

Large Scale Energy Storage for Smart Grids

DI Werner Gamon

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History of BlueSky Energy

2000 - Foundation of the Company AlliedPanels

Development and production of innovative products for the **Medical Technology**

Primary customers were **GE** and **Siemens**.

2010 - Acquisition of AlliedPanels GmbH by a major international group

2013 - The birth of BlueSky Energy

With decades of experience as a successful technology company, BlueSky Energy is created to contribute to the energy industry with **Innovative energy storage systems**

In a strategic partnership

BlueSky Energy is in cooperation with the leading manufacturers of batteries in the world. No-one knows which technology will succeed in the future. We offer to our customers and partners the best solution for their application

Optimal energy storage for Your System

- BlueSky Energy is a **System Integrator**
- From the **private photovoltaic system** to **large scale systems** - in combination with solar and wind farms, grid- and frequency stabilization
- BlueSky Energy supports their customers from **analysis** and **installation** to **maintenance** and **service**
- Our storage partners are leaders in the industry. These products are **safe**, **innovative** and **efficient**
- BlueSky Energy offers **contract manufacturing**



Modern development and Production Center Frankenburg

- 5000 sqm Area
- Flexible production
- ISO 9001 Certification
- Storage and Logistics
- Battery test center
- No CO2 emissions
- Power generation via PV-system
- Showroom and energy storage demonstration





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Our Products

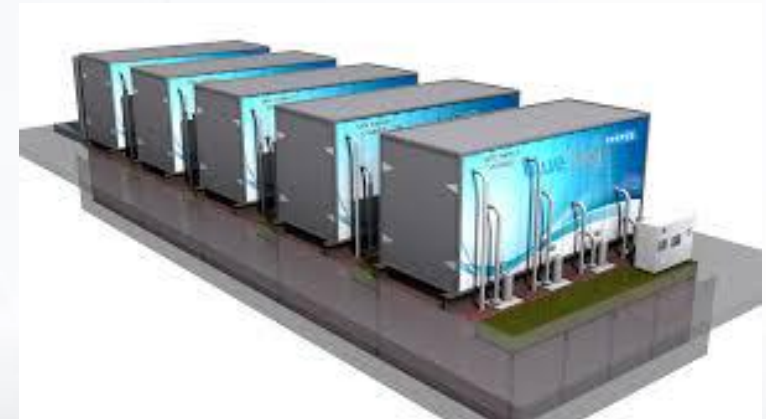
ViZn Energy: Z20 – large scale battery

- **Technology** – Zinc-Iron Redox-Flow-Technology
- **Energy Performance** – Energy storage up to 160 kWh and power of 80 kW
- **Flexibility** – scalable up to 1 MW
- **Efficiency** – 75 percent round trip
- **Depth of Discharge (DOD)** – 100 percent
- **Cycling** – >10,000 (full charge- / discharge cycles)
- **Environmentally friendly** – Green technology based on environmentally friendly materials and substances
- **Safe** – Non-explosive, non-toxic, non-flammable



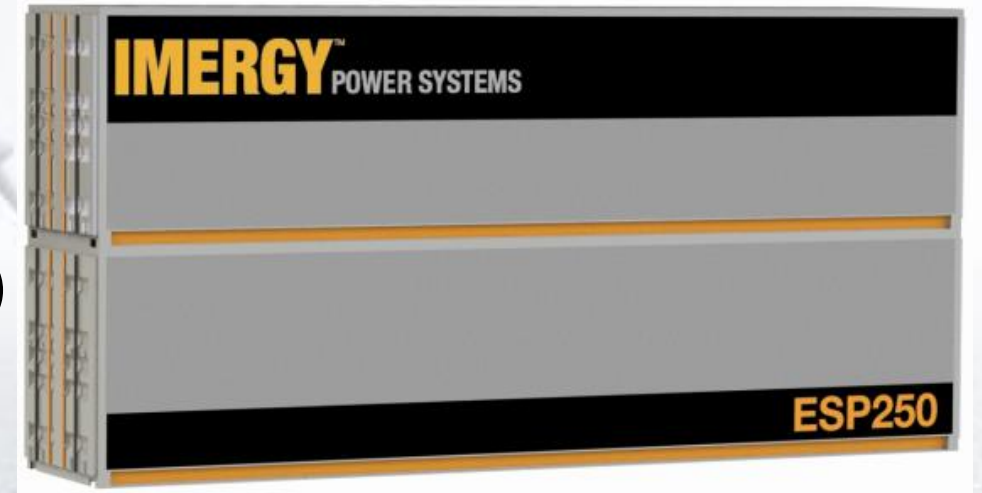
ViZn Energy: GS200 – large scale battery

- **Technology** – Zinc-Iron Redox-Flow-Technology
- **Energy Performance** – Energy storage up to 3 MWh and power of 1 MW
- **Flexibility** – scalable up to 50 MW
- **Efficiency** – 75 percent round trip
- **Depth of Discharge (DOD)** – 100 percent
- **Cycling** – >10,000 (full charge- / discharge cycles)
- **Environmentally friendly** – Green technology based on environmentally-friendly materials and substances
- **Safe** – Non-explosive, non-toxic, non-flammable



Imergy: ESP – large scale battery

- **Technology** – Vanadium Redox Flow
- **Energy Performance** – Energy storage up to 1 MWh and power of 250 kW
- **Flexibility** – scalable up to multiple MW
- **Efficiency** – 75 percent round trip
- **Depth of Discharge (DOD)** – 100 percent
- **Cycling** – up to 100,000 (full charge- / discharge cycles)
- **Safe** – Non-explosive, non-toxic, non-flammable



Electrovaya: BESS – large scale battery

- **Technology** – Lithium Ion Superpolymer[®]2.0
- **Energy Performance** – Energy storage up to 1.2 MWh and power of 1.2 MW
- **Flexibility** – Scalable up to multiple MW
- **Efficiency** – 85 - 92 percent (Round Trip AC)
- **Depth of Discharge (DOD)** – 90 percent
- **Cycling** – >7,000 (full charge- / discharge cycles)
- **High Development Status** – Millions of cells on the market



Aquion – Hybrid Ion Battery

- **Technology** – AHI™ Aqueous Hybrid Ion Technology
- **Energy Performance** – Energy storage 2 kWh to 30 kWh
- **Scalability** – Scalable up to MW
- **Depth of Discharge (DOD)** – 100 percent (8 years warranty)
- **Environmentally friendly** – **Greenest technology**



RedFlow – ZBM Battery

- **Technology** – Zinc-Bromine Redox Flow
- **Energy Performance** – Energy storage 10 kWh and power of 3 kW nominal and 5 kWp
- **Scalability** – scalable up to MW
- **Depth of Discharge (DOD)** – 100 percent



BYD - Lithium Battery

- **Technology** – LiFePO4 Lithium-Iron-Phosphate
- **Energy Performance** – Energy storage 2.5 kWh – 80 kWh
- **Depth of Discharge (DOD)** – 85 percent (12 years warranty for battery)
- **Cycling** – >6,000 (full charge- / discharge cycles)





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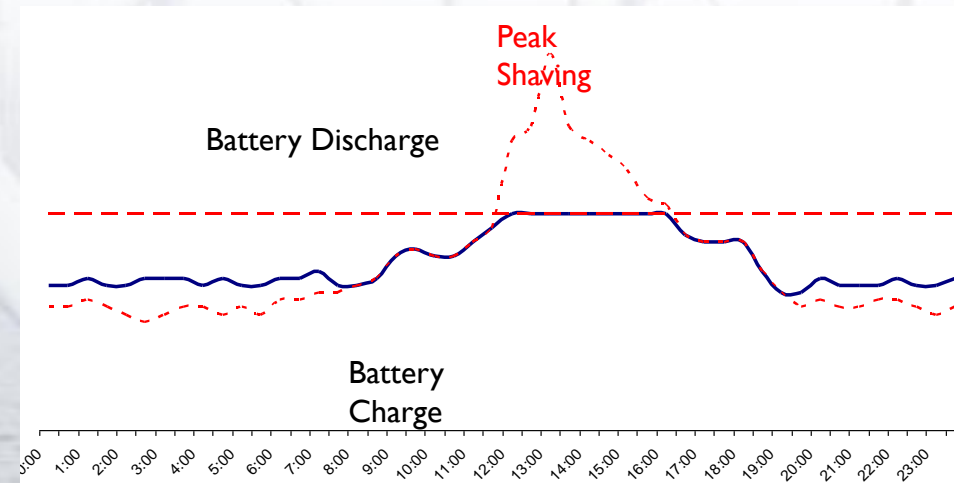
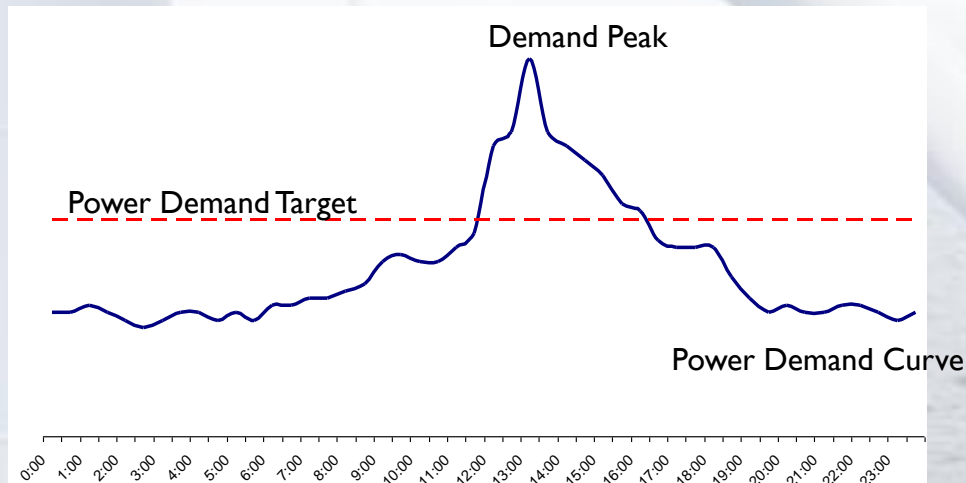
Applications

BESS Applications

Peak shaving

How it works: stores energy during periods of light loading and delivers it in periods of high demand. This decreases the load on less economical peak-generating facilities.

Economic value: allows postponement of large investments into grid upgrades and other electrical systems. Commercial and industrial consumers can reduce electricity cost by reducing peak demand. Utility companies reduce operational costs of generating power in peak periods. Can also generate savings through delta between electrical rates - arbitrage



BESS Applications

Capacity Firming

How it Works: system controls the output and variable ramp rate of renewable energy sources to eliminate rapid voltage and power swings in the electrical grid

Economic value: renewable energy generation will cause less stress to the grid, reducing cost of maintaining the grid infrastructure.

BESS Applications

Back-up Power / Spinning Reserve

How it Works: acts as a backup power supply that can respond to outages within milliseconds. It can function as a temporary power supply until back-up generators are brought on line.

Economic value: reduces down time as a more reliable energy source with instant response. Reduces maintenance costs on diesel generators and eliminates need to idling.

BESS Applications

Power Quality

How it Works: provides accurate and rapid response to short-duration disturbances such as voltage sags or short supply interruptions in the grid, thereby improving power quality.

Economic value: provides reliable power supply for sensitive digital electronics, electronic equipment and microprocessor-based controls.

BESS Applications

Frequency Regulation

How it Works: energy storage system is charged/discharged according to decreases/increases in grid frequency.

Economic value: improves power stations to actively control frequency of power generation with emission-free operation and in an almost instantaneous fashion.

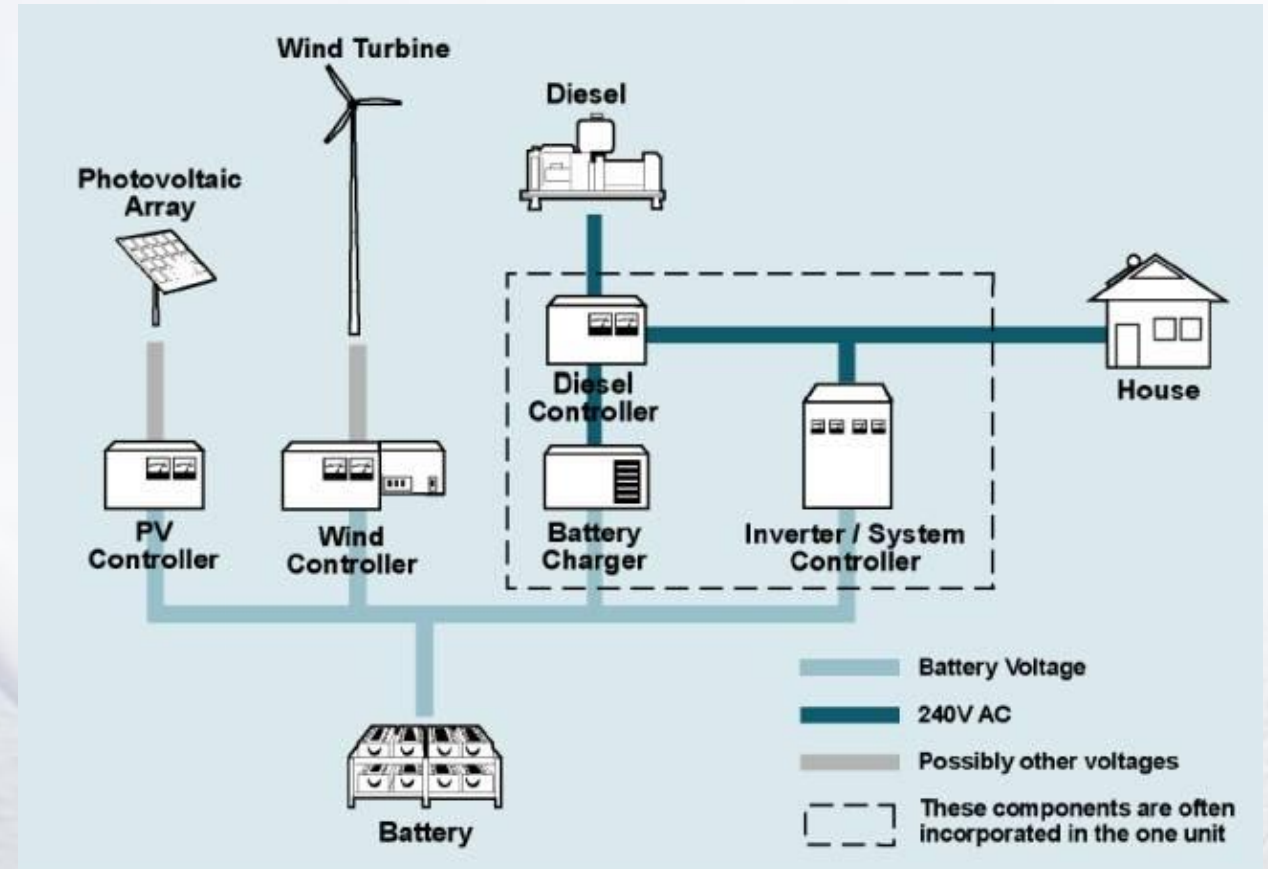
Intelligent Energy Storage System (IESS)

- **IESS** Energy management solution for grid and industrial applications
- **Features:**
 - Capacity scalable
 - Voltage/Frequency regulation
 - Phase balancing
 - Power Factor Correction
 - Uninterrupted power supply
 - Network capacity improvement
 - Arbitrage



Integrated Storage – PV, Wind, Diesel Generator and Energy Storage

- **THE solution for islanding**
- **Features:**
 - Modular design for scalability
 - Integrate with multiple energy sources
- **Benefits:**
 - Decrease fuel consumption and emissions
 - Decrease costs associated to maintenance and fuel
 - Enables Off-grid installations



Thank You for Your Attention

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