Energy management for the home

Enertex Bayern specialises in energy management in automated homes and has developed the new EibPC² for this purpose.

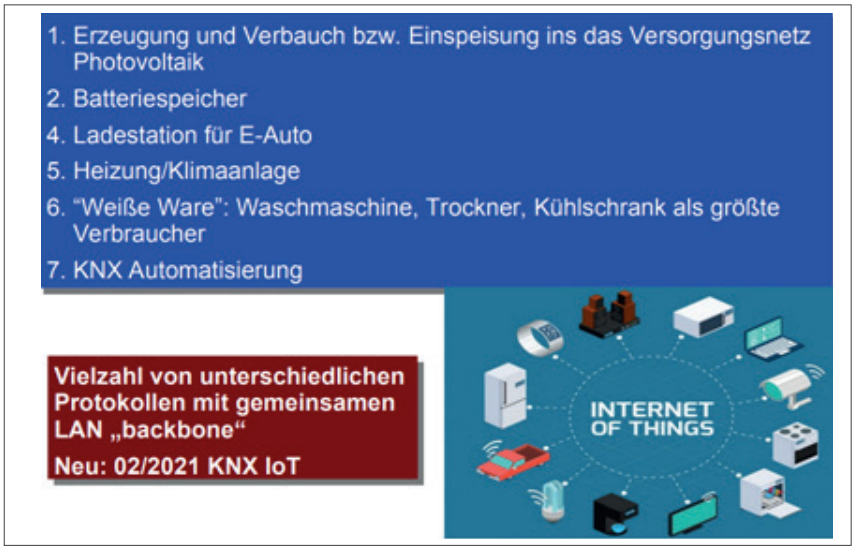
Today, a typical smart home usually has a PV system with an inverter and, more recently, a battery storage system installed. Furthermore, the KNX bus can often be found there, which controls the consumption meters, the heat pump, the heating system, the household appliances, the lighting control and much more. Now the Wallboxes are being added, the charging stations for the electric vehicles.
"So there is a high degree of system diversity," says Dr Michael Schuster, Managing Director of Enertex Bayern. And above all, there are a multitude of different protocols. However, KNX IoT protocol has not yet become so widespread that most devices could be easily connected over it. So the devices and system components have to be addressed individually in order to be able to integrate them into a communal energy management system.
To make things as simple as possible for the end user, Enertex has developed a central unit that takes control of all subsystems and communicates with the IoT and KNX devices: the EibPC². Mountable on the DIN rail, its size is 4 TE. It is supplied with power only via the bus, the power consumption is 1.8 W. The bus interface is integrated and it has a KNX IP tunnel for programming via ETS. Modbus, REST API and the Enertex KNX Smart Meter are also integrated as a Modbus metering point for the other devices. The EibPC² can now control the charging poles and the entire systems, as well as the visualisation and automation of the KNX system. Equipped with an ARM processor for industrial applications, fast low-power DDR DRAM and 8 GB flash memory, it offers performance that will last for many years.
Longevity is also an important criterion for Michael Schuster: the new EibPC² will be adaptable to future developments for many years. Just like its predecessor, the EibPC: "It started at the time the iPhone 1 was launched, and we supported it until the iPhone 10. And even today it runs without any problems. Because it is not a cloud service, but a ready-made device that runs autonomously. "This enables long-term support, as we have shown in the past with the example of the EibPC", states Schuster.

Michael Schuster, Enertex: "Users who want to integrate the charging station into the energy management of their home should make sure that they purchase intelligent stations. Only with these charging strategies can be realised."

This is important because the motivation of users to be able to carry out energy management in their Smart Home is high: in Germany, 1 kWh of electricity from the provider currently costs 31 cents, yet the owner of a PV system only receives 7 cents for the kWh he generates himself when he feeds it into the grid.
So every smart home owner is concerned with using as much of the self-generated energy in the house as possible instead of having to feed it into the grid for a small fee. Above all, in the age of electromobility, it would make sense to use the energy to charge the car battery. "So we need an energy management system that also addresses

Der »EbPC²« von Enertex Bayern mit integreirtem KNX-Smart Meter spricht mit allen IoT- und KNX-Geräten und übernimmt die Steuerung der verschiedenen Systeme im Smart Home – einschließlich der Ladesäulen.

Quelle: Enertex Bayern



Die hohe Systemvielfalt im Smart Home. *Quelle: Enertex Bayern*

the Wallbox and the inverters of the PV system," explains Michael Schuster. Integrating the battery storage of the PV system is not a major problem because it usually does not require extensive management. Here it is more about the visualisation of the respective charging states, because most inverters can be addressed via Modbus and SunSpec. Many inverters support the SunsPec protocol, such as those from SMA, Solar Edge and Kostal, with whom Enertex predominantly works. With charging stations, on the other hand, the situation is quite different: in Schuster's experience, there are many charging stations that are hardly programmable via an API, i.e. they are not manageable. "So users who want to integrate the charging station into their home's energy management system should make sure that they purchase smart stations. This can vary from manufacturer to manufacturer and even within the product range of one and the same manufacturer", says Michael Schuster. Therefore, caution is advisable: Of course, a charging strategy can only be built up with the controllable types.

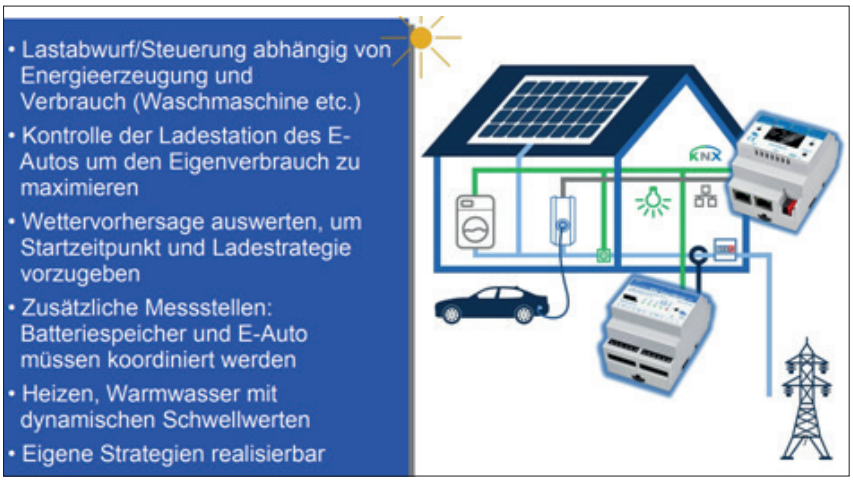
However, the integration is not that simple: "Unlike the inverters, in this field there is no REST API that would be the same for all devices". So a different control must be implemented for each Wallbox.

This is precisely why Enertex has expanded the range of functions of the EibPC²: With the current software update, it is now possible to connect charging stations from different manufacturers. This allows the charging points to start, stop and charge via group addresses, the charging status, the remaining charge and the remaining charging times can be interfaced to the KNX bus. In addition, the charging stations should be able to execute different charging strategies: Maximise self-consumption and operate on a time-limited or current-limited basis to make optimal use of self-generated energy. Up to five charging points can be controlled without major adjustments.

And in such a way that the surplus of the solar system is applied according to the charging strategy and the self-generated electricity is used optimally. Different charging strategies can be set. For example, that a fully charged car is available by 6 pm at the latest. Until then, self-consumption should be optimised. The system then shows, among other things, how long it will take until the car is fully charged. Another charging strategy would be to limit the current to a maximum of 6 A. However, the user could also increase the current to 10 A if necessary and the system takes over after a short time. In addition, it is possible to perform load shedding for different consumers and control them according to the ratio of generation and demand. The weather forecast can also be integrated so that certain devices are started according to the forecast. "If I know that the sun will be shining in the afternoon, I will definitely not charge the car in the morning if there is still time to do so in the afternoon", says Schuster. However, in order to be able to coordinate the battery storage units and the cars, additional measuring points are required in many cases, even if for example the PV inverter is equipped with them.

But why does it still make sense for the Enertex smart meter to be integrated in the EibPC²? "We need another meter for intermediate measurements to coordinate the devices", Schuster answers. For example, when it comes to the PV battery and the batteries in the car, it must be known with which currents they are currently being charged. This requires an additional measuring point. Besides, a cumulative meter capable of measuring up to 630 A is required for larger charging stations and larger PV battery storage systems. This is exactly what the Enertex smart meter is designed to do.

However, there is another advantage of the integrated smart meter: "I think it is particularly important that it can also be used to monitor the network quality directly with a KNX device", says Michael Schuster. Because problems with the network quality have grown over the last few years and will certainly not diminish over the coming years.



Was alles möglich ist *Quelle: Enertex Bayern*