

**Intersolar Europe  
Intersolar Europe Conference  
Munich, May 7–9, 2025**

## **TREND PAPER FOR INTERSOLAR EUROPE: HYBRID POWER PLANTS: EFFICIENT AND GRID-SERVING**

**Munich/Pforzheim, October 2024 – In the context of the ongoing energy transition, the integration of various energy sources, such as solar, wind, and hydropower with smart storage systems is becoming increasingly vital. The shared use of the existing energy infrastructure can help maximize the use of grid capacity and cut costs. What’s more, when combined with smart storage systems, it can help match power generation with demand and prevent the oversupply of renewable power during peak generation times.**

Renewable power plants are being curtailed more and more often, which comes at a huge financial cost. Meanwhile, the lack of grid connection points continues to prevent new systems from being connected, and grid connection points occupied by a single power source cannot be fully utilized due to the inherent volatility of that source. Hybrid power plants could help solve these problems, and developers have begun to shift their focus to them. This technology uses a single grid connection point for multiple generation technologies, such as solar and wind energy. These two power sources complement each other: In the summer, PV generates more electricity, whereas wind power prevails in the winter. Combined solar and hydropower applications are also on the rise. By using battery storage systems in combination with single or multiple generation technologies, the generated electricity can be fed into the grid when it is needed for consumption or grid stabilization. For this reason, these types of plant are described as system-integrating.

### **Benefits of hybrid power plants**

Sharing grid connection points reduces the CapEx and OpEx for renewable power plants. What’s more, it speeds up the approval process because the two systems are treated as one. Hybrid power plants with PV and battery storage also benefit the economy, as they are able to meet peak demand at a lower cost than gas-fired power plants. The combination of renewable generation and battery storage helps prevent grid congestion and price cannibalization (which occurs when an oversupply of renewable power leads to negative electricity prices) by storing renewable electricity until it is actually needed.

### **“Low-hanging fruits”: Increasing efficiency by allowing overcapacity at the grid connecting points**

According to a study by the German Renewable Energy Federation (BEE), the efficiency of combined wind and PV power plants could be enormously improved if the German government were to allow the installation of higher renewable energy capacity than what is contracted for the grid connection. Thanks to their complementary generation profiles, solar and wind could increase grid connection point usage to a total of 53 percent, and 250 percent if the overcapacity approach of grid connection points were allowed. In contrast, PV-only power plants have a utilization rate of 13 percent on average, wind-only power plants 33 percent. The BEE describes the benefits of this kind of utilization optimization as low-hanging fruits – if they were permitted by law. In countries such as Portugal, Spain and Ireland, they are already allowed for hybrid power plants. The model also incentivizes the installation of storage systems and sector coupling technologies, as Simone Peter from BEE points out.

### **Challenges for hybrid power plants**

Combining multiple technologies in one location often requires larger sites and a more complex infrastructure, making land use a challenge for hybrid power plants. Due to the complexity and novelty of this type of project, convincing banks, investors and insurance companies of its merits also remains a challenge. Another important step in promoting hybrid power plants is the standardization of processes.

### **Business models for hybrid power plants with battery storage systems**

There are several business models for marketing electricity from hybrid power plants, such as feed-in tariffs, direct marketing, energy arbitrage and the provision of operating reserves and grid stability services. As renewable generation capacity increases, the latter two will make this type of plant essential for grid stability. In the future, hybrid power plants with digitalized control concepts will switch between different modes of operation in order to maximize profitability and optimize their ability to balance out short-term fluctuations in the grid.

### **The legal situation in Germany**

In Germany, hybrid power plants are subject to innovation tenders under the Renewable Energy Sources Act (EEG). Due to their complexity, the installation of these types of power plant is very expensive. In order to promote this technology, the maximum value of these tenders (9.18 €ct per kilowatt hour) has remained the same since 2023. The Solar Package I also made some important improvements for hybrid power plants with battery storage systems to make them more profitable and competitive, allowing them to change their mode of operation to store grid-supplied electricity several times a year. However, a major barrier in Germany remains, since the generation capacity is limited by how much the grid connection point can handle.

At the EU level, there is no regulatory definition of hybrid power plants which could serve as basis for similar regulatory frameworks and process optimizations in the member states.

### **Hybrid power plant projects in Europe**

Europe's largest hybrid power plant is being built by the Spanish electric company Endesa in Pego, Portugal, in the District of Santarém. The plan is to build a combination of a 365 megawatt (MW) PV system, a 264 MW wind farm and a 168 MW battery storage system. It will also include a 500 kilowatt (kW) electrolyzer for the production of green hydrogen from any excess power.

Iberdola, a Spanish energy company, is currently building a hybrid power plant that combines PV with hydropower. 160,000 PV modules are being installed in Cedillo in the Spanish province of Cáceres, and once it is complete, the system will generate a total of 86 MW.

In Tenevo, Bulgaria, Bulgarian project developer Eura Energy is constructing a hybrid power plant with 238 MW of PV, 250 MW of wind, and a battery storage system with a capacity of 500 megawatt hours (MWh).

### **Intersolar Europe 2025: Experience innovation up close**

From May 7–9, 2025, Intersolar Europe will present the latest products, technologies and trends in the area of hybrid power plants in Munich. Visitors will have the opportunity to learn more about the latest developments and innovations in hybrid power plants across ten exhibition halls. A diverse presentation program at the Intersolar Forum (hall A3, booth

A3.150) and at the Intersolar Europe Conference on the day before the exhibition kicks off will round off the exhibition program.

**For more information, please visit:**

[www.intersolar.de](http://www.intersolar.de)

[www.TheSmarterE.de](http://www.TheSmarterE.de)

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