Area 3 - Responsible Architecture

Clean Energy Package / EPBD: ACE position and proposals of amendments

Draft version

Date: 27 March 2017

BACKGROUND

On 30 November 2016, the EU Commission adopted a package of measures titled *Clean energy for all Europeans*, with the objective of "*accelerating, transforming and consolidating the EU economy's clean energy transition thereby creating jobs and growth in new economic sectors and business models"*. The package includes several legislative measures, including a **proposal to amend the Energy Performance of Buildings Directive (EBPD),** as follows:

- Extension of the definition of technical building systems to include on-site electricity generation and on-site infrastructure for electro-mobility;
- The long-term building renovation strategies would become part of the integrated national energy and climate plans and will be notified by Member States to the Commission by 1 January 2019 for the period post 2020. The strategy will cover the renovation of the stock of residential and non-residential buildings.
- Technical building systems: the proposal introduced requirements concerning:
  - infrastructure for electro-mobility:
  - reinforcing the use of building electronic monitoring, automation and control in order to streamline inspections;
  - the introduction of a 'smartness indicator' rating the readiness of the building to adapt its operation to the needs of the occupant and of the grid, and to improve its performance.
- Financial incentives: the Directive would be updated to include two new provisions on using energy performance certificates (EPCs) to assess savings from renovations financed with public support are to be assessed by comparing EPCs before and after renovation. Public buildings with a surface over a certain threshold must disclose their energy performance.
- Inspections: the update provides for more effective approaches to regular inspections which could be used instead to ensure that building performance is maintained and/or improved.
- Annex I would be updated to improve transparency and consistency in the way energy performance is determined at national or regional level and to take into account the importance of the indoor environment.

HIGHLIGHTS OF THE ACE POSITION

ACE advocates for an ambitious and clearly defined long-term 2050 vision for the EU buildings stock, with key milestones in 2030 and 2040, in order create a stable regulatory framework, conducive to investment decisions. The current review of the EPBD is expected to be the last one to be undertaken for the next decade. In such a rapidly evolving sector, it is imperative that long-term and robust solutions are created to address the issues raised.

ACE's suggested amendments to the Directive have been guided by the five following principles – applying these consistently would substantially improve the market conditions for energy efficiency

retrofits:

1. **Incorporate the validation of calculated EPCs with measured operational performance data. Only validated EPCs should be used to underpin any financial instruments or performance contracting;**
2. **Energy retrofits need to be incentivised and regulated as part of overall functional and aesthetic upgrades of buildings in order to speed up the energy efficiency of the existing building stock;**
3. **Recognise the need to target improvements across all four pillars of building performance: consumption of natural resources, indoor environmental quality, occupant satisfaction and value over the life-cycle of a building;**
4. **Energy efficiency of Buildings needs to be defined in a lifecycle perspective. Life Cycle Costing (LCC) and Life Cycle Assessment (LCA) methods need to be integrated in the cost efficiency and energy performance standards and benchmarks;**
5. **Open Big Data – Harmonise reporting metrics across nation states and between calculated and achieved performance and put in place disclosure requirements to ensure the rapid and continuous improvement of energy efficiency measures and technologies.**

ACE POLICY POSITION – TOWARDS HEALTHY AND RESOURCE EFFICIENT BUILDINGS

ACE is committed to work with the European Council and Parliament for a greater recognition of the role of architecture in delivering a step change in building performance and in the uptake of energy efficiency retrofits of the existing building stock.

THE FOUR PILLARS OF BUILDING PERFORMANCE

The current EU legislation has been very successful in raising the performance of the building fabric and improving the notional efficiency of the systems installed. In terms of the integration of building architecture and systems design there is an increasing body of scientific evidence showing the **need to see building performance in a broader lifecycle perspective**, so as to better consider occupants' behaviour (a major driver of building energy performance[1]) as well as non-energy benefits of better indoor environment. ACE therefore calls for a greater acknowledgement of all four pillars of building performance, namely:

1. Reducing the consumption of natural resources, including energy, water, materials, the creation of waste and environmental impacts;
2. Improving indoor environmental quality including indoor air quality, thermal comfort, daylight, acoustics, biophilia;
3. Raising occupant satisfaction including occupants' health and their perception of building functionality, indoor environmental quality and how the building meets their needs;

[1] In old buildings, the calculations overestimate consumption by 60-80%: occupants are aware of the building poor performance and have a more energy-efficient behaviour. Conversely, as showed by post-occupancy evaluations, the energy consumption of new buildings is underestimated as electronic controls consume energy, do not achieve their expected savings and are often the source of poor indoor environmental quality.

4. Increasing value as demonstrated by lower lifecycle cost, higher market value, greater adaptability and resilience to changes of use and climate.

BUILDING PERFORMANCE INDICATORS – proposals of amendments to articles 2, 8 (5)

A **transparent comparison between calculated and measured performance** across all four pillars of building performance and throughout a building's life cycle is essential. Implementing Life Cycle Assessments in building standards will open up new areas of invention in circular economy building design solutions, targeting energy savings in the production and construction of buildings and components.

Crucially, greater well-being, productivity, learning, etc. resulting from improved indoor environments do not feature in the cost/benefit calculations and are therefore omitted from the business case for renovation. The sector urgently needs **better methods to account for non-energy benefits.** The revision should link – possibly through the development of the smartness indicator (article 8(5)) – to the new framework of indicators for the evaluation of the environmental performance of buildings currently being developed by the Commission[2], in order to facilitate the clear and transparent communication of these aspects of design and construction. Clearer definition of terms (Article 2) such as 'general indoor climate conditions' and 'designated function', would be a step in the right direction as well. By following the energy Union's Efficiency First principle and NZEB principle, the future building stock will be more efficient and better performing. At the same time, the EU should promote and aspire to a healthier, more comfortable and more affordable building stock. ACE believes that the vision for a 'decarbonized building stock' and the definition of 'nearly zero-energy building' should be converging (article 2). Both of them should incorporate life cycle approach.

LIFECYCLE APPROACH – proposals of amendments to articles 2 and Annex I

The revised EPBD should incorporate life cycle principles guiding energy efficiency in buildings, and require life cycle costing as a standardized method for cost efficiency calculations. The current NZEB requirements for new buildings are so tough that it is not possible to save more energy by requiring, for example, thicker insulation. The revised EPBD should therefore open up the possibility to include embodied energy in the calculations. Where NZEB has been compulsory since 2015 for new buildings, such as in Denmark, operational energy use is now of the same order of magnitude as the embodied energy of building materials seen over a 30 year life-span. It is therefore more cost effective to reduce embodied energy in materials than to save the last few kWh/m2 with ever more insulation to achieve nZEB status.

Life Cycle Costing and Life Cycle Assessments need to be implemented as methods for documenting feasibility and environmental impacts. Life Cycle Assessments need to be implemented because reducing environmental impacts – particularly climate gas emissions – are among the key political aims of achieving higher energy efficiency through the EPBD.

To this end ACE calls for a **clearer definition of the terms 'cost effective' and 'cost optimal' under Article 2 as well as the inclusion of embodied impacts in the calculation method**.

ARCHITECTURAL DETERMINANTS TO BUILDING PERFORMANCE – proposals of amendments to articles 2a, 10 and Annex I (4)

Despite the intention of the EPBD to prioritise passive efficiency measures, the absence of a feedback mechanism from achieved performance in-use has contributed to a systemic preference for 'active' measures over 'passive' solutions to energy efficiency, affecting in particular the renovation

[2] See JRC website to learn more about this initiative: http://susproc.jrc.ec.europa.eu/Efficient_Buildings

quality and rate of historic properties. Yet building envelope solutions are more robust, durable and cheaper to operate, have longer lifespans (20-50 years), are more user-friendly and generate better occupants' satisfaction than technical building systems. Conversely, technical building systems solutions require higher operating and maintenance costs, consume energy and are associated with a higher risk of underperformance.

A building's architecture, its connection to its site and users, its configuration and materiality are major determinants of resource efficiency and occupant well-being and also govern a building's functionality, adaptability and long-term resilience. ACE advocates that the language of the legislative framework for energy performance of buildings should give **greater priority to the architectural means of improving long term building performance,** including better prioritisation of passive, low-tech, locally tested solutions that do not consume energy in operation and carry a lower risk of under-performance.

FOCUS ON MEASURED PERFORMANCE IN USE – proposals of amendments to articles 2 (3), 2 (12), 8 (5), 8 (6), 10, 14, 15 and 20

There are well-documented examples of the unintended consequences of omitting the operational phase from the current Directive, including:

- the sizeable gap between the expected and achieved energy performance of buildings (on average between 1.5-2 times higher than calculated in the UK);
- high rates of non-compliance (e.g. currently around 30% in Denmark);
- an often undue complexity of building systems;
- compromised indoor environmental quality;
- higher than expected maintenance cost of the energy efficiency solutions.

The lack of a clear relationship between EPC ratings and achieved energy performance in use has added unnecessary risks to investment in energy efficiency and the credibility of EPCs has also suffered. ACE argues that minor changes to the current EPBD allowing for the **validation of calculated performance with measured data in operation** would improve architectural quality as well as building performance in use.

A calculation standard to reconcile calculated with measured performance will be necessary to support this in line with the standard developed for of the European common voluntary certification scheme for non- residential buildings (EVCS).

Such a change would bring about greater uptake of measures that use less energy to improve building functionality while inherently raising occupant satisfaction, well-being and value. The proposed changes also aim to tackle the proven risk associated with prioritising mechanised and automated solutions for creating healthy and productive indoor environments.

ACE is strongly opposed to the use of Energy Performance Certificates (EPCs) to monitor improvements in energy savings following renovation work until those EPCs are **validated with measured energy use data**. Should the EPCs not be validated with measured energy use, comparing EPC before and after renovation work would result in severe unintended consequences.

The **information contained in EPCs should be included in centrally managed national databases**, which should also serve as a basis for the monitoring of the building stock and in developing measures in the framework of the implementation of national long-term renovation strategies.

SMARTNESS INDICATOR – proposals of amendments to article 8 (6)

ACE calls for a clarification of the definition, scope and objectives of the proposed smartness indicator: What will be measured exactly? Using which parameters? What use will be made of the results? Who will measure? Which buildings will be included? How will they account for the risks associated with automation in buildings? ACE invites the Commission to consult the stakeholders of the construction sector before developing this. It believes that any **smartness indicator shall be coherent and compatible with the framework of indicators currently being developed by the Commission (DG ENVI) to assess the environmental performance of buildings and with the Building Passport initiative.**

BUILDING RENOVATION PASSPORTS: Customised roadmaps towards deep renovation and better homes – proposals of amendments to article 20

ACE supports the idea of a Building Renovation Passport (BRP) promoted notably by the Buildings Performance Institute Europe (BPIE)[3]. A BRP should be "a document - in electronic or paper format - outlining a long-term (up to 15 or 20 years) step-by-step renovation roadmap for a specific building, resulting from an on-site energy audit fulfilling specific quality criteria and indicators established during the design phase and in dialogue with building owners. The expected benefits in terms of reduced heating bills, comfort improvement and CO2 reduction are a constitutive part of the BRP and are explained in a user- friendly communication. The renovation roadmap can be combined with a repository of building-related information (logbook) on aspects such the energy consumption and production, executed maintenance and building plans. On-site data gathering is the first step towards the creation of a BRP". These BRPs shall be delivered by independent, certified and experienced building experts. They shall be customised to the building type, owner profile and national characteristics so as to increase their value as tools for guiding investment decisions. ACE argues that the results of valuations before and after renovations should also be added to these BRPs. Attributable BRPs data should be made available for research purposes and anonymised data for commercial use.

ACCELERATING THE RENOVATION OF THE EU BUILDING STOCK – proposals of amendments to articles 2 (10), 2a and 10

In recent years the financing of the retrofit of the existing stock, has been decoupled from investment in the spatial and architectural design of buildings. With legislation focusing on technical solutions, the business case to undertake spatial and architectural renovation as part of an energy efficient retrofit has been reduced. As EU Member States embark on one of the largest retrofit efforts ever undertaken, there is a major opportunity to improve the uptake of efficiency measures by interlinking financial instruments with architectural design and renovation. By re-connecting energy efficiency with market drivers for architectural renovation, public investment in energy efficiency will offer far greater returns and achieve greater traction and robustness for technical solutions. ACE supports the development of innovative financial schemes for energy and resource efficiency in buildings that appreciate architecture as part of the solution rather than an on-cost.

It is recognised that the majority of properties do not have an EPC as they are not under leasing or being sold. Successfully increasing energy efficient renovation rates means that **financing incentives must focus on retrofits taking place in between property transactions**. ACE promotes amendments in the EPBD that incentivise a much closer integration between the

[3] http://bpie.eu/publication/renovation-passports

performative and functional/spatial/material retrofit of buildings.

Life-cycle thinking is crucial in stimulating the rate of retrofitting and in finding the quick wins of energy efficiency and climate effective solutions. Retrofits usually happen when buildings change ownership or tenancy. This is the time functional requirements change and needs to be accommodated. The design of the energy retrofit requirement should target these situations as described above. Otherwise retrofits happen when buildings are run down, in-between transactions. The user groups in these cases often lack economic resources, therefore **financial instruments combining the architectural and performative retrofits are therefore crucial to increase renovation rates**. Such instruments must be **underpinned by EPCs that reflect the energy consumption of a building in use**.

TRIGGER POINTS – DEFINITION OF MAJOR RETROFITS – proposals of amendments to article 2 (10)

The current legal requirements for energy renovations do not work as they should. Today, there are requirements for energy renovation if replacing more than 25% of the building envelope. The requirement is implemented only in practice if it is simultaneously deemed to be economically viable energy renovating. But the rules are de facto a barrier because the renovation is never economically viable in terms of energy efficiency alone in the short term. Retrofits are feasible through the social benefits they provide in terms of better amenity and comfort, and this drives the higher increase in property value that is very often associated with architectural retrofits rather than single purpose energy retrofits. To implement the political aim of energy efficiency in the existing building stock, it would be more efficient to **replace the 'major retrofit' definition with a specific benchmark – e.g. improving the EPC by at least two classes – for any major retrofit requiring a building permit, assuming the Directive prescribes more robust EPCs**. Building owners should have the possibility to avoid this demand only if they can prove that it will not be feasible in 30 year period using a life cycle costing calculation.

ENERGY POVERTY

ACE welcomes the focus on energy poverty. Increasing the value of properties as part of energy efficiency retrofits can result in diminished access to social housing, which must be addressed by national strategies.

ACE PROPOSALS OF AMENDMENTS TO THE COMMISSION'S PROPOSAL

The document is structured to include the Commission's proposals in the left column, alongside ACE proposals of amendments on the right. In the right column, ACE proposals of deletion are strikethrough and highlighted in red (~~deletion~~), while proposals of additions are in blue (addition). Each proposal of amendment is followed by a justification.

Article 2
Definitions

Commission's proposal	ACE proposal of amendment
3. ~~'technical building system' means technical equipment for the heating, cooling, ventilation, hot water, lighting or for a combination thereof, 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, 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 the heating, cooling, ventilation, hot water, lighting or for a combination thereof, 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,~~ **the provision of energy usages as per ISO Standard 12655 and the systems required for** 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;
Justification ACE believes that broadening the scope of reported energy end uses incorporating previously 'unregulated' uses, such as controls and vertical transportation, is important for the following reasons: - Unregulated energy use can be responsible for over a third of a building's energy consumption[4]; - They have a big impact on the design and operation of a building and the successful integration of building services in the building's architecture to achieve low energy consumption in use; - They are important contributors to indoor environment and occupants' comfort; - Omitting previously 'unregulated' systems and end uses from the definition of building systems resulted in fragmented responsibility for the design, installation, commissioning and	

[4] See:
- Energy Consumption Guides 19 on Energy use in offices, which provides benchmarks for the assessment of the energy performance of office buildings: http://www.cibse.org/getmedia/7fb5616f-1ed7-4854-bf72-2dae1d8bde62/ECG19-Energy-Use-in-Offices-(formerly-ECON19).pdf.aspx
- The Building Data Exchange: http://www.buildingdataexchange.org.uk

operation of these systems. This has been highlighted by several studies as a major cause of unexpectedly high energy consumption in buildings[5];

- There is now sufficient data in the public domain and standards to allow the standardised calculation of such parameters and detailed submetering requirements that allow any occupant behaviour related deviation from such standards to be corrected for as part of the certification process[6]. It is essential that the property industry learns from the mistakes of the car industry and returns to measuring what it aims to reduce rather than a 'notional' performance.

ACE proposes to include a reference to the ISO standard 12655, which provides a set of clear definitions, terms and procedures for presenting the energy use in buildings in a consistent and uniform way. Such a comprehensive expression of building energy use is of great importance for the reconciliation of calculated and measured energy consumption and it is conducive to:

a) Regulating the presentation of the energy use of buildings with respect to data collection, metering and analysis;

b) Providing a uniform platform for the assessment and comparison of building energy;

c) Laying the foundation of energy data collection, metering, statistics, audit and analysis for both regional and national buildings.

Learn more on ISO standard 12655 on ISO website[7].

PROPOSALS OF CHANGES TO OTHER PARAGRAPHS IN ARTICLE 2

2. Nearly zero-energy building

Current EPBD	ACE proposals of change
2. 'nearly zero-energy building' means a building that has a very high energy performance, as determined in accordance with Annex I. The nearly zero or very low amount of energy required should be covered to a very significant	2. 'nearly zero-energy building' means a **healthy and comfortable** building that has a very high energy performance, **constructed with minimal energy, waste and environmental impact,** as determined in accordance with Annex I. The

[5] See: http://www.buildingdataexchange.org.uk

[6] See:

- Burman, E., Kimpian, J., and Mumovic, D., 2012. Towards an integrated building energy assessment framework to account for the externality of performance gap, Proceedings of the First International Conference on Urban Sustainability and Resilience (ISSN 2051-1361) Poster Presentation, 5-7 November 2012, University College London, London, UK.)
- Burman, E., Mumovic, D., Kimpian, J. 2014. *Analysis of the Applicability of the UK National Calculating Methodology to Energy Efficiency Finance of Non-domestic Buildings: A Case Study Approach,* [Forthcoming, submitted to Building Simulation and Optimisation 2014, London]
- EPB standard ISO/FDIS 52000-1:2016(E)
- Burman, E., Mumovic, D., and Kimpian, J., 2013. A *Methodology for Measurement and Verification of Energy Performance under the Framework of the European Directive for Energy Performance of Buildings*, proceedings of the 6th International Conference on Sustainable Energy & Environmental Protection (SEEP 2013), pp. 239-250, 20-23 August 2013, Maribor, Slovenia.

[7] https://www.iso.org/obp/ui/#iso:std:iso:12655:en

extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby;	nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby;
Justification ACE believes that the definitions 'nearly zero-energy building' should be converging with the vision for a 'decarbonized building stock' (see below proposal for a definition of 'decarbonized building stock' page 11). Both of them should incorporate life cycle approach.	

10. Major renovation

Current EPBD	ACE proposals of change
10. 'major renovation' means the renovation of a building where: (a) the total cost of the renovation relating to the building envelope or the technical building systems is higher than 25 % of the value of the building, excluding the value of the land upon which the building is situated; or (b) more than 25 % of the surface of the building envelope undergoes renovation; Member States may choose to apply option (a) or (b).	10. 'major renovation' means the renovation of a building where: (a) the total cost of the renovation relating to the building envelope or the technical building systems is higher than 25 % of the value of the building, excluding the value of the land upon which the building is situated; or (b) more than 25 % of the surface of the building envelope undergoes renovation; **(c) more than 50% of Gross Internal Area undergoes renovation.** Member States may choose to apply option (a)**,** ~~**or**~~ (b) **and/or (c)**.

Justification

ACE challenges the definition of 'major renovation', which is acting as a market deterrent for undertaking renovation. Instead ACE argues that Point 10 could be entirely omitted if the robustness of EPCs is sufficiently increased to reflect the achieved and not the notional performance of buildings. Data disclosure through EPCs will in themselves highlight the need to better plan for the operational functionality of buildings, if predicted performance improvements are to be achieved. Further incentives may be required to support the creation of financial instruments that would jointly support functional and performative retrofits, such as a requirement for performance and valuation data to be disclosed before and after renovation.

ACE suggests that, if the term is retained, then clause (c) is added to recognise that removal and reinstatement of surface finishes form a significant part of cost and upheaval for deep renovation. Once a significant indoor area is affected by renovation then it is reasonable to expect that prior to reinstating internal finishes the fabric and systems upgrades required to improve the thermal efficiency of the building are implemented throughout.

12. Energy Performance Certificate

Current EPBD	ACE proposals of change
12. 'energy performance certificate' means a certificate recognised by a Member State or by a legal person designated by it, which indicates the energy performance of a building or building unit, calculated according to a methodology adopted in accordance with Article 3;	12. 'energy performance certificate' means a certificate recognised by a Member State or by a legal person designated by it, which indicates the energy performance of a building or a building unit, calculated according to a methodology adopted in accordance with Article 3 **and validated as within range of achieved measured energy consumption in use**;

Justification

It is essential that the EPC certification is validated with measured consumption achieved in use to ensure that financial incentives are based on robust certificates that indicate real reductions in energy use. Unintended consequences of current EPCs include:

- significantly higher than expected energy consumption in use,
- investment in energy efficiency measures that offer no or significantly lower than expected return on investment,
- high maintenance and operating costs and
- compromised indoor environmental quality.

Validated EPCs are required to kick-start a virtuous cycle of continuous performance improvement based on evidence. Such an improvement in certification would allow investors to make robust links between performance improvements and value, which is currently not possible to establish as EPCs are not perceived to relate to achieved performance in use.

14. Cost-optimal level

Current EPBD	ACE proposals of change
14. 'cost-optimal level' means the energy performance level which leads to the lowest cost during the estimated economic lifecycle, where: (a) the lowest cost is determined taking into account energy-related investment costs, maintenance and operating costs (including energy costs and savings, the category of building concerned, earnings from energy produced), where applicable, and disposal costs, where applicable; and (b) the estimated economic lifecycle is determined by each Member State. It refers to the remaining estimated economic lifecycle of a building where energy performance requirements are set for the building as a whole, or to the estimated economic lifecycle of a building element where energy performance requirements are set for building elements. The cost-optimal level shall lie within the range of performance levels where the cost benefit analysis calculated over the estimated economic lifecycle is positive;	14. 'cost-optimal level' means the energy performance level which leads to the lowest cost **and lowest risk of under-performance** during the estimated economic lifecycle, where: (a) the lowest cost is determined taking into account energy-related investment costs, maintenance and operating costs (including energy costs and savings, the category of building concerned, earnings from energy produced), where applicable, and disposal costs, where applicable; and (b) the estimated economic lifecycle is determined by each Member State. It refers to the remaining estimated economic lifecycle of a building where energy performance requirements are set for the building as a whole, or to the estimated economic lifecycle of a building element where energy performance requirements are set for building elements. **(c) where the risks of under-performance are factored in based on the gap between calculated and measured performance in use and calculated nationally for each system.** The cost-optimal level shall lie within the range of performance levels where the cost benefit analysis calculated over the estimated economic lifecycle is positive;
Justification The assumptions made in life-cycle calculations do not require the evaluation of risks associated with different energy efficiency measures despite evidence showing that these risks can contribute on average to 1.5-3-fold increases in energy consumption in operation[8]. There is a need to base life-cycle calculations on more realistic performance predictions by collecting and analysing data relating to the success of different systems nationally. While it is arguable that operating factors can have a big influence on these risks it has to be acknowledged that solutions that are well-designed, are easy to use or require no active maintenance, such as passive systems, present significantly lower operating risks, which needs to be taken into account.	

[8] Kimpian, J., Burman, E.,Bull, J., Paterson, G., Mumovic, D., 2013. *Getting Real about Energy Use in Non-domestic Buildings,* [CIBSE ASHRAE 2014 Conference, London]

PROPOSALS OF NEW DEFINITIONS UNDER ARTICLE 2

- **"*decarbonised building stock*"** means healthy, comfortable and highly energy efficient buildings, with a very low energy demand, supplied by renewable energy sources and intelligently integrated into a decarbonised, flexible energy system as well as constructed with minimal energy, waste and environmental impact.

- **'*Individual building renovation passport'*** means a document – in electronic or paper format – that outlines a long-term (up to 20 years) step-by-step renovation roadmap for a specific building, resulting from an on-site energy audit and fulfilling specific quality criteria and indicators established in consultation with the building owner.

- ***'general indoor climate conditions'*** means thermal, including resilience to overheating, pollutant free air provision, acoustic and daylighting conditions.

- ***'designated function'*** of a building includes the building's ability to meet occupant needs as well as functional adaptability, including the ability to adapt to long term changes in use types and occupant needs.

Justification

The additional definitions are necessary to establish common principles for a harmonised improvement of the European building stock ("*decarbonised building stock*" and '*Individual building renovation passport'*) and to clarify terms used under Article 4 points 1 and 2 ("*general indoor climate conditions*" and "*designated function*") to go some way to recognise all four pillars of building performance.

While it could be left to MS to decide on a specific definition and strategy to achieve the goal to decarbonise the building stock by 2050, it is essential that the principles on how a decarbonised building stock would look like are commonly established. To achieve the energy transition and deliver all its benefits to the EU citizens, it is imperative to send clear signal to the market about how the future should look like.

By following the energy Union's Efficiency First principle and NZEB principle (which is already established in the directive), the future building stock will be more efficient and better performing. At the same time, the EU should promote and aspire to a healthier, more comfortable and more affordable building stock.

In addition, ACE believes that '*Smartness indicator*' as referred to under Article 8 requires interim definition that recognises the risks associated with the design, installation, commissioning, operation and maintenance needs of automated services. These systems have been highlighted as a primary cause of the performance gap and the source of excessive mitigation and maintenance costs in modern buildings.

Additional guidelines and standards should be created to support the transparent reporting and certification of all energy end uses and related technical building systems, in particular:

- the reporting of occupant density and hours of use;
- the concepts of "cost-effective", "estimated economic lifecycle" (Article 5 / Annex III, and already to be considered in guidelines);
- targeted and achieved indoor climate conditions, indoor comfort parameters;
- nearly zero energy buildings.

New Article 2a
Long-term renovation strategy

Commission's proposal	ACE proposal of amendment
1. Member States shall establish a long-term strategy for mobilising investment in the renovation of the national stock of residential and commercial buildings, both public and private. This strategy shall encompass: (a) an overview of the national building stock based, as appropriate, on statistical sampling; (b) identification of cost-effective approaches to renovations relevant to the building type and climatic zone; (c) policies and measures to stimulate cost-effective deep renovations of buildings, including staged deep renovations; (d) a forward-looking perspective to guide investment decisions of individuals, the construction industry and financial institutions; (e) an evidence-based estimate of expected energy savings and wider benefits.	1. Member States shall establish a long-term strategy for mobilising investment in the renovation of the national stock of residential and commercial buildings, both public and private. This strategy shall encompass: (a) an overview of the national building stock based, as appropriate, on statistical sampling; (b) identification of **life cycle** cost-effective approaches to renovations relevant to the building type and climatic zone **and their alignment with relevant functional retrofit scenarios;** (c) policies and measures to stimulate cost-effective deep renovations of buildings, including staged deep renovations; (d) a forward-looking perspective to guide investment decisions of individuals, the construction industry and financial institutions; (e) an evidence-based estimate of expected energy savings and wider benefits.

Justification

ACE proposes an addition to (b) under paragraph 1:

*(b) identification of **life cycle** cost-effective approaches to renovations relevant to the building type and climatic zone **and their alignment with relevant functional retrofit scenarios;***

Cost efficiency needs to be assessed using Life Cycle Costing (LCC) calculations. This will stimulate longer term investments and solutions that are needed to improve the rate of energy retrofitting of the existing building stock. Quantifying the net present value of future energy savings and the long term robustness and feasibility of design solutions using LCC will help decision makers and property owners decide the best solutions.

"*Relevant functional retrofit*" includes capacity enhancements such as roof and side extensions, creation of semi-outdoor buffer spaces such as balconies, façade shading and lightwells, kitchen and bathroom upgrades.

This is to promote the alignment of functional and performative upgrades of buildings. Functional upgrades occur with much greater frequency than energy efficient retrofits. These already require the replacement or addition of structure, wiring, plumbing and finishes similar to deep renovation. Common energy efficiency retrofit in domestic scenarios reduce energy consumption on average between 5-10% and only deep renovation can improve energy efficiency by more than the 30% required to meet efficiency targets. In addition, energy efficiency retrofits by themselves contribute to between 0.5-1% of increase in property values, while a functional/architectural retrofit can increase

property values by an order of magnitude. Providing advantageous financing for all retrofit projects willing to improve energy efficiency by more than 30% is a win-win scenario for all stakeholders and is more likely to achieve a step change in the uptake of energy efficient retrofits than providing finance for energy efficiency only. See comments on 'major renovation' under point 2a.

Commission's proposal	ACE proposal of amendment
2. In their long-term renovation strategy referred to in paragraph 1, Member States shall set out a roadmap with clear milestones and measures to deliver on the long-term 2050 goal to decarbonise their national building stock, with specific milestones for 2030.	2. In their long-term renovation strategy referred to in paragraph 1, Member States shall set out a roadmap with clear milestones and measures to deliver on the long-term 2050 goal to decarbonise their national building stock, with specific milestones for 2030. **Member states shall define nearly zero EMISSION building standards and benchmarks to be fully implemented in building regulations by 2030 for new buildings and retrofits of the existing building stock.** **Near zero EMISSION building standards need to be documented using Life Cycle Assessment (LCA) methods to calculate energy and resource use associated impacts of buildings.** **The accuracy of LCAs should be continuously improved by requiring all building components to have Environmental Product Declarations (EPD) based on the actual and specific resource use of the given component implemented by 2030.**
In addition, the long term strategies shall contribute to the alleviation of energy poverty.	In addition, the long term strategies shall contribute to the alleviation of energy poverty.

Position

ACE believes that the current wording "*2050 goal to decarbonise their national building stock*" is too vague. It calls on the co-legislator to clarify the EU long-term 2050 vision. The EU needs an ambitious and clearly defined long-term 2050 vision, with key milestones in 2030 and 2040, in order create a stable regulatory framework, conducive to investment decisions. ACE advocates for a resource efficient and comfortable building stock by 2050 – see proposal of definition of "*decarbonised building stock*" under article 2.

Energy efficiency is a primary means to achieve the political aims of energy security and climate change mitigation. This should be reflected in the revision of the EPBD by linking energy efficiency to

carbon emission savings and environmental impacts. These are calculated using Life Cycle Assessment (LCA) methods and Environmental Product Declarations (EPD) to account for operational and embodied energy uses and the associated environmental impacts of building operation, fabrication and possible reuse and recycling of building elements.

This will connect the EPBD to the upcoming policy on circular economy and the great potentials the circular economy carries for economic growth, job creation and resource efficiency and availability. In the case of Denmark, an ambitious implementation of circular economy has an economic potential of an 0,8-1,4% increase in the Danish GDP and a 3-7% reduction in carbon footprint by 2035 according to the Ellen MacArthur Foundation[9]. Half of these benefits are found in the construction sector through recycling, digital fabrication and documentation as well as greater efficiency in space use. Reaping the benefits of the circular economy, carbon savings and overall resource efficiency require better access to data and quality of data on building performance and the embodied energy and carbon emissions of materials and components in buildings. LCA is an ISO 14040 standardized method, but input data are often based on generic values which often do not reflect the regional differences and product specific resource uses and environmental impacts accurately.

Therefore the framework and data quality of LCAs and EPDs should be consistently and continuously improved by defining a step by step procedure for implementing EPDs for all building components based on the specific data of the components' fabrication by 2030.

ACE welcomes the focus on energy poverty and recognises that increasing the value of properties as part of energy efficiency retrofits can result in diminished access to social housing, which must be addressed by national strategies.

Commission's proposal	ACE proposal of amendment
3. To guide investment decisions as referred to in point (d) in paragraph 1, Member States shall introduce mechanisms for:	3. To guide investment decisions as referred to in point (d) in paragraph 1, Member States shall introduce mechanisms for:
(a) the aggregation of projects, to make it easier for investors to fund the renovations referred to in points (b) and (c) in paragraph 1;	(a) the aggregation of projects, to make it easier for investors to fund the renovations referred to in points (b) and (c) in paragraph 1;
	(b) identifying overlaps with relevant functional retrofits scenarios
(b) de-risking energy efficiency operations for investors and the private sector; and	(**c**) de-risking energy efficiency operations for investors and the private sector; and
(c) the use of public funding to leverage additional private sector investment or address specific market failures.	(**d**) the use of public funding to leverage additional private sector investment or address specific market failures.
	(e) identifying the benefits of renovation in terms of indoor environmental quality and occupant satisfaction.

[9] https://www.ellenmacarthurfoundation.org/assets/downloads/government/20151113_DenmarkCaseStudy.pdf
See page 26

Justification

ACE proposes the addition of a new (b) under paragraph 3:

(b) identifying beneficial overlaps with relevant functional retrofits scenarios

This is to promote the alignment of functional and performative upgrades of buildings. Functional upgrades, including capacity enhancements such as roof and side extensions, creation of semi-outdoor buffer spaces such as balconies, façade shading and lightwells, kitchen and bathroom upgrades, occur with much greater frequency than energy efficient retrofits. These already require the replacement or addition of structure, wiring, plumbing and finishes similar to deep renovation. Common energy efficiency retrofit in domestic scenarios reduce energy consumption on average between 5-10% and only deep renovation can improve energy efficiency by more than the 30% required to meet efficiency targets. In addition, energy efficiency retrofits by themselves contribute to between 0.5-1% of increase in property values, while a functional/architectural retrofit can increase property values by an order of magnitude. Providing advantageous financing for all retrofit projects willing to improve energy efficiency by more than 30% is a win-win scenario for all stakeholders and is more likely to achieve a step change in the uptake of energy efficient retrofits than providing finance for energy efficiency only. See comments on 'major renovation' under point 2a.

ACE suggests the addition of a new (e) under paragraph 3:

(e) identifying the benefits of renovation in terms of indoor environment quality and occupants' satisfaction.

ACE shares the view that the renovation of the existing building stock is the most important task for reaching the climate protection targets. Energy efficiency is central to fighting climate change. Strategies to achieve significant reductions in building energy use must also deliver better indoor environmental quality, building functionality and occupant satisfaction in order to provide long-term solutions and to avoid any unintended consequences. It is also important to recognise that indoor environmental quality and improved building functionality act as far greater incentives for occupiers and investors to finance energy efficient retrofits and that to achieve resilient buildings it is essential to target all these four pillars of building performance.

Article 6
New buildings

Commission's proposal	ACE proposal of amendment
1. Member States shall take the necessary measures to ensure that new buildings meet the minimum energy performance requirements set in accordance with Article 4.	1. Member States shall take the necessary measures to ensure that new buildings meet the minimum energy performance requirements set in accordance with Article 4.
~~For new buildings, Member States shall ensure that, before construction starts, the technical, environmental and economic feasibility of high-efficiency alternative systems such as those listed below, if available, is considered and taken into account:~~	~~For new buildings, Member States shall ensure that, before construction starts, the technical, environmental and economic feasibility of high-efficiency alternative systems such as those listed below, if available, is considered and taken into account:~~
~~(a) decentralised energy supply systems~~	~~(a) decentralised energy supply systems~~

~~based on energy from renewable sources;~~ ~~(b) cogeneration;~~ ~~(c) district or block heating or cooling, particularly where it is based entirely or partially on energy from renewable sources;~~ ~~(d) heat pumps.~~ ~~2. Member States shall ensure that the analysis of alternative systems referred to in paragraph 1 is documented and available for verification purposes.~~ ~~3. That analysis of alternative systems may be carried out for individual buildings or for groups of similar buildings or for common typologies of buildings in the same area. As far as collective heating and cooling systems are concerned, the analysis may be carried out for all buildings connected to the system in the same area.~~	~~based on energy from renewable sources;~~ ~~(b) cogeneration;~~ ~~(c) district or block heating or cooling, particularly where it is based entirely or partially on energy from renewable sources;~~ ~~(d) heat pumps.~~ ~~2. Member States shall ensure that the analysis of alternative systems referred to in paragraph 1 is documented and available for verification purposes.~~ ~~3. That analysis of alternative systems may be carried out for individual buildings or for groups of similar buildings or for common typologies of buildings in the same area. As far as collective heating and cooling systems are concerned, the analysis may be carried out for all buildings connected to the system in the same area.~~

ACE position

ACE agrees with the Commission's analysis and welcomes the deletion of these provisions: the requirement to assess the technical, environmental and economic feasibility of high-efficiency alternative systems under Article 6(1) of the EPBD is effectively redundant because the obligation for all new buildings to be nearly zero-energy buildings implicitly requires an assessment of locally available high-efficiency alternative systems.

Article 7
Existing buildings

Commission's proposal	ACE proposal of amendment
Member States shall take the necessary measures to ensure that when buildings undergo major renovation, the energy performance of the building or the renovated part thereof is upgraded in order to meet minimum energy performance requirements set in accordance with Article 4 in so far as this is technically, functionally and economically feasible.	Member States shall take the necessary measures to ensure that when buildings undergo major renovation, the energy performance of the building or the renovated part thereof is upgraded in order to meet minimum energy performance**, general indoor climate and designated functional** requirements set in accordance with Article 4 in so far as this is technically, functionally and economically feasible.
Those requirements shall be applied to the renovated building or building unit as a whole. Additionally or alternatively, requirements may be applied to the renovated building elements. Member States shall in addition take the	Those requirements shall be applied to the renovated building or building unit as a whole. Additionally or alternatively, requirements may be applied to the renovated building elements. Member States shall in addition take the

necessary measures to ensure that when a building element that forms part of the building envelope and has a significant impact on the energy performance of the building envelope, is retrofitted or replaced, the energy performance of the building element meets minimum energy performance requirements in so far as this is technically, functionally and economically feasible. Member States shall determine these minimum energy performance requirements in accordance with Article 4. ~~Member States shall encourage, in relation to buildings undergoing major renovation, the consideration and taking into account of high-efficiency alternative systems, as referred to in Article 6(1), in so far as this is technically, functionally and economically feasible.~~	necessary measures to ensure that when a building element that forms part of the building envelope and has a significant impact on the energy performance of the building envelope, is retrofitted or replaced, the energy performance of the building element meets minimum energy performance requirements in so far as this is technically, functionally and economically feasible. Member States shall determine these minimum energy performance requirements in accordance with Article 4. ~~Member States shall encourage, in relation to buildings undergoing major renovation, the consideration and taking into account of high-efficiency alternative systems, as referred to in Article 6(1), in so far as this is technically, functionally and economically feasible.~~
ACE position See comments on the term 'major renovation' under Article 2 (10) The purpose of using energy in buildings is to create a comfortable, healthy and productive indoor environment. Passive architecture measures on their own cannot fully deliver these and require mechanical enhancements. Adding the term '*general indoor climate and designated functional*' in the first paragraph is the first step towards re-directing market focus away from purely mechanical solutions to indoor environmental quality towards more holistic and innovative means of achieving indoor comfort. ACE requests a clearer definition of the term "*technically, functionally and economically feasible*" in the context of 'cost-optimal' interventions.	

Article 8
Technical building systems

Commission's proposal	ACE proposal of amendment
1. Member States shall, for the purpose of optimising the energy use of technical building systems, set system requirements in respect of the overall energy performance, the proper installation, and the appropriate dimensioning, adjustment and control of the technical building systems which are installed in existing buildings. Member States may also apply these system requirements to new buildings. System requirements shall be set for new, replacement and upgrading of technical building systems and shall be applied in so far as they are	1. Member States shall, for the purpose of optimising the energy use of technical building systems, set system requirements in respect of the overall energy performance, the proper installation, and the appropriate dimensioning, adjustment and control of the technical building systems which are installed in existing buildings. Member States may also apply these system requirements to new buildings. System requirements shall be set for new, replacement and upgrading of technical building systems and shall be applied in so far as they are

technically, economically and functionally feasible.	technically, economically and functionally feasible.
~~The system requirements shall cover at least the following:~~ ~~(a) heating systems;~~ ~~(b) hot water systems;~~ ~~(c) air-conditioning systems;~~ ~~(d) large ventilation systems;~~ ~~or a combination of such systems.~~	~~The system requirements shall cover at least the following:~~ ~~(a) heating systems;~~ ~~(b) hot water systems;~~ ~~(c) air-conditioning systems;~~ ~~(d) large ventilation systems;~~ ~~or a combination of such systems.~~
~~2. Member States shall encourage the introduction of intelligent metering systems whenever a building is constructed or undergoes major renovation, whilst ensuring that this encouragement is in line with point 2 of Annex I to Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity (16). 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.~~	~~2. Member States shall encourage the introduction of intelligent metering systems whenever a building is constructed or undergoes major renovation, whilst ensuring that this encouragement is in line with point 2 of Annex I to Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity (16). 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.~~
2. Member States shall ensure that in all new non-residential buildings and in all existing non-residential buildings undergoing major renovation with more than ten parking spaces, at least one of every ten is equipped with a recharging point within the meaning of Directive 2014/94/EU on the deployment of alternative fuels infrastructure, which is capable of starting and stopping charging in reaction to price signals. This requirement shall apply to all non-residential buildings, with more than ten parking spaces, as of 1 January 2025.	2. Member States shall ensure that in all new non-residential buildings and in all existing non-residential buildings undergoing major renovation with more than ten parking spaces, at least one of every ten is equipped with a recharging point within the meaning of Directive 2014/94/EU on the deployment of alternative fuels infrastructure, which is capable of starting and stopping charging in reaction to price signals. This requirement shall apply to all non-residential buildings, with more than ten parking spaces, as of 1 January 2025.
Member States may decide not to set or apply the requirements referred to in the previous subparagraph to buildings owned and occupied by small and medium-sized enterprises as defined in Title I of the Annex to Commission Recommendation 2003/361/EC of 6 May 2003.	Member States may decide not to set or apply the requirements referred to in the previous subparagraph to buildings owned and occupied by small and medium-sized enterprises as defined in Title I of the Annex to Commission Recommendation 2003/361/EC of 6 May 2003.
3. Member States shall ensure that newly built residential buildings and those undergoing major renovations, with more than ten parking spaces, include the pre-cabling to enable the installation	3. Member States shall ensure that newly built residential buildings and those undergoing major renovations, with more than ten parking spaces, include the pre-cabling to enable the installation

of recharging points for electric vehicles for every parking space. 4. Member States may decide not to set or apply the requirements referred to in paragraphs 2 and 3 to public buildings which are already covered by Directive 2014/94/EU.	of recharging points for electric vehicles for every parking space. 4. Member States may decide not to set or apply the requirements referred to in paragraphs 2 and 3 to public buildings which are already covered by Directive 2014/94/EU.
Justification Point 1, second paragraph: See comments on the term 'major renovation' under Article 2 (10). ACE requests a clearer definition of the term "*technically, functionally and economically feasible*" in the context of 'cost-optimal' interventions. Point 2 deleted Metering and monitoring needs to then be clarified elsewhere, such as under Article 2a and Article 8 point 6. Points 2, 3, 4 ACE welcomes the new provisions regarding recharging points for electro mobility.	

Commission's proposal	**ACE proposal of amendment**
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 performance certificates. Member States shall ensure that this information is included in the national energy performance certificate database referred to in Article 18(3).	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 performance certificates. Member States shall ensure that this information is included in the national energy performance certificate database referred to in Article 18(3). **5.a. Information regarding the intended operation and maintenance of the technical building system installed must be easily made available either through printed or digital documentation.**
Justification Point 5	

ACE welcomes point 5 but calls for clarification:

- What are the boundaries of "*complete altered system"* and could these be defined under Article 2a?
- What is the minimum threshold for the definition of a system?
- ACE recommends that the Smartness Indicator should include the digital storage of such data – i.e. in the form of a digital building passport

Smartness indicator should include the digital storage of such data – i.e. a digital building passport.

New point 5a

Inclusion of intended operational profiles and maintenance schedules are frequently missing from building documentation. There is an opportunity to formalise the disclosure of such information through a Digital Building Passport, a form of digital 'Log Book' that accompanies a building during transactions if the datasets can accommodate related data.

Commission's proposal	ACE proposal of amendment
6. The Commission is empowered to adopt delegated acts in accordance with Article 23 supplementing this Directive with a definition of 'smartness indicator' and with the conditions under which the 'smartness indicator' would be provided as additional information to prospective new tenants or buyers. The smartness indicator shall cover flexibility features, enhanced functionalities and capabilities resulting from more interconnected and built-in intelligent devices being integrated into the conventional technical building systems. The features shall enhance the ability of occupants and the building itself to react to comfort or operational requirements, take part in demand response and contribute to the optimum, smooth and safe operation of the various energy systems and district infrastructures to which the building is connected.	6. The Commission is empowered to adopt delegated acts in accordance with Article 23 supplementing this Directive with a definition of 'smartness indicator' and with the conditions under which the 'smartness indicator' would be provided as additional information to prospective new tenants or buyers. The smartness indicator shall cover flexibility features, enhanced functionalities and capabilities resulting from more interconnected and built-in intelligent devices being integrated into the conventional technical building systems. The features shall enhance the ability of occupants and the building itself to react to comfort or operational requirements, take part in demand response and contribute to the optimum, smooth and safe operation of the various energy systems and district infrastructures to which the building is connected. **Such systems shall allow feedback on achieved performance including the metering and monitoring of the energy consumption of technical building systems as well as indoor environmental quality.**
Justification ACE calls for a clarification of the definition, scope and objectives of the proposed smartness indicator: What will be measured exactly? Using which parameters? What use will be made of the	

results? Who will measure? Which buildings will be included? How will they account for the risks associated with automation in buildings? ACE invites the Commission to consult the stakeholders of the construction sector before developing this. It believes that any smartness indicator shall be coherent and compatible with the framework of indicators currently being developed by the Commission (DG ENVI) to assess the environmental performance of buildings and with the Building Passport initiative.

Providing feedback on the energy consumption of technical building systems and indoor environmental quality is essential to ensure that smart systems in fact deliver the expected improvements in building performance.

Article 10

Financial incentives and market barriers

Commission's proposal	ACE proposal of amendment
~~6. Member States shall take account of the cost optimal levels of energy performance when providing incentives for the construction or major renovation of buildings.~~	~~6. Member States shall take account of the cost optimal levels of energy performance when providing incentives for the construction or major renovation of buildings.~~
6. Member States shall link their financial measures for energy efficiency improvements in the renovation of buildings to the energy savings achieved due to such renovation. These savings shall be determined by comparing energy performance certificates issued before and after renovation.	6. Member States shall link their financial measures for energy efficiency improvements in the renovation of buildings to the energy savings achieved due to such renovation. These savings shall be determined by comparing energy performance certificates **validated to be within range of achieved measured energy consumption data and** issued before and after renovation.
6a. When Member States put in place a database for registering EPCs it shall allow tracking the actual energy consumption of the buildings covered, regardless of their size and category. The database shall contain the actual energy consumption data of buildings frequently visited by the public with useful floor area of over 250 m² which shall be regularly updated.	6a. When Member States put in place a database for registering EPCs it shall allow tracking the actual energy consumption **over time, the basic building configuration, including if feasible its relevant LCA-data (grey energy), the envelope performance and technical building systems** of the buildings covered, regardless of their size and category. The database shall contain the actual energy consumption data of ~~**buildings frequently visited by the public**~~ **all non-domestic buildings** with useful floor area of over 250 m² which shall be regularly updated.
6b. Aggregated anonymised data compliant with EU data protection requirements shall be made available on request, at least for the public	6b. Aggregated anonymised data, **including if**

authorities for statistical and research purposes.	**feasible its relevant LCA-data (grey energy), building configuration, envelope performance and technical building systems,** compliant with EU data protection requirements shall be made available ~~**on request, at least for the public authorities for statistical and research purposes.**~~ **in the public domain**. **6c. When Member States put in place a database for registering EPCs, it shall allow the storage of energy consumption data before and after maintenance, as well as operational and maintenance data relating to the operating and maintenance requirements of its technical systems.**

Justification

Point 6

ACE support this, providing that the EPCs are validated with measured energy use to give credibility to the certificates. Should the EPCs not be validated with measured energy use, this would result in severe unintended consequences.

Point 6a

ACE calls on the co-legislator to define what actual energy consumption means and specify which data will be recorded. Primary energy use of buildings and associated emissions should be disclosed at the minimum along with basic data on building configuration (m2, floor to floor heights, orientation, no of thermal zones and m2). The lodging of energy end uses and indoor environmental quality should be required for all buildings, with a 'high' smartness indicator.

ACE advocates that the database shall contain the actual energy consumption data of all non domestic buildings, and not just of "*buildings frequently visited by the public".* The rollout of operational ratings is the first step towards a better focus on operational performance and helps create a level playing field for stakeholders in the property sectors. In several member States commercial landlords and developers are undertaking voluntary reporting, such as the Better Building Partnership's scheme[10] in the UK and are campaigning on national level to implement operational ratings to help achieve real savings in energy consumption and maintenance costs. Operational Ratings (OR) are also considered to be a cost-effective vehicle for performance contracting and can support the validation of EPCs. Where adopted, Operational Ratings have provided a major incentive for industry and policy makers to undertake detailed research of the factors affecting energy consumption in use.

Point 6b

ACE calls for a broad disclosure of the actual energy consumption data: aggregated anonymised data shall made available in the public domain, to ensure the rapid and continuous improvement of energy efficiency measures and technologies.

[10] http://www.betterbuildingspartnership.com.au

Point 6c

The regular maintenance of technical equipment is important to reduce the decrease of its energy-efficiency.

Article 14
Inspection of heating systems

Commission's proposal	ACE proposal of amendment
~~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), 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.~~ ~~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. 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.~~ ~~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. 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 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	1. Member States shall lay down the necessary measures to establish a**n** ~~regular~~ **annually** inspection **and assessment** ~~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 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~~

regards the heating requirements of the building in the meantime.	~~as no changes were made to the heating system or as regards the heating requirements of the building in the meantime.~~

ACE position

Heating systems should be serviced annually and the related certificates should be included in a building's digital Log Book /Building Passport

Non-compliance was extremely high with previous system but that is not a reason to remove performance validation altogether. The inspection of heating systems should be incentivised to avoid operational and maintenance risks.

A building management system in itself is no guarantee that any of the information provided by the system is acted upon – and usually such systems are not installed with the monitoring and reporting features enabled.

Inspections should be carried out by independent assessor or if automated energy and benchmarking is opted for then the data should be made available in the public domain and be subjected to quality checks.

Commission's proposal	ACE proposal of amendment
~~2. Member States may set different inspection frequencies depending on the type and effective rated output of the heating system whilst taking into account the costs of the inspection of the heating system and the estimated energy cost savings that may result from the inspection.~~	~~2. Member States may set different inspection frequencies depending on the type and effective rated output of the heating system whilst taking into account the costs of the inspection of the heating system and the estimated energy cost savings that may result from the inspection.~~
~~3. Heating systems with boilers of an effective rated output of more than 100 kW shall be inspected at least every two years.~~ ~~For gas boilers, this period may be extended to four years.~~	~~3. Heating systems with boilers of an effective rated output of more than 100 kW shall be inspected at least every two years.~~ ~~For gas boilers, this period may be extended to four years.~~
~~4. As an alternative to paragraphs 1, 2 and 3 Member States may opt to take measures to ensure the provision of advice to users concerning the replacement of boilers, other modifications to the heating system and alternative solutions to assess the efficiency and appropriate size of the boiler. The overall impact of this approach shall be equivalent to that arising from the provisions set out in paragraphs 1, 2 and 3.~~	~~4. As an alternative to paragraphs 1, 2 and 3 Member States may opt to take measures to ensure the provision of advice to users concerning the replacement of boilers, other modifications to the heating system and alternative solutions to assess the efficiency and appropriate size of the boiler. The overall impact of this approach shall be equivalent to that arising from the provisions set out in paragraphs 1, 2 and 3.~~
~~Where Member States choose to apply the measures referred to in the first subparagraph,~~	~~Where Member States choose to apply the measures referred to in the first subparagraph,~~

~~they shall submit to the Commission a report on the equivalence of those measures to measures referred to in paragraphs 1, 2 and 3 of this Article by 30 June 2011 at the latest. Member States shall submit these reports to the Commission every three years. The reports may be included in the Energy Efficiency Action Plans referred to in Article 14(2) of Directive 2006/32/EC.~~	~~they shall submit to the Commission a report on the equivalence of those measures to measures referred to in paragraphs 1, 2 and 3 of this Article by 30 June 2011 at the latest. Member States shall submit these reports to the Commission every three years. The reports may be included in the Energy Efficiency Action Plans referred to in Article 14(2) of Directive 2006/32/EC.~~
~~5. After receiving the national report from a Member State about the application of the option as described in paragraph 4, the Commission may request further specific information regarding the requirements and equivalence of the measures set out in that paragraph. In that case, the Member State concerned shall present the requested information or propose amendments within nine months.~~	~~5. After receiving the national report from a Member State about the application of the option as described in paragraph 4, the Commission may request further specific information regarding the requirements and equivalence of the measures set out in that paragraph. In that case, the Member State concerned shall present the requested information or propose amendments within nine months.~~
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:	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 **as handed over** shall be ~~**capable of**~~ **installed to carry out the activities listed under points a-d**:
(a) continuously monitoring, analysing and adjusting energy usage;	(a) continuous monitoring, **communication**, analys**is** and adjusting **of** 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;	(b) benchmarking **of** 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.	(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**;**
	(d) submission of anonymised annual energy use data in the public domain and attributable data for inspection purposes.

Justification

ACE proposes to rephrase the last sentence of the point 2 as capability does not mean it actually is set up on site to do it: *These systems **as handed over** shall be ~~**capable of**~~ **installed to carry out the***

activities listed under points a-d

ACE proposes a new (d)

(d) submission of annual energy use data in the public domain

In order to ensure the rapid and continuous improvement of energy efficiency measures and technologies an evidence base needs to be created to underpin robust legislation and to provide feedback on the effectiveness of different energy efficiency measures. Therefore data from buildings in use needs to be made available in the public domain automatically.

Commission's proposal	ACE proposal of amendment
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. 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~~ **installed to carry out the activities listed under points a-c**: (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**;** **(c) in the case of automated systems the inspection shall be carried out remotely.**

Justification

ACE proposes to rephrase the last sentence of the point 3 as capability does not mean it actually is set up on site to do it: *These systems **as handed over** shall be ~~capable of~~ **installed to carry out the activities listed under points a-c***

ACE proposes a new (c)

(c) in the case of automated systems the inspection shall be carried out remotely.

Automation carries additional risks, which means that inspection is imperative for these systems. Installing automated systems provides the economic benefit of low-cost remote inspections rather than exempting inspections altogether. Automation is relatively new technology, likely to undergo intensive development over the coming decade. Inspections are an important tool for gathering feedback and expertise required to spur the market on towards continuous improvements.

Article 15
Inspection of air-conditioning systems

Commission's proposal	ACE proposal of amendment
~~1. 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. 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.~~
~~Member States may reduce the frequency of such inspections or lighten them, as appropriate, where an electronic monitoring and control system is in place.~~	~~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. 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 changes were made to this air-conditioning system or as regards the cooling requirements of the building in the meantime.	1. Member States shall lay down the necessary measures to establish a ~~regular~~ **annual** 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 changes were made to this air-conditioning system or as regards the cooling requirements of the building in the meantime.~~
~~2. The 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 air-conditioning system and the estimated energy cost savings that may result from the inspection.~~	~~2. The 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 air-conditioning system and the estimated energy cost savings that may result from the inspection.~~
~~3. In laying down the measures referred to in paragraphs 1 and 2 of this Article, Member~~	~~3. In laying down the measures referred to in paragraphs 1 and 2 of this Article, Member~~

~~States shall, as far as is economically and technically feasible, ensure that inspections are carried out in accordance with the inspection of heating systems and other technical systems referred to in Article 14 of this Directive and the inspection of leakages referred to in Regulation (EC) No 842/2006 of the European Parliament and of the Council of 17 May 2006 on certain fluorinated greenhouse gases (17).~~	~~States shall, as far as is economically and technically feasible, ensure that inspections are carried out in accordance with the inspection of heating systems and other technical systems referred to in Article 14 of this Directive and the inspection of leakages referred to in Regulation (EC) No 842/2006 of the European Parliament and of the Council of 17 May 2006 on certain fluorinated greenhouse gases (17).~~
~~4. As an alternative to paragraphs 1, 2 and 3 Member States may opt to take measures to ensure the provision of advice to users on the replacement of air conditioning systems or on other modifications to the air-conditioning system which may include inspections to assess the efficiency and appropriate size of the air-conditioning system. The overall impact of this approach shall be equivalent to that arising from the provisions set out in paragraphs 1, 2 and 3.~~	~~4. As an alternative to paragraphs 1, 2 and 3 Member States may opt to take measures to ensure the provision of advice to users on the replacement of air conditioning systems or on other modifications to the air-conditioning system which may include inspections to assess the efficiency and appropriate size of the air-conditioning system. The overall impact of this approach shall be equivalent to that arising from the provisions set out in paragraphs 1, 2 and 3.~~
~~Where Member States apply the measures referred to in the first subparagraph, they shall, by 30 June 2011 at the latest, submit to the Commission a report on the equivalence of those measures to the measures referred to in paragraphs 1, 2 and 3 of this Article. Member States shall submit these reports to the Commission every three years. The reports may be included in the Energy Efficiency Action Plans referred to in Article 14(2) of Directive 2006/32/EC.~~	~~Where Member States apply the measures referred to in the first subparagraph, they shall, by 30 June 2011 at the latest, submit to the Commission a report on the equivalence of those measures to the measures referred to in paragraphs 1, 2 and 3 of this Article. Member States shall submit these reports to the Commission every three years. The reports may be included in the Energy Efficiency Action Plans referred to in Article 14(2) of Directive 2006/32/EC.~~
~~5. After receiving the national report from a Member State about the application of the option as described in paragraph 4, the Commission may request further specific information regarding the requirements and equivalence of the measures set in that paragraph. In this case, the Member State concerned shall present the requested information or propose amendments within nine months.~~	~~5. After receiving the national report from a Member State about the application of the option as described in paragraph 4, the Commission may request further specific information regarding the requirements and equivalence of the measures set in that paragraph. In this case, the Member State concerned shall present the requested information or propose amendments within nine months.~~
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:	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	(a) continuous~~ly~~ monitoring,

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. 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 (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.	**communication,** analysis and adjust**ment of** 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. 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 (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. **(c) in the case of automated systems the inspection shall be carried out remotely.**
Justification See justification under Article 14.	

Article 20
Information

Commission's proposal	ACE proposal of amendment
~~2. Member States shall in particular provide information to the owners or tenants of buildings on energy performance certificates and inspection reports, their purpose and objectives, on cost-effective ways to improve the energy~~	~~2. Member States shall in particular provide information to the owners or tenants of buildings on energy performance certificates and inspection reports, their purpose and objectives, on cost-effective ways to improve the energy~~

~~performance of the building and, where appropriate, on financial instruments available to improve the energy performance of the building.~~ 2. Member States shall in particular provide information to the owners or tenants of buildings on energy performance certificates, their purpose and objectives, on cost-effective ways to improve the energy performance of the building and, where appropriate, on financial instruments available to improve the energy performance of the building.	~~performance of the building and, where appropriate, on financial instruments available to improve the energy performance of the building.~~ Member States shall in particular **set up accessible and transparent advisory tools, such as energy performance certificates, individual building renovation passports, renovation advice, and one-stop-shops for consumers.** ~~Member States shall in particular provide~~ **Through these tools, Member States shall** provide information to the owners or tenants of buildings on ~~energy performance certificates, their purpose and objectives, on~~ cost-effective ways to improve the energy performance of the building **in line with national renovation strategies**, and~~, where appropriate,~~ on **available** financial instruments ~~available to improve the energy performance of the building.';~~ **Individual building renovation passports outline a long-term (up to 20 years) step-by-step renovation roadmap for a specific building, resulting from an on-site energy audit and fulfilling specific quality criteria and indicators established in consultation with the building owner;** **One-stop-shops are physical or digital places of advisory service, which are easily accessible and provide independent advice.**

Justification

Statement by BPIE: In-depth information provided to building owners and tenants about the tools available in each Member States to improve energy performance of buildings will contribute to successfully implement and deliver on the long-term renovation strategies (Art. 2a). Together with difficulty to access finance, a recognised barrier to renovation is the lack of knowledge about what to do, where to start, and which measures to implement in which order.

One-stop-shops should be close to the consumer to ensure he/she finds all the relevant and commercially independent information in the same place, including financial support available, lists of certified experts, and tools to develop a personalised renovation plan (e.g. individual building renovation passport).

ANNEX I
Common general framework for the calculation of energy performance of buildings
(referred to in Article 3)

Commission's proposal	ACE proposal of amendment
~~1. The energy performance of a building shall be determined on the basis of the calculated or actual annual energy that is consumed in order to meet the different needs associated with its typical use and shall reflect the heating energy needs and cooling energy needs (energy needed to avoid overheating) to maintain the envisaged temperature conditions of the building, and domestic hot water needs.~~	~~1. The energy performance of a building shall be determined on the basis of the calculated or actual annual energy that is consumed in order to meet the different needs associated with its typical use and shall reflect the heating energy needs and cooling energy needs (energy needed to avoid overheating) to maintain the envisaged temperature conditions of the building, and domestic hot water needs.~~
1. The energy performance of a building shall reflect its typical energy use for heating, cooling, domestic hot water, ventilation and lighting.	1. The energy performance of a building shall reflect its typical energy use for ~~heating, cooling, domestic hot water, ventilation and lighting.~~ **the provision of all energy usages as per ISO Standard 12655 and the systems required for 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.**
The energy performance of a building shall be expressed by a numeric indicator of primary energy use in kWh/(m².y), harmonised for the purpose of both energy performance certification and compliance with minimum energy performance requirements. The energy performance and the methodology applied for its determination shall be transparent and open to innovation.	The energy performance of a building shall be expressed by a numeric indicator of primary energy use in kWh/(m².y), harmonised for the purpose of both energy performance certification and compliance with minimum energy performance requirements. The energy performance and the methodology applied for its determination shall be transparent and open to innovation.
Member States shall describe their national calculation methodology following the national annex framework of related European standards developed under mandate M/480 given by the European Commission to the European Committee for Standardisation (CEN).	Member States shall describe their national calculation methodology ~~following the national annex framework of related European standards developed under mandate M/480~~ **as per ISO/FDIS 52000-1:2016(E)** given by the European Commission to the European Committee for Standardisation (CEN).
Justification The terms '*transparent'* and '*open to innovation'* require further clarification in the following sentence: *The energy performance and the methodology applied for its determination shall be transparent and open to innovation*. The completion of the ISO/FDIS 52000-1:2016(E) standard intended to underpin the EU Voluntary Certification Scheme makes it possible to harmonise the reporting metrics across	

Member States.

Commission's proposal	ACE proposal of amendment
~~2. The energy performance of a building shall be expressed in a transparent manner and shall include an energy performance indicator and a numeric indicator of primary energy use, based on primary energy factors per energy carrier, which may be based on national or regional annual weighted averages or a specific value for on-site production.~~ ~~The methodology for calculating the energy performance of buildings should take into account European standards and shall be consistent with relevant Union legislation, including Directive 2009/28/EC.~~ 2. The energy needs for space heating, space cooling, domestic hot water and adequate ventilation shall be calculated in order to ensure minimum health and comfort levels defined by Member States. The calculation of primary energy shall be based on primary energy factors per energy carrier, which may be based on national or regional annual weighted averages or on more specific information made available for individual district system. Primary energy factors shall discount the share of renewable energy in energy carriers so that calculations equally treat: (a) the energy from renewable source that is generated on-site (behind the individual meter, i.e. not accounted as supplied), and (b) the energy from renewable energy sources supplied through the energy carrier.	~~2. The energy performance of a building shall be expressed in a transparent manner and shall include an energy performance indicator and a numeric indicator of primary energy use, based on primary energy factors per energy carrier, which may be based on national or regional annual weighted averages or a specific value for on-site production.~~ ~~The methodology for calculating the energy performance of buildings should take into account European standards and shall be consistent with relevant Union legislation, including Directive 2009/28/EC.~~ 2. The energy needs for **energy usages as per ISO Standard 12655 and the systems required for 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,** shall be calculated in order to ensure minimum health and comfort levels defined by Member States **in relation to general indoor climate conditions as defined under Article 2 Point 3a.** The calculation of primary energy shall be based on primary energy factors per energy carrier, which may be based on national or regional annual weighted averages or on more specific information made available for individual district system. Primary energy factors shall discount the share of renewable energy in energy carriers so that calculations equally treat: (a) the energy from renewable source that is generated on-site (behind the individual meter, i.e. not accounted as supplied), and (b) the energy from renewable energy sources supplied through the energy carrier.
Justification All major energy end uses should be calculated or estimated and these estimates declared as part of	

certification and when checking against minimum health and comfort levels.

Minimum Health and Comfort Levels in Nations States should be aligned with the terminology 'general indoor climate conditions' as defined in Article 2 Point 3a.

Commission's proposal	ACE proposal of amendment
3. The methodology shall be laid down taking into consideration at least the following aspects: (a) the following actual thermal characteristics of the building including its internal partitions: (i) thermal capacity (ii) insulation (iii) passive heating (iv) cooling elements; and (v) thermal bridges …	3. The methodology shall be laid down taking into consideration at least the following aspects: (a) the following actual thermal and **hygroscopic** characteristics of the building including its (i) thermal capacity (ii) insulation (iii) passive heating (iv) cooling elements; and (v) thermal bridges …
4. The positive influence of the following aspects shall~~, where relevant in the calculation,~~ be taken into account: (a) local solar exposure conditions, active solar systems and other heating and electricity systems based on energy from renewable sources; (b) electricity produced by cogeneration; (c) district or block heating and cooling systems; (d) natural lighting.	4. The positive influence of the following aspects shall~~, where relevant in the calculation,~~ be taken into account: (a) local solar exposure conditions, **(b) spatial and material configuration of the building** **(c)** active solar systems and other heating and electricity systems based on energy from renewable sources; (**d**) electricity produced by cogeneration; (**e**) district or block heating and cooling systems; (**f**) natural lighting **5. The Energy performance of Buildings shall be reported within a larger benchmarking framework of buildings' contribution to a 'decarbonised building stock'. Member states shall define near zero emission building standards to be implemented in building regulations by 2030. Buildings' emissions shall be calculated using ISO 14040 LCA methods based on actual and specific EPD data on the environmental impacts associated**

	with materials' and component's resource efficiency and environmental impacts implemented by 2030. Member states shall work to ensure increased data reliability on EPDs.

Justification

The building configuration and materiality as well as the envelope performance have a major impact on the energy performance outcomes. Declaration of these should be part of the drive towards transparency across nation states.

Declaring the hygroscopic characteristics of the building fabric is essential to recognise humidity and thermal buffering capabilities of the building fabric and its potential contribution to passive heating and cooling. Without this inclusion there is a high risk of mis-specifying insulation and vapour barrier products as well as compromising the thermal and humidity buffering capabilities of historic building envelopes.

Accounting for the contribution of buildings towards decarbonisation opens up a new avenue of innovation in carbon savings in the design of the built environments. In Denmark where NZEB has been standard building regulations since 2015, it has become very difficult to achieve further cost efficient energy savings in the operational energy use of buildings. Shifting the focus towards saving embodied energy and carbon emissions through circular economy and recycling of materials shows much higher growth potentials as noted above. These savings of energy, resources and carbon emissions are documented using Life Cycle Assessments and Life Cycle Costing methods which should be implemented over the duration of the EPBD in a step by step process. In the case of Denmark NZEB classes for 2015 and 2020 were adopted as voluntary classes in 2010, which proved to stimulate the entire building sector value chain to develop the necessary competencies, skills and technologies to achieve those aims very effectively. Adding embodied energy and emissions will stimulate the next wave of circular economy innovations in building performance.

ANNEX II
Independent control systems for energy performance certificates and inspection reports

Commission's proposal	ACE proposal of amendment
~~1. The competent authorities or bodies to which the competent authorities have delegated the responsibility for implementing the independent control system shall make a random selection of at least a statistically significant percentage of all the energy performance certificates issued annually and subject those certificates to verification.~~	~~1. The competent authorities or bodies to which the competent authorities have delegated the responsibility for implementing the independent control system shall make a random selection of at least a statistically significant percentage of all the energy performance certificates issued annually and subject those certificates to verification.~~
1. The competent authorities or bodies to which the competent authorities have delegated the	1. The competent authorities or bodies to which the competent authorities have delegated the

responsibility for implementing the independent control system shall make a random selection of all the energy performance certificates issued annually and subject them to verification. The sample shall be of a sufficient size to ensure statistically significant compliance results.	responsibility for implementing the independent control system shall make a random selection of all the energy performance certificates issued annually and subject them to verification. The sample shall be of a sufficient size to ensure statistically significant compliance results.
The verification shall be based on the options indicated below or on equivalent measures: (a) validity check of the input data of the building used to issue the energy performance certificate and the results stated in the certificate; (b) check of the input data and verification of the results of the energy performance certificate, including the recommendations made; (c) full check of the input data of the building used to issue the energy performance certificate, full verification of the results stated in the certificate, including the recommendations made, and on-site visit of the building, if possible, to check correspondence between specifications given in the energy performance certificate and the building certified.	The verification shall be based on the options indicated below or on equivalent measures: (a) validity check of the input data of the building used to issue the energy performance certificate and the results stated in the certificate; (b) check of the input data and verification of the results of the energy performance certificate, including the recommendations made; (c) full check of the input data of the building used to issue the energy performance certificate, full verification of the results stated in the certificate, including the recommendations made, and on-site visit of the building, if possible, to check correspondence between specifications given in the energy performance certificate and the building certified.
2. The competent authorities or bodies to which the competent authorities have delegated the responsibility for implementing the independent control system shall make a random selection of at least a statistically significant percentage of all the inspection reports issued annually and subject those reports to verification.	2. The competent authorities or bodies to which the competent authorities have delegated the responsibility for implementing the independent control system shall make a random selection of at least a statistically significant percentage of all the inspection reports issued annually and subject those reports to verification.
3. When information is added to a database it shall be possible for national authorities to identify the originator of the addition, for monitoring and verification purposes.	3. When information is added to a database it shall be possible for national authorities **and researchers** to identify the originator of the addition, for monitoring and verification purposes.