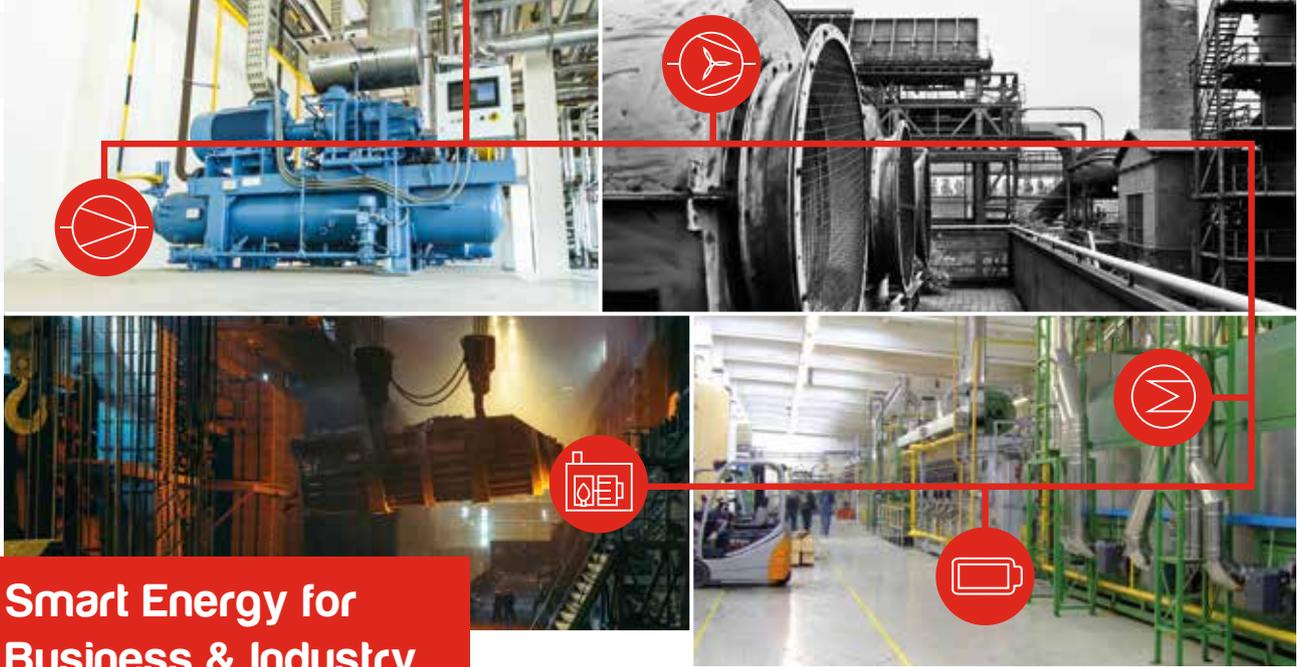




Easy
Smart
Grid GmbH



**Smart Energy for
Business & Industry**



Smart Energy for Business & Industry

Industrial flexibility has great potential to lower energy cost, use more renewable energy (RE), and support energy system transformation. This is especially true in countries with weak energy infrastructure and becoming increasingly important in industrialized countries.

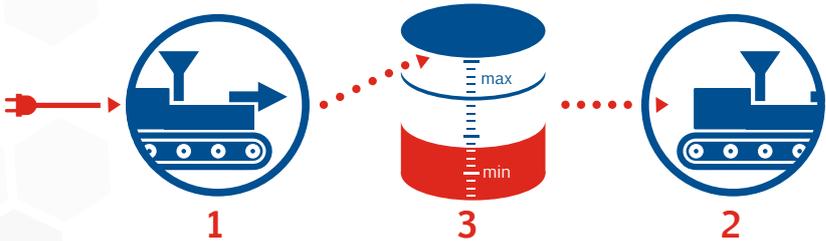
Industry Challenges and Opportunities

- **Cheaper self-generation**
RE costs have dropped substantially, presenting an opportunity for businesses and industry to produce their own energy. Due to natural RE volatility, sometimes it must be complemented by grid energy, at others it is exported to the grid, which reduces economic benefits.
- **Reliable energy supply**
To power productivity 24/7, backup energy systems or storage are often installed that increase GHG emissions and costs. Innovations that ensure energy reliability, minimize system cost and protect the climate are smart alternatives.
- **Infrastructure relief**
Growing energy demand and volatile generation require infrastructure investments. A smart solution creates a win-win situation between infrastructure operators and flexible energy consumers in business and industry. This allows optimal use of grid infrastructure where grid capacity is close to its limits.

Harvesting Industrial Flexibility

Companies have unused energy flexibility in their processes, i.e. the technical capacity to shift energy consumption: If financial benefits can be created, energy can be used at other times, while total consumption does not change. Such flexibility comes from energy storage in non-electrical form (heat, cold, pressure, etc.) or from buffers.

Power consumption of process (1) is proportional to throughput and thus flexible. Process (2) is inflexible and needs a continuous feed of semi-finished product. Buffer (3) allows storage of the semi-finished product, decoupling the two industrial processes and freeing energy flexibility.



Flexibility potential can be harvested by smart heating, cooling, pumping (water, oil, other liquids or compressed air), or by shifting transport, assembly, machining, casting and charging processes over time.

Taking the paper and pulp industry as an example, around 50% of electricity consumption is flexible. This includes shifting operation time of devices like chipping, pulping, washing, drying and HVAC systems. Upgrading pneumatic chip conveyors, refiners, buffers for drying and preheating with HVAC can increase flexibility to be harvested by Easy Smart Grid technology to 80%.

Smart energy management does not mean remote control of sensitive individual processes. Rather it provides information that orchestrates process controllers to use their energy flexibility towards a common goal, observing productivity and local constraints.

Our Value Proposition

Energy costs affect an increasing number of service and manufacturing companies. Demand Side Management (DSM) creates “virtual batteries” that can reduce energy costs substantially, and we help businesses harvesting flexibility and converting it into profit.

○ Limit peak loads (Peak shaving)

The electricity bills of large consumers consist of two parts: energy consumption (price per kWh) and peak demand (peak power in kW).

Peak reduction by better coordination of loads avoids costly consumption peaks by reducing required grid capacity.

○ Cost-effective RE integration

Easy Smart Grid helps maximize the use of self-generated RE. In many countries local use of surplus energy is more attractive than selling it to the grid. Typical RE feed-in tariffs (FIT) are set below the price of energy from the grid. If more (volatile) self-generated energy is used by a real or “virtual” DSM battery, less expensive energy is procured and less is sold to the grid at low price. The price delta (typically in the order of 10 ct/kWh) constitutes the financial reward.

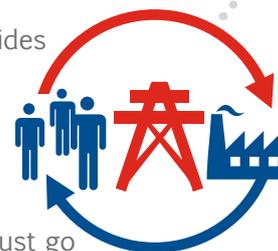
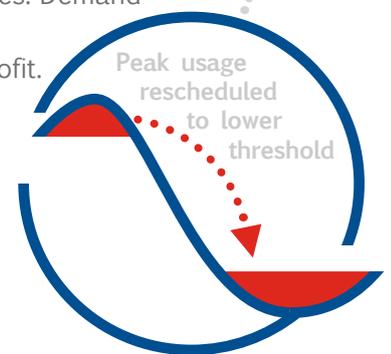
○ Sell flexibility and help keep grid stable

Flexibility means that consumption reacts to price signals and provides a service to the energy system. Energy producers and consumers can offer flexibility to balance the grid or reduce congestion.

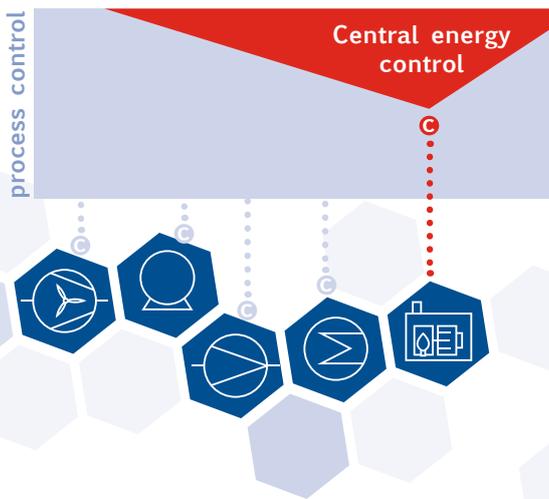
So far, grid stability is ensured through markets for primary, secondary and tertiary control, with few actors, high requirements and costs. The lowest bid size is around 1 MW, and smaller actors must go through aggregators. Our technology reduces complexity and cost of participating in such markets, leading to higher returns for business and industry.

○ Industrial autonomy (islanding operation)

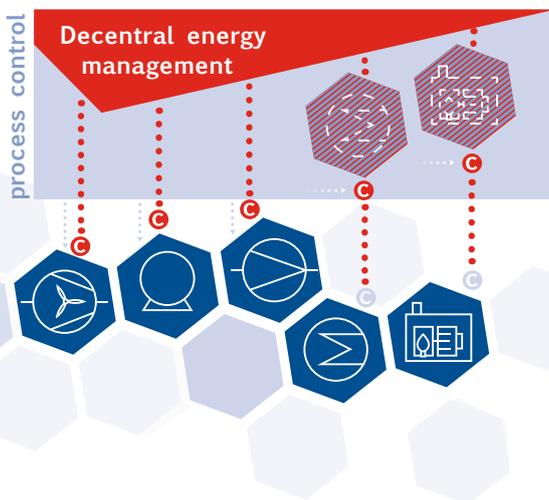
Storage is necessary for business and industry operating in remote locations who want to reduce energy cost by replacing diesel generation with RE. Flexibility of operation is equivalent to charging (or discharging) a battery, creating a low cost “virtual” battery. Charging battery cycles are avoided and smart coordination of all flexibilities is implemented in a performant, simple and cost-effective way.



Migration of Energy Management Systems



Current energy management is based on central automation technology and can only integrate few large assets like gensets/CHP or battery stacks. State-of-the-art includes “digital twins” to provide process constraints, status and forecasts to the optimization. However, it requires powerful solvers and large programming effort - initially and for every system change. Computational complexity and data handling causes latencies that reduce performance and stability.



Together with software partners, Easy Smart Grid develops packages migrating centralized to decentral energy control. This minimizes complexity and lowers the threshold for economic integration of flexibility. In its target state, simple and smart controllers optimize their process flexibilities against a local market guided by a common objective. As a result, minimum requirements for data communication and management, algorithmic optimization, maintenance and support are achieved.



Easy Smart Grid

was founded in Karlsruhe/Germany in 2014 with a clear vision: An energy system dominated by renewable sources. Our mission is to supply the missing puzzle piece - a real time energy management technology with unmatched price/performance ratio to make the energy transformation simple and affordable.

Easy Smart Grid GmbH | Haid-und-Neu-Str. 7 | 76131 Karlsruhe | Germany
mail@easysg.de | t +49 (0)721 - 451 956 10 | www.easysg.de



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