UNLOCK THE VALUE

HOW TO ACCESS THE UNIFIED SMART METER GATEWAY SYSTEM

HKE AN BORD

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Introduction

This Industry Briefing explains important recent developments in the German smart meter rollout, concerning so-called System Units (Systemeinheiten), and the opportunities they present to businesses active, or coming into, the German market for metering, sub-metering, automation services, electromobility and more.

The German smart meter rollout is uniquely based on the Intelligent Metering System (iMSys) which comprises a smart meter and a Smart Meter Gateway (SMGW); a device designed to securely manage communication of data from the smart meter into the wider energy infrastructure. Not only metering and billing information, but a wide range of data can be communicated from the smart meter to end customers, utilities, energy providers, grid operators and third-party businesses. The SMGW encrypt and secures transmission of the correct data to the relevant parties.

Interoperability and the HAN Communication Adapter Unit (HKE)

In 2021 the BMWK* and BSI* proposed standards to make components of the metering system interoperable. They identified three core elements "Systemeinheiten" or "System Units" which should be able to communicate collectively, and among themselves, using the iMSys as a hub, especially since the SMGW is able to receive firmware updates remotely.

This Industry Briefing focusses particularly on the HAN-Kommunikationsadaptereinheit (HKE) the unit related to data in the home area network, the value-added services it opens up for the various market players, and how they will be rolled out.

Federal Office for Information Security

BMWK – Bundesministerium für Wirtschaft und Klimaschutz
Federal Ministry for Economic Affairs and Climate Action

The remit of the Federal Ministry for Economic Affairs and Climate Action includes all aspects of technological and industrial policy, in coordination with European internal markets, foreign trade and investment, and global competition.

Federal Ministry for Economic Affairs and Energy

BSI - Bundesamt für Sicherheit
Federal Office of Information Security

As the Federal Cyber Security Authority, the BSI shapes digital data security through prevention, detection and response, for government, business and society. The BSI defines the standards and also the physical and environmental parameters for Smart Meter Gateways.

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The energy transition (Energiewende) is in full swing in Germany, in line with the 2016 Digitalisation of the Energy Transition Act (GDEW)[1]; regulations governing the digitalisation of energy. The goal is to ensure sustainable climate protection through the expansion of renewable energies, and efficient cross-sector use of electrical power.

In order for the power grid to cope with volatile, decentralised energy production and consumption, it must be digitalised. Steps must be taken to make supply and demand in the power grid both flexible and controllable.

As well as promoting climate protection, digitalisation can reduce expensive expansion measures in distribution grids and help to ensure security of supply.

In addition, controllability means end customers who are also suppliers (so called prosumers) are not prevented from connecting their systems to the grid.

The central component of this modern infrastructure is the intelligent metering system (iMSys).[2] The iMSys consists of a modern metering device (digital meter or smart meter) and a Smart Meter Gateway[3] (SMGW) (See Figure 1). Its function is to establish intelligent data communication networks through which electricity producers and consumers can participate in the smart grid. This promotes communication with consumers, generating plants and other market participants such as service providers.

In addition to meter reading, the digital meter provides information about near real time power consumption and usage times as well as data about the grid status and feed-in power.

The SMGW, as the data communication unit of the iMSys, securely forwards the appropriate data to authorised market participants.

[1] Gesetz zur Digitalisierung der Energiewende (GDEW)= Regulations governing the digitalisation of energy transition
[2] Intelligentes Messsystem: in essence a smart meter combined with a Smart Meter Gateway, the iMSys provides not just consumption & billing data, but a data link between consumers and the market.
[3] Smart Meter Gateway: a device for channelling and securing smart meter data (see page 6)

The step by step model (Stufenmodell)[4]

The systematic rollout of smart meters, intelligent metering systems and other components of the smart grid in Germany is being managed according to a defined step by step process that is continuously updated (see Figure 2).

Stage one established the basic architecture. Stage two, the collection of relevant data about electricity supply and demand. The focus is currently on Stage 3: which covers the control of consumption and generation facilities in low-voltage grids, and submetering via the CLS[5] interface of the SMGW.

In addition to intelligent metering systems, so-called Systemeinheiten " System Units " are required for the implementation, which provides connections between local, end customers' systems and the SMGW.

System Units enable local control and the use of energy management systems with which customer technologies can be securely integrated into the grid. They also open up possibilities for value-added applications for end customers.

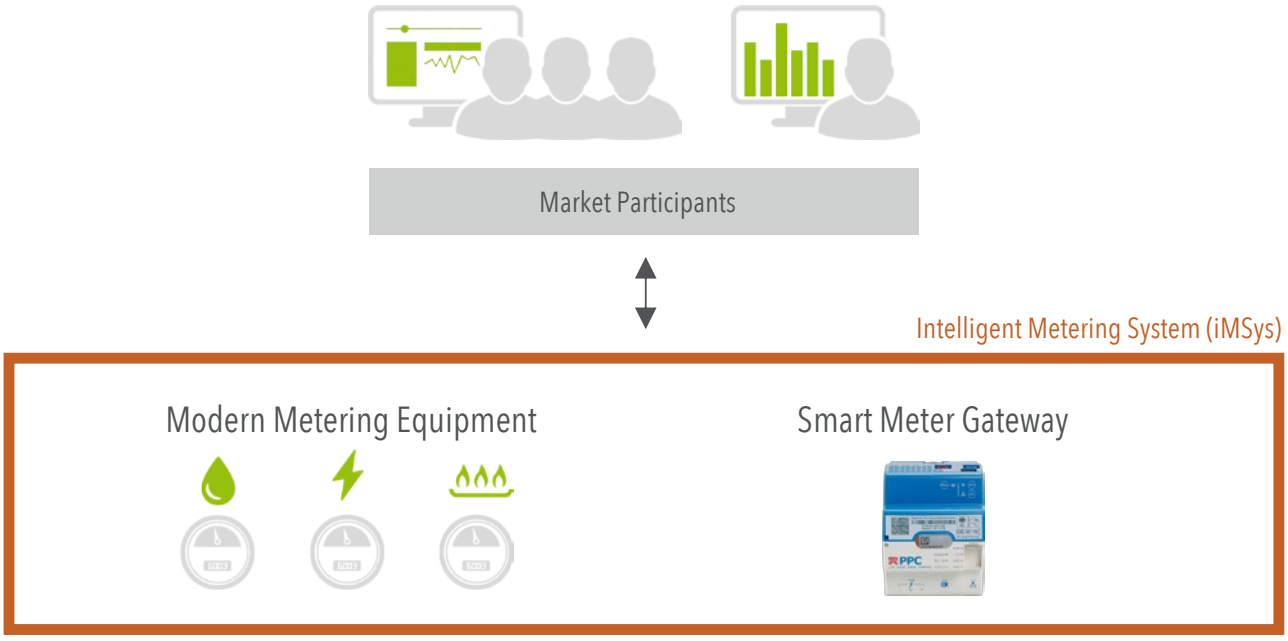


Figure 1: Components of the intelligent metering system (iMSys)

In 2021, a number of important regulatory paths were laid for the rollout and installation scenarios. Specifically, these included amendments to the Metering Point Operation Act (MsGB)[6]: with clarifications and refinement of the technical requirements for the iMSys, and reinforcement of the systematic approach.

[4] Stufenmodell or Step by step process; the phased approach defined to manage the smart meter roll out in Germany (see Figure 3)
[5] CLS: Controllable Local Systems
[6] Messstellenbetriebsgesetz (MsbG) or Metering Point Operation Act September 2016

With the "Step by Step Model 2.1", the Federal Ministry of Economics and Climate Protection (BMWK)[7] and the Federal Office for Information Security[8] (BSI) agreed various use cases and technical requirements with the industry, for which the System Units were specified. The Heating Costs Ordinance[9] (HKVO) adopted at the end of 2021 and the Ordinance on Consumption Recording and Billing for the Supply of District Heating/ Cooling[10] (FFVAV) have paved the way for the use of the iMSys in the heating sector.

About the Smart Meter Gateway

The Smart Meter Gateway as the heart of the intelligent metering system ensures secure and standardised communication. It receives and distributes measurement data from smart meters to the participants of the energy market, and enables remote access to local systems.

The need for the SMGW arose primarily due to the widespread and continuing growth of renewable and sustainable energy technologies in the German grid; including renewable generation plants, electric vehicles, heat pumps etc.

All these technologies designed to support climate protection require fast, robust and above all secure data exchange among many parties. Sector coupling especially, needed to coordinate the energy sector with industry, transport, and building infrastructures, and to optimise efficiencies and reduce CO2 emissions. This is not feasible without sophisticated data transfer.

These systemic changes can only be achieved if loads, storage systems and generators in the energy system can be monitored and controlled at any time. However, the control of the power grid - the most important critical infrastructure of the future - must also be cyber-secure and robust.

Intelligent metering systems (iMSys), combining meters with Smart Meter Gateways, are designed to enable secure integration of decentralised systems into the energy system and make end customers active participants in the Energiewende.

Connection to the Smart Meter Gateway takes place via a choice of standardised interfaces:

- LMN (Local Metrological Network)
- HAN (Home Area Network)
- WAN (Wide Area Network) and
- CLS (Controllable Local System)

In Stage 3 of the step by step model, data from the System Units connected via the CLS interface are not processed in the SMGW itself, but forwarded to the backend systems of active external market participants (aEMTs) by way of the proxy functionality.

[7] Bundesministerium für Wirtschaft und Klimaschutz (BMWK). Until 8 December 2021, the Bundesministerium für Wirtschaft und Energie (BMWi)
[8] Bundesamt für Sicherheit in der Informationstechnik
[9] Heizkostenverordnung (HKVO)
[10] Verordnung über die Verbrauchserfassung und Abrechnung bei der Versorgung mit Fernwärme/Fernkälte (FFVAV)

Development of the iMSys according to the step by step model

The iMSys will be further developed in accordance with the step by step model laid out by the BMWK and BSI.

In order to ensure the further development of the iMSys infrastructure, in line with the digitalisation of the energy transition, the step by step model (see Figure 3) is continually updated.

Stages 1 and 2 have already been implemented in recent years, and Stage 3, with the corresponding specification of System Units according to the BSI directive BSI TR-03109-5 "Requirements for further System Units of the iMSys" began in 2022.

This phase focuses on the following use cases:

- Control of consumption or generation facilities in low-voltage grids, for example according to §14a of the Energy Industry Act (EnWG)[11]
- Transmission of submeter data via the CLS interface of the SMGW
- Measurement and control at the point where charging infrastructure connects to the grid

These use cases should be implemented in a security-compliant way, and this is to be achieved by connecting the three defined System Units to the SMGW. And in order to ensure interoperability and security, the System Units must be certified according to BSI TR 03109 5.

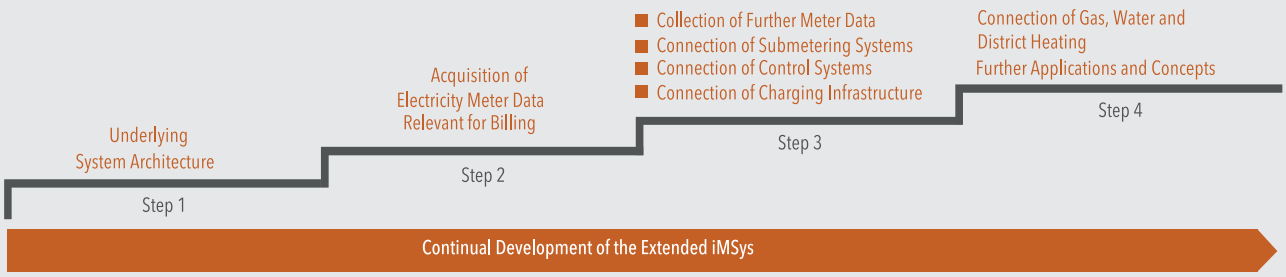


Figure 2: The step by step model for the continuing development of intelligent metering systems

[11] Energiewirtschaftsgesetz 2005

The Regulatory Framework at a Glance

Recent amendments to the Charging Station Ordinance[12] (LSV) the Heating Costs Ordinance (HKVO) and the District Heating and Cooling regulations (FFVAV) are further boosting the German smart meter rollout.

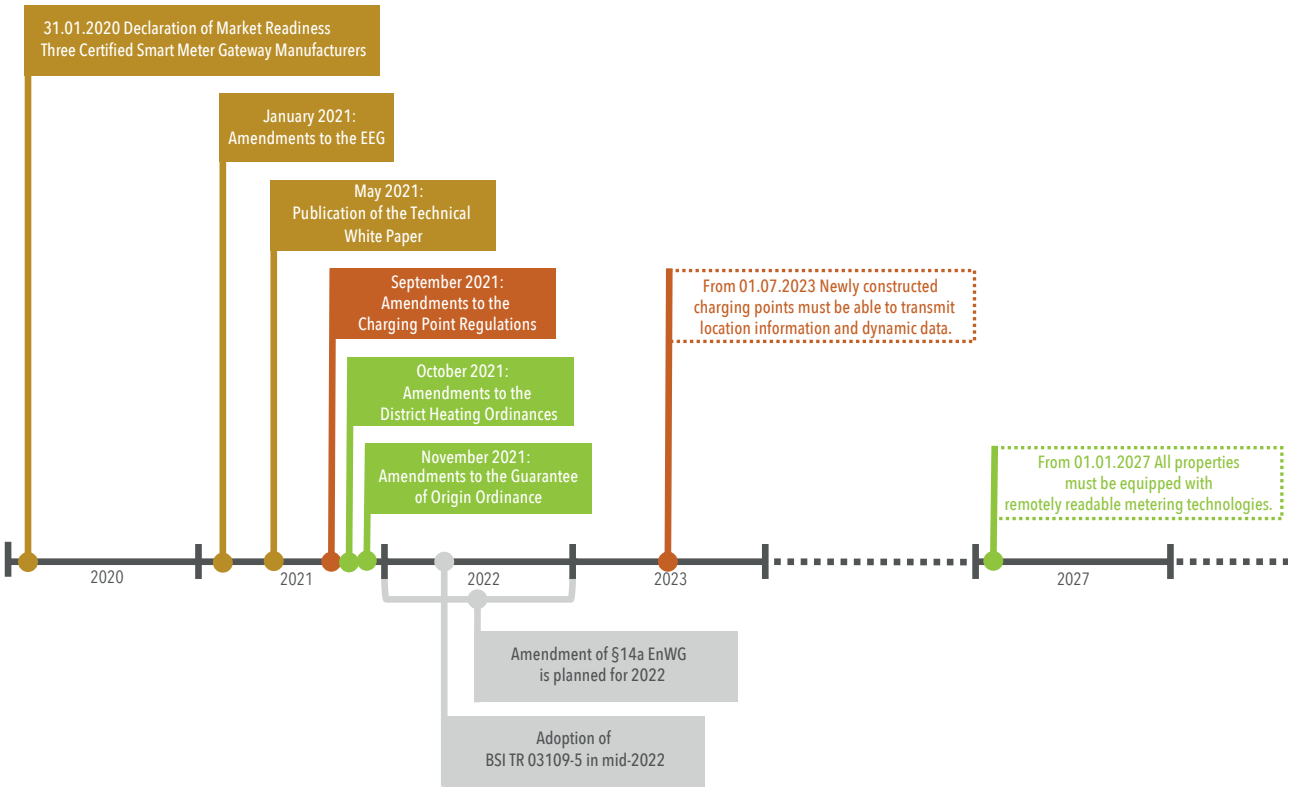


Figure 3: Regulatory milestones in the SMGW environment

Technical Guidelines and Technical Key Issues Paper

The Smart Meter Gateway is used for secure data exchange with market participants in the WAN and with local systems in the HAN or LMN. For this purpose, the devices must meet the requirements of the BSI in terms of functionality, interoperability and security.

The minimum requirements to be met are summarised in the BSI document "Technical specifications for intelligent metering systems and their safe operation". [13]

[12] Ladesäulenverordnung (LSV)
[13] BSI TR-03109 Technische Vorgaben für intelligente Messsysteme und deren sicherer Betrieb

The requirements for the individual components of the intelligent metering system are listed in the respective documents:

- BSI-TR 03109-1 Requirements for the interoperability of the communication unit of a smart metering system[14]
- BSI-TR 03109-2 Requirements for the interoperability of the safety module[15]
- BSI-TR 03109-3 Cryptographic specifications for the infrastructure of measurement systems[16]
- BSI-TR 03109-4 Public Key Infrastructure for Smart Meter Gateways[17]
- BSI-TR 03109-5 Requirements for further System Units of the iMSys[18]
- BSI-TR 03109-6 Smart Meter Gateway administration[19]

BSI-TR 03109-5 is scheduled for publication in 2022. It specifies the security-related requirements for the System Units. The term 'System Units' defines all devices that are connected to the SMGW via the CLS interface. They enable value-added services and controlling processes and the exchange of energy-relevant data.

The basis for this is the Technical Key Issues Paper "Technical Cornerstones for the Further Development of Standards" published by BMWK/BSI on 17 May 2021.

The paper describes various solutions to accelerate the expansion of installations and applications based on Smart Meter Gateways. The BMWK/BSI estimate that by 2030, more than 15 million installations (of about 22 million buildings equipped with 44 million electricity meters) will be equipped for smart grid, electromobility and smart submetering.

Installation cases/ number:	2021	2030
Consumers 6 – 100 MWh/annum	3,7 Mio.	4,1 Mio.
Consumers according to §14a EnWG	1,0 Mio.	5,2 Mio.
Generators according to EEG/KWKG[20]	1,2 Mio.	2,2 Mio.
Property types according to §6 MsbG	-	> 1,8 Mio.
Consumers with dynamic tariffs	-	0,4 Mio.
Prosumers according to §14a EnWG	0,6 Mio.	1,2 Mio.
Public charging infrastructure <150 kW	0,1 Mio.	0,5 Mio.
Total	6,6 Mio.	> 15 Mio.

(Source: Technical cornerstones for the further development of standards)

Once the directives based on the paper are published, a standardised certification procedure is established, to ensure compliance with the regulatory requirements.

The following focal points are considered:

- Grid and market integration of plants through safe and standardised remote control

[14] BSI-TR 03109-1 Anforderungen an die Interoperabilität der Kommunikationseinheit eines intelligenten Messsystems
[15] BSI-TR 03109-2 Anforderungen an die Interoperabilität des Sicherheitsmoduls
[16] BSI-TR 03109-3 Kryptografische Vorgaben für die Infrastruktur von Messsystemen
[17] BSI-TR 03109-4 Public Key Infrastruktur für Smart Meter Gateways
[18] BSI-TR 03109-5 Anforderungen an weitere Systemeinheiten des iMSys Note: The preparation or publication of this guideline is in planning.
[19] BSI-TR 03109-6 Smart Meter Gateway Administration
[20] Kraft-Wärme-Kopplungsgesetz: Combined Heat and Power Generation Act 2016

- Expansion of metering to include other sectors beyond electricity, billing of high-usage consumers and dynamic tariffs
- Connection of systems to the WAN for maintenance tasks or software updates
- Secure transmission of measurement data collected from a property by submetering devices
- Connection of the charging infrastructure to the smart grid for billing and balancing-relevant measurements, as well as grid-friendly control at the grid connection point

Regulatory amendments and their significance for the rollout

Since the declaration of market readiness on January 31, 2020, the regulatory environment has evolved. After the amendment of the Renewable Energy Sources Act (EEG) in December 2020, significant amendments to the Charging Point Operations Act (LSV), the Ordinance on Consumption Recording and Billing for the Supply of District Heating/ Cooling (FFVAV) and the Heating Costs Ordinance (HKVO) followed less than a year later.

These are just a few of the amendments that concern the use of the Smart Meter Gateway:

- EEG Amendment (17th December 2020): The Bundestag and Bundesrat adopted a comprehensive amendment to the Renewable Energy Sources Act, which, subject to the outstanding approval by the European Commission, entered into force on 1st January 2021 (EEG 2021). By 2050 at the latest, all electricity should be greenhouse gas neutral. Solar and wind power plants to be greatly expanded by 2030
- LSV Amendment (17th September 2021). From 1 July 2023, newly built charging points must have an interface to transmit location data and dynamic data (including operational readiness).
- FFVAV Amendment (4th October 2021). All newly installed heating meters must be remotely readable from 5th October 2021. Metering equipment that has already been installed must be retrofitted by 31st December 2026.
- HKVO Amendment (5th November 2021) After the entry into force of the amendment on 1st December 2021. All newly installed measurement devices (submetering equipment such as water meters or heat cost allocators) must be remotely readable:
  1. Existing measurement technology, if not already remotely readable, must be converted by the end of 2026.
  2. Interoperability with systems from other providers must be ensured.

[21] Technische Eckpunkte für die Weiterentwicklung der Standards - Cyber-Sicherheit für die Digitalisierung der Energiewende
[22] BSI Markterklärung: Marktanalyse zur Feststellung der technischen Möglichkeit zum Einbau intelligenter Messsysteme nach § 30 MsbG October 2020
[23] Erneuerbare-Energien-Gesetz (EEG) The Renewable Energy Sources Act 2017
[24] Beschlussempfehlung des Ausschusses für Wirtschaft und Energie, (Recommendation of the Committee on Economic and Energy) and see also PDF EEG-Novelle Ebnet den Weg zu den Klimazielen
[25] Einfacher Zahlen an der Ladesäule (Easier payment at charging stations)
[26] Fernwärme- oder Fernkälte-Verbrauchserfassungs- und -Abrechnungsverordnung (pdf) (FFVAV: Ordinance on Consumption Recording and Billing for the Supply of District Heating/Cooling)
[27] Verordnung über die Änderung der Verordnung über Heizkostenabrechnung (Ordinance amending the Heating Bills Act)

3. Devices that are installed one year after the amended HKVO comes into force or later must be able to be connected to a Smart Meter Gateway.
4. If the meters were installed before this date, a corresponding retrofit must be carried out by the end of 2031 at the latest.
5. All newly installed heating meters must be remotely readable from 5th October 2021.
6. Measurement equipment that has already been installed must be retrofitted by 31st December 2026.

The New System Units

The term 'Systemeinheiten' or System Units encompasses all devices that are connected to the CLS interface of the SMGW: They are the link between the SMGW and local applications such as wall boxes, renewable energy sources, heat pumps, submetering systems and local energy management systems.

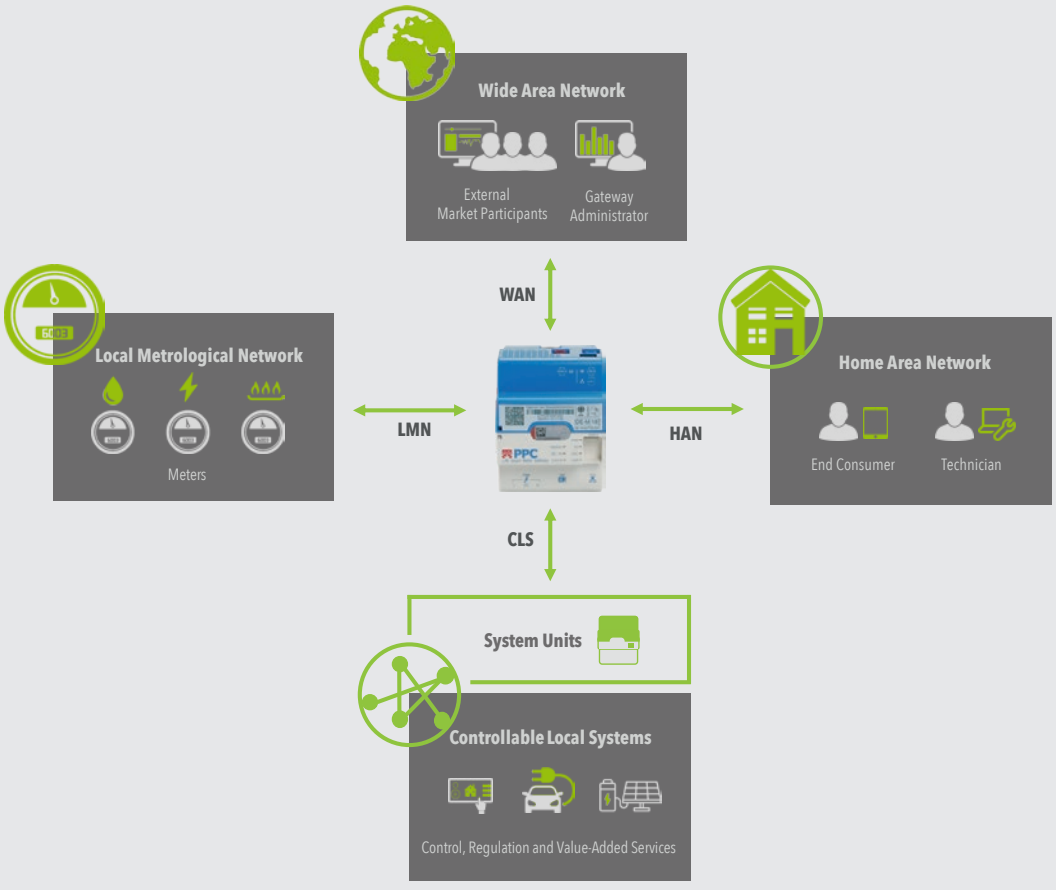


Figure 4: Interfaces of the Smart Meter Gateways

System Units enable secure data transmission from the applications in the building to the SMGW and from there onwards to service providers such as submetering providers, operators of electromobility infrastructures, or Distribution System Operators (DSO). As such, they provide a universal, encrypted data communication channel to and from the SMGW.

In order to implement stage 3 of the step by step model, the iMSys must be able to interact with System Units in a standardised way (see Figure 5). For this purpose, three different combinable System Units were defined in the Technical Key Issues Paper which was the basis for the step by step model:

- Control Unit (SE),
- Submetering Unit (SME) and,
- HAN Communication Adapter Unit (HKE).

The extended range of functions of the iMSys accelerates and expands the integration of use cases around submetering, electromobility and flexible load control for other industries.

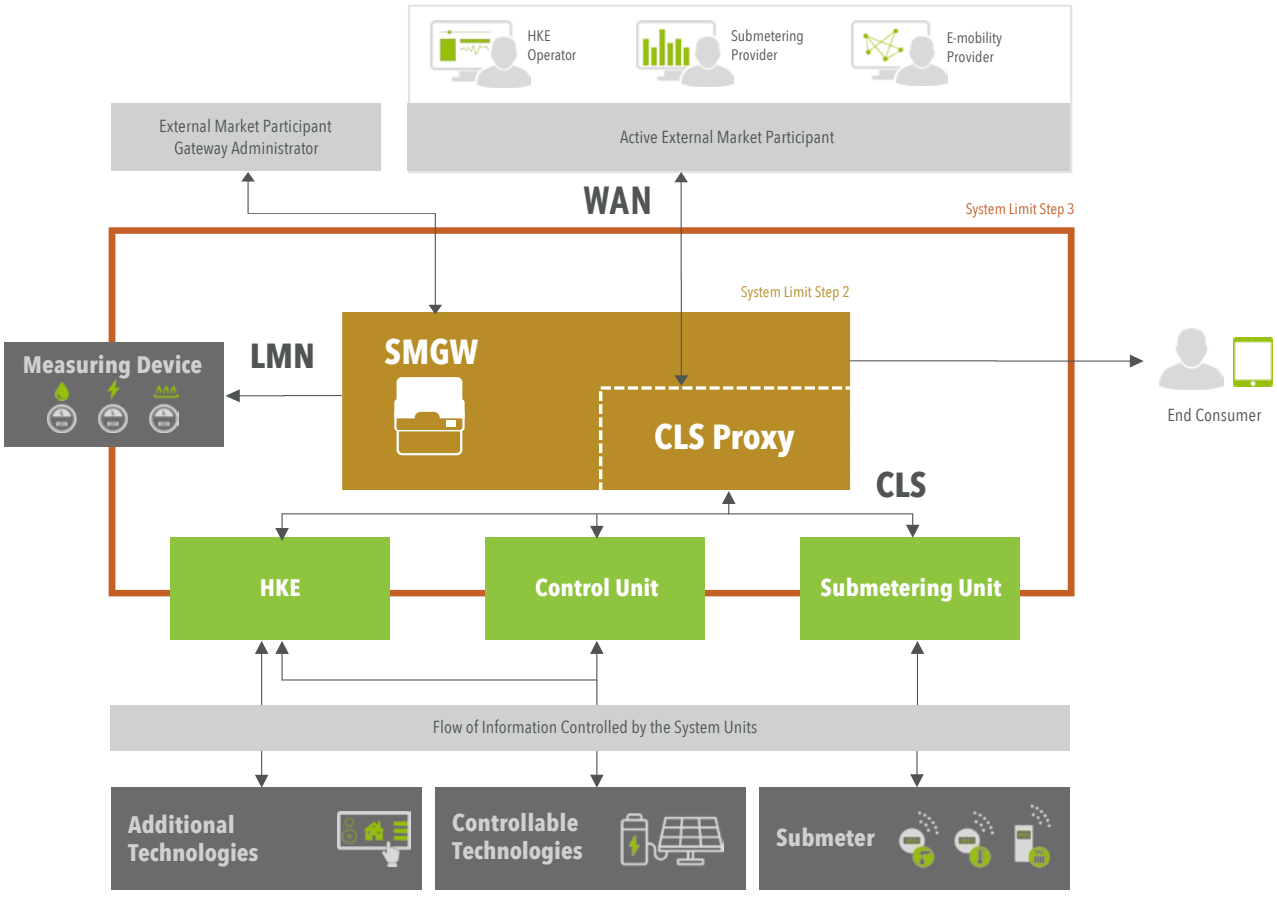


Figure 5: Measurement system characterised by stage 3 of the step by step model

According to the definition of the step by step model, what are System Units meant to do?

1

HAN-Kommunikationsadaptereinheit (HKE) - HAN Communication Adapter Unit

The HKE describes the basic functionality for a secure interoperable connection to the SMGW, to which applications can be connected. To implement interaction with components such as inverters, storage systems, renewable energy sources, wall boxes, energy management systems or submeters, the functionality of the HKE is a fundamental component of an SE or SME. The HKE functionality is primarily responsible for the interoperable and secure use of the CLS channel, which includes the initiation and maintenance of the CLS channel, as well as the security features.

2

Submeter-Einheit (SME) - The Submetering Unit

The SME records measured values of submeters on a regular basis or on demand via local wireless networks, stores them and sends them to authorised actors via the CLS proxy channel of the SMGW. In addition to submeters, other devices, such as smoke detectors, can be connected and read out. The SME can be part of a physical device such as a data collector.

3

Steuereinheit (SE) - The Control Unit

The SE is used to control the supply or feed-in power of controllable systems. The authorised active external market participant (aEMT)[28] transmits control commands to the SE via the CLS channel of the SMGW. An example of the design of an SE is the control box defined by FNN[29] specifications. Implementation in combination with an energy management system is another possibility.

The System Units combine simple, short-term feasibility and availability with the coverage of the highest security standards and maximum flexibility in application solutions and application protocols. This makes them the ideal way to benefit quickly and easily from the secure infrastructure of the SMGW with value-added offers. This finding has not only been revealed in analysis by the BMWK and BSI, but is also reflected in many projects in practice.

[28] Aktiver Externer Marktteilnehmer or Active External Market Participant
[29] Forum Netztechnik / Netzvertrieb im VDE (VDEFNN)

Value-added Services

The step by step plan creates opportunities for value-added services to the energy and housing industries. Costs are reduced by multi-sector metering (electricity and heat) as well as by the elimination of manual meter reading. Electricity suppliers can use data to generate tailored offerings of interest to both sides.

For players in the energy and housing industries, and also for service providers and technology providers, there are many opportunities for new offers and business models, such as the visualisation of heating consumption according to the implementation of the EU Energy Efficiency Directive (EED).[30]

[30] EU Energy Efficiency Directive (EED)

Value-added services for the energy industry

The System Units open up new installation cases and added value for stakeholders in the energy industry. This is made possible by high frequency measurement data from the SMGW, extended control options and the possibility of connecting previously uninvolved sectors.

Until recently, the control of systems in the energy market has been managed with very basic, limited data, without e.g. the possibility of feedback on the success of a switching command. CLS control units, on the other hand, have a significantly higher resolution and a return channel, so metering point operators can selectively communicate with the systems.

With control boxes or energy management systems (EMS), better control of flexible consumption and generation systems is made possible. In particular, the mapping of a setpoint specification at the grid connection point is made possible by the iMSys in combination with a control unit.

Flexible loads such as heat pumps, electric vehicles and generation plants can be controlled in real time in a grid-friendly manner. The battery of an electric vehicle, for example, can be used as an electricity storage system to stabilise the power grid in the event of overcapacity. At the same time, the now possible feedback of the systems on the success or failure of the control command provides a transparent overview of the condition of the system at all times. Monetary incentives, such as time- or load-variable electricity tariffs, can promote grid-friendly behaviour by end users, or end users' systems, based on this information exchange.

New business propositions

The inclusion of metering and submetering provided for in the legislation opens up access to a completely new business area. As a new division or in cooperation with established submetering providers, the combination of electricity/gas/district heating measurement and the Submeter Unit results in synergies coming from complete transparency of all measurement data within a building.

In the future, this will enable complete offers of measurement services from a single source, and combined solutions for electricity and heat. In particular, the use of renewable energy and charging infrastructure in multi-occupancy houses offers holistic supply concepts and attractive service potential for energy market participants, through tenant electricity models and procurement bundling. The development of new business models using the CLS interface of the SMGW as a communication platform for providers increases synergies and adds value.

Value-added services for the housing industry

The new System Units open up many new possibilities for the housing industry – especially in terms of combined submetering and metering point operation for electricity and gas.

For this purpose, a real estate management organisation can take on the role of the metering company or cooperate closely with a metering company.

Likewise, the use of an iMSys in combination with a Submetering Unit (SME) enables the fulfilment of regulatory requirements e.g. for monthly meter reading and the provision of readings to occupiers.

Standardised and secure communication connection via the SMGW also opens up the possibility of expanding mandatory basic solutions with new services. It is already becoming apparent that providers from the fields of smart home, electromobility and assistance systems are also keen to use this infrastructure.

This will create an interoperable ecosystem that will replace the proprietary systems that have been widely used to date. The HAN Communication Adapter Unit (HKE) is the key to linking all these systems with the SMGW – within the system as well as externally towards various backend systems. Such a central, standardised platform lowers the entry barrier for cooperation and new business models.

Powerful devices that can take over the function of an HKE and also provide other functions promote lean hardware equipment in the building, leading to cost savings.

Value-added services for service and technology providers

The existence of a standardised technology base with defined interfaces and an integrated data connection offers enormous growth potential for providers of building-based technology and service offerings.

The combination of high-resolution measurement data from various sectors with flexible control mechanisms and connection options for previously isolated systems enables holistic offerings, for example an integrated range of submeters and smart home systems.

Energy management systems can control the entire property across the board and reconcile local optimisation with the requirements set by the grid operator.

This enables, for example, operators of production plants who also use the generated electricity themselves to achieve optimal self-consumption while at the same time accessing any monetary incentives available for grid-friendly behaviour.

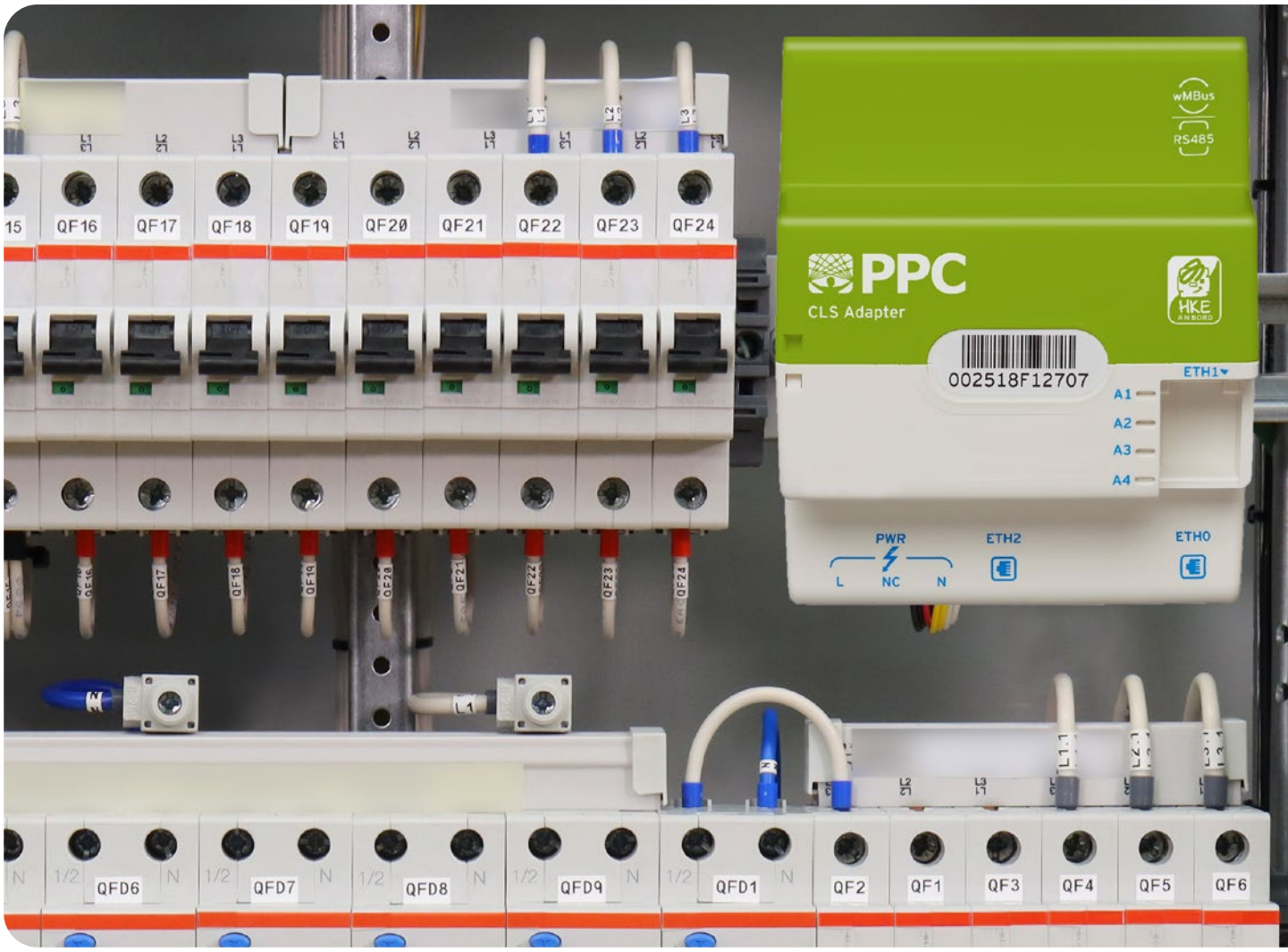
For providers of devices that have so far used their own applications, the standardised CLS interface, functioning as a System Unit, offers the possibility of an open platform approach.

This promotes the emergence of technical ecosystems with integrated value-added bundles.

New System Units in practice

The new System Units are already available for use in practice. Power Plus Communications (PPC), the leading manufacturer for Smart Meter Gateways, offer a product portfolio with "HKE on Bord" includes:

- CLS Gateway with HKE: The HKE is integrated in the CLS Gateway. Your own applications can be implemented on the device as required, and thus connected to the iMSys.
- CLS Software Stack HKE: Is an easy to deploy integrated software module, with the function of an HKE, which can access CLS functionality according to BSI TR-03109-5 for existing systems. These devices can then be connected to the CLS interface of the SMGW.
- CLS Adapter Submetering as SME with HKE: This allows existing submeter systems to be connected to the iMSys. The data collected is received by the CLS Adapter, stored and transmitted to the authorised actor.



Integration of HKE and SME into a home area network

The illustration (Figure 6) showS how the System Units are integrated into a home network.

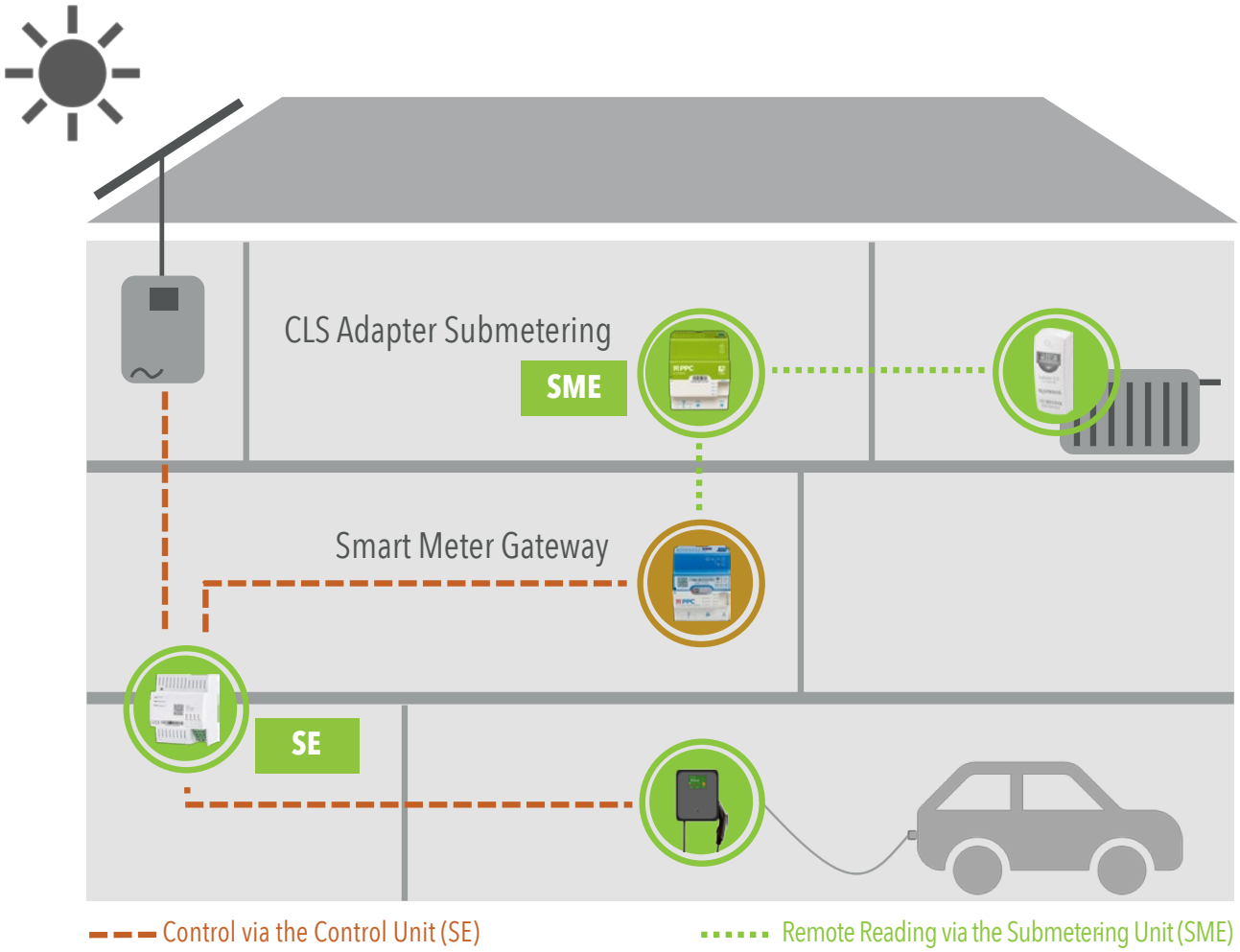


Figure 6:
Solid Line = connection of a submetering system to the SMGW via CLS adapter
Dashed Line = connection of the inverter and wall box to the SMGW via a control box.

Applications in the field

With PPC CLS products – in their function as HKE, SE and SME – submetering and electromobility applications have already been implemented in numerous projects.

Submetering

The entire building stock of the GWG Group (housing & real estate management), around 1,000 buildings with about 5,500 occupiable units, will be equipped with Smart Meter Gateways and CLS Adapters for submetering. A full-service provider will assume the role of the metering point operator.

Heating energy consumption is recorded by devices on the premises and linked to the measurement of general electricity consumption. This multi-division metering avoids duplicate infrastructures and manual meter reading.

Based on this structure, the landlord can generate added value in the area of smart building and smart home and ensure faster and error-free billing. Landlords and tenants can observe their consumption through data visualisation, see the results of any changes they make, and take advantage of variable electricity tariffs.

GWG GRUPPE

Learn more:
www.hkeanbord.org/submetering

Electromobility

A charging station was installed at the campus car park of TEAG Thüringer Energie AG in Erfurt. The bidirectional communication of the charging station with the backend system takes place via a SMGW and a CLS Gateway.

The focus is on grid-friendly load and feed-in management as well as control in the smart grid. The system data can be continuously compared with the current grid status data in the backend and charging managed in a grid-friendly way. Electric vehicles can stabilise the grid as flexible energy storage systems.

Hier geht es zum Projekt:
www.hkeanbord.org/electromobility

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www.hkeanbord.org

Do you want to know which CLS product is right for you, or do you want to undertake projects together with us? Then please contact our CLS experts: kontakt@hkeanbord.org

Glossary

Acronym/ Abbreviation	German	English	Notes
aEMT	Aktiver Externer Marktteilnehmer	Active External Market Participant	Third parties that may want or need access to meter or home device data: such as a company managing in-home monitoring and alert systems. The aEMT Active Market Participant can control systems behind the SMGW.
BMWK	Bundesministerium für Wirtschaft und Klimaschutz	Federal Ministry for Economic Affairs and Climate Action	The remit of the Federal Ministry for Economic Affairs and Climate Action includes all aspects of technology, industrial and SME policy, along with European internal market, foreign trade and investment, and global competition.
BSI	Bundesamt für Sicherheit in der Informationstechnik	Federal office of Information security	The BSI set the standards and defined the physical and environmental parameters of the Smart Meter Gateways.
CLS	Lokales Steuerbares System	Controllable Local Systems	In SMGW context, the interface to sensors and devices in the local or home network, that can be controlled, measured or communicated with, also from outside the network. (Note: should not be confused with Controllable Load Systems)
DSO	Verteilnetzbetrieber or VNB	Distribution System Operator	In Germany the local grid is often managed by a local DSO, which is a sister company to the Stadtwerke (municipal energy supplier). In many cases the grid operator rents the local grid infrastructure to one of the large energy suppliers.
EED	(EU) Energie Effizient Direktiv	(EU) Energy Efficiency Directive	With the European Green Deal, the EU is increasing its climate ambition and aims at becoming the first climate-neutral continent by 2050. To meet the new EU 2030 climate target energy efficiency needs to be prioritised. To step up its efforts, the European Commission put forward, in July 2021, a proposal for a new directive on energy efficiency as part of the package “Delivering on the European Green Deal”
EEG	Erneuerbare-Energien-Gesetz	Renewable Energy Law	Legal framework concerning renewable energy generation
EnWG	Energiewirtschaftsgesetz	Energy Economy Law	Regulations governing the supply of electricity and gas.

FFVAV	Verordnung über die Verbrauchserfassung und Abrechnung bei der Versorgung mit Fernwärme/Fernkälte	Ordinance on Consumption Recording and Billing for the Supply of District Heating/ Cooling	District heating is widely used in Germany, with whole buildings and districts tied in to the same heating and cooling systems, more often than not provided by their local Stadtwerke (municipal energy supplier) of which there are more than 800 in the country.
FNN	Forum Netztechnik/ Netzbetrieb im VDE (VDE FNN)	Network Technology/ Network Operation	The technical regulator for power grids in Germany. (See also VDE)
GWA	Gateway Administrator	Forum at the VDE	Market entity responsible for the administration and operation of the SMGW and the data from it. This role is sometimes but not always performed by the MSB. Independent operators have been established since the outset of the legislation.
HAN	Heimnetze	Home Area Network	The area behind the SMGW
HKE	HAN-Kommunikations-adaptereinheit	HAN Communication Adapter Unit	The HKE enables technical components like inverters, wall boxes or submeters to use the SMGW for secure communication with backend systems
HKVO	Heizkostenverordnung	Heating cost regulations	In Germany, heating is often metered and billed separately from other energy costs. This is partly due to with rental arrangements, and also the prevalence of district heating.
HKV	Heizkostenverteiler	Heat cost allocator	A device usually attached to a radiator to measure specifically heating usage. These were traditionally read manually but since the new regulations must be remotely readable.
iMSys	Intelligentes Messsystem	Intelligent Metering System or Intelligent Measurement system	An Intelligent Measurement System consists of a modern measurement device (digital meter, aka smart meter) and the Smart Meter Gateway as a communication unit. Intelligent measurement systems support secure and standardised communication in the energy networks.
LMN	Lokale Messgerätenetzwerk	Local Metrical Network or Local Metrological Network	The Local Metrological Network is the interface from a Smart Meter Gateway to the smart meter, as opposed to the WAN.
LSV	Ladesäulenverordnung	Charging column regulations	Since March 2016, the charging column regulation has regulated the minimum technical requirements for electricity filling stations in Germany. It also defines the requirements for the operators of public charging stations (in public transport areas but also the majority of customer and company parking areas). Due to German competitive regulations, there had to be certified Smart Meter Gateways from three separate suppliers available on the market, before the rollout could get underway.

mMe	Moderne Messeinrichtung	Modern Metering Equipment	Smart meters and other digital metering equipment that the SMGW can be connected to.
MSB	Messstellenbetreiber	Metering Point Operator	This is the party which is responsible for the installation and operation of smart meters and modern metering devices unless the consumer or plant operator has opted for a different company to serve as the metering point operator.
SE	Steuereinheit	Control Unit	The Control Unit controls the feed-in power of controllable systems.
SME	Submeteringeinheit	Submetering Unit	The Submetering Unit records current meter readings.
SMGW	Smart Meter Gateway	Smart Meter Gateway	A device that combines with a smart meter to comprise a secure smart metering system. The Smart Meter Gateway encrypts meter data before passing it on to authorised entities such as the meter owner and the gateway's administrator. The Smart Meter Gateway is part of an iMSys and forms the communication unit that receives measurement data from meters, and which then further processes it for other participating market players.
SubM	Submeter	Submeter	A meter in the building that records measurement data such as water meters in apartments or heat cost allocators.
TR	Technische Richtlinie	Technical Specifications	For example: BSI TR-03109: Technical specifications for intelligent metering systems and their secure operation.
VDE	Verband der Elektrotechnik Elektronik Informationstechnik	Association for Electrical, Electronic & Information Technologies	VDE, one of the largest technology organizations in Europe, the VDE combines science, standardisation, testing, certification, and application and consulting under one umbrella.
WAN	Weitverkehrsnetz	Wide Area Network	Wide Area Network (WAN), which is the connection to the external market participants, the energy suppliers.

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