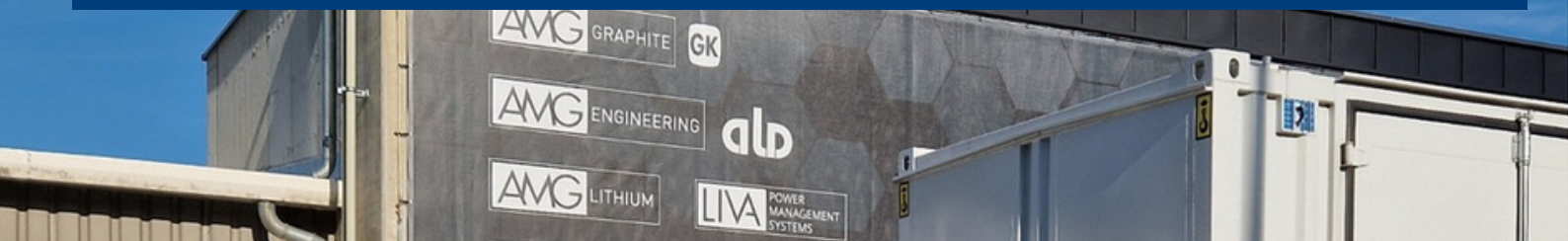
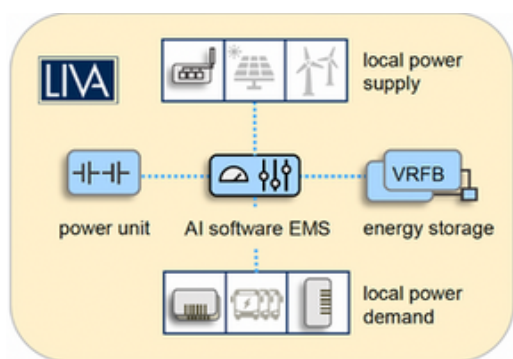


# ACCELERATING THE ENERGY TRANSITION



The future energy market will change profoundly. Global energy demand growth is driven by three factors: increasing demand of electricity, increasing supply of renewable energies and improvements in energy efficiency. The LIVA Hybrid Energy Storage System (Hybrid ESS) for industrial applications helps to improve energy and power management to reduce energy costs and CO<sub>2</sub> emissions. Hybrid ESS can serve an energy demand of 3.45 MWh up to 100MWh.

## The LIVA Hybrid Energy Storage System (Hybrid ESS)



The custom tailored ecosystem Hybrid ESS efficiently combines 4 core components:

- Lithium-Ion battery as high power unit
- Vanadium Redox-Flow battery as energy storage unit
- Software solution with artificial intelligence (AI)
- The system controls further energy assets to produce power, hydrogen/oxygen, process heat/cooling

## Advantages and Benefits of Hybrid ESS

- Industrial peak shaving: smoothing and managing the fluctuating power demand of electricity from the grid
- Integrate unsteady & fluctuating power supply from locally produced renewable energies (RE) from solar and wind
- Sector coupling strategies: integrate hydrogen applications, process heat & cooling from RE
- Reduce electricity and energy costs
- Stabilize power grids and reduce CO<sub>2</sub> emissions

## AMG's Green Mining Strategy of Vanadium

In a joint venture, Shell and AMG Recycling B.V. recycles spent catalyst and gasification ash from the oil and gas industries for the production of Vanadium and high-grade Vanadium oxide. The recycling reduces the CO<sub>2</sub> emissions by 85% compared to classic mining process.



"From Tier 1 automotive supplier with automated assembly lines to energy intensive electro- steel production: the custom tailored ecosystem Hybrid ESS stands for active power management without intervention of the production processes and helps to reduce electric energy cost."

Dr. Volker Kölln, Director LIVA Power Management Systems