EEBUS SPEAK ENERGY

15 July 2026

WHITEPAPER

Code of Conduct 1.0

An analysis of the requirements for home appliances and heat pumps

Home appliances | Heat pumps | Use cases | SAREF / SAREF4ENER

AS OF
July 2026

VERSION
V5

AUTHOR
Tom Rudolph

EEBus Initiative e.V.
eebus.org

EEBUS | SPEAK ENERGY

WHITEPAPER

Code of Conduct 1.0

An analysis of the requirements for home appliances and heat pumps

Communication protocol, mandatory use cases and technical evidence

KEY MESSAGE

CoC 1.0 does not prescribe any particular communication protocol. A standardised open API or an open communication protocol is permitted. What matters is the complete implementation of the use cases that are mandatory for the respective product category, a documented and published semantic mapping to SAREF/SAREF4ENER, appropriate security mechanisms and the publication of conformity in the EPREL database.

As of: July 2026 · **Version:** V5 · **Author:** Tom Rudolph

1. Summary

The Code of Conduct on energy management related interoperability of Energy Smart Appliances (CoC v1.0) takes a protocol-neutral approach. Manufacturers are therefore not obliged to use EEBUS/SPINE, SPINE-IoT or EN 50631. Chapter 4b does, however, require an interoperability profile based on a standardised open API or an open communication protocol.

What is actually binding sits at the functional and information level: for at least one product or model available in the EU, the use cases flagged as mandatory for the respective product category must be implemented. All relevant information elements must have a SAREF representation and be compatible with the SAREF framework as defined in ETSI TS 103 264 and ETSI TS 103 410.

For home appliances, Flexible Start and Manual Operation are mandatory. For heat pumps, Monitoring of Power Consumption and Limitation of Power Consumption are mandatory. The remaining use cases are optional or not applicable.

EN 50631 and SPINE/SPINE-IoT are described in the CoC in detail as a reference and mapping example. They therefore represent the implementation route that is easiest to evidence, technically and organisationally, but formally they are not prescribed as the only option.

2. Comparison of the minimum requirements

Use case	Home appliances	Heat pumps	What it means
Flexible Start	**Mandatory**	Optional	The Energy Management System (EMS) selects the optimal start time within the permitted time limits.
Monitoring of Power Consumption	Optional	**Mandatory**	The current electrical power consumption is made available.
Limitation of Power Consumption	Optional	**Mandatory**	The EMS can set a maximum active power; failsafe mechanisms are provided for.
Incentive Table based Power Consumption Management	Not applicable	Optional	Optimisation based on cost, CO_2, renewable share or grid requirements.
Manual Operation	**Mandatory**	Optional	The EMS is informed when operation is started or overridden manually.

3. Requirements for the communication protocol and the interface

3.1 No protocol is prescribed

The CoC explicitly does not address the communication layer in normative terms. A wide range of existing and future communication standards can be used, for example EN 50631/SPINE, SPINE-IoT, S2, Home Connectivity Alliance or Matter. Another standardised open API is also possible in principle.

3.2 What is mandatory nonetheless

- The interface must be standardised and open; an exclusively proprietary, closed manufacturer API is not sufficient under the wording of Chapter 4b.

- The applicable use cases must be implemented in an interoperable way.
- All relevant data objects, states, time values, power values and control information must be mapped to SAREF or SAREF4ENER.
- The SAREF mapping must be fully documented and published.
- Communication must be protected by up-to-date open security mechanisms (e.g. TLS 1.2). This includes secure communication, installation and configuration, role assignment, authorisation and control over private data.
- The function may be implemented directly in the device, in the manufacturer cloud or in a dongle or adapter. If a dongle or an adapter/EMS is used, its compatibility with the requirements above must be demonstrated. The device can then only be presented as compatible with the requirements of CoC 1.0 as a system together with this additional component.

3.3 How EN 50631/SPINE compares

EN 50631 is not mandatory, but Annex 2 and Annex 3 of the CoC use it as the only complete reference. The tables contain concrete mappings of SAREF triples to EN 50631 data elements, in addition, a SPINE-IoT example with real data is shown for Flexible Start. Anyone using EN 50631 or SPINE/SPINE-IoT can therefore build on a mapping that the CoC already documents. With any other protocol, an equivalent mapping has to be described independently and evidenced in a traceable way.

4. Requirements for home appliances

This product group covers washing machines, tumble dryers, washer-dryers and dishwashers carrying an energy label.

4.1 Mandatory use case: Flexible Start

The device or its digital twin provides the Energy Manager with a schedulable power profile. Within the limits set by the device, the Energy Manager may select or change a suitable start time as long as the process has not yet started.

- earliest permitted start time and latest permitted end time
- planned start and end time as well as total duration
- status of the Power Sequence, for example scheduled, running, paused or completed
- information on whether the Power Sequence can be remotely controlled, paused or stopped
- one or more Power Sequences, or programme variants

- time-structured slots with duration and with expected, minimum and maximum power in watts
- origin of the values, for example measured, calculated or empirically determined

4.2 Mandatory use case: Manual Operation

If a programme is started manually by the user, the Energy Manager must still be informed about the running process and its power demand. In this case the process can no longer be shifted in time.

- The status of the Power Sequence is running.
- The start time, or earliest start time, is the current point in time.
- Remote Control and Reselection are false.
- Pausing and stopping by the Energy Manager are false.
- The expected power demand continues to be described via the Power Sequence and its slots.

4.3 Optional functions

Monitoring of Power Consumption and Limitation of Power Consumption can be implemented in addition. For home appliances, however, CoC v1.0 does not require them in order to meet the minimum requirements of the product category.

5. Requirements for heat pumps

This product group covers all electrical heating, ventilation and air conditioning devices in buildings, such as heat pumps.

5.1 Mandatory use case: Monitoring of Power Consumption

The heat pump must state its electrical power consumption as a measured value. The minimum requirements include the description of the device, its classification as an ‘electricity’ energy source, the property ‘power’, the unit ‘watts’ and a numerical measured value. Further values such as energy, current, voltage or frequency are named in the explanatory text as possible additions, but they are not part of the minimum SAREF core of the table.

5.2 Mandatory use case: Limitation of Power Consumption

The Energy Manager must be able to set a maximum active power consumption. Alongside the Active Power Limit itself, the CoC also describes a failsafe mechanism for communication failure.

- unique identifier of the current power limit
- indication of whether the limit can be changed and whether it is binding
- period of validity and active status of the limit
- maximum permitted active power in watts
- optional representation of a contractual power limit
- nominal maximum power consumption according to the manufacturer specification
- failsafe state when communication is interrupted
- minimum duration of the failsafe state and failsafe power limit

5.3 Optional functions

Flexible Start, Incentive Table based Power Consumption Management and Manual Operation are optional for heat pumps. Flexible Start can be used for domestic hot water preparation, for example. The incentive table approach enables optimisation based on cost, CO_2 emissions, share of renewable energy or higher-level grid requirements.

5.4 Addendum: national requirements for heat pumps under Section 14a of the German Energy Industry Act (EnWG)

In addition to the requirements of CoC 1.0, heat pumps have to meet the national rules on grid-oriented control set out in § 14a EnWG. Since 1 January 2024, new heat pumps with an electrical connected load of more than 4.2 kW must be designed or installed so that the power they draw from the grid can be limited when a local grid overload is imminent. These control instructions are transmitted securely only via the local smart metering system, consisting of a modern metering device (moderne Messeinrichtung, mME) and a Smart Meter Gateway (SMGW), together with a connected control unit (e.g. FNN Control Box) or a corresponding control function integrated in the SMGW. The heat pump can be controlled either directly or indirectly via an EMS.

For local communication, VDE-AR-N 4100 (the binding technical connection rules) requires either control via a relay or a standardised, interoperable digital IP interface in the EEBUS format in line with VDE-AR-E 2829-6. (Note: relay control is only permitted as a transitional solution; in the longer term, only the digital interface will apply.)

EN 50631, VDE-AR-E 2829-6 and EEBUS with its protocol components SPINE and SHIP are identical on all points relevant here. A device that has integrated the SPINE protocol component in line with Code of Conduct version 1.0 (corresponding to the category “Build In” in the Code of Conduct on energy management related interoperability of Energy Smart Appliances, i.e. a communication function integrated into the device by the manufacturer; in English, this is more commonly referred to as ‘built-in’) therefore meets the requirements of § 14a EnWG.

If the heat pump itself does not have a suitable compliant interface, controllability can be established through an adapter, a dongle or a compatible EMS that reliably translates the power limits received via the smart metering system into device-specific control commands.

Implementing this via an adapter/dongle or an EMS is also explicitly in line with CoC 1.0.

5.5 National requirements for heat pump funding

The funding guideline for the German Federal Funding for Efficient Buildings – Individual Measures (BEG EM) sets out the requirements for heat pumps that are eligible for funding.

From 1 July 2027, newly installed heat pumps must provide a digital interface in a format that complies with the CoC (for example EEBUS in line with VDE-AR-E 2829-6).

In addition, the heat pump must be able to connect to the local smart metering system under § 14a EnWG via the EEBUS communication standard in line with VDE-AR-E 2829-6. This connection can be established either directly or via an energy management system.

Assessment:

EN 50631, VDE-AR-E 2829-6 and the EEBUS standard with its protocol components SPINE and SHIP are to be regarded as equivalent with respect to the requirements relevant here.

If a device has an integrated implementation of the SPINE protocol component in line with the Code of Conduct (CoC category “Build In”), the requirements for grid-oriented control and for the digital interface under the CoC are deemed to be met. Eligibility for funding is therefore given regardless of whether an additional energy management system is used.

If the CoC conformity of a heat pump is achieved via an alternative communication protocol named in the CoC and VDE-AR-E 2829-6 is not implemented, an energy management system is required in order to connect to the smart metering system. That energy management system must meet the requirements of VDE-AR-E 2829-6 towards the grid connection.

6. EPREL database

The EPREL database is the European register for products carrying an energy label. It holds key information on energy-related products so that authorities, manufacturers and consumers can trace it. This keeps the details on the energy label transparent and verifiable.

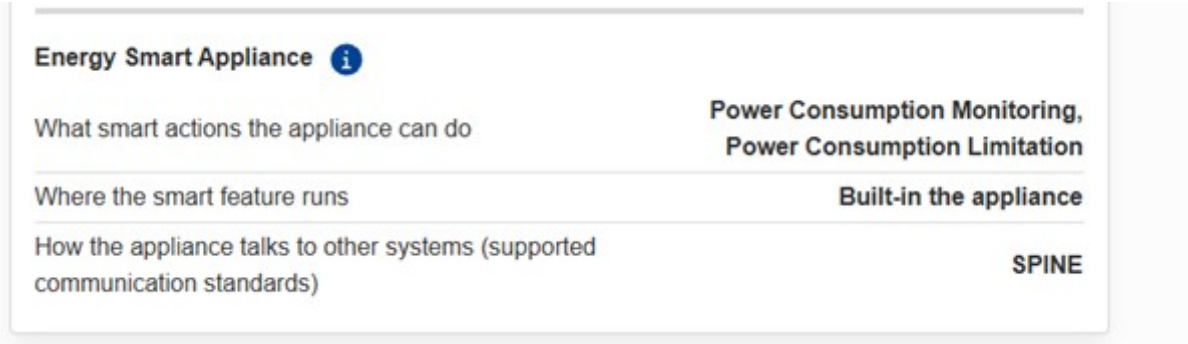
EPREL is therefore a central instrument for greater energy efficiency and market surveillance in the EU.

How conformity with the requirements of CoC 1.0 can be shown in the EPREL database is currently not clear-cut. The selectable options leave too much room for interpretation. The entry does not reveal whether a device actually meets the requirements of CoC 1.0 or not. The term “CoC 1.0” does not appear in the portal interface. The option to select “Other” allows any incompatible communication standard to be entered. This adds considerably to user confusion. It must be possible to state clearly whether a device meets the requirements of CoC 1.0 on its own or only in combination with an additional device (e.g. an adapter or EMS).

It is also unclear at present which evidence manufacturers have to submit (e.g. documented mappings) and how it will be verified.

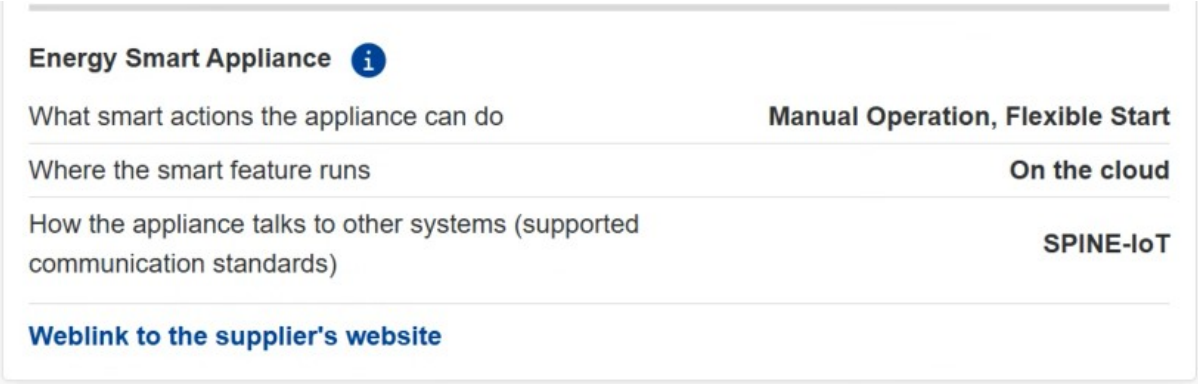
For heat pumps that state the SPINE protocol variant in the device itself (corresponding to the “Build In” category), the statement is unambiguous: they use the documented reference mapping in the annex. The same applies to home appliances where SPINE-IoT is ticked.

Example for a heat pump:



Energy Smart Appliance	
What smart actions the appliance can do	**Power Consumption Monitoring, Power Consumption Limitation**
Where the smart feature runs	**Built-in the appliance**
How the appliance talks to other systems (supported communication standards)	**SPINE**

Example for a washing machine:



Energy Smart Appliance	
What smart actions the appliance can do	**Manual Operation, Flexible Start**
Where the smart feature runs	**On the cloud**
How the appliance talks to other systems (supported communication standards)	**SPINE-IoT**

Weblink to the supplier's website

EPREL process:

No.	Checkpoint	Expected evidence
1	Product category and mandatory use cases defined	Assignment in line with Annex 1
2	At least one EU market model selected	Evidence of model and market availability
3	Open standardised API or open protocol defined	Interface and standard reference
4	Use case functions fully implemented	Functional description and test cases
5	SAREF/SAREF4ENER mapping created	Mapping table of all core data elements
6	Interoperability demonstrated	Integration test or proof of conformity (e.g. EEBUS Certificate)
7	Security requirements implemented	Security concept, role and permission model
8	Implementation location documented and submitted	In the device, via cloud or via dongle, adapter or EMS
9	End customer information prepared	Activation, prerequisites and benefits
10	EPREL labelling planned	Documented registration process

The current process is being revised and made more concrete as part of the general maintenance and further development of the CoC process.

7. Conclusion

For heat pumps, at least the use cases “Monitoring of Power Consumption” and “Limitation of Power Consumption” have to be implemented. No particular communication protocol is prescribed. At present, however, EN 50631/SPINE is the only comprehensively documented reference approach, and it is also based on a valid European standard.

Using EN 50631 removes the additional effort of creating and evidencing a mapping of your own. In that case, conformity with EN 50631 is sufficient as proof of conformity, evidenced for example by an EEBUS Certificate.

If an alternative open interface is used, the complete semantic mapping to SAREF/SAREF4ENER and the interoperable implementation of the required use cases have to be evidenced independently. This evidence also has to be kept up to date and maintained across the entire product life cycle.

It has not yet been finally clarified which specific evidence will be required in future for the CoC conformity of alternative interfaces. It is equally open whether a SAREF mapping to any data model will remain permissible. The greatest investment certainty combined with the lowest implementation effort therefore comes from using standard-based and fully specified mappings.

RECOMMENDATION

When implementing the CoC, and when referring to it – in funding programmes, for example – make sure that CoC conformity is based on a valid EN standard for which the required mapping is concretely defined and fully standardised. This minimises the risk around future evidence obligations and provides a conformity basis that holds up over the long term.

8. Sources

European Commission, Joint Research Centre: Code of Conduct on energy management related interoperability of Energy Smart Appliances (V.1.0), in particular Chapters 2–5 and Annexes 1–5.

European Commission, Joint Research Centre: Evaluating the Code of Conduct on Interoperability of Energy Smart Appliances, 2026, in particular Sections 2.3, 3.1, 5 and 6.

Note: the statements in this document summarise the CoC materials provided. Annex 3 of the CoC is explicitly informative; the binding obligations follow from Chapter 4 in conjunction with Annex 1 and Annex 2.