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Survey across EU Member States
The inclusion of building automation and controls in legislation and building codes

Data collection: August 2015 – August 2016

Survey across EU Member States
The inclusion of building automation and controls in legislation and building codes

This document has been prepared for having an overview about how the Energy Performance of Buildings Directive (EPBD 2010/31/EU) recommendation for the application of building automation, controls and building technical management has been transposed and implemented at Member State level across the European Union.

Date

26 September 2016

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Disclaimer

1. Introduction

The Energy Performance of Buildings Directive (EPBD 2010/31/EU) recommends the application of building automation and controls for increasing the energy performance of both existing and new buildings.

The scope of this survey is to determine how these recommendation are transposed and implemented at Member State level across the European Union.

The results are meant to feed in the evidence base during the current EPBD review process for helping the European Commission, European Parliament and Council of Ministers make and take an informed decision that will increase EPBD's effectiveness in contributing to EU's climate and energy targets.

2. Questionnaire

The live survey is included in Annex I. Respondents were asked the following questions:

1. **Legislation** – inclusion of building automation and controls (BAC) at Member State level

1.1. EPBD Article 3 (Adoption of a methodology for calculating the energy performance of buildings): Are BAC considered in the calculation methodology (new/existing & residential/non-residential)?

Member States shall apply a methodology for calculating the energy performance of buildings in accordance with the common general framework set out in Annex I. This methodology shall be adopted at national or regional level.

1.2. EPBD Article 8 (Technical building systems) paragraph 2: Is this transposed at Member State level (new/existing & residential/non-residential)?

Member States may furthermore encourage, where appropriate, the installation of active control systems such as automation, control and monitoring systems that aim to save energy.

1.3. EPBD Article 11 (Energy performance certificates) paragraph 1: Are BAC included in the calculation methodology?

Member States shall lay down the necessary measures to establish a system of certification of the energy performance of buildings. The energy performance certificate shall include the energy performance of a building and reference values such as minimum energy performance requirements in order to make it possible for owners or tenants of the building or building unit to compare and assess its energy performance. The energy performance certificate may include additional information such as the annual energy consumption for non-residential buildings and the percentage of energy from renewable sources in the total energy consumption.

1.4. EPBD Article 11 (Energy performance certificates) paragraph 2: Are BAC included in the recommendations for improvement of the energy performance of buildings?

The energy performance certificate shall include recommendations for the cost-optimal or cost-effective

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improvement of the energy performance of a building or building unit, unless there is no reasonable potential for such improvement compared to the energy performance requirements in force. The recommendations included in the energy performance certificate shall cover: (a) measures carried out in connection with a major renovation of the building envelope or technical building system(s); and (b) measures for individual building elements independent of a major renovation of the building envelope or technical building system(s).

1.5. EPBD Article 14 (Inspection of heating systems) paragraph 1: Are BAC considered?

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), with boilers of an effective rated output for space heating purposes of more than 20 kW. That inspection shall include an assessment of the 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.

1.6. EPBD Article 14 (Inspection of heating systems) paragraph 1: Is this transposed at Member State level?

Member States may reduce the frequency of such inspections or lighten them as appropriate, where an electronic monitoring and control system is in place.

1.7. EPBD Article 15 (Inspection of air-conditioning systems) paragraph 1: Are BAC considered?

Member States shall lay down the necessary measures to establish a regular inspection of the accessible parts of air-conditioning systems of an effective rated output of more than 12 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.

1.8. EPBD Article 15 (Inspection of air-conditioning systems) paragraph 1: Is this transposed at Member State level?

Member States may reduce the frequency of such inspections or lighten them as appropriate, where an electronic monitoring and control system is in place.

1.9. EPBD Article 16 (Reports on the inspection of heating and air-conditioning systems) paragraph 1: Are BAC considered?

An inspection report shall be issued after each inspection of a heating or air-conditioning system. The inspection report shall contain the result of the inspection performed in accordance with Article 14 or 15 and include recommendations for the cost-effective improvement of the energy performance of the inspected system. The recommendations may be based on a comparison of the energy performance of the system inspected with that of the best available feasible system and a system of similar type for which all relevant components achieve the level of energy performance required by the applicable legislation.

2. **Building codes** – inclusion of BAC at Member State level

2.1. Are there recommendations for BAC in the national building codes (existing/new & residential/non-residential)?

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2.2. Are there requirements for BAC in the national building codes (existing/new & residential/non-residential)?

3. **Incentives** – inclusion of BAC at Member State level

3.1. Are BAC included in voluntary building certification schemes for residential buildings?

3.2. Are BAC included in voluntary building certification schemes for non-residential buildings?

3.3. Are there any other incentives for the application of BAC for residential buildings?

3.4. Are there any other incentives for the application of BAC for non-residential buildings?

3. Respondents

The list of all respondents is included in Annex II.

For the purpose of this document the respondents are classified in the following four categories:

1. "BAC manufacturer";
2. "Association BAC manufacturers";
3. "Building professional";
4. "Association of building professionals";
5. "Academia".

In total, 22 respondents representing 22 organisations from 13 EU Member States i.e. Belgium, Bulgaria, Finland, France, Germany, Italy, Latvia, Malta, Portugal, Romania, Slovenia, Spain and United Kingdom.

For 4 out of the 13 countries covered by the survey, eu.bac members have also replied i.e. Belgium, Italy, Slovenia and Spain.

The spread of the 22 organisations that responded by category is 18% BAC manufacturer, 28% Association of BAC manufacturers, 27% Building professionals, 18% Association of building professionals and 9% Academia.

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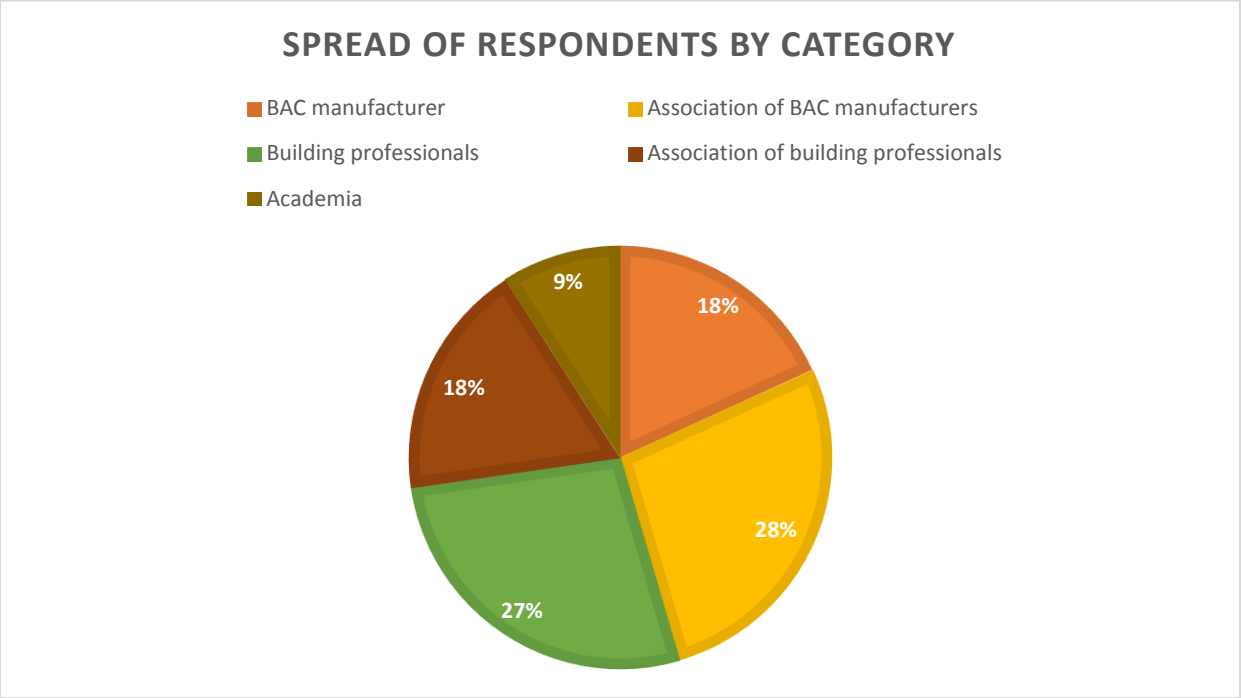

4. Survey results

a. Legislation – inclusion of BAC at Member State level

EPBD Article 3 Adoption of a methodology for calculating the energy performance of buildings

Building automation and controls are included in the national methodology for calculating the energy performance of buildings of most EU Member States for which responses were received. However, this is done partially by considering several control functions for some technical building systems (e.g. heating, ventilation, lighting). A few respondents estimated that this captures a third of the full potential of energy efficiency delivered by building automation and controls during the operation phase of buildings. In Finland, the legislation for buildings is currently being reviewed.

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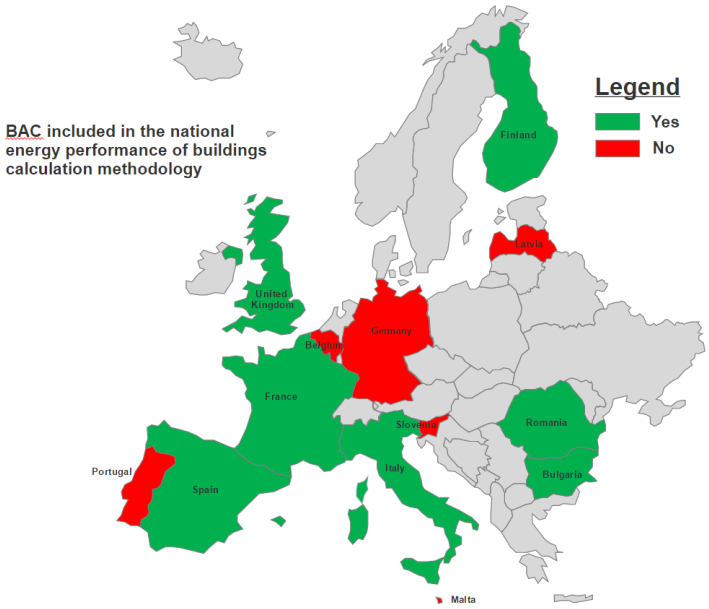
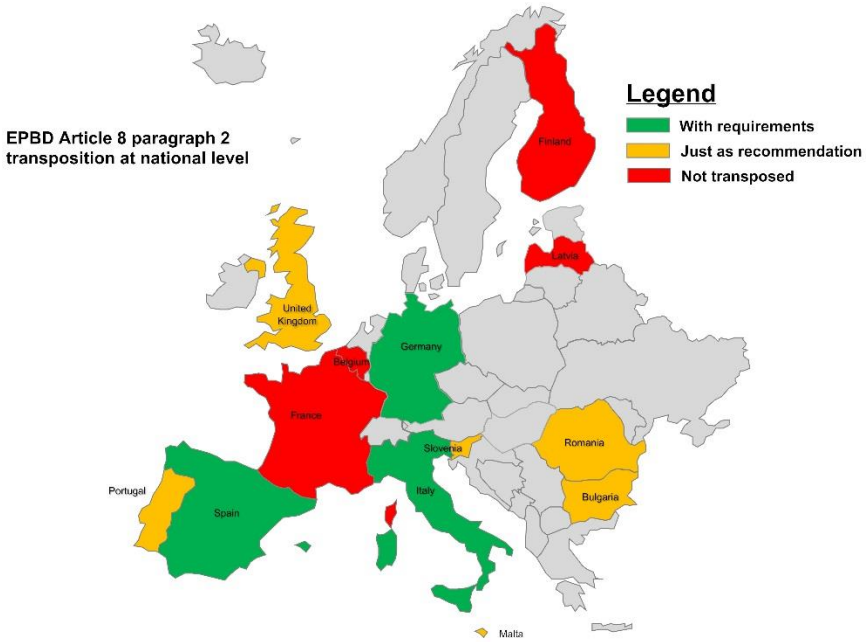


EPBD Article 8 Technical building systems

EPBD's Article 8 'Technical building systems' paragraph 2 is in most of the EU Member States, for which responses were received, either not transposed or transposed just as recommendation in the national legislation.



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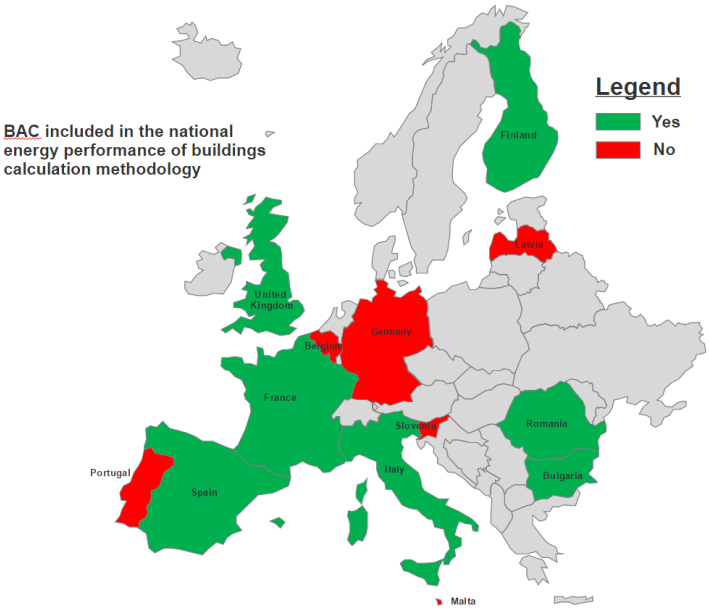
EPBD Article 11 Energy performance certificates

Building automation and controls are included in the national calculation methodology for issuing an energy performance certificates of most EU Member States for which responses were received. However, this is done partially by considering several control functions for some technical building systems (e.g. heating, ventilation, lighting). A few respondents estimated that this captures a third of the full potential of energy efficiency delivered by building automation and controls during the operation phase of buildings. In Finland, the calculation methodology for issuing an energy performance certificate is the same as the calculation methodology for the energy performance of buildings.



When it comes to recommendations for energy performance improvements this highly depends on the expertise of the energy performance certificate issuer. Only in France and the United Kingdom by default improvements for heating controls are considered. Another exception is in Italy where, for new and deep renovated non-residential buildings, it is required to have Class B of building automation and controls according to EPBD standard EN 15232 'Energy performance of buildings. Impact of Building Automation, Controls and Building Management'.

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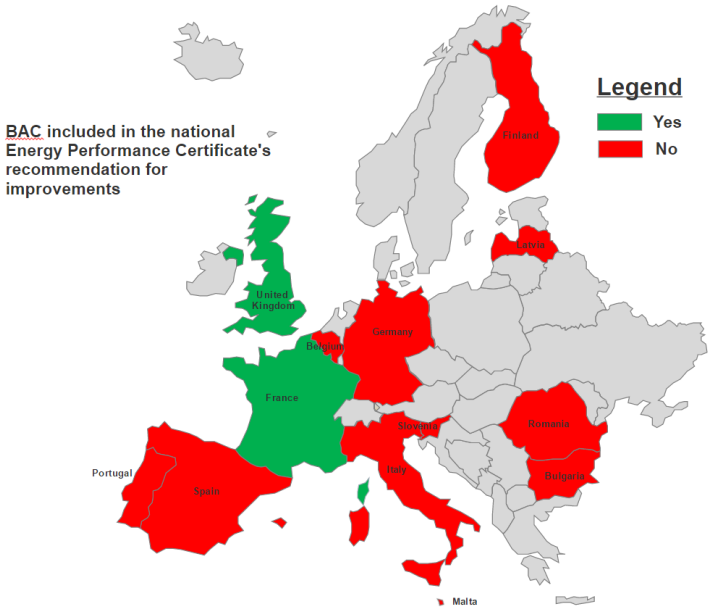
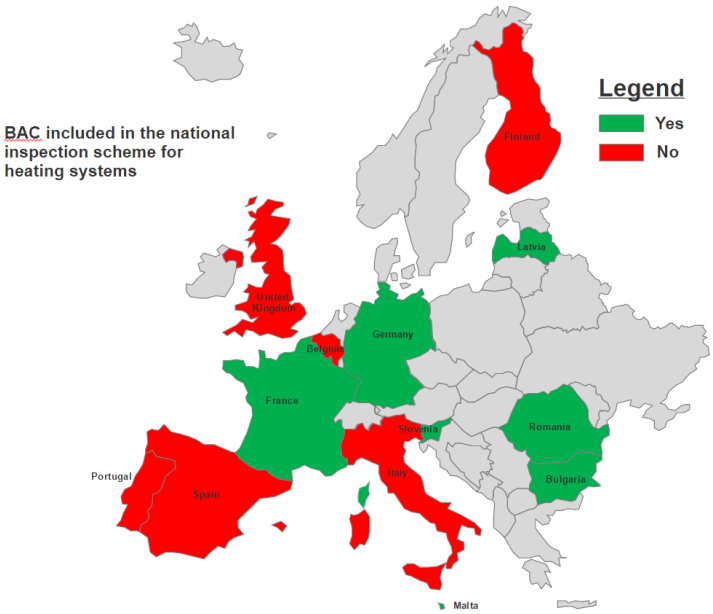


EPBD Articles 14, 15 and 16 Inspection of heating and air-conditioning systems

EPBD Article 14 'Inspection of heating systems' includes building automation and controls in some EU Member States, for which responses were received. However, the respondents stated that the benefits of building automation and controls are only partially considered. Finland didn't set up inspection schemes, but opted for alternative measures.



EPBD's Article 14 'Inspection of heating systems' paragraph 1 is in most of the EU Member States, for which responses were received, either not transposed or transposed just as recommendation in the

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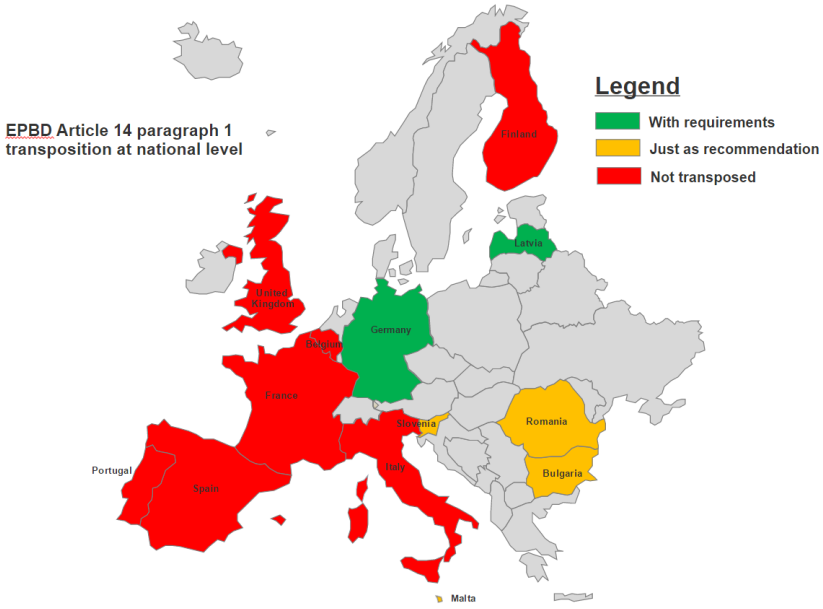
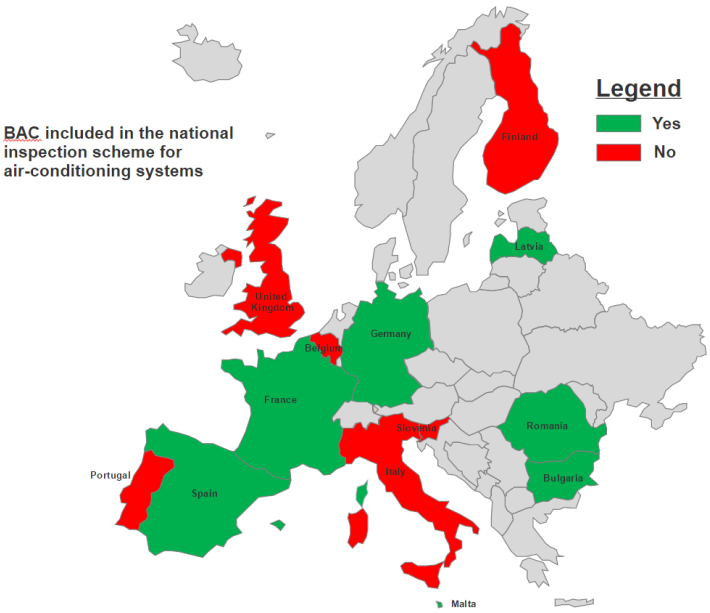
national legislation. Germany and Latvia are exceptions, in which there are some requirements. Finland didn't set up inspection schemes, but opted for alternative measures.



EPBD Article 15 'Inspection of air-conditioning systems' includes building automation and controls in some EU Member States, for which responses were received. However, the respondents stated that the benefits of building automation and controls are only partially considered. In Germany's case this inspection scheme is not even enforceable. Finland didn't set up inspection schemes, but opted for alternative measures.



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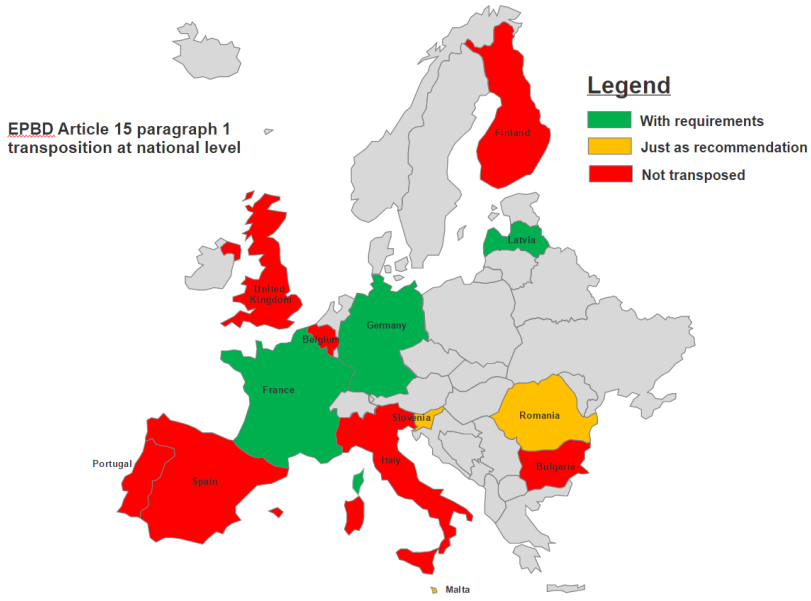
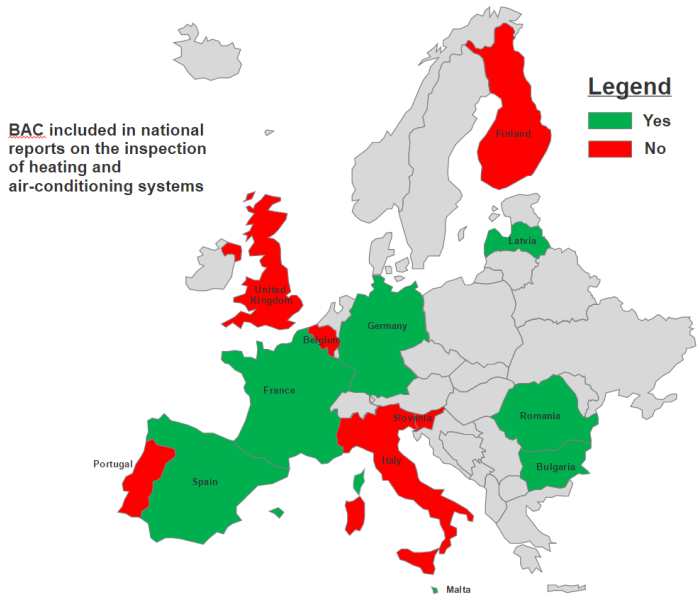
EPBD's Article 15 'Inspection of air-conditioning systems' paragraph 1 is in most of the EU Member States, for which responses were received, either not transposed or transposed just as recommendation in the national legislation. France, Germany and Latvia are exceptions, in which there are some requirements. Finland didn't set up inspection schemes, but opted for alternative measures.



In the EU Member States, for which responses were received, that consider building automation and controls in the inspection process for heating and/or air-conditioning systems, usually building automation and controls improvements are included the report issued as a result of the inspection. Finland didn't set up inspection schemes, but opted for alternative measures.



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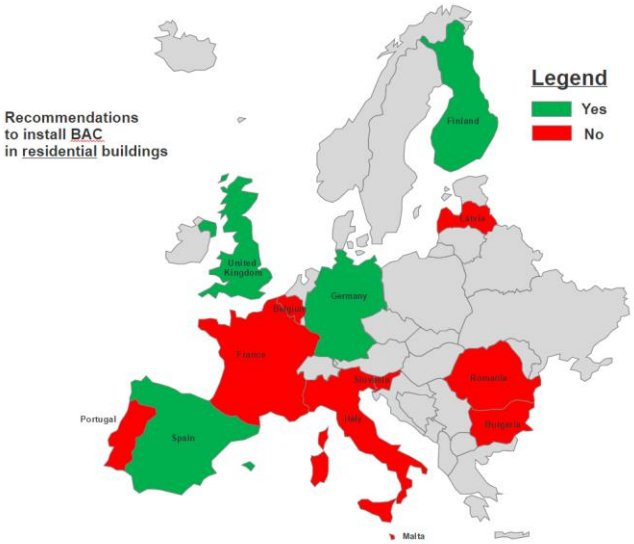
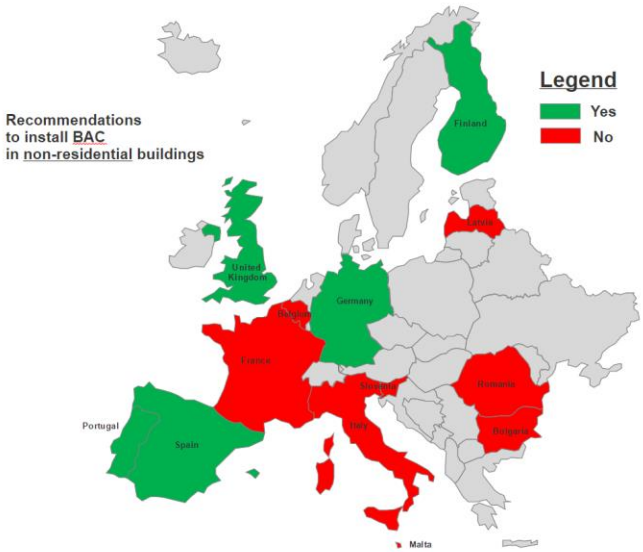
b. Building codes – inclusion of BAC at Member State level

For most EU Member states that have responded, there aren't recommendations and/or requirements for building automation and controls. In general, for the EU Member States that have something included in their building codes, it is either recommendations or requirements. Except, Latvia and Italy (non-residential), all other EU Member States, for which responses were received, that have requirements for building automation and controls also have recommendations. The recommendations and requirements are focusing more on non-residential buildings and most often recommend or require Class C (Class B in Italy) of building automation and controls according to EPBD standard EN 15232 'Energy performance of buildings. Impact of Building Automation, Controls and Building Management'.

Recommendations for BAC





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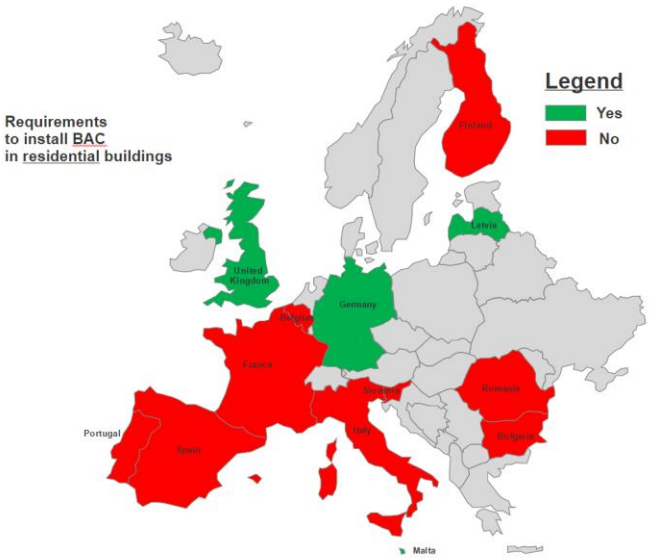
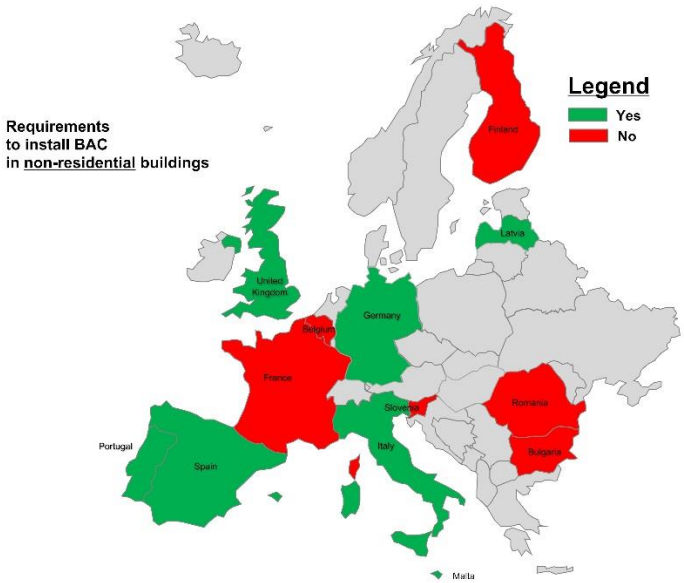
Requirements for BAC





c. Incentives – inclusion of BAC at Member State level

Except France, Germany and the United Kingdom that have their national voluntary certification schemes for non-residential buildings (i.e. HQE, DGNB, BREEAM), the other EU Member States, for which responses were received, use the internationally acknowledged schemes i.e. BREEAM, LEED. All these existing voluntary certification schemes for non-residential buildings take only indirectly into account the benefits of building automation and controls. More details regarding the existing voluntary certification schemes and the ongoing decision making process on an

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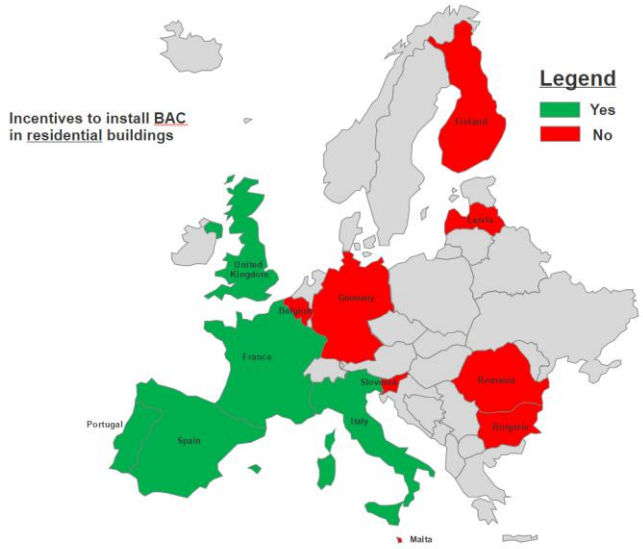
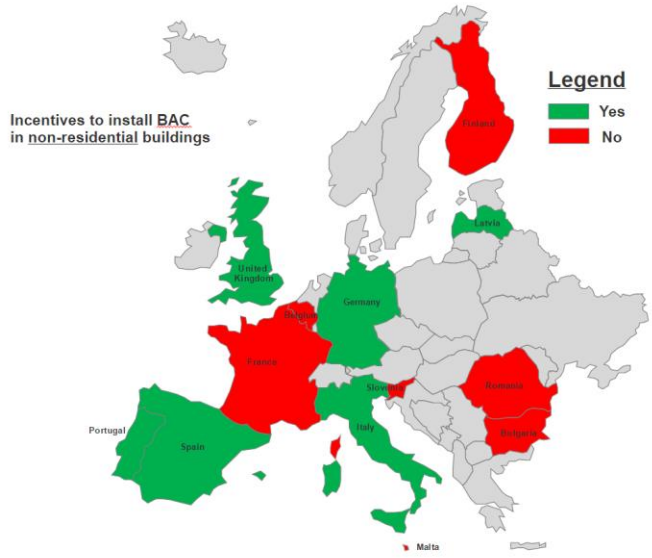
European Voluntary Certification Scheme for non-residential buildings can be found on the European Commission's webpage[1] and the construction21 webpage[2].

Regarding the existing financial incentives the respondents explained that most often they are underused or not used at all, due to either the lack of awareness of such programmes or their complexity which entails a long and complicated bureaucratic process that is most often overkill for providers of energy performance projects.





[1] https://ec.europa.eu/energy/sites/ener/files/documents/Final%20report%20-%20Building%20Certification%20Schemes%20-%20FINAL%2026112014.pdf

[2] http://www.construction21.org/community/pg/groups/25189/vcs-project/

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5. Conclusions

The Energy Performance of Buildings Directive (EPBD) is a big step in the right direction for improving the energy performance of EU's building stock. However, as it looks today, it doesn't grasp the cost-effective potential of building automation and controls. Furthermore, the results of the survey show Member States even fell short in effectively transposing and implementing the partial requirements and recommendations for building automation and controls currently comprised in EPBD.

The inclusion of building automation and controls in national level legislation, building codes and incentives in a nutshell

- Building automation and controls is only partially (1/3 of full potential) included in the national methodology for calculating the energy performance of buildings of most EU Member States for which responses were received.
- EPBD's Article 8 'Technical building systems' paragraph 2 is in most of the EU Member States, for which responses were received, either not transposed or transposed just as recommendation in the national legislation.
- Building automation and controls is only partially (1/3 of full potential) included in the national calculation methodology for issuing an energy performance certificates of most EU Member States for which responses were received.
- The recommendations for energy performance improvements highly depends on the expertise of the energy performance certificate issuer. Only in France and the United Kingdom by default improvements for heating controls are considered. Another exception is in Italy where, for new and deep renovated non-residential buildings, it is required to have Class B of building automation and controls according to EPBD standard EN 15232 'Energy performance of buildings. Impact of Building Automation, Controls and Building Management'.
- EPBD Article 14 'Inspection of heating systems' and EPBD Article 15 'Inspection of air-conditioning systems' include only partially building automation and controls in some EU Member States, for which responses were received.
- EPBD's Article 14 'Inspection of heating systems' paragraph 1 and EPBD's Article 15 'Inspection of air-conditioning systems' paragraph 1 are in most of the EU Member States, for which responses were received, either not transposed or transposed just as recommendation in the national legislation.
- In the EU Member States, for which responses were received, that consider building automation and controls in the inspection process for heating and/or air-conditioning systems, usually building automation and controls improvements are included the report issued as a result of the inspection.
- For most EU Member states that have responded, there aren't recommendations and/or requirements for building automation and controls. In general, for the EU Member States that have something included in their building codes, it is either recommendations or requirements. The recommendations and requirements are focusing more on non-residential buildings and most often recommend or require Class C (Class B Italy) of building automation and controls according to EPBD standard EN 15232 'Energy performance of buildings. Impact of Building Automation, Controls and Building Management'.
- Except France, Germany and the United Kingdom that have their national voluntary certification schemes for non-residential buildings (i.e. HQE, DGNB, BREEAM), the other EU Member States, for which responses were received, use the internationally acknowledged schemes i.e. BREEAM, LEED. All these

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existing voluntary certification schemes for non-residential buildings take only indirectly into account the benefits of building automation and controls.

- Regarding the existing financial incentives the respondents explained that most often they are underused or not used at all, due to either the lack of awareness of such programmes or their complexity which entails a long and complicated bureaucratic process that is most often overkill for providers of energy performance projects.

Looking forward

The ongoing EPBD review is the optimum opportunity to ensure a better coordinated, coherent (due to the synchronization of other Energy Union actions and initiatives i.e. adoption of the Ecodesign Work Plan 2015-2017, review of specific articles of the Energy Efficiency Directive, review of Renewable Energy Directive and the New Energy Market Design) and more effective energy efficiency policy framework that can fully exploit the potential of EU's building stock in terms of optimizing and at the same time decarbonising the energy use in operation phase. Additionally, due to the difficulties Member States encounter in transposing and implementing all the articles of EPBD, it would be highly beneficial for them to have a clearer, better guided and easier to streamline version of EPBD.

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Annex I Live survey

eu.bac european building automation controls association

Survey across EU Member States (MSs) - The inclusion of building automation and controls in legislation and building codes

The Energy Performance of Buildings Directive EPBD (2010/31/EU) recommends the application of building automation, controls and building technical management for increasing the energy performance of both existing and new buildings. The scope of this survey is to determine how these recommendations are transposed and implemented at MS level across the EU.
Link to DIRECTIVE 2010/31/EU http://eur-lex.europa.eu/legal-content/EN/ALL/;ELX_SESSIONID=FZMjThLLzfxmmMCQGp2Y1s2d3TjwtD8QS3pqdkhXZbwqGwlgY9KN!2064651424?uri=CELEX%3A32010L0031

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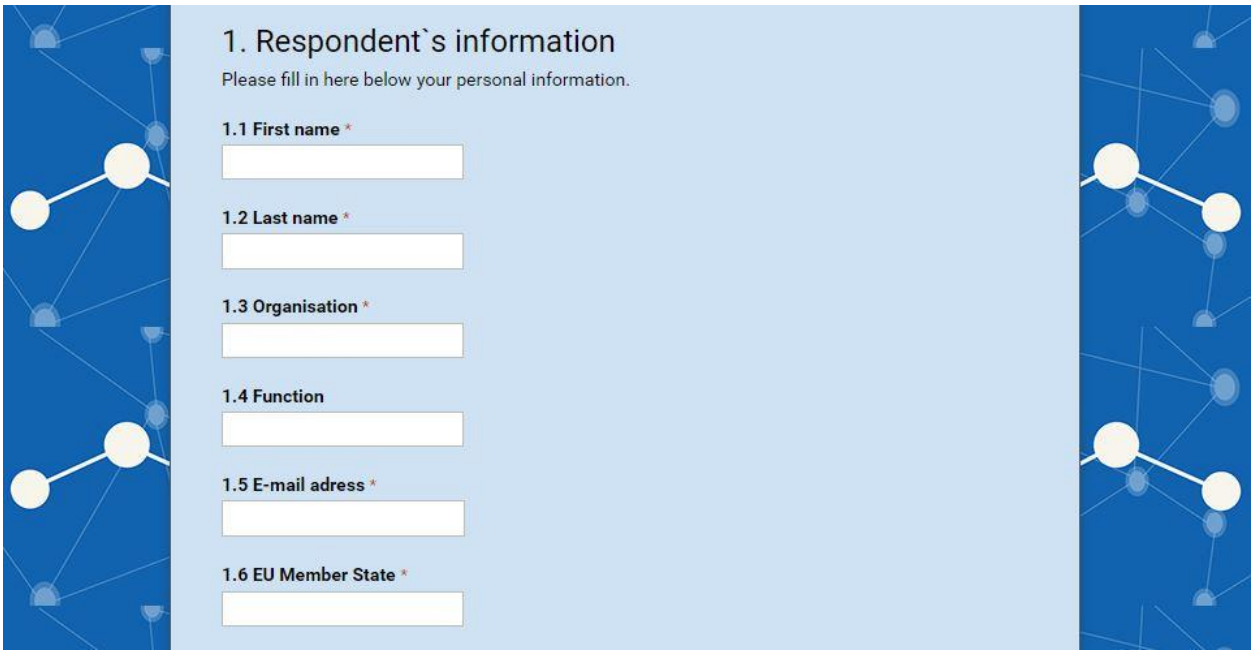

1. Respondent`s information

Please fill in here below your personal information.

1.1 First name *

1.2 Last name *

1.3 Organisation *

1.4 Function

1.5 E-mail adress *

1.6 EU Member State *

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2. Legislation - inclusion at MS level of Building Automation and Controls (BAC)

2.1 EPBD article 3 (Adoption of a methodology for calculating the energy performance of buildings) - Are BAC considered in the calculation methodology (new/existing & residential/non-residential)? *

Member States shall apply a methodology for calculating the energy performance of buildings in accordance with the common general framework set out in Annex I. This methodology shall be adopted at national or regional level.

- No
- Yes
- Other:

2.2 EPBD article 8 (Technical building systems) paragraph 2 - Is this transposed at MS level (existing/new & residential/non-residential)? *

Member States may furthermore encourage, where appropriate, the installation of active control systems such as automation, control and monitoring systems that aim to save energy.

- No
- Transposed just as recommendation
- Transposed with requirement(s)
- Other:

2.3 EPBD article 11 (Energy performance certificates) paragraph 1 - Are BAC included in the calculation methodology? *

Member States shall lay down the necessary measures to establish a system of certification of the energy performance of buildings. The energy performance certificate shall include the energy performance of a building and reference values such as minimum energy performance requirements in order to make it possible for owners or tenants of the building or building unit to compare and assess its energy performance. The energy performance certificate may include additional information such as the annual energy consumption for non-residential buildings and the percentage of energy from renewable sources in the total energy consumption.

- No
- Yes
- Other:

2.4 EPBD article 11 (Energy performance certificates) paragraph 2 - Are BAC included in the recommendations for improvement of the energy performance of buildings? *

The energy performance certificate shall include recommendations for the cost-optimal or cost-effective improvement of the energy performance of a building or building unit, unless there is no reasonable potential for such improvement compared to the energy performance requirements in force. The recommendations included in the energy performance certificate shall cover: (a) measures carried out in connection with a major renovation of the building envelope or technical building system(s); and (b) measures for individual building elements independent of a major renovation of the building envelope or technical building system(s).

- No
- Yes
- Other:

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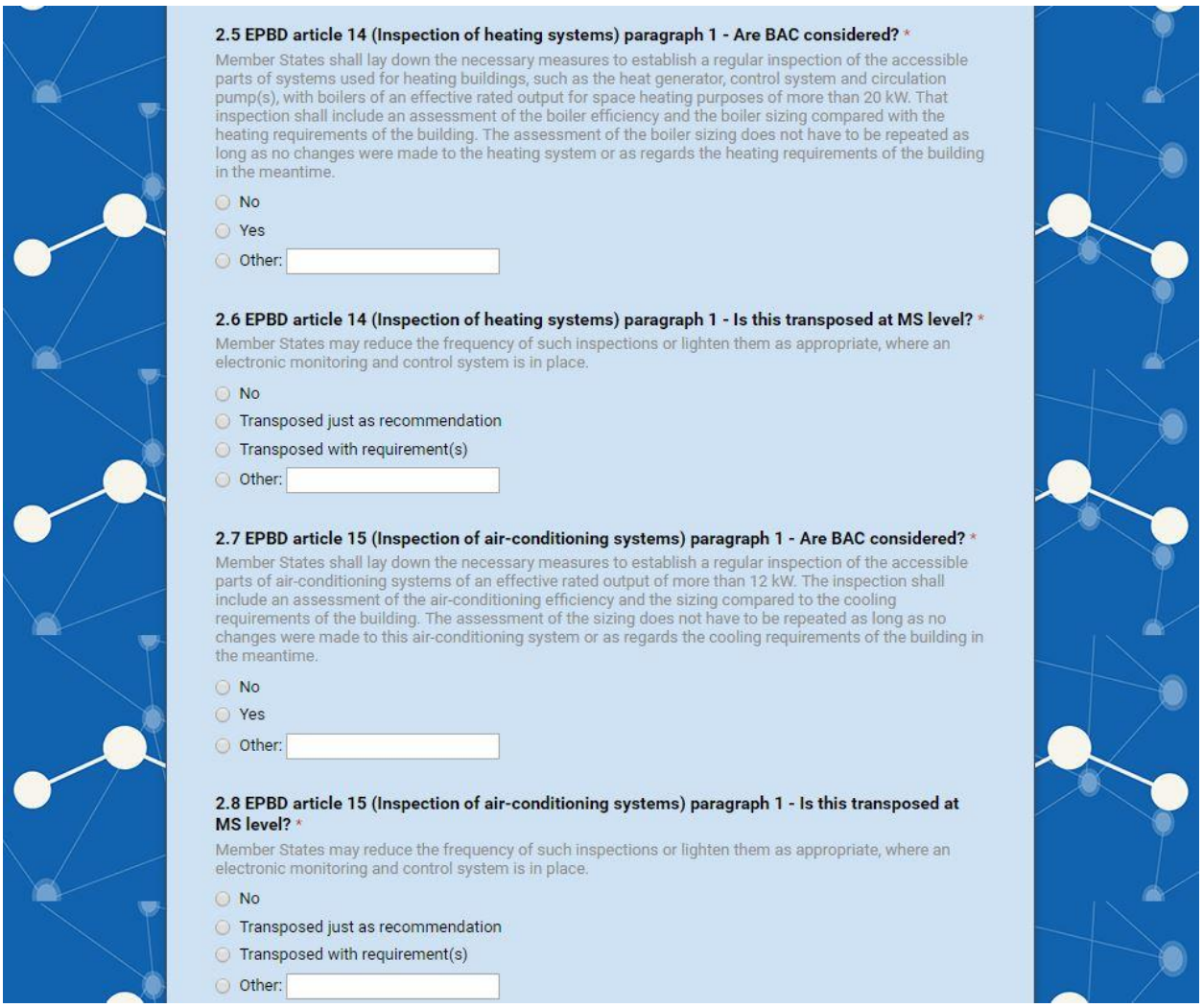

2.5 EPBD article 14 (Inspection of heating systems) paragraph 1 - Are BAC considered? *

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), with boilers of an effective rated output for space heating purposes of more than 20 kW. That inspection shall include an assessment of the 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.

- No
- Yes
- Other:

2.6 EPBD article 14 (Inspection of heating systems) paragraph 1 - Is this transposed at MS level? *

Member States may reduce the frequency of such inspections or lighten them as appropriate, where an electronic monitoring and control system is in place.

- No
- Transposed just as recommendation
- Transposed with requirement(s)
- Other:

2.7 EPBD article 15 (Inspection of air-conditioning systems) paragraph 1 - Are BAC considered? *

Member States shall lay down the necessary measures to establish a regular inspection of the accessible parts of air-conditioning systems of an effective rated output of more than 12 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.

- No
- Yes
- Other:

2.8 EPBD article 15 (Inspection of air-conditioning systems) paragraph 1 - Is this transposed at MS level? *

Member States may reduce the frequency of such inspections or lighten them as appropriate, where an electronic monitoring and control system is in place.

- No
- Transposed just as recommendation
- Transposed with requirement(s)
- Other:

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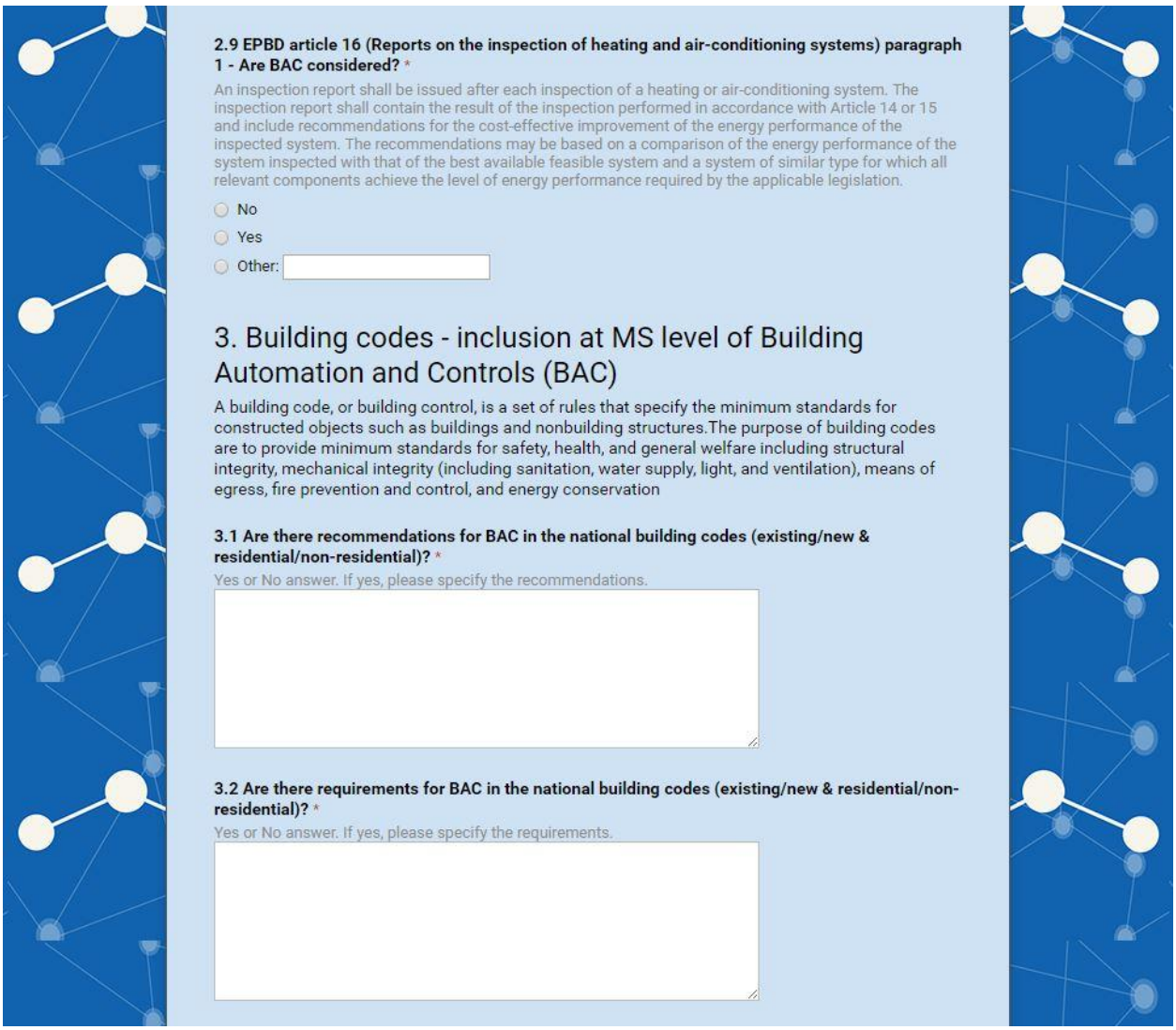

2.9 EPBD article 16 (Reports on the inspection of heating and air-conditioning systems) paragraph 1 - Are BAC considered? *

An inspection report shall be issued after each inspection of a heating or air-conditioning system. The inspection report shall contain the result of the inspection performed in accordance with Article 14 or 15 and include recommendations for the cost-effective improvement of the energy performance of the inspected system. The recommendations may be based on a comparison of the energy performance of the system inspected with that of the best available feasible system and a system of similar type for which all relevant components achieve the level of energy performance required by the applicable legislation.

- ○ No
- ○ Yes
- ○ Other:

3. Building codes - inclusion at MS level of Building Automation and Controls (BAC)

A building code, or building control, is a set of rules that specify the minimum standards for constructed objects such as buildings and nonbuilding structures.The purpose of building codes are to provide minimum standards for safety, health, and general welfare including structural integrity, mechanical integrity (including sanitation, water supply, light, and ventilation), means of egress, fire prevention and control, and energy conservation

3.1 Are there recommendations for BAC in the national building codes (existing/new & residential/non-residential)? *

Yes or No answer. If yes, please specify the recommendations.

3.2 Are there requirements for BAC in the national building codes (existing/new & residential/non-residential)? *

Yes or No answer. If yes, please specify the requirements.

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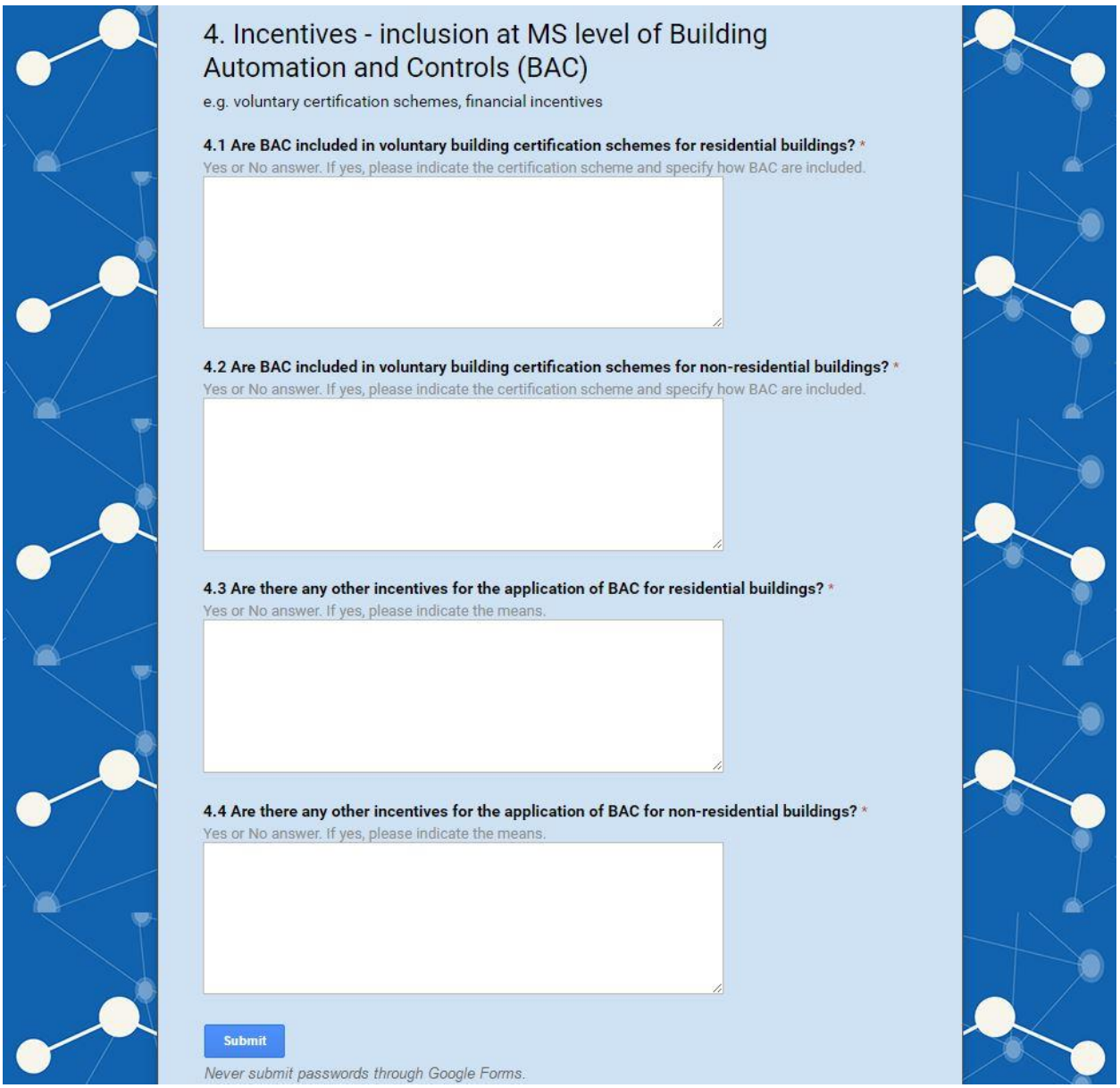

4. Incentives - inclusion at MS level of Building Automation and Controls (BAC)

e.g. voluntary certification schemes, financial incentives

4.1 Are BAC included in voluntary building certification schemes for residential buildings? *

Yes or No answer. If yes, please indicate the certification scheme and specify how BAC are included.

4.2 Are BAC included in voluntary building certification schemes for non-residential buildings? *

Yes or No answer. If yes, please indicate the certification scheme and specify how BAC are included.

4.3 Are there any other incentives for the application of BAC for residential buildings? *

Yes or No answer. If yes, please indicate the means.

4.4 Are there any other incentives for the application of BAC for non-residential buildings? *

Yes or No answer. If yes, please indicate the means.

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Annex II Respondents

No.	Country	Respondent category	Organisation	Observations	No.
1	Belgium	BAC manufacturer	Siemens BT Belgium	eu.bac member	1
2	Bulgaria	Association of building professional	European Labour Institute	-	2
		Building professional	Energy & Agro	-	3
3	Finland	Association of BAC manufacturers	FABSI	-	4
		Association of building professionals	STUL	-	5
4	France	Association of BAC manufacturers	Syndicat ACR	-	6
5	Germany	Association of BAC manufacturers	VDMA	-	7
		Academia	Universität Rostock	-	8
6	Italy	Building professional	Energy Team S.p.A.	-	9
		BAC manufacturer	Schneider Electric S.p.A.	eu.bac member	10
7	Latvia	Building professional	ESEB	-	11
8	Malta	Association of building professionals	MEEREA	-	12
9	Portugal	Association of BAC manufacturers	APIRAC	-	13
		Building professional	Modular – Arq:i+d, Lda	-	14
		Academia	INESC Coimbra	-	15
10	Romania	Building professional	Melior Electro Energy	-	16
11	Slovenia	BAC manufacturer	Sauter Automatika	eu.bac member	17
12	Spain	Association of BAC manufacturers	CEDOM	-	18
		Building professional	insolatio	-	19
		Association of building professionals	Fundacion Laboral de la Construccion	-	20
		BAC manufacturer	Trend Controls	eu.bac member	21
13	United Kingdom	Association of BAC manufacturers	BEAMA	-	22

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