

Fact Sheet Energy Services

Mobility is undergoing a fundamental change, in which electro-mobility is becoming increasingly important. Two worlds, mobility and energy, are drawing closer together. The energy sector is also in the midst of a transformation – as a result of digitalisation and growing integration of renewable energies.

Intelligent connectivity between energy consumers, producers and storage systems will create the energy environment of the future. Electric vehicles and their batteries will play an important role. These changes in mobility and the energy sector will create the scope for new connected business models for BMW Energy Services.

About Energy Services

BMW Energy Services views itself as an enabler for the BMW Group's electro-mobility strategy. It develops customer-centric connected business models, which include storage business models based on second-life EV batteries and the BMW Energy Cloud. These business models enable customers to reduce their energy costs – for example, through peak load optimisation, or improve their CO₂ footprint – for example, through better utilisation of electricity from renewable energies or electro-mobility.

BMW Battery Storage Farm Leipzig

The BMW Battery Storage Farm Leipzig currently forms the basis for two energy-related business models: Local energy optimisation at the Leipzig plant with regard to energy costs and CO₂, as well as grid stabilisation, using so-called balancing energy.

The large-scale battery storage facility is capable of integrating locally-produced captive energy from four wind turbines more effectively into the plant's energy consumption to lower its CO₂ footprint even further. Using peak shaving – i.e. avoiding costly peak loads – the battery storage farm is also able to help lower energy costs at the Leipzig plant.

Beyond the plant, the BMW Battery Storage Farm Leipzig is also able to integrate renewable energies more effectively into the public power grid by stabilising it. The large scale battery storage facility feeds into the primary balancing power, which relies on the precise responsiveness of our high-capacity batteries.

Subject Fact Sheet Energy Services

Page 2

The BMW Battery Storage Farm Leipzig includes up to 700 second-life BMW i3 high voltage batteries. Currently there are 500 new and used high-voltage batteries integrated in the battery storage unit.

The BMW Battery Storage Farm Leipzig commands up to 10MW of marketable power and up to 15MWh of marketable capacity. This equals an electric reach of 100,000 km driven by a BMW i3.

The BMW Battery Storage Farm Leipzig will be introduced into primary balancing power marketing in early 2018.

Unique features of the BMW Battery Storage Farm Leipzig:

- The solution we developed entirely in-house is unique: We remove used second-life batteries from vehicles and integrate them as “plug and play” into the battery storage unit. No technical modifications of any kind are needed.
- The second-life high-voltage batteries are currently supplemented by new batteries we keep in reserve as replacement parts.
- Scalability:
 - We can incorporate future battery generations: currently first-generation 60Ah batteries are integrated.
 - The concept is scalable at the Plant Leipzig location: Capacity could be doubled by “building on” a second, identical hall.
 - The concept would also be scalable worldwide.
 - The battery farm is not only set up for the two usage scenarios of peak shaving and balancing power, but could also be used in the future in further business models.

The BMW Battery Storage Farm project in Leipzig is part of the WindNODE initiative, dedicated to promoting intelligent usage and storage systems for renewable energies. The German Federal Ministry for Economic Affairs and Energy provides funding for the venture through its "Smart Energy Showcases – Digital Agenda for the Energy Transition" (SINTEG) programme.

Subject Fact Sheet Energy Services

Page 3

Digital Energy Solutions joint venture

The BMW Group and the Viessmann Group founded the joint venture “Digital Energy Solutions” in late 2015. The two companies each hold a 50-per-cent stake in the joint venture, headquartered in Munich and Berlin, each providing one managing director.

Digital Energy Solutions is primed to develop solutions for an energy environment in which also heating and mobility are electric besides power.

Digital Energy Solutions has offered small and mid-sized companies holistic solutions for future-oriented energy management since January 2016. Sustainability, economic efficiency and security of supply are the focus of its business activities, while battery storage systems will also be a fundamental component of this electric world.

Digital Energy Solutions uses an IT system developed in-house to analyse its customers’ energy systems and highlight potential for optimising energy supply and consumption.

Through smart integration and storage of captive electricity from renewable energies, Digital Energy Solutions reduces its customers’ CO₂ footprint, makes them more independent and, at the same time, reduces energy costs.

With intelligent charging solutions for electric-vehicle fleets, Digital Energy Solutions is also making e-mobility more attractive to companies.

Customers of Digital Energy Solutions include, for example:

- Companies who want to add electro-mobility to their vehicle fleet.
Here, Digital Energy Solutions offers intelligent fleet charging solutions that not only include the actual charging infrastructure, but can also be supplemented with local captive-electricity production, energy storage systems or access to public charging infrastructure.
- Small and mid-sized companies.
Digital Energy Solutions offers this group of customers energy transparency and analysis, through to intelligent energy management for cost or CO₂ optimisation. Here, Digital Energy Solutions offers mid-scale energy-storage systems for local energy optimisation.



Subject Fact Sheet Energy Services

Page 4

- Modern urban districts.
Here, in addition to connected EV charging solutions and possibilities for local energy generation and optimisation, Digital Energy Solutions also offers smart electricity tariffs.
- Digital Energy Solutions also offers B2C customers, whom it has been serving since early this year, options such as more economical EV- or heat-pump optimised electricity tariffs.

The Digital Energy Solutions service portfolio continues to be refined.