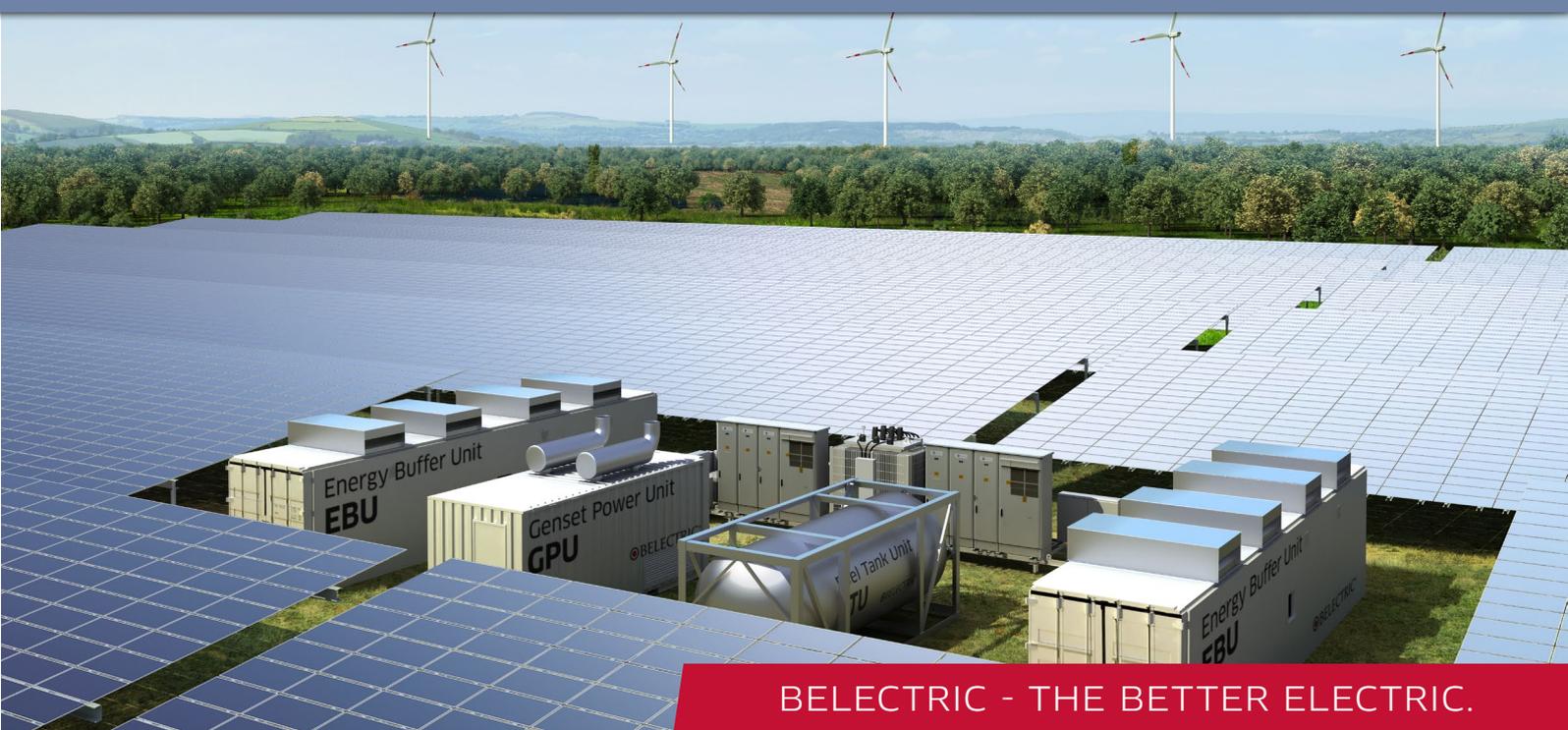




Hybrid Systems

COMBINING PV WITH YOUR ENERGY SOURCE



BELECTRIC - THE BETTER ELECTRIC.

www.belectric.com

Hybrid Systems are a key to a cost-efficient, stable and sustainable power supply all around the globe. By combining different energy sources (e.g. solar energy, wind turbines, hydropower or diesel generators) it is possible to reduce the consumption of fossil fuels, and, even more, the production costs of energy (LCOE). BELECTRIC Hybrid solutions are designed for all-size applications, ranging from one-digit kWp systems to Multi-MWp power plants.

Hybrid Systems: the solution to save fuel today

With our **Hybrid¹** system, we have optimized the integration of PV Power Plants into your local power grid. Our Hybrid Controller is able to control each power generator to guarantee a stable and most cost-efficient power supply at all times.

Adding a battery storage unit can reduce the fuel consumption even more. Permanent frequency regulation, peak shaving at high load (or high feed-in) periods or buffer energy for energy trading at national energy stock markets are key areas for the deployment of the **Hybrid²** solution.

The benefits at a glance:

- Decrease your fossil fuel consumption and your carbon dioxide emissions
- Increase grid availability
- Reduce your total power generation costs (LCOE)
- Increase the amount of renewable energy in your local grid
- Easily expand the system in the future to meet a growing energy demand

Since the company was founded in 2001, BELECTRIC delivered single projects exceeding 100 MWp and has installed over 1.5GWp of solar power in total. This makes it possible to supply over one million people with electricity.

BELECTRIC: a wealth of in-house expertise

We develop innovative technologies characterized by high energy yields, reliable operation in diverse climates, and low raw material consumption.

Our solar power plants are based on over a decade of system know-how from a company that continuously conducts development, construction and realization activities itself. The high degree of vertical integration in the production processes has resulted in a leading market position for BELECTRIC.

The majority of BoS components, such as energy distribution systems, inverter technology and substructure, are manufactured in-house. This unique selling point enables components to be tailored exactly to their intended application. This reduces long-term costs per generated kWh (LCOE) and delivers reliable and efficient system technology over many years.

HYBRID SYSTEM REFERENCES:

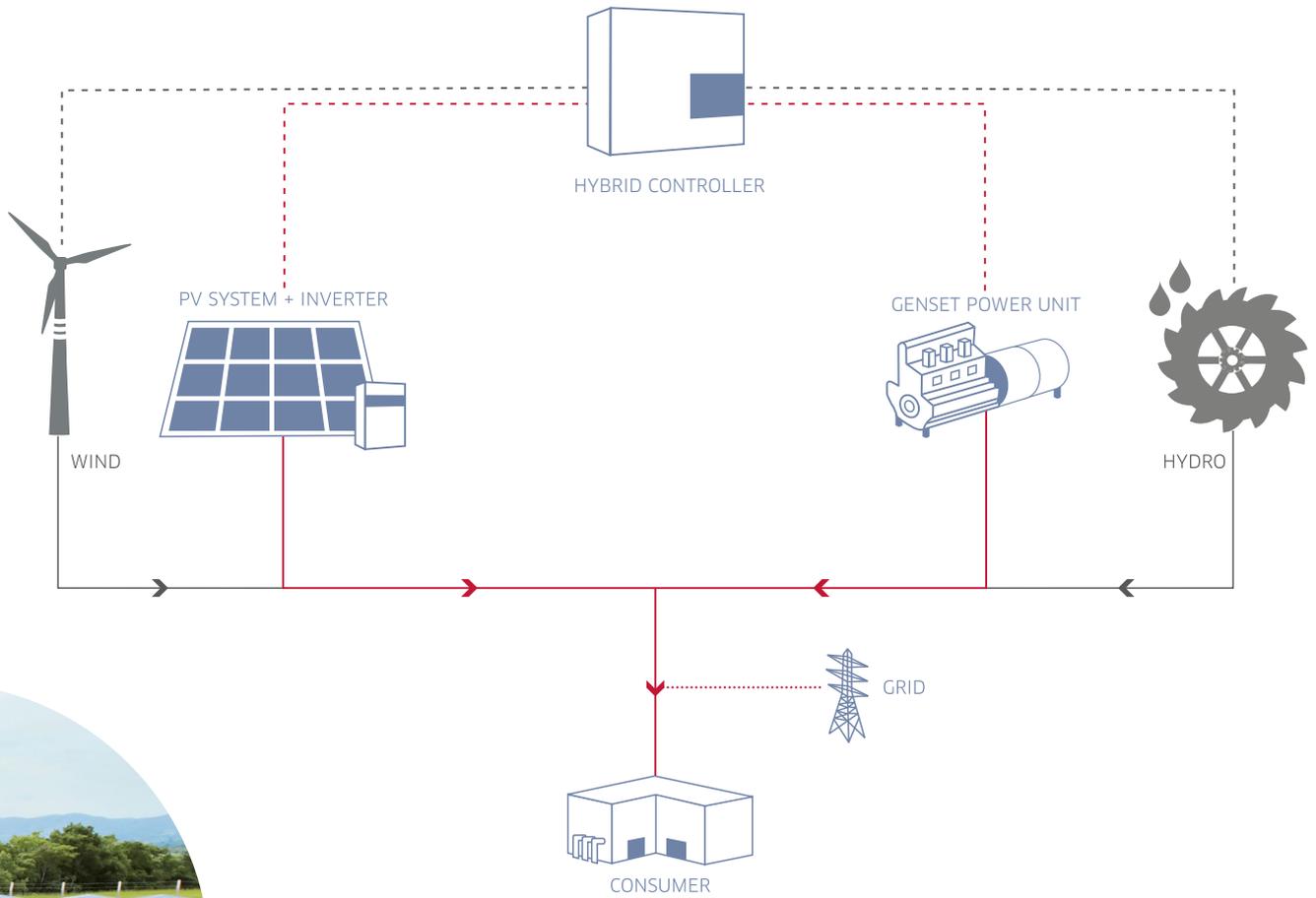
- 2009 Soneva Fushi, Maldives, 70 kWp, PV/diesel
- 2011 La Rochette, France, 5 kWp, PV/wind/battery
- 2011 Marawah Island, United Arab Emirates, 492 kWp, PV/diesel
- 2012 Kitzingen, Germany, 800 kWp, PV/battery
- 2013 Peramiho, Tanzania, 108 kWp, PV/hydro/diesel
- 2014 Alt-Daber, Germany, 67,8 MWp PV / 1.6 MWp battery



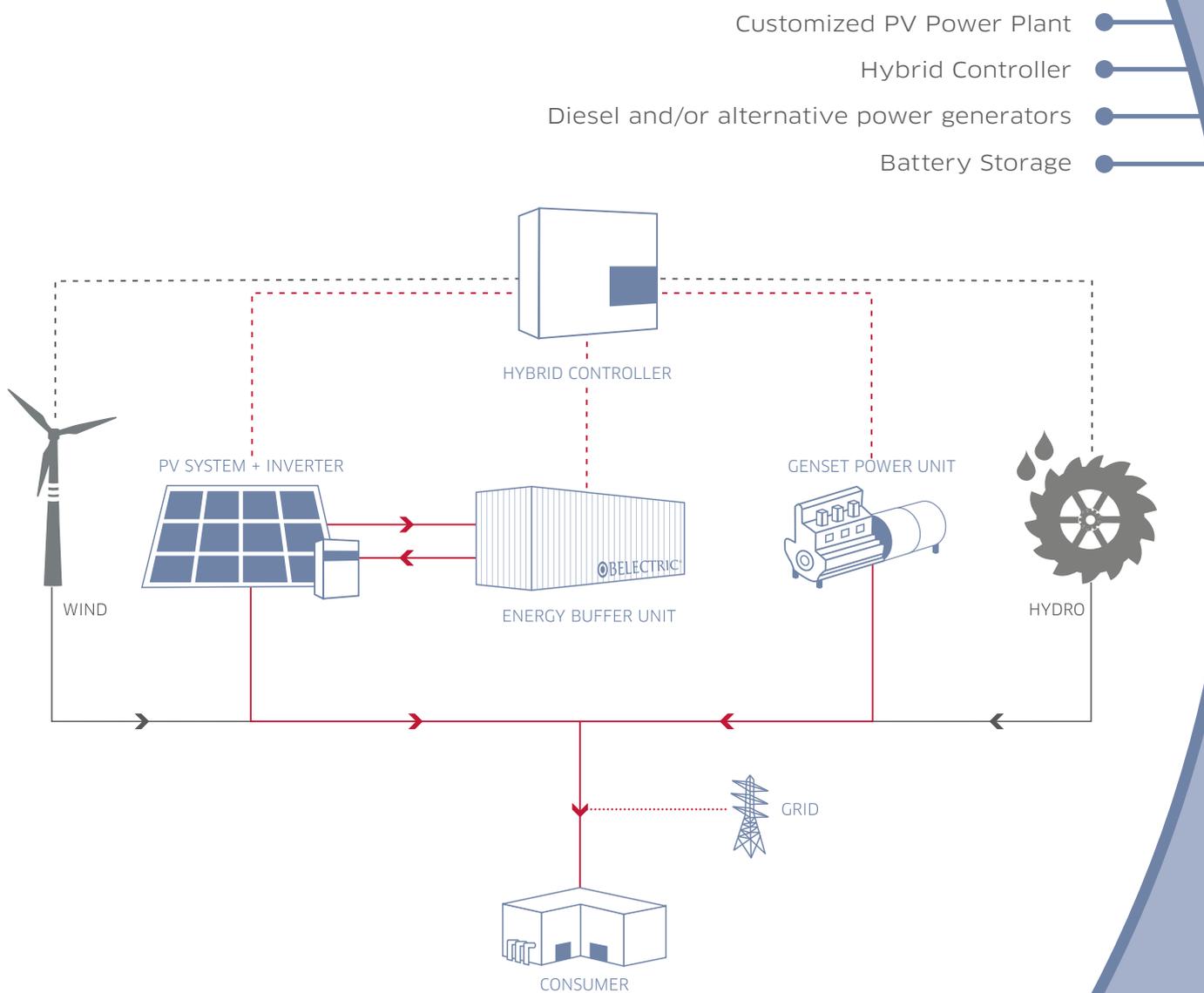
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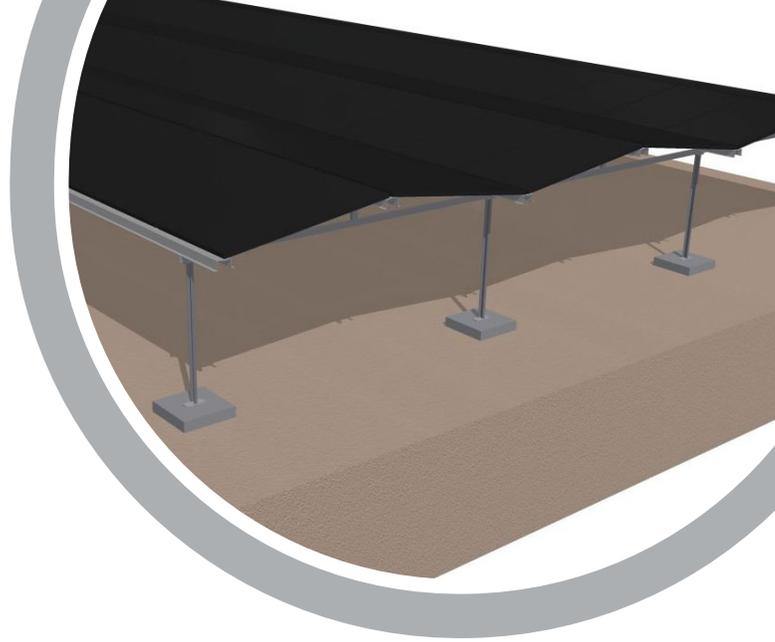
Hybrid¹ Solution

- Customized PV Power Plant
- Hybrid Controller
- Diesel and/or alternative power generators



Hybrid² Solution





Components to keep your system in balance

Hybrid Controller

High penetration of renewable energy requires an intelligent control system for the different energy sources. A cost-optimized system operation and grid stability at all times are the key functions of such a system. Both are ensured by the BELECTRIC Hybrid Controller.

First priority is always on grid stability. The Hybrid Controller continuously monitors the grid and the different energy sources. It calculates the necessary operating reserve and allocates this to the different energy sources.

Furthermore, based on the operating costs of each energy source, the Hybrid Controller determines the cost-optimal working condition for each energy source and gives the necessary setpoints. Like this, not only grid stability, but also the most cost-efficient system operation are ensured at all times.

Battery Storage

Our Hybrid² system is equipped with a battery storage. Batteries are always a significant cost factor, but they can be economical when it comes to grid stabilization or storing excess energy in times of surplus production. BELECTRIC is able to perform a detailed analysis for your system to define the most cost-efficient battery size.

For large systems, BELECTRIC has designed the Energy Buffer Unit (EBU) which consists of a 40' climate conditioned container housing the battery system and all necessary equipment. It provides 800 kW for 30 min or 550 kW for 1h, with a total capacity of 948 kWh. The EBU has been designed for the most cost-efficient prices on the market.



For further details please contact hybrid@belectric.com





BELECTRIC is one of the most successful enterprises in the realization of free-field solar power plants and utility-grade energy storage systems. Since 2001 the company group has constructed over 280 solar pv power plants with over 1.5GW PV capacity. At BELECTRIC, engineers and project developers conduct interdisciplinary research in all areas of

solar pv technology and battery storage systems for the development of innovative technologies. As one of the largest O&M provider globally BELECTRIC's full-integrated services support continuous operation, giving higher energy yield and therefore high return on investment across life-cycle.

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