Definitions

Art. 2, point 3 – Definition of "technical building system"

Commission	EP	Council	eu.bac remarks
'3. 'technical building system' means technical equipment for space heating, space cooling, ventilation, domestic hot water, built-in lighting, building automation and control, on-site electricity generation, on-site infrastructure for electro mobility, or a combination of such systems, including those using energy from renewable sources, of a building or building unit;';	3. 'technical building system' means technical equipment for space heating, space cooling, ventilation, management of indoor air quality, domestic hot water, built-in indoor and outdoor lighting systems, solar shading, elevators and escalators, building automation and control, building data transmission and storage, on-site electricity generation and storage, on-site infrastructure for electro-mobility, or a combination of such systems, including those using energy from renewable sources, of a building or building unit;	'3. 'technical building system' means technical equipment for space heating, space cooling, ventilation, domestic hot water, built-in lighting, building automation and control, on-site electricity generation, [ ] or a combination of such systems, including those systems using energy from renewable sources, of a building or building unit;';	eu.bac welcomes the inclusion of "building automation and control". In addition, the inclusion of "solar shading" is positive, as solar shading technologies have significant saving potential for cooling energy. They should be considered systematically for optimization of energy performance of technical building systems.

eu.bac european building automation controls association

Art. 2, point 16a – Definition of "building automation and control system"

Commission	EP	Council	eu.bac remarks
	'16a. "building automation and control system" means a system comprising all products, software and engineering services for automatic controls including interlocks, monitoring, optimisation, for operation, human intervention and management to achieve energy-efficient, economical and safe operation of technical building systems'		eu.bac welcomes the inclusion of "building automation and control". In addition, the inclusion of "solar shading" is positive, as solar shading technologies have significant saving potential for cooling energy. They should be considered systematically for optimization of energy performance of technical building systems.

eu.bac european building automation controls association

Individual Room Temperature Control Functionality

Art. 8, paragraph 1, third subparagraph I - Individual Room Temperature Control

Commission	EP	Council	eu.bac remarks
	Member States shall require that new buildings are equipped with self-regulating devices that regulate room temperature levels in each individual room. In existing buildings, the installation of self-regulating devices to individually regulate the room temperature shall be required when heat generators are replaced.		Individual room temperature control is a functionality that is basic for an acceptable energy performance in any building in continuous use. It is missing in a large part of the corresponding stock, despite a pay-back time of the low-capital investment of about 2 years. It is a low-capital investment (1.5 €/m2), payback 1-3 years, returns 7 times higher than the costs. The approach of the European Parliament is a no-regret. It maximises the benefits from investments in heat generator exchange. And it minimizes investment costs, as heat generator

			exchange is a convenient point in time for overall system optimization, and in particular installation of individual room temperature control.

Technical buildings systems

Art. 8.5 - Technical building systems

Commission	EP	Council	eu.bac remarks
5. Member States shall ensure that, when a technical building system is installed, replaced or upgraded, the overall energy performance of the complete altered system is assessed, documented it and passed on to the building owner, so that it remains available for the verification of compliance with the minimum requirements set pursuant to paragraph 1 and the issue of energy	5. Member States shall ensure that, when a technical building system is installed, replaced or upgraded, the overall energy performance of the complete altered system is assessed, ***both at full load and part load conditions*****, and when relevant, the impact on indoor air quality should also be assessed. The results shall be** documented and passed on to the building owner, so that it remains available for the verification of compliance with the minimum requirements	Member States shall ensure that, when a technical building system **for space heating, air conditioning or water heating** is installed, replaced or upgraded, **unless this does not have an impact on its energy performance, the new performance of the system *or* of the altered part** is documented and passed on to the building owner, so that it remains available and can be used for the verification of compliance with the minimum requirements set	*1) Technical buildings systems vs a subset of technical building systems* The text agreed in the Council suggests limiting the assessment to those technical building systems for space heating, air conditioning or water heating. Such a limitation is unjustified, as it risks missing significant improvement potentials of increasingly diverse technical building systems. It is of key importance that every opportunity is taken to quantify and improve

performance certificates. Member States shall ensure that this information is included in the national energy performance certificate database referred to in Article 18(3).	set pursuant to paragraph 1 and the issue of energy performance certificates. Member States shall ensure that this information is included in the national energy performance certificate database referred to in Article 18(3).	pursuant to paragraph 1 and the issue of energy performance certificates. *Without prejudice to Article 12, Member States shall decide whether to require the issue of a new energy performance certificate*.	the energy performance of all technical building The scope encompassing all technical building systems should be retained. 2) <u>*Part load conditions*</u> The approach of the European Parliament ensures that system performance is optimized for actual conditions, not for theoretical conditions. This will ensure that energy performance is closer to expectations, thereby increasing investors' trust in energy efficiency investments. In practice, establishing system performance under actual part loads does not require any measurements. It is sufficient to check a few system features with uncomplicated checklists, which can be flexible for different types of buildings and climate conditions, considering e.g. EPB standards. Today optimization of system performance is not done for actual use. The self-standing *product* performance established e.g. under ecodesign for heat generators under one or more standardized full and part load conditions will

			not be achieved under actual non-standardized *system* conditions – similar to the discrepancy of vehicle fuel consumption under standard and actual use. This observation was the reason to establish Article 8 in the 2010 EPBD. The actual system performance depends on well-established functions, such as adaptation of energy use to actual outside temperature (not considered under eco-design), balancing of hydronic heating and cooling systems (not considered by eco-design), indoor temperature control, or variable adaptation of air flow in ventilation systems, depending on occupancy. *3) <u>Object of the assessment</u>* When a TBS is installed, replaced or upgraded, the Council text would *not* require assessment and documentation of the overall energy performance of the complete altered system. Limiting system performance assessment to “altered parts“ is in contradiction with the objective of system performance optimization.

			This would create red tape without added value.

Inspections

Art. 14 – heating systems

Commission	EP	Council	eu.bac remarks
'1. Member States shall lay down the necessary measures to establish a regular inspection of the accessible parts of systems used for heating buildings, such as the heat generator, control system and circulation pump(s) for non-residential buildings with total primary energy use of over 250MWh and for residential buildings with a centralised technical building system of a ***cumulated effective rated output of over 100 kW***. That inspection shall include an assessment of the	'1. Member States shall lay down the necessary measures to establish a regular inspection of the accessible parts of systems used for heating buildings, such as the heat generator, control system and circulation pump(s) for non-residential buildings with total primary energy use of over 250MWh and for residential buildings with a technical building system **for space and domestic water heating**	Member States shall lay down the necessary measures to establish a regular inspection of the accessible parts of systems with an ***effective rated output for space heating purposes of over 70 kW***, such as the heat generator, control system and circulation pump(s) used for heating buildings. That inspection shall include an assessment of the heat generator efficiency and the heat generator sizing compared with the heating requirements	

boiler efficiency and the boiler sizing compared with the heating requirements of the building. The assessment of the boiler sizing does not have to be repeated as long as no changes were made to the heating system or as regards the heating requirements of the building in the meantime.'; 	**purposes** of a ***cumulated effective rated output of over 70 kW.*** That inspection shall include an assessment of the **heat generator** efficiency, **<u>both at full load and part load condition</u>,** and the **heat generator** sizing compared with the heating requirements of the building. The assessment of the **heat generator** sizing does not have to be repeated as long as no changes were made to the heating system or as regards the heating requirements of the building in the meantime.'; 	of the building. The assessment of the **heat generator** sizing does not have to be repeated as long as no changes were made to the heating system or as regards the heating requirements of the building in the meantime. Member States that maintain more stringent requirements pursuant to Article 1(3) shall be exempted from the obligation to notify them to the Commission.'; 	
(b) paragraphs 2, 3, 4 and 5 are deleted and replaced by the following: 	(b) paragraphs 2, 3, 4 and 5 are deleted and replaced by the following: 	[ ] 	
		'2a. As an alternative to paragraph 1, Member States may opt to take measures to ensure that adequate advice is given to users concerning the replacement of heat generators, other modifications to the heating system and	The Commission and EP's proposals already include cost-efficient and effective alternatives to inspections, such as electronic monitoring, building automation and controls and energy saving programmes.

		alternative solutions to assess the efficiency and appropriate size of the heating generator. The overall impact of such an approach shall be equivalent to the impact arising from the measures taken pursuant to paragraph 1.	Having "adequate advice to users" as an alternative to inspections means, in many cases, having a leaflet signed by an expert, with no real intervention on the heating and air-conditioning systems. There is evidence that such measures cannot effectively maintain the energy performance of buildings and their technical systems, this leads to unnecessary energy expenses to be borne e.g. by tenants.
'2. As an alternative to paragraph 1 Member States **may set requirements to ensure** that non-residential buildings with total primary energy use of over 250 MWh per year are equipped with building automation and control systems. These systems shall be capable of: (a) continuously monitoring, analysing and adjusting energy usage; (b) benchmarking the building's energy efficiency, detecting losses in efficiency of technical building systems, and informing the person responsible for the facilities or technical	2. Member States ***shall require*** that non-residential buildings with total primary energy use of over 250 MWh per year are equipped with building automation and control systems ***by 2023***. These systems shall be capable of: a) continuously monitoring, **logging,** analysing and adjusting energy usage **to enable optimal energy performance at full load and part load conditions**; b) benchmarking the building's energy	(b) paragraphs 2, 3, 4 and 5 are deleted and replaced by the following: '2a. As an alternative to paragraph 1, Member States may opt to take measures to ensure that ***adequate advice*** is given to users concerning the replacement of heat generators, other modifications to the heating system and alternative solutions to assess the efficiency and appropriate size of the heating generator. The overall impact of this approach shall be equivalent to the impact arising from the	The revision of the EPBD aims at accelerating the cost-effective renovation of buildings and modernizing the provisions in the light of technological developments, such as Building Automation and Control systems (BACs). Despite the significant potential of BACs, in particular for large buildings, their deployment is still not sufficient, mainly because of split incentives between owners and tenants, and the lack of awareness on their huge potential. In a nutshell, BACS can:

building management about opportunities for energy efficiency improvement; (c) allowing communication with connected technical building systems and other appliances inside the building, and being interoperable with technical building systems across different types of proprietary technologies, devices and manufacturers.	efficiency, detecting losses in efficiency of technical building systems, and informing the person responsible for the facilities or technical building management about opportunities for energy efficiency improvement; c) allowing communication with connected technical building systems and other appliances inside the building, and being interoperable with technical building systems across different types of proprietary technologies, devices and manufacturers.	measures taken pursuant to paragraph 1. 2. As an alternative to paragraph 1 for non-residential buildings, Member States may set requirements to ensure that they are equipped with building automation and control systems. These systems shall be capable of: (a) continuously monitoring, analysing and allowing for adjusting energy usage; (b) benchmarking the building's energy efficiency, detecting losses in efficiency of technical building systems, and informing the person responsible for the facilities or technical building management about opportunities for energy efficiency improvement; (c) allowing communication with connected technical building systems and other appliances inside the building, and being interoperable with technical building systems across different types of proprietary technologies, devices and manufacturers.	• ***REDUCE EMISSIONS AND HELP EUROPE ACHIEVE ITS ENERGY OBJECTIVES:*** The estimated annual saving of energy/gas consumption, costs and GHG emissions in the stock of non-residential buildings is respectively 465 TWh/ 40 Mtoe, 48€ billion, and 80 million tons CO2 emissions. The annual energy savings are up to 20.3% of all EU service sector building energy consumption. • ***SAVE MONEY:*** Investments in BACS are low capital investments, with a fast payback time, between 2 and 2 years. The average cost is 30 €/m2 in non-residential buildings, and by 2035, the cumulative energy savings can be 15 to 19 times as great as the magnitude of the additional investment. Moreover, with their ability to continuously monitoring the energy usage, benchmarking the building's energy efficiency and detecting losses in energy efficiency of technical building systems, they can replace physical inspections and, therefore, allowing the building owner to avoid the costs and burdens of

			periodically inspections in a cost-efficient manner. • ***BOOST DIGITALIZATION AND JOBS:*** An incentivizing policy framework for BACS would create 200.00 - 300.00 direct jobs and 3.7 million indirect jobs by 2030. A change in the regulatory framework would also drive manufacturers' investments into R&D, innovation and manufacturing, in particular on smart digital technologies. • ***INCREASE HEALTH AND COMFORT OF THE OCCUPANTS:*** They act as an integrator of all installed technical building systems - HVAC, lighting, solar shading, but also appliances - and enable their coordination, e.g. preventing "conflicting" space heating and cooling. • ***FACILITATE THE INTEGRATION OF RENEWABLES:*** They facilitate the integration of on-site renewable energy sources e.g. in nZEBs, and maximize self-

			consumption. In order to be consistent with an ambitious review of the Renewable Energy Directive, it is key to make the buildings more dynamic and ready for renewables.
3. **As an alternative to paragraph 1** Member States may set requirements to ensure that residential buildings with centralised technical building systems of a cumulated effective rated output of over 100 kW are equipped: a) with continuous electronic monitoring that measures systems' efficiency and inform building owners or managers when it has fallen significantly and when system servicing is necessary, and b) with effective control functionalities to ensure optimum generation, distribution and use of energy.’;	3. Member States may **require** that residential buildings with technical building systems of a cumulated effective rated output **for space and domestic water heating purposes** of over **70** kW are equipped: a) with continuous electronic monitoring **functionality** that measures systems' efficiency and inform building owners or managers when it has fallen significantly and when system servicing is necessary, and b) with effective control functionalities to ensure optimum generation, distribution**, storage** and use of energy **at both full load and part load conditions**	3. As an alternative to paragraph 1 for residential buildings, Member States may set requirements to ensure that they are equipped: (a) with continuous electronic monitoring that measures systems' efficiency and inform building owners or managers when it has fallen significantly and when system servicing is necessary, and (b) with effective control functionalities to ensure optimum generation, distribution and use of energy.’;	This paragraph should necessarily be integrated with subparagraph 3a (see comments below), in order to give the choice to economic operators to choose between inspections or electronic monitoring functionalities. The wording “may require/set requirements” without subparagraph 3a does not provide certainty for economic operators.

	including hydronic balancing.’;		
	3a. Buildings that comply with paragraph 2 or 3 shall be exempted from the requirements laid down in paragraph 1.		This subparagraph (3a) is necessary to ensure that economic operators have the choice between inspection and electronic monitoring functionalities.
	3b. Technical building systems explicitly covered by an agreed energy performance criterion or a contractual arrangement on an agreed level of energy efficiency improvement, such as energy performance contracting as defined in point (27) of Article 2 of Directive 2012/27/EU, or that are operated by a utility or network operator and therefore subject to performance monitoring measures on the system side, shall be exempted from the requirements laid down in paragraph 1.		

Art. 15 – air-conditioning systems

Commission	EP	Council	eu.bac remarks
paragraph 1 is replaced by the following: '1. Member States shall lay down the necessary measures to establish a regular inspection of the accessible parts of air-conditioning systems for non-residential buildings with total primary energy use of over 250MWh and for residential buildings with a centralised technical building system of a cumulated effective rated output of over 100 kW. The inspection shall include an assessment of the air-conditioning efficiency and the sizing compared to the cooling requirements of the building. The assessment of the sizing does not have to be repeated as long as no	paragraph 1 is replaced by the following: 1. Member States shall lay down the necessary measures to establish a regular inspection of the accessible parts of air-conditioning **and ventilation** systems for non-residential buildings with total primary energy use of over 250MWh and for residential buildings with a technical building system **for air-conditioning and ventilation** of a cumulated effective rated output of over **12kW**. The inspection shall include an assessment of the air-conditioning **and ventilation** efficiency**, both at full load and part load condition,** and the sizing compared to the cooling requirements of the building. The assessment of the sizing does not	(a) paragraph 1 is replaced by the following: '1. Member States shall lay down the necessary measures to establish a regular inspection of the accessible parts of air-conditioning systems with an effective rated output of over 70 kW. The inspection shall include an assessment of the air-conditioning efficiency and the sizing compared to the cooling requirements of the building. The assessment of the sizing does not have to be repeated as long as no changes were made to this air-conditioning system or as regards the cooling requirements of the building in the meantime.	

changes were made to this air-conditioning system or as regards the cooling requirements of the building in the meantime.’;	have to be repeated as long as no changes were made to this air-conditioning **or ventilation** system or as regards the cooling requirements of the building in the meantime. **Member States may set different inspection frequencies depending on the type and effective rated output of the air-conditioning system, whilst taking into account the costs of the inspection of the system and the estimated energy cost savings that may result from the inspection**;		
paragraphs 2, 3, 4 and 5 are deleted and replaced by the following:	paragraphs 2, 3, 4 and 5 are deleted and replaced by the following:	**[ ]**	
		Member States that maintain more stringent requirements pursuant to Article 1(3) shall be exempted from the obligation to notify them to the Commission.’;	

		'2a. As an alternative to paragraph 1, Member States may opt to take measures to ensure the prevision of advice to users concerning the replacement of air-conditioning systems, other modifications to the air-conditioning system and alternative solutions to assess the efficiency and appropriate size of the air-conditioning system. The overall impact of such an approach shall be equivalent to that arising from the provisions set out in paragraph 1.	The Commission and EP's proposals already include cost-efficient and effective alternatives to inspections, such as electronic monitoring, building automation and controls and energy saving programmes. Having "advice to users" as an alternative to inspections means, in many cases, having a leaflet signed by an expert, with no real intervention on the heating and air-conditioning systems. There is evidence that such measures cannot effectively maintain the energy performance of buildings and their technical systems, this leads to unnecessary energy expenses to be borne e.g. by tenants.
'2. **As an alternative to paragraph 1** Member States **may set requirements to ensure** that non-residential buildings with total primary energy use of over 250 MWh per year are equipped with building automation and control systems. These systems shall be capable of: a) continuously monitoring, analysing	'2. Member States **shall** require that non-residential buildings with total primary energy use of over 250 MWh per year are equipped with building automation and control systems **by 2023**. These systems shall be capable of: a) continuously monitoring, analysing**, logging** and adjusting energy usage **to**	2. As an alternative to paragraph 1 for non-residential buildings, Member States may set requirements to ensure that they are equipped with building automation and control systems. These systems shall be capable of: (a) continuously monitoring, analysing and adjusting energy usage;	The revision of the EPBD aims at accelerating the cost-effective renovation of buildings and modernizing the provisions in the light of technological developments, such as Building Automation and Control systems (BACs). Despite the significant potential of BACs, in particular for large buildings, their deployment is still not sufficient, mainly because of split incentives between owners and tenants, and

and adjusting energy usage; b) benchmarking the building's energy efficiency, detecting losses in efficiency of technical building systems, and informing the person responsible for the facilities or technical building management about opportunities for energy efficiency improvement; c) allowing communication with connected technical building systems and other appliances inside the building, and being interoperable with technical building systems across different types of proprietary technologies, devices and manufacturers.	**enable optimal energy performance at full load and part load conditions**; b) benchmarking the building's energy efficiency, detecting losses in efficiency of technical building systems, and informing the person responsible for the facilities or technical building management about opportunities for energy efficiency improvement; c) allowing communication with connected technical building systems and other appliances inside the building, and being interoperable with technical building systems across different types of proprietary technologies, devices and manufacturers.	(b) benchmarking the building's energy efficiency, detecting losses in efficiency of technical building systems, and informing the person responsible for the facilities or technical building management about opportunities for energy efficiency improvement; (c) allowing communication with connected technical building systems and other appliances inside the building, and being interoperable with technical building systems across different types of proprietary technologies, devices and manufacturers.	the lack of awareness on their huge potential. In a nutshell, BACS can: • ***REDUCE EMISSIONS AND HELP EUROPE ACHIEVE ITS ENERGY OBJECTIVES:*** The estimated annual saving of energy/gas consumption, costs and GHG emissions in the stock of non-residential buildings is respectively 465 TWh/ 40 Mtoe, 48€ billion, and 80 million tons CO2 emissions. The annual energy savings are up to 20.3% of all EU service sector building energy consumption. • ***SAVE MONEY:*** Investments in BACS are low capital investments, with a fast payback time, between 2 and 2 years. The average cost is 30 €/m2 in non-residential buildings, and by 2035, the cumulative energy savings can be 15 to 19 times as great as the magnitude of the additional investment. Moreover, with their ability to continuously monitoring the energy usage, benchmarking the building's energy efficiency and detecting losses in energy efficiency

			of technical building systems, they can replace physical inspections and, therefore, allowing the building owner to avoid the costs and burdens of periodically inspections in a cost-efficient manner. • ***BOOST DIGITALIZATION AND JOBS:*** An incentivizing policy framework for BACS would create 200.00 - 300.00 direct jobs and 3.7 million indirect jobs by 2030. A change in the regulatory framework would also drive manufacturers' investments into R&D, innovation and manufacturing, in particular on smart digital technologies. • ***INCREASE HEALTH AND COMFORT OF THE OCCUPANTS:*** They act as an integrator of all installed technical building systems - HVAC, lighting, solar shading, but also appliances - and enable their coordination, e.g. preventing "conflicting" space heating and cooling.

			• ***<u>FACILITATE THE INTEGRATION OF RENEWABLES:</u>*** They facilitate the integration of on-site renewable energy sources e.g. in nZEBs, and maximize self-consumption. In order to be consistent with an ambitious review of the Renewable Energy Directive, it is key to make the buildings more dynamic and ready for renewables.
3. **As an alternative to paragraph 1** Member States may set requirements to ensure that residential buildings with centralised technical building systems of a cumulated effective rated output of over 100 kW	3. Member States may **require** that residential buildings with technical building systems of a cumulated effective rated output **for air-conditioning or ventilation** of over **12 kW are equipped:**	3. As an alternative to paragraph 1 for residential buildings, Member States may set requirements to ensure that they are equipped:	This paragraph should necessarily be integrated with subparagraph 3a (see comments below), in order to give the choice to economic operators to choose between inspections or electronic monitoring functionalities. The wording "may require/set requirements" without subparagraph 3a does not provide certainty for economic operators.
a) with continuous electronic monitoring that measures systems' efficiency and inform building owners or managers when it has fallen	a) with continuous electronic monitoring **functionality** that measures systems' efficiency and inform building owners or managers when it has	(a) with continuous electronic monitoring that measures systems' efficiency and inform building owners or managers when it has fallen significantly and when	*<u>On Part load conditions:</u>* The approach of the European Parliament ensures that system performance is optimized for actual conditions, not for theoretical conditions. This will ensure that

significantly and when system servicing is necessary, and b) with effective control functionalities to ensure optimum generation, distribution and use of energy.’;	fallen significantly and when system servicing is necessary, and b) with effective control functionalities to ensure optimum generation, distribution**, storage** and use of energy **at both full and part load conditions including hydronic balancing.’;**	system servicing is necessary, and (b) with effective control functionalities to ensure optimum generation, distribution and use of energy.’;	energy performance is closer to expectations, thereby increasing investors’ trust in energy efficiency investments. In practice, establishing system performance under actual part loads does not require any measurements. It is sufficient to check a few system features with uncomplicated checklists, which can be flexible for different types of buildings and climate conditions, considering e.g. EPB standards. Today optimization of system performance is not done for actual use. The self-standing *product* performance established e.g. under ecodesign for heat generators under one or more standardized full and part load conditions will not be achieved under actual non-standardized *system* conditions – similar to the discrepancy of vehicle fuel consumption under standard and actual use. This observation was the reason to establish Article 8 in the 2010 EPBD. The actual system performance depends on well-established functions, such as adaptation of energy use to actual

			outside temperature (not considered under eco-design), balancing of hydronic heating and cooling systems (not considered by eco-design), indoor temperature control, or variable adaptation of air flow in ventilation systems, depending on occupancy.
	3a. Buildings that comply with paragraph 2 or 3 shall be exempted from the requirements laid down in paragraph 1.		This subparagraph (3a) is necessary to ensure that economic operators have the choice between inspection and electronic monitoring functionalities.
	3b. Technical building systems explicitly covered by an agreed energy performance criterion or a contractual arrangement on an agreed level of energy efficiency improvement, such as energy performance contracting as defined in point (27) of Article 2 of Directive 2012/27/EU, or that are operated by a utility or network operator and therefore subject to performance monitoring measures on the system side, shall be exempted from the requirements laid down in paragraph 1.		