EM-Power Europe

Munich, May 7–9, 2025

TREND PAPER: THE ENERGY TRANSITION REQUIRES FLEXIBILITY, AND THAT REQUIRES DIGITALIZATION

Munich/Pforzheim, January 2025 – The energy transition has reached a turning point. While the expansion of renewable energy is advancing rapidly on a global scale and conventional power plants – such as those driven by coal and nuclear power – are being shut down in many countries, the electricity system is increasingly dependent on weather conditions. It is going to take a whole lot more than ambitious goals to overcome these new challenges in the electricity system – what we really need is flexibility. But flexibility only works in tandem with extensive digitalization. Digitalization lays the groundwork for monitoring electricity flows in real time, controlling systems with precision and adjusting consumption in an intelligent way. This trend paper analyzes the reasons why, despite the urgent need for action, digitalization has stagnated for a decade in Germany and explores how simplifying the system could trigger the crucial breakthrough.

Digitalizing the electricity market is the only way to ensure the energy transition succeeds. And that is down to the far-reaching changes taking place in the global energy world. Renewable energies are expanding rapidly, while at the same time centralized power generators such as nuclear or coal-fired power plants are being dismantled in many counties. As a result, the feed-in is becoming ever more weather-dependent, which is leading to new challenges in the electricity system.

Distribution grid operators in particular need to know how much electricity is being fed in or out of which systems, and when. They also have to be able to shut down or switch on systems in emergencies to avoid any disruptions in the grid. That requires systems to be visible and adjustable in real time. And digital grid status monitoring, combined with the digitalization of relevant customer systems, is what will make all of this possible.

No flexibilization without digitalization

It is not just about grid capacity utilization. Basic market-driven flexibilization of the power being consumed is becoming increasingly important. After all, the electricity supplied by renewable sources can fluctuate greatly over the course of a day. While millions of solar installations feed in large amounts of electricity at midday, the supply drops dramatically in the evening. This causes prices to fluctuate sharply on the power exchange and sometimes even negative prices can occur, meaning customers are being paid for purchasing electricity. Both companies and private consumers can profit from this. By taking a flexible approach to their electricity consumption and restricting it to times when prices are low, they can save money. Battery operators can also act in a way that serves the grid or the market by charging their batteries when the electricity supply is high, and discharging them when electricity production drops and prices go up. From 2025, suppliers must offer dynamic electricity tariffs that react to electricity supply and prices. To be able to offer this kind of contract and bill accordingly, they have to know how much electricity is being used and at what point in time. And that requires a digital meter and, potentially, an advanced metering infrastructur (AMI).

Why digitalization in Germany has failed until now

Policymakers, grid operators and consumers may all agree that digitalization is ultimately required, yet this has been foundering in Germany for over ten years. There are approximately 50,000,000 so-called metering locations, or locations in the grid, where electricity is physically measured. Of those, only around 1.5 percent currently have a smart meter installed. In contrast, the market penetration with smart meters in Scandinavian countries is 99-100 percent, with Italy (97.2 percent) and France (92 percent) not far behind (2022). Germany is among the European countries lagging behind in the deployment of smart meters, along with Greece, Cyprus and Hungary.

There are several reasons behind this failure. German regulations currently stipulate an overly complicated approach to rolling out smart meters. That is why the installation of certified devices only began after a considerable delay. The excessive complexity and bureaucracy have also meant that the competition has largely ceased to exist. Many competing metering providers have left the market. Foreign suppliers are shunning the German complexity trap. So it is the roughly 850 German distribution system operators that are responsible for the installation. In many cases, neither the necessary knowledge nor the required personnel exist to install and operate the technology. From 2025, it will be a legal requirement for certain consumer groups to be equipped with smart meters. But the current challenges make it difficult to estimate how long this will take to implement.

GLOSSARY

Modern metering equipment (mME): digitalized power meter

Advanced metering infrastructur (AMI): records the feed-in and electricity consumption and provides this data to the market. These systems consist of modern metering equipment (digital meter) + smart meter gateway (SMGW, communication unit).

An advanced metering infrastructur is also known as a **smart meter.**

The solution lies in simplification

If digitalization is to reach German basements too, the technical requirements must be scaled down significantly. The regulations have so far prevented any major competition, even though many companies are ready and waiting to get involved in rolling out smart meters. Each and every metering location should be equipped with meters that can, in principle, be read remotely. But this does not necessarily always require an expensive and technically demanding smart meter.

Instead, a distinction must be made. Energy transition systems such as solar installations, storage systems, charging stations and heat pumps need an AMI to be installed, because it is essential that they can be controlled online. High safety requirements must be met in this case, because it is no longer just about billing data. In contrast, for the vast majority of consumers, it would suffice if they could read their electricity consumption remotely (later, if need be) using the digital meter, and use this data to calculate their bills. These customers do not need online controllability.

EM-Power Europe, and the parallel events Intersolar Europe, ees Europe and Power2Drive Europe, will take place from May 7–9, 2025 as part of The smarter E Europe, Europe's largest alliance of exhibitions for the energy industry, at Messe München.

Further information on this topic can be found at the following events and exhibitors:

EM-Power Europe Conference

Developing the Future Grid
Tuesday, May 6, 2025, 11:30am - 01:00pm
ICM München, Room 13A

Smart Electrification of Demand
Tuesday, May 6, 2025, 2:30pm - 04:00pm
ICM München, Room 13A

Innovation & Digitalization
Wednesday, May 7, 2025, 11:00am - 12:30pm
ICM München, Room 13A

The smarter E Forum

Intelligent Distribution Grids for tomorrow's demands
Wednesday, May 7, 2025, 10:30am - 11:30am
Messe München, Hall B5, Booth B5.550

Optimising Grids Through Demand-Side Flexibility
Thursday, May 8, 2025, 01:00pm – 02:00pm
Messe München, Hall B5, Booth B5.550

Turning energy flexibility into money
Friday, May 9, 2025, 12:00pm – 01:00pm
Messe München, Hall B5, Booth B5.550

HEMS and their pivotal role in modern energy management and grid stability
Friday, May 9, 2025, 1:30pm – 02:30pm
Messe München, Hall B5, Booth B5.550

EM-Power Europe Exhibitors: www.em-power.eu/exhibitorlist

Product categories: Grid management technologies and services, grid system services, grid monitoring / Advanced Metering Infrastructure (AMI) / Software for analysing and simulating energy systems/ Digitalisation, data management & analytics, IoT / Energy Management / Flexibility Management

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