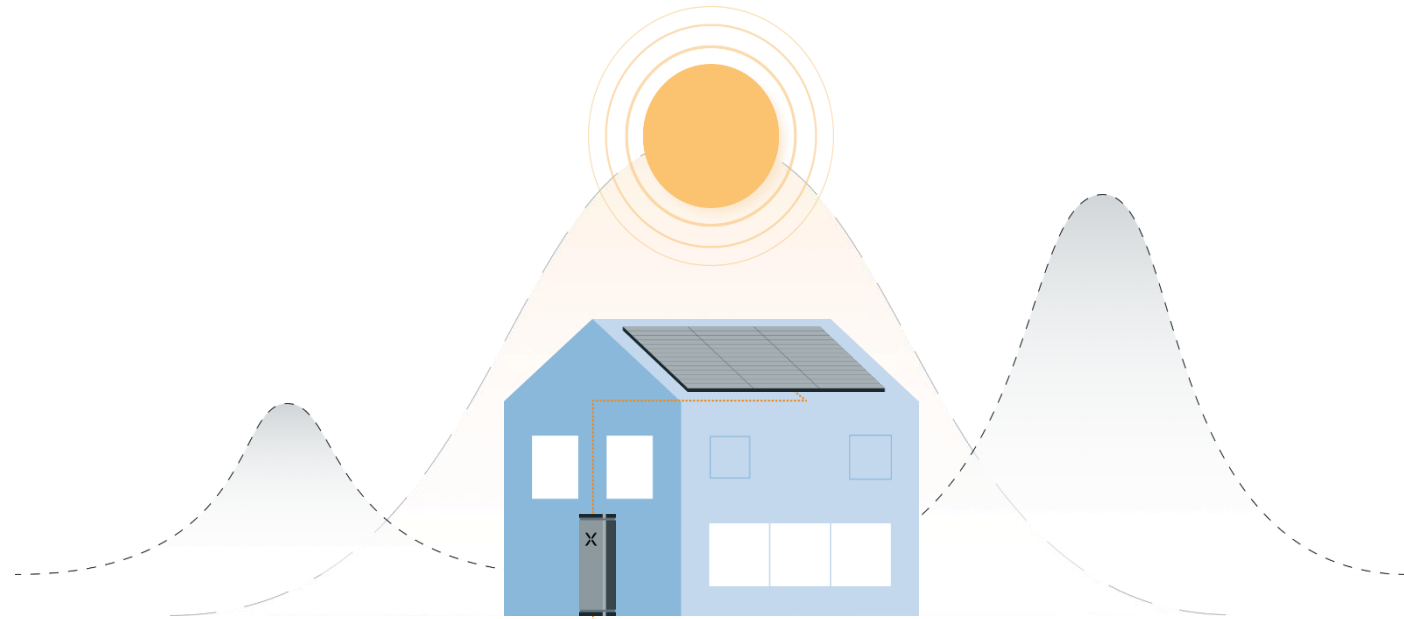
Li-ion is 84% of all energy storage* constructed 2014 to May 2020 (20 GW)



* excl. pumped hydro. Source: Clean Horizon Consulting

Production from sun

Consumption



Morning

Noon

Evening

Intelligent batteries for storage of renewable energy, Compatible with existing solar installations

Compact energy storage



New release
5-30 kWh

Indoor energy storage



Modular design
79 kWh

Outdoor energy storage



All-in-one
79 kWh-2,5 MWh

Energy storage for all needs

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Battery design considerations

Safe

- **Designed to BD-60**
- **Gas vent**
- **Outdoor installation**
- **Best in class BMS, Lithium Balance**

Efficiency

- **Minimal energy loss in inverter during standby**
- **Low energy consumption for cooling**
- **High roundtrip efficiency**

Urban design

- **Simple installation**
- **Indoor and outdoor versions**
- **Vandal proof**



Battery design considerations

Scalable – future proof

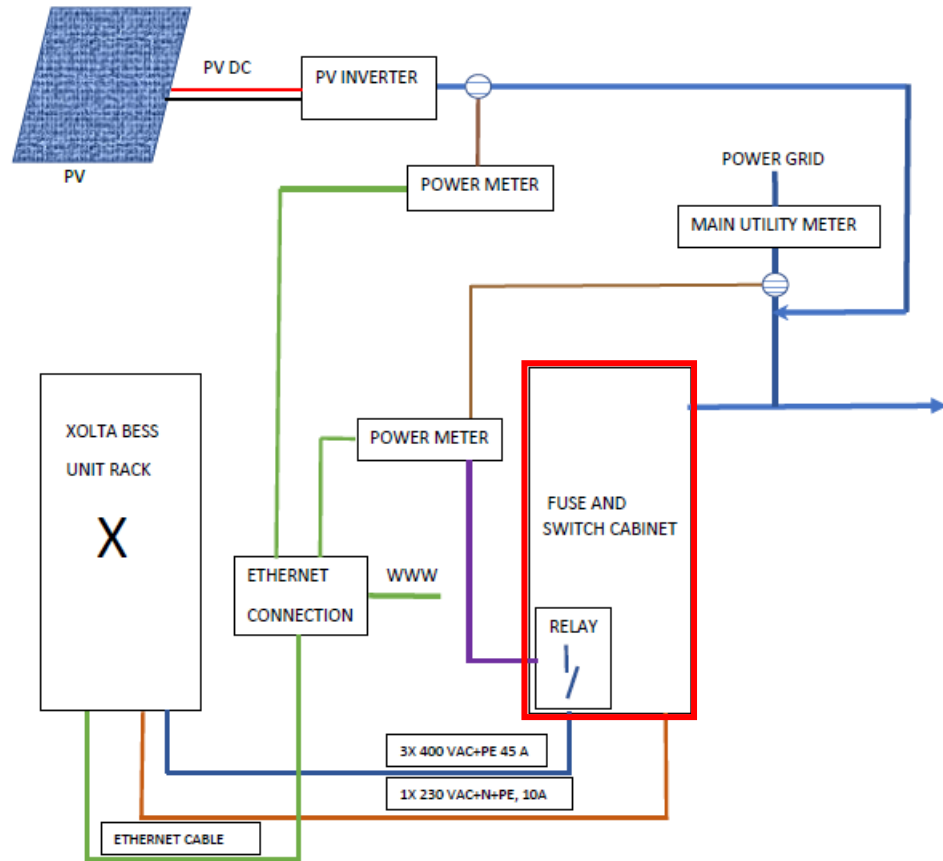
- Independent units can be added one by one
- No performance loss when adding another unit
- Avoid over-investment upfront to counter expected degradation

Reliability

- One inverter per unit – if one rack fails, the others continue operation



On-grid or off-grid installations



The battery can be installed independently of existing renewable energy sources

Possibility of Off-grid capability with external grid forming Danfoss Drive

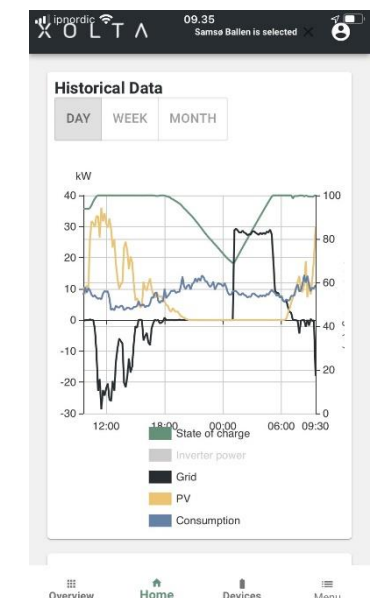
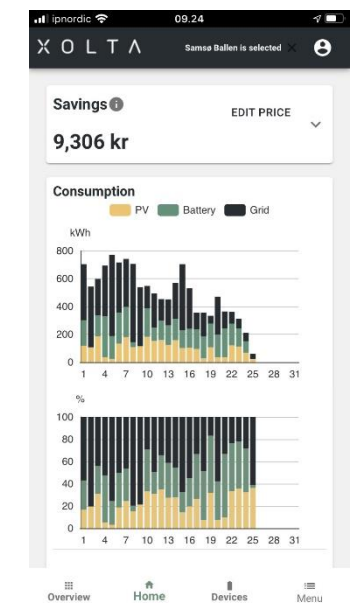
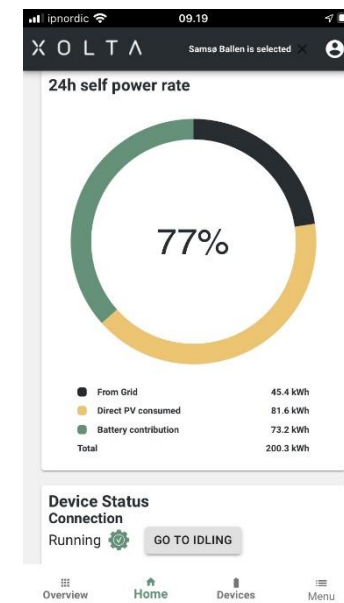
Metering by reading solar inverter or external power meter



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Webapp

- ✦ Central overview of solarproduction, site consumption and battery state of charge SoC
- ✦ High resolution - follow consumption minute by minute
- ✦ Gain insights on CO₂ savings and economic benefits
- ✦ Customizable to fit with site specific energy cost
- ✦ See historical consumption, solar production and battery SoC values
- ✦ Exsport data to Excel for own analysis
- ✦ Up to 5 user accounts per site



Examples of BAT-79 applications and scalability



Bolzano

Standard BAT-79 indoor kWh/50 kW time shift and peak shaving application with AC EV charging in parking house



Standard BAT-79 outdoor kWh/30 kW time shift application and EV AC & DC charging at housing association



Standard BAT-79 outdoor 395 kWh/150 kW time shift application at industrial plant 1MW solar

Estimated system cost



- ✦ System cost depends on several factors including:
 - ✦ Size of plant
 - ✦ Power requirements
 - ✦ on/off-grid
 - ✦ Ambient temperature
- ✦ Plant size 100-500 kW
- ✦ System price range – 500-650 USD/kWh

Contact



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