**Stationary Storage: Key element of the future energy system**

Worldwide growing energy demand, the shift from fossil to renewable energy supply and the associated challenges for power transmission and distribution are forcing an inevitable change in the energy system. The deployment of renewable energy fosters decentralized power generation and impacts the efficient use of the transmission and distribution grid. Stationary Energy Storage will play a key role in the future energy supply system as it allows energy to be used at any time, regardless of when it was produced.

**The role of Stationary Energy Storage**

Storage is scalable and easy to implement. It is an essential element of a modern decentralized electricity system where it can be deployed for a broad range of applications.

**Smooth and effective integration of renewable energy sources**

Renewable energy like wind and photovoltaic (PV) are by nature susceptible to fluctuations that can be efficiently smoothed with Storage. Coupled with an Energy Storage system, wind and PV become dispatchable and controllable energy sources. Thereby, the strain on the grid is reduced, and energy demand and supply can be better balanced.
Residential and community Storage
Storage can increase the customers’ self-consumption of renewable energy sources and provide back-up power during emergencies. Aggregation of small, distributed Storage systems offers additional benefits to the local utilities and cities such as peak load management, power quality, and grid reliability.

Optimization of consumption profiles for industries and commercial enterprises
By charging Storage during off-peak periods and discharging it during peak demand hours, Storage shaves the contracted power and energy when electricity prices are high. Customers can significantly reduce their electricity bills and achieve further advantages: Back-up power, on-site integration of renewable energy and participation in ancillary services.

Realization of smart grids
Storage is a central element for creating a flexible distribution grid where smart generation and consumption assets are communicating with each other within a network. Storage is capable of balancing real-time differences between supply and demand.

Off-grid applications
In combination with renewable energy sources, Storage reduces the consumption of fossil fuels and fossil carbon emissions for islands, off-grid communities and remote industries.
**Bosch**: Your reliable and innovative partner for Stationary Storage solutions

The Bosch group, truthful to its slogan “Invented for life”, is committed to developing innovative and reliable Storage solutions for a modern power grid. Bosch is engaging in break-through projects and is collaborating with relevant industry partners to make innovation happen.
**In residential, commercial or industrial projects, on-grid or off-grid**

Bosch provides a complete innovative solution for installers, industries, utilities and renewable operators. From the concept phase to the daily operations, our project specific services and products help our customers meet their energy challenges:

- Intensive analysis of Storage benefits and customer specific requirements to define the optimal Storage size, technology and operational strategy
- Integral design of containerized solutions for the most appropriate battery technology, thermal management system, power electronics and controls, including grid connection equipment
- Design, planning and implementation of grid connection
- Service and maintenance support, customized for individual needs

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**Bosch turn-key solution concept**

1. **Storage user requirement management**
   - Customer data, value stream modelling, legal framework etc.
2. **System design**
   - Optimal design for customer and Storage technology selection via planning tool, system configuration and integration of components
3. **Controls design**
   - Customer specific optimized operation strategy software
4. **Construction & grid connection**
   - Installation of turnkey system accounting for site specific requirements, globally
5. **Service & maintenance**
   - Assure lifetime functionality of system
Our Goal: Maximizing benefits of Storage for our customers

Beginning with an intensive assessment of customer requirements, all the way through to system design and installation, we are always in close collaboration with our customers to create the best solution for their specific use. Our expertise in three key areas enables us from an outstanding position to achieve the best use of Storage.

Powerful simulation tools for technical and economic assessment
Our industry benchmarked planning tool and our deep knowledge of applications enable us to conduct a comprehensive evaluation of the techno-economical viability of Storage for each customer. The Bosch planning tool selects the most suitable Storage technology and determines its optimal dimension, as well as for other generation assets. Based on the customer’s load profile and electricity tariff structure, the tool also selects the most profitable revenue streams.

Deep knowledge of Storage technologies
The Bosch Research and Technology Center specializes in electrochemical and mechanical Storage Systems and can match the most appropriate technology to each application. Continuous performance testing and research guarantee the selection of the best-performing technologies for our customers.

Excellent controls expertise
Drawing from our longstanding experience from the automotive, industrial and building technology sectors, we have developed the Bosch Energy System Controller that optimizes the operation of Energy Storage and generation assets for maximum revenues, battery life, safety and ease of maintenance.

Bosch Energy System Controller ensures optimal system operation

Renewables

Dispatchables

Load

Grid

Energy Storage

Bosch Energy System Controller
The Bosch Group is a leading global supplier of technology and services. In the areas of automotive and industrial technology, consumer goods, and building technology, more than 300,000 associates generated sales of 51.5 billion euros in fiscal 2011. The Bosch Group comprises Robert Bosch GmbH and its roughly 350 subsidiaries and regional companies in some 60 countries. If its sales and service partners are included, then Bosch is represented in roughly 150 countries. This worldwide development, manufacturing, and sales network is the foundation for further growth. Bosch spent some 4.2 billion euros for research and development in 2011, and applied for over 4,100 patents worldwide. With all its products and services, Bosch enhances the quality of life by providing solutions which are both innovative and beneficial.