**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**

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# 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]](#footnote-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.

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

## 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]](#footnote-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.

## Self-regulating devices

### 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),
* 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 temperature would not fulfil the requirements, even if the adjustment can be performed at room (or zone) level.
* Any solution that allow 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.

### 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 cooling systems.

Therefore, not only heating systems – but also air-conditioning / cooling ones – 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.

### 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 ‘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 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).

### 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:

|  |  |  |
| --- | --- | --- |
| **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 |

## 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).

### Note on 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;*

*(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).

## 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 (and uncommon) 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.”*

1. 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) |

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

## 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:

* All new buildings delivered as from the date of the national transposition of these obligations will have to be equipped with self-regulating devices.
* 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.

## 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.

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

## 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.

## 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[[3]](#footnote-3):

*“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.”*

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.

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.

## 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:

1. When the effective rated output of the heating system is above 290 kW;
2. When the effective rated output of the combined heating and ventilation system is above 290 kW;
3. When the effective rated output of the air-conditioning system is above 290 kW;
4. When the effective rated output of the combined air-conditioning and ventilation system is above 290 kW.

### Mixed-use buildings

The requirements 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:

1. Apply the requirements to the whole building,
2. Apply the requirements only to non-residential units,
3. Apply the requirements only to non-residential units if the associated ‘non-residential’ rated output is above the threshold[[4]](#footnote-4).

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.

### 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.

As stated previously, the threshold on the effective rated output applies to each system individually (heating, air-conditioning, combined heating / air-conditioning and ventilation). Where combined systems are in place, the effective rated output must reflect the capacity of the combination of systems[[5]](#footnote-5) [[6]](#footnote-6).

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.

## 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[[7]](#footnote-7).

|  |  |  |  |
| --- | --- | --- | --- |
| **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) |

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

## 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[[8]](#footnote-8).

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. (e.g. Quality assurance of the BACS, the need of BACS when Commissioning a new building for datalogging and monitoring when performing the Commissioning Functional Performance Tests)

## 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.

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.

# GOOD PRACTICES

To be completed in subsequent steps.

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. [↑](#footnote-ref-1)
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’. [↑](#footnote-ref-2)
3. This definition is close to the one given in standard EN 15232. [↑](#footnote-ref-3)
4. 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. [↑](#footnote-ref-4)
5. Noting that in most cases, the effective rated output for heating (resp. air-conditioning) purposes will by far outweigh the effective rated output for ventilation purposes. [↑](#footnote-ref-5)
6. The guidance on inspections of technical building systems under Article 14-15 includes useful insights on combined heating / air-conditioning and ventilation systems. [↑](#footnote-ref-6)
7. The ‘décret tertiaire’ french act (2017) e.g. set threshold of maximum 200 €/m2 for the investment and a maximum payback time of 10 years for public buildings and 5 years for others (hotels, offices, etc.). [↑](#footnote-ref-7)
8. As a first-order estimate, the BACS capabilities required under Article 14-15 could correspond to B-class BACS under EN 15232. [↑](#footnote-ref-8)