

**EM-Power Europe**  
**Munich, May 11–13, 2022**

## **EM-POWER EUROPE TREND PAPER: TAPPING INTO FLEXIBILITY POTENTIAL QUICKLY**

**Munich/Pforzheim, April 2022 – In the past the power supply system was based on a simple principle: conventional power plants adapted their power production to meet consumer demand. This is changing as the share of renewable energies grows, because the supply of wind and solar power is weather-dependent. A fluctuating power consumption is confronted by a volatile power supply. Flexibility is needed in order to stabilize the power grid and balance out fluctuations between supply and demand. Above all, more flexible consumption is key for the success of the transformation of the energy system. This is the only way for renewable energies to be integrated into the power system and new installations and heat pumps or electric vehicles to be connected to the grid, even if grid expansion is too slow. The grid expansion may also be limited in the long term to what is necessary. The technologies necessary for greater flexibility have been around for a long time, for example energy management systems, storage technologies and power-to-grid solutions. What is still missing in many countries is a suitable regulatory framework and the digital capability of grids and measuring systems.**

### **Different forms of flexibility needed throughout the day and the year**

Wind power and photovoltaics supply and power consumption fluctuate greatly throughout the day. Short-term changes in the weather have to be forecasted as precisely as possible and fluctuations have to be balanced out. Flexibility is provided for example by batteries and virtual power plants. Long-term flexible capacity is needed to compensate for seasonal fluctuations in supply and consumption. The slow progress in the grid expansion necessary for the integration of renewable energy installations requires flexibility in the grid. Bottleneck situations in the grid have to be balanced out by flexibility.

### **Creating incentives for consumer-side flexibility**

Consumer-side flexibility can be achieved particularly quickly and cost effectively. This will dramatically reduce the need for adjustable power plants to ensure supply and at the same time make better use of weather-dependent electricity from PV plants and wind power sites. This will significantly cut costs of the power supply system. The potential of large industrial consumers can be exploited particularly quickly, because they already have the necessary energy management systems. However, in Germany there is currently no regulatory incentive to offer flexibility. On the contrary, companies are even rewarded if they keep their consumption as steady as possible.

The key driver for the development of demand-side flexibility will be price volatility in the wholesale markets for power. Companies which behave flexibly need to be rewarded in the price and not “punished”. The solution is called demand-side management (load management): Companies which manage their production processes flexibly can use the power when much renewable energy is fed to the grid and therefore when it is particularly inexpensive. Conversely, companies scale back their production or use previously stored energy when the sun is not shining and the wind is not blowing.

In the next few years, the potential for flexibility will grow not just in industry, but also in private households. Thanks to electromobility, incentive schemes for heat pumps and new players such as storage system operators and hydrogen electrolyzers, this market is growing. In just a few years demand-side flexibility – in particular bidirectional charging of electric vehicles and the variable

operation of end consumers in buildings and in industry – will be essential for the operation of the future power supply system.

### **Making better use of opportunities for flexibility**

In many countries there are still regulatory obstacles to flexibility, because the power market is still geared to conventional power plants. In Germany huge obstacles to the exploitation of flexibility lie in the structure of grid charges, surcharges, levies and electricity tax, in particular for large consumers with grid charge exemptions.

Last but not least, there are no rules for the procurement of flexibility by grid operators on the market. A further obstacle is the inadequate or misguided digitalization, in particular for small consumers. In order to optimally match supply and consumption, metering systems are essential. Flexibility options can be utilized quickly and efficiently if the regulatory measures are modernized and the digital infrastructure is in place. In this regard, numerous new business models are emerging.

### **An international trend**

Flexibility is not a national, but increasingly a cross-border issue. According to [IRENA's REmap analysis](#), by 2050 over 61 percent of electricity worldwide will come from volatile renewable energies. In order for this supply to be managed effectively on a large scale, flexibility options need to be planned and exploited fully in all sectors of the energy system – from power generation to transmission and distribution grids and to storage and demand. In case studies IRENA (International Renewable Energy Agency) has assessed the flexibility of power systems of individual countries and identified the least-cost solutions to increase flexibility. To conclude, more flexibility on the demand side will reduce the number of low-load hours for fossil power generation systems and the number of starts and shut downs of natural gas generators. In scenarios with a high degree of electrification and a high share of volatile renewable energies, the flexibility of the demand side can reduce annual carbon emissions by 8.3 percent.

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