Guidance document on revised Articles 8(1), 14(4) and 15(4) EPBD
Requirements for the installation of self-regulating devices and building automation and control systems

1. INTRODUCTION

Article 1 of **Directive 2018/844 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27 on energy efficiency**[1] (hereafter referred to as the 'Amending Directive') includes **new requirements** on the installation of **self-regulating devices** and **building automation and control systems** in buildings when specific conditions are met. More precisely:

- According to Article 8(1) subparagraph 3 of the revised EPBD, Member States must require the installation of self-regulating devices in all new buildings, and in existing buildings when heat generators are replaced, where technically and economically feasible.
- According to Article 14(4) and Article 15(4) of the revised EPBD, Member States must require the installation of building automation and control systems in all non-residential buildings with an effective rated output for heating, air-conditioning, combined heating and ventilation, combined air-conditioning and ventilation of more than 290 kW, by 2025, where technically and economically feasible.

This note aims to provide guidance to Member States on how to apply the provisions on self-regulating devices of Article 8(1) subparagraph 3, and Articles 14(4) and 15(4) on the installation of building automation and control systems, in the revised EPBD. The note states the views of the Commission services, does not alter the legal effects of the Directive and is without prejudice to the binding interpretation of Article 8(1) subparagraph 3, and Articles 14(4) and 15(4) as provided by the Court of Justice.

2. UNDERSTANDING OF THE PROVISIONS APPLYING TO SELF-REGULATING DEVICES IN ARTICLE 8 OF THE REVISED EPBD

2.1. Aim and objectives

The aim of the provisions applying to self-regulating devices in Article 8(1) subparagraph 3, is to require the installation of devices able to regulate indoor temperature in buildings. Such devices improve the management of energy consumption with limited costs and it is generally beneficial to make their use more widespread.

These provisions link to obligations in Article 8(1), subparagraphs 1 and 2, of the revised EPBD requiring Member States to set system requirements for the purpose of optimising the energy use of technical building systems[2]. Self-regulating devices improve the management of heating and air-conditioning systems and as such can also be part of the requirements that apply to those systems when they are installed, replaced or upgraded.

[1] Directive (EU) 2018/844 of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency.

[2] Clarifications on these provisions and on how they have evolved with the revision of the EPBD, in particular in relation to the definition of technical building systems, are given in a separate guidance note on 'revised Articles 2, 8(1) and 8(9) EPBD Technical Building Systems'.

2.2. Self-regulating devices

2.2.1. What it covers

The text refers to 'self-regulating device' without giving any specific definition. However, Article 8(1) clarifies that such a device must allow for the *separate regulation* of the temperature in *each room* (or, where justified, in a designated zone) of the building unit.

The devices installed as a result of the implementation of these provisions must therefore:

- allow for the automatic adaptation of heating output depending on the indoor temperature (and optionally additional parameters)[3],
- allow for the regulation of heating output in each room (or zone), in accordance with the heating settings of the considered room (or zone).

This means in particular that:

- Any solution based on the manual regulation of heating output would not fulfil the requirements, even if the adjustment can be performed at room (or zone) level.
- Any solution that allows for the automatic regulation of temperature but not at room (or zone) level, e.g. automatic regulation at dwelling-level, would not fulfil the requirements.

It is important to note that, regardless of the number or the types of system(s) installed, what matters is that the systems enable the users to adjust temperature settings and, ensure that these settings are respected[4].

2.2.2. Scope: heating, cooling, or both?

Subparagraphs 2 and 3 of Article 8(1) refer to technical building systems in the broad sense, i.e. as in the definition given in Article 2 of Directive (EU) 2018/844. As regards the specific provisions on self-regulating devices (subparagraph 3), the text does not specify which type of system is concerned but does refer to regulation of temperature, which applies both to heating and systems for space cooling.

Therefore, not only heating systems – but also air-conditioning systems / systems for space cooling – would fall under the requirements on self-regulating devices.

In particular, the reference to 'heated zone' in the text should not be interpreted as implicitly restricting the requirements to only heating systems.

However, the focus of these provisions is effectively on heating as the vast majority of air-conditioning / cooling systems are already equipped with room- or zone- level monitoring and control.

[3] In this context, 'automatic' means that the device allows for the automatic regulation of heating output when ambient temperature evolves based on pre-defined settings. Adjustment of the settings itself, however, is generally manual and performed by users (e.g. manual adjustment of temperature settings with a thermostatic radiator valve).

[4] For instance, where a building or building unit is equipped with more than one heating system, the requirement could apply to only one of the systems, provided that the expected capability is ensured.

In addition, in existing buildings, when heat generators are replaced, the requirement to install self-regulating devices applies only to heating systems[5].

Also, the text does not require to install self-regulating devices in the case where cooling generators are replaced in existing buildings. However, Member States may consider establishing such additional requirement[6], as it would be consistent with the general objective of these provisions: to ensure adequate regulation capability and avoid wasting energy.

The following table summarizes the different cases that may arise.

New or existing building	**Type of intervention**	**Requirement to install self-regulating devices**
New	Installation of heating system	Yes
New	Installation of space cooling system	Yes
Existing	Replacement of heat generators	Yes, only for heating system
Existing	Replacement of cool generators	Up to Member State

2.2.3. Scope: room- or zone-level?

The principal requirement is the regulation of temperature at room-level. The installation of self-regulating devices at zone-level, however, has to be justified.

A 'room' is to be understood as a part or division of a building enclosed by walls, floor, and ceiling.

A 'heated zone' is to be understood as a zone of a building or building unit, located on a single floor, with homogeneous thermal parameters and corresponding temperature regulation needs (i.e. the equivalent of a 'thermal zone', a common concept in the scope of energy performance calculation).

Examples of cases[7] where it may be justified to consider zone-level instead of room-level for the application of the requirements are:

- Adjacent offices with identical indoor environment requirements in an office building;
- Adjacent rooms / spaces that are not physically separated one from the other (e.g. open-plan kitchen and living room in an apartment).

The assessment of the most appropriate scope of regulation (room or zone) will generally depend on the design and intended use of the specific building or building unit, and of the spaces therein. In making this assessment, the main parameter to consider will generally be whether several rooms can share the same indoor environment requirements and, therefore, could be merged into a single zone (from a temperature regulation perspective). Such cases should be well justified.

[5] This means in particular that when heat generators are replaced in an existing building, which is equipped with a system for space cooling that has no self-regulation at room- or zone-level, the requirement to install self-regulating devices at room- or zone-level would not extend to the system for space cooling.

[6] Most space cooling systems will have the self-regulation capability anyway but this is not a requirement under Ecodesign regulations.

[7] These are indicative examples. There can be other cases where zone-level regulation is justified.

However, in consideration of some national, regional or local specificities, Member States may allow zone-level temperature regulation for some categories of buildings or building units, when there is sufficient justification for doing so. In the latter case, Member States must clarify the categories of buildings or building units targeted, the national, regional or local specificities considered and, give the necessary justification[8] for allowing upfront to deviate from the principal requirement for these categories of buildings or building units.

2.2.4. Examples of self-regulating devices

The devices used to implement the self-regulating capability will depend on the type of system considered. The following table gives some indicative examples of devices that fulfil the requirement for different types of systems[9]:

Device	Type of system	Regulation capability
Thermostatic radiator valve	Hydronic heating system and radiators	Regulation of hot water flow in emitters according to temperature setting.
Room thermostat	Hydronic heating system and surface heating (e.g. floor heating)	Regulation of hot water flow in the surface heating thanks to the room's mixing valve.
Fan coil unit thermostat	Hydronic heating / cooling system	Controls hot / cool water- and air-flow based on temperature setting.
Individual thermostat	Standalone heaters or air-conditioners	Control the heat output depending on temperature setting

2.3. When obligations are triggered

The text requires new buildings to be equipped with self-regulating devices, and existing buildings when heat generators are replaced.

The obligations apply to all types of buildings and all types of systems unless they are not technically and economically feasible (see section 2.4).

2.3.1. Note on the definition of heat generators

Article 2(15b) of the revised EPBD gives a definition of a 'heat generator', as follows:

''heat generator' means the part of a heating system that generates useful heat using one or more of the following processes:
(a) the combustion of fuels in, for example, a boiler;
(b) the Joule effect, taking place in the heating elements of an electric resistance heating system;

[8] Such justification can e.g. be based on scientific studies, which results would back the assessment that zone-level regulation is preferable in the considered cases.
[9] Self-regulating devices can be electronic or not (e.g. a thermostatic radiator valve); what matters is the self-regulation capability, not the technology itself.

(c) capturing heat from ambient air, ventilation exhaust air, or a water or ground heat source using a heat pump;'

It is important to note that this definition does not differentiate between heat generators that are distinct from heat emitters (e.g. boiler and radiators) and those that are integrated with the heat emitter in a standalone heating system (e.g. electric resistance heaters). This means that the obligations (on self-regulation) also applies in the latter case (i.e. when a standalone heating system is replaced in an existing building).

2.3.2. Partial replacement of heat generators in existing buildings

When buildings are equipped with multiple heat generators, situations may arise where only part of the heat generators are replaced. In such situations, the requirement to install self-regulating devices also applies, where technically and economically feasible. In particular, in the case where several heat generators are coupled together and serve the same space, and at least one of the heat generators is replaced, the requirement applies. In case a building is equipped with several heat generators that are independent and serve different spaces, Member States may allow the requirement to apply only to the space(s) served by the replaced heat generator(s).

2.3.3. Buildings connected to district heating

Where existing buildings are connected to district heating and are not equipped with any heat generators at building level, the requirement to install self-regulating devices will apply only when district heat generators are replaced.

Member States may require self-regulating devices to be installed when heat exchangers in buildings are replaced, but this is not a requirement of the Directive.

2.3.4. Installation of heating systems in existing buildings

The installation of a new heating system in an existing building or building unit that was already equipped with a heating system (e.g. installation of a central heating system in a building in replacement of individual heating systems) triggers the requirement on the installation of self-regulating devices, as it implies the replacement of heat generators.

The installation of a heating system in a construction that was formerly not within the scope of the EPBD but which for example subsequently, due to restoration works, becomes a building in the sense of the EPBD, also triggers the requirement on the installation of self-regulating devices.

2.4. Technical and economic feasibility

The provisions state that the obligations to install self-regulating devices apply when this installation is technically and economically feasible:

- Technical feasibility generally refers to possible technical barriers that can prevent or make technically irrelevant the obligations,
- Economic feasibility generally relates to the upfront price (including installation) and the running costs of self-regulating devices and, to how these costs compare to the expected benefits and other costs borne by the investor. In the context of these

provisions, only upfront price is relevant as running costs of self-regulating devices will be negligible.

In the vast majority of cases, the question of technical and economic feasibility will not apply for new buildings, as the need for temperature self-regulation at room (or zone) level can be addressed in the design phase (preventing any technical barrier in the subsequent steps and ensuring related costs are optimal). One straightforward case where it would not be technically feasible to install self-regulating devices in a room or a zone is when this room or zone will not be heated (or cooled).

With regard to existing buildings, technical feasibility can be an issue where it is not possible to enable self-regulation without carrying out substantial alterations to the systems and / or to the building that would inevitably lead to prohibitive costs (this can e.g. be the case for some types of floor heating systems in existing buildings).

Also with regard to existing buildings, economic feasibility can be an issue when the costs for installing the self-regulating devices is excessive as compared to the costs for replacing the heat generator. When choosing this approach, Member States must clarify how the costs are calculated and how they are compared. The two following approaches may be considered:

1. Comparing the upfront costs of self-regulating devices to the costs of the replacement of the heat generators and setting a threshold on the maximum ratio between the two. This approach is in line with recital 21 of the Directive, which reads as follows:
   "The installation of self-regulating devices in existing buildings for the separate regulation of the temperature in each room or, where justified, in a designated heated zone of the building unit should be considered where economically feasible, for example where the cost is less than 10 % of the total costs of the replaced heat generators."
2. Comparing the upfront costs of self-regulating devices to the expected energy cost savings resulting from the installation of these devices, and setting a threshold on a maximum payback period (e.g. 5 years).

While both approaches are possible, the latter option would be preferable, as in the vast majority of cases the investment will pay back in a limited period (typically 2 to 3 years).

Type of feasibility	**How it can translate**	**Can apply to**	
		New buildings	**Existing buildings**
Technical feasibility	The room (zone) has no heating / cooling.	Yes (but rare)	Yes (but rare)
	The heating system makes it impossible to install self-regulating devices.	No	Yes (but not frequent)
Economic feasibility	The upfront costs are too high with regard to other costs.	No	Yes (but not frequent)
	The investment does not sufficiently pay back.	No	Yes (but rare)

3. IMPLEMENTATION OF THE PROVISIONS APPLYING TO SELF-REGULATING DEVICES IN ARTICLE 8 OF THE REVISED EPBD

3.1. Transposition of the requirements

Member States must transpose these obligations by 10 March 2020. Except in the infrequent / rare case of the absence of technical or economic feasibility:

- Every new building will have to be equipped with self-regulating devices by the transposition deadline. This must be ensured in the case of buildings for which permit applications are submitted after the transposition deadline.
- All existing buildings whose heat generators are replaced as from the date of the national transposition of these obligations will have to be equipped with self-regulating devices.

Member States should advertise these requirements sufficiently in advance for professionals to take them into account early enough in the design of new buildings, and in the preparation of the replacement of heat generators in existing buildings.

In transposing the requirements on the installation of self-regulating devices, Member States must ensure that the expected self-regulating capability of such devices is clearly expressed and in line with the one given in Article 8(1), as detailed in section 2.2.1 of this document.

In the revised EPBD, this self-regulating capability is expressed in a technology-neutral way. This leaves therefore flexibility on the specific solutions that can be used to achieve this capability. While this flexibility can be considered beneficial (as it allows designers and installers to select the best solution for a given building or building unit), Member States are also encouraged to provide further technical guidance on how to implement self-regulation for the various systems that can be encountered, in particular the most common ones. The table in section 2.2.4 gives some examples.

On the scope of regulation (room or zone), Member States are also encouraged to provide technical guidance on the cases where zone-level regulation could be relevant, in order to help professionals in their assessment and support a consistent implementation of the requirements in the national (or, where applicable, regional) territory.

In the particular cases where Member States allow for zone-level regulation for well-identified categories of buildings or building units (see section 2.2.3), this must be made clear in the transposition of the requirements or in the technical guidelines supporting the implementation of the requirements.

3.2. Technical and economic feasibility

It is for Member States to detail in which specific cases the installation of self-regulating devices could not be feasible from a technical or economic perspective. Member States must ensure that these cases are clearly identified, framed and justified.

In particular the interpretation of technical and economic feasibility must not be left to owners or to system installers. Conditions under which feasibility is evaluated must be defined at Member State level or, where applicable, in the case of regional conditionalities affecting only part of the Member State territory, at regional level. However, in the latter case, regional conditionalities must be defined in national transposition measures. In any

case, these conditions must be documented (e.g. in technical guidelines) and apply uniformly on the national (or, where applicable, regional) territory. Finally, the decision not to install self-regulating devices on the grounds of technical or economic (un)feasibility must be assessed under clear procedures established by public authorities.

4. UNDERSTANDING OF THE PROVISIONS APPLYING TO BUILDING AUTOMATION AND CONTROL SYSTEMS IN ARTICLE 14-15 OF THE REVISED EPBD

4.1. Aim and objectives

The aim of the provisions applying to Building Automation and Control Systems (BACS) in Article 14-15 is to require the installation of BACS in all non-residential buildings over a certain effective rated output of heating, ventilation, and air-conditioning systems. It is important to note that the requirement will apply to *all* buildings, i.e. new *and* existing ones, when they meet the criterion on the effective rated output.

BACS lead to significant energy savings, improve the management of the indoor environment and as such, are beneficial to building owners and users, in particular in large non-residential buildings.

4.2. Building Automation and Control Systems

'Building automation and control systems' (BACS) is a concept that is widely known and used, but the meaning of which can vary significantly. Before addressing the requirements themselves, it is important to underline what this term refers to in the specific scope of Article 14-15 of the revised EPBD.

First of all, a BACS is a system that complies with the definition given in Article 2(3a) of the revised EPBD, which reads as follows[10]:

> *'3a. 'building automation and control system' means a system comprising all products, software and engineering services that can support energy efficient, economical and safe operation of technical building systems through automatic controls and by facilitating the manual management of those technical building systems;'*

In addition, a BACS within the scope of Article 14-15 of the revised EPBD must have all of the capabilities listed in paragraph 4 of Article 14 and 15, which read as follows:

- *'continuously monitor, log, analyse and allow for adjusting energy use;*
- *benchmark the building's energy efficiency, detect losses in efficiency of technical building systems, and inform the person responsible for the facilities or technical building management about opportunities for energy efficiency improvement; and*
- *allow communication with connected technical building systems and other appliances inside the building, and be interoperable with technical building systems across different types of proprietary technologies, devices and manufacturers.'*

[10] This definition is close to the one given in standard EN 15232.

Building automation and control systems installed in non-residential buildings pursuant to the obligations of Article 14(4) and 15(4) must *both* comply with the definition of Article 2(3a) and include the capabilities listed above. The latter must be ensured at least for the technical building systems that fall under the scope of Articles 14 and 15 of the revised EPBD: heating systems, air-conditioning systems, combined heating and ventilation systems, combined air-conditioning and ventilation systems.

While automation and control systems have been common for some categories of buildings (e.g. in the non-residential area), the vast majority of them do not have such advanced capabilities and therefore will – for the buildings that fall under the obligations – require upgrades, which can be significant.

It is therefore of particular importance that the interested parties (e.g. facility managers of buildings that fall under the obligations) are made aware of the fact that the scope of the requirements is beyond the broad conception of what such systems normally cover.

4.3. When obligations are triggered

The provisions on the installation of building automation and control systems apply to all (i.e. new and existing) non-residential buildings with systems for heating, air-conditioning, combined heating and ventilation, combined air-conditioning and ventilation systems over 290 kW of effective rated output.

The 290 kW threshold applies to each system individually, i.e. the obligations will apply in all of the following cases:

i. When the effective rated output of the heating system is above 290 kW;
ii. When the effective rated output of the combined heating and ventilation system is above 290 kW;
iii. When the effective rated output of the air-conditioning system is above 290 kW;
iv. When the effective rated output of the combined air-conditioning and ventilation system is above 290 kW.

4.3.1. Determination of effective rated output

The effective rated output corresponds to the maximum output (in kW) during operation, as stated by the manufacturer of the system[11]:

- Rated heat output for a heating system;
- Rated cooling output for an air-conditioning system.

Member States may also refer to the definition of 'effective rated output' given in Article 2(17) of the EPBD.

As stated previously, the threshold on the effective rated output applies to each system individually (heating, air-conditioning, combined heating / air-conditioning and ventilation).

[11] Such information is part of the product information required under the different Ecodesign regulations for heating and cooling products.

Where combined systems are in place, the effective rated output must reflect the capacity of the combination of systems[12] [13].

Usually, a system will comprise more than one unit that operate jointly. In this case, the effective rated output corresponds to the sum of the effective rated outputs of the individual units.

4.4. Technical and economic feasibility

The provisions state that the obligations to install building automation and control systems apply when this installation is technically and economically feasible.

- Technical feasibility generally refers to possible technical barriers that can prevent or make technically irrelevant the obligations,
- Economic feasibility generally relates to the upfront price (including installation) and the running costs of BACS and, to how these costs compare to expected benefits and other costs borne by the investor.

In the vast majority of cases, the issue of technical and economic feasibility will not apply for new buildings, as: (i) the design of buildings and systems can ensure that there is no technical barrier to the installation of BACS; (ii) the design of buildings and systems can ensure that the costs for the installation of BACS will be minimized; (iii) BACS are already part of common practices for new large non-residential buildings.

With regard to existing buildings, the only cases where technical feasibility can be an issue are where the technical building systems cannot be controlled, or when making them controllable would require substantial alterations to the systems and / or to the building, which would inevitably lead to prohibitive costs. Such situations, considering the size of the buildings concerned, can only happen where the buildings are equipped with old systems and should not frequently arise.

Also with regard to existing buildings, economic feasibility can be linked to the upfront and running costs and / or to the payback period of the investment required to install BACS. A possible approach is to evaluate the economic feasibility based on the energy cost savings generated by the BACS and to compare them to upfront and running costs of the BACS, over its lifetime. This can be supplemented by an evaluation of the proportionality of the upfront costs for installing BACS in the building in question, based on such parameters as e.g. its size or its energy consumption[14].

[12] For ventilation systems, the notion of effective rated output does not apply as such, but the effective electric power input can be used instead. Noting that in most cases, the effective rated output for heating (resp. air-conditioning) purposes will by far outweigh the power input for ventilation purposes.

[13] The guidance on inspections of technical building systems under Article 14-15 includes useful insights on combined heating / air-conditioning and ventilation systems.

[14] The 'décret tertiaire' french act (2017) e.g. set a threshold of maximum 200 €/m^2 for the investment and a maximum payback time of 10 years for public buildings and 5 years for others (hotels, offices, etc.).

Type of feasibility	How it can translate	Can apply to	
		New buildings	Existing buildings
Technical feasibility	The technical building systems cannot be controlled without substantial alterations	No	Yes (but rare)
Economic feasibility	The upfront costs are excessive with regard to the building's characteristics.	No	Yes (but not frequent)
	The investment does not sufficiently pay back.	No	Yes (but rare)

5. IMPLEMENTATION OF THE PROVISIONS APPLYING TO BUILDING AUTOMATION AND CONTROL SYSTEMS IN ARTICLE 14-15 OF THE REVISED EPBD

5.1. Transposition of the requirements

Articles 14(4) and 15(4) of the revised EPBD refer to 2025 as the date by when non-residential buildings shall be equipped with building automation and control systems satisfying the conditions established in those articles. But Member States must lay down the requirements to ensure such equipping beforehand, by the transposition deadline (i.e. 10 March 2020).

In transposing the requirements on the installation of building automation and control systems, Member States shall ensure that the capabilities of the systems whose installation is required are in line with both the definition of building automation and control systems given under Article 2(3a) and the capabilities listed in points (a), (b) and (c) of Article 14(4) and 15(4) (see section 4.2).

While compliance with the definition of BACS should not bring any particular difficulty, the identification – for a given building – of available capabilities and their mapping to the ones prescribed under the revised EPBD can be challenging. A possible approach, in order to facilitate the exercise, is to map these capabilities to BACS functions and classes as defined in available standards, in particular under EN 15232[15].

In any case, Member States are encouraged to provide professionals with dedicated technical guidelines in order to support the assessment of BACS capabilities, the identification of potential gaps, and give recommendations on how to effectively fill these possible gaps.

5.2. Technical and economic feasibility

It is for Member States to detail in which specific cases the installation of BACS could not be feasible from a technical or economic perspective. Member States must ensure that these cases are clearly identified, framed and justified.

[15] As a first-order estimate, the BACS capabilities required under Article 14-15 could correspond to B-class BACS under EN 15232.

In particular the interpretation of technical and economic feasibility must not be left to owners or to system installers. Conditions under which feasibility is evaluated must be defined at Member State level or, where applicable, in the case of regional conditionalities affecting only part of the Member State territory, at regional level. However, in the latter case, regional conditionalities must be defined in national transposition measures. In any case, these conditions must be documented (e.g. in technical guidelines) and apply uniformly on the national (or, where applicable, regional) territory. Finally, the decision not to install BACS on the grounds of technical or economic (un)feasibility must be assessed under clear procedures established by public authorities.

6. GOOD PRACTICES

6.1. Self-regulating devices

6.1.1. Verification and enforcement

As part of their wider responsibility and efforts to ensure effective implementation and enforcement of the Directive, Member States will also have to consider how to verify compliance with the new requirements for the installation of self-regulating devices under Article 8(1).

When these requirements apply to new buildings, Member States may rely on existing processes related to building permits.

When these requirements apply to existing buildings where heat generators are replaced, Member States may rely on existing processes on the verification of the compliance of heating systems with requirements established under Article 8(1), as the replacement of heat generators will generally constitute a system upgrade and trigger the application of the requirements.

6.2. Building Automation and Control Systems

6.2.1. Verification and enforcement

As part of their wider responsibility and efforts to ensure effective implementation and enforcement of the Directive, Member States will also have to consider how to verify compliance with the new requirements for the installation of BACS under Article 14-15.

The aim will be to ensure that owners, facility manager or energy managers of the buildings falling under these requirements are made aware of their entry into force early in advance in order to be able to plan and execute in the best way the necessary works.

As all Member States have put in place inspections of heating and air-conditioning systems, or equivalent alternative measures, under the former EPBD, Member States may consider relying on those schemes to verify and enforce the requirements, as all buildings that fall under these requirements are also in the scope of mandatory inspections (or alternative measures) under Article 14-15.

Member States may also consider link the supervision and enforcement of these requirements with the enforcement of system requirements under Article 8(1), as the installation, replacement or upgrade of a heating, air-conditioning and / or ventilation system may be an opportunity to also install a BACS.

6.2.2. Mixed-use buildings

The requirements on the installation of BACS apply to non-residential buildings only, which means buildings that are used for a purpose other than residential (i.e. office buildings, healthcare buildings, wholesale and retail trade buildings, educational buildings, hotels and restaurants, etc.)

With regard to mixed-used buildings, i.e. buildings that include both residential and non-residential units (e.g. a residential building with shops on the ground floor), Member States may define the most suitable approach. However, they should consider the following guidelines in order to avoid legal loopholes.

When systems are integrated (i.e. the non-residential units and the residential ones use the same systems) and the effective rated output is above the threshold, the following options are open to Member States:

i. Apply the requirements to the whole building,
ii. Apply the requirements only to non-residential units,
iii. Apply the requirements only to non-residential units if the associated 'non-residential' rated output is above the threshold[16].

When systems are distinct (i.e. the non-residential units and the residential ones have different systems) and the effective rated output of the non-residential units' systems is above the threshold, requirements should apply at least to the non-residential units.

6.2.3. Maintenance of BACS

As for any technical building system, proper maintenance of BACS is necessary to ensure that they operate adequately, in particular when it comes to their ability to predict, detect and address sub-optimal functioning or malfunctioning of other technical building systems.

It is therefore important that BACS, as other technical building systems, are followed over their lifetime in order to check their performance and make any adaptation needed. This issue is well known and there exist different schemes, from the industry[17] and national authorities[18], as well as dedicated standards[19], which can support the proper maintenance of BACS.

[16] In this latter case, the effective rated output associated to non-residential units can be based on the share of non-residential units in the building. This share can calculated from the energy consumption or (but probably less relevant) on the surface area. For instance: a mixed-use buildings with an effective rated output for heating of 500 kW, in which non-residential buildings represent 70% of total energy consumption, would lead to a non-residential effective rated output of 0,7 * 500 = 350 kW, which is above the threshold.

[17] E.g. eu.bac system certification (https://www.eubac.org/system-audits/index.html) or, in Germany, VDMA 24186-4 "Program of services for the maintenance of technical systems and equipment in buildings – Part 4: Measurement and control equipment and building automation and control systems" (https://www.vdma.org/en/v2viewer/-/v2article/render/15979771).

[18] E.g. in Germany, AMEV Wartung (https://www.amev-online.de/AMEVInhalt/Betriebsfuehrung/Vertragsmuster/Wartung%202014/)

[19] E.g. EN 16946-1:2017 'Energy Performance of Buildings. Inspection of Automation, Controls and Technical Building Management'