Smart Heating:
More comfort and energy efficiency

Smart Heating as a key component of energy management and Smart home

The digital heating technology is a key component in the networking of building services. Almost every smart home solution now allows the heat supply to be optimised using schedules, room sensors and other automatic features. The systems that are particularly efficient are the ones that control not only the heat transfer but the heat generator itself to adapt the heating demand because they control not only the room heating, but can flexibly control the energy consumption as well.

Here, the heater cannot be considered as an isolated system. As part of the energy revolution, consumers will increasingly use electricity generated from renewable sources. The existing electrical building services will then compete with electrically operated heat pumps and electric cars that are charged at house wall terminals.

The integration of equipment and systems, which generate electricity, heat and mobility is described as "linking of sectors". Heating and electric mobility have to be adapted to the other electrical systems through the use of the available electricity. Since electricity from renewable sources is limited and going to be increasingly volatile in the wake of the energy revolution, the discussion about the optimal use between the major electricity producers and consumers is becoming more and more important.

EEBUS provides a common language for energy

The prerequisite for this communication is a common language,which can be used by the equipment and systems to communicate the energy supply, demand and capacity beyond the limits of industry and manufacturer. To this end, the leading communication standard across manufacturers and industries is EEBUS. With the standard networking protocol SPINE (Smart Premises Interoperable Neutral Message Exchange), EEBUS provides the prerequisites for ensuring that all energy-related equipment and systems of a building can exchange information about their energy demands and their flexibility in energy consumption. In the EEBUS initiative, over 70 international companies from all areas of electrical, heating, power systems and electric mobility develop the communication specifications together for energy-related equipment and systems in buildings.

The goal is to integrate "new" electricity consumers such as heat pumps or electric car charging stations in a flexible manner and without mutual interference. Illustrative example: If an electric car is connected to the wall terminal and a heat pump is running at full capacity at the same time, it has to be ensured that the safety circuit in the house does not trip. If the systems support the EEBUS application "Overload Protection" then they adapt their loads: To start the charging process, the heater slightly reduces its capacity and then adapts its overall capacity to that of the building grid.

Communication relieves the network – and your wallet

Along with an energy management system (HEMS), further EEBUS applications are planned. Thus an energy manager can operate the heat pump such that it consumes maximum electricity from an in-house photovoltaic system. In the noon time, the hot water tank is heated to the maximum using inexpensive solar power generated by the roof-installed batteries – instead of using it in the evening when the heat is required.

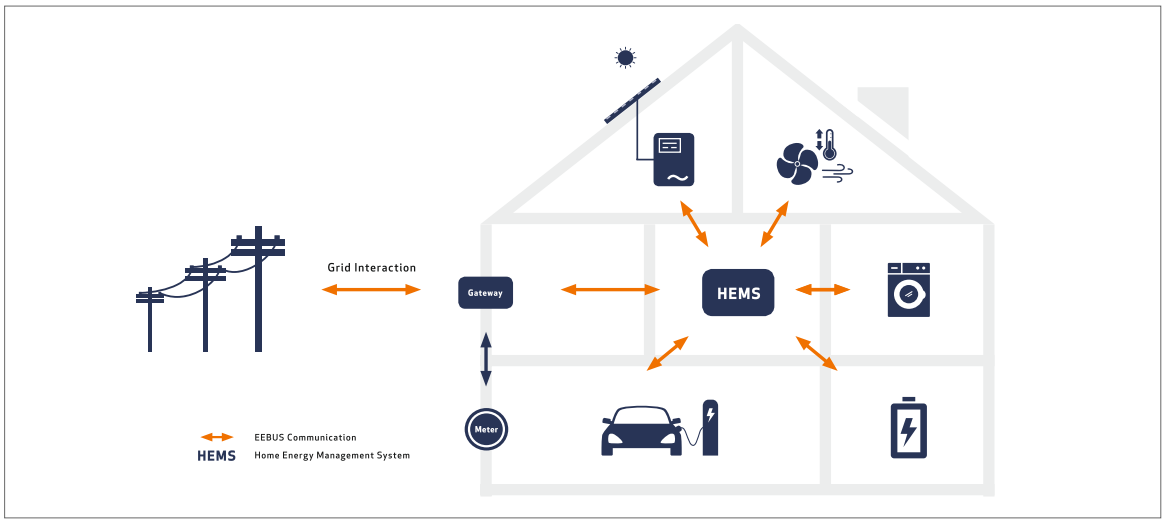

Fig. 88; EEBUS provides a common language for energy

In addition to cost benefits, this also takes the load off the public power grid: At the time of peak power generation, less solar power is supplied and, on the whole, the output of the existing solar power or wind power systems need to be curtailed later. Ultimately, large quantities of energy generated by renewable sources on windy and sunny days are curtailed or sold too cheaply to other countries today. Even electric cars can be charged in a flexible manner that is network conducive using the standardised EEBUS communication between HEMS, PV system, heating and electric car charging station.

Heating and e-mobility use excess electricity from the power grid:

Together with a smart measuring system, the EEBUS communication also supports the power grid. The HEMS can offer the flexibility of the building in the grid or take up the tariff of the local energy supplier via an interface to the distribution network. The heat pump then heats its water storage favourably at noon when surplus electricity is available in the grid. Using the same technique, supply shortages can be managed, when many people connect their electric cars into a wall box for charging at the same time when they get back from work. The EEBUS communication can thereby offset consumption peaks by prioritising the charging and coordinating the distribution throughout the night time. The additional grid load is as low as possible.

Working group HVAC: EEBUS and BDH are connected for success

BDH and its member companies have been participating in the working group "Heating, ventilation, air conditioning" (HVAC) of the EEBUS initiative since 2016. In addition, the manufacturers involved also cooperate with the leading companies in the energy management and e-mobility sector in order to link the sector internally and to the Smart grid interface in an efficient and transparent manner.

A series of heating systems and their controllers already support the EEBUS communication, as well as growing number of energy management systems. The first networked electric car charging stations with EEBUS will be launched in 2019.

In developing its communication specifications, the EEBUS Initiative, being an European association with German roots, focuses on open systems, democratic decision making processes as well as free availability of the final standard. This is also to be seen as an alternative to the closed communication platforms in the "Internet of Things", which some big companies put on the market with force.

EEBUS heating applications

To enable open communication, all the information that needs to be exchanged between a heating and domestic hot water system in the networked building for its optimal operation with other equipment, are defined in the EEBUS specifications. This includes the operating condition (on, off, auto, eco) or a required room temperature, but also complex data sets like schedules or the expected heating demand.

In the first step, the EEBUS specification defines HVAC-specific control data in order to operate heating systems, e.g., via smart home systems. These application scenarios provide for convenient, cross-industry operation of the heating system, without being restricted by proprietary protocols of individual smart home platforms.

In the area of "Energy management", the information with which the heating system can be integrated into an energy network is defined. The application scenario "Consumption forecast" roughly shows how the forecasted heating energy needs are reported to an energy management system (HEMS). The HEMS can then control the heater such that the power consumption of a solar system is optimised or surplus power is drawn from the grid.

Each manufacturer has the control over their device functions

The use cases are defined, translated into technical specifications and tested jointly by the participating member companies of BDH and EEBUS. The functions within the heating system are still left to the discretion of the manufacturer. In this manner, the EEBUS standard provides a shared communication basis on the one hand and on the other hand, allows manufactures all options of differentiation within their product series. The interlinking of systems via the EEBUS communication is carried out locally via Ethernet or Wi-Fi in the building via plug and play using a secure encrypted, standardised data protocol.

The EEBUS standard is defined today for the solar, household appliance, heating system and e-mobility applications and the connection to the smart grid. The specifications are developed further based on new applications. In the process, all market players are invited to collaborate by joining the EEBUS initiative and actively participating in its working groups. The major focus thereby is on the practical needs: Standardisation takes place at the request of the BDH and EEBUS members, rather than based on the technical platform specifications.