

EuroACE Response to the EPBD Consultation

INFORMATION ABOUT YOU

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- an individual
- an organisation
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- other

What is the name of your company/organisation?* (compulsory) (maximum 50 characters)

EuroACE (European Alliance of Companies for Energy Efficiency in Buildings)

Which country or countries are you from/most active in?* (compulsory)

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A. Overall Assessment

1. How successful has the EPBD been in achieving on its goals?

EuroACE assesses the EPBD as the start of a process, ensuring that buildings, by their high energy performance, have a more prominent role in energy policy, which shall be continued. The EPBD recalls in its Recital (5) the European Council conclusions of March 2007, which “*emphasised the need to increase energy efficiency in the Union so as to achieve the objective of reducing by 20% the Union’s energy consumption by 2020.*” However, the European Commission acknowledged in 2014 that only 18-19% will be achieved in 2020, falling short of the indicative 20% target (European Commission, Communication “Energy efficiency and its contribution to energy security and the 2030 framework for climate and energy policy”, COM(2014)520, 23 July 2014, page 4). While there are other pieces of EU legislation dealing with energy efficiency, the EPBD has partly contributed to this result, i.e. progressing on the energy efficiency target, while not achieving it fully. On the EPBD more specifically, its major benefit was to set a vision for new buildings, and a timeframe for moving construction of new buildings at national level towards the nZEB level. Nonetheless, the majority of MS has not shown a great ambition when transposing the EPBD. The implementation has also been quite slow, which might also be linked to the economic situation during the transposition period. Therefore, the expected outcomes are not yet fully visible, which can also be explained by the way the construction sector works (i.e. changes are slow and political and regulatory ambition is needed to push the market). All in all, more needs to be done, especially regarding renovation of existing buildings, in order to fully tap the significant remaining energy savings potential and continue the positive trend that the EPBD has initiated.

2. Has it helped improve energy efficiency in buildings?

On the one hand, the EPBD has helped to improve the energy efficiency of *new* buildings, being constructed under updated tougher requirements (stepwise increase towards the nZEB level). According to the EPBD Concerted Action, there has been a positive 25% improvement of the overall energy performance of new buildings since the first EPBD. In countries such as Belgium, Ireland, or Poland, progressive improvements to the building codes have been encouraged by the EPBD. Nevertheless, as there are some challenges linked to the definition of an nZEB building, the EPBD has not yet had the full expected impact. Additionally, the EPBD has not adequately stimulated progress on the energy performance of *existing* buildings through renovation. Several reasons can explain this untapped potential, e.g. a lack of focus on existing buildings versus new buildings, a lack of real long-term vision for the building stock until 2050 and a lack of clarity concerning which building elements are to be considered when improving the energy performance of a building and how they are subject to energy efficiency requirements.

3. Has it helped to increase renovation (more than 25% of the surface of the building envelope) rates?

The EPBD has not yet ensured that the right framework for increasing the energy renovation rate, i.e. the proportion of buildings being renovated (with energy improvements) out of the whole building stock, is in place. In fact, the yearly renovation rate still remains at around 1%, which is clearly not enough to ensure that the EU achieves the objective of an nZEB-level building stock in the EU by 2050. In addition, there is no reliable information on energy savings resulting from renovation projects, highlighting the need to gather such data. This is even more striking, as it has been officially recognised at the highest political level that 75% of the European building stock is still inefficient in 2015. Importantly, one should also keep in mind that millions of interventions are undertaken on buildings every year, but these opportunities are not yet being properly used to trigger energy performance upgrades.

4. In your view, has the EPBD sufficiently contributed to accelerating investment in improving the energy performance of the EU's building stock? Why/Why not?

There were some positive developments, given that the main focus of the current EPBD is on nZEB for new buildings, therefore it has stopped the building stock in the EU from getting much worse. However, the EPBD was not meant to have and indeed did not have the tools to *sufficiently* contribute to accelerating investment in improving the energy performance of the building stock in the EU. This would need around €100 billion annually (EEFIG). But currently, the renovation rate is far too low to ensure that we achieve an nZEB-level building stock in the EU by 2050. This insufficient contribution of the EPBD to accelerating investment in energy efficiency in buildings is partly due to a very poor engagement by a majority of MS which, due to a lack of prioritisation of the buildings to achieve climate, energy, health, jobs and growth objectives, have favoured putting in place inconsistent, short-term financial and non-financial incentive structures. Furthermore, a lack of regulatory stability in some MS where continuous reforms of subsidy schemes makes the market suffer from stop-go incentives is highly detrimental. Regulatory stability is therefore vital to achieve an ambitious investment level in energy efficiency improvements of the building stock. Finally, raising more awareness on the multiple benefits of energy efficient building renovation and accounting for them in investment decisions would help to accelerate investment in improving the energy performance of the building stock in the EU.

5. Overall, do you think that the EPBD is contributing to cost-effective improvements of energy performance? Why/Why not?

On *new* buildings, the EPBD is indeed contributing to cost-effective improvement of energy performance. According to the EPBD Concerted Action, there has been a positive 25% improvement of the overall energy performance of new buildings since the first EPBD. This relates to the fact that in many MS, there were very low requirements, which have been raised with the introduction of new improved MEPR in the second EPBD. The cost-effective efficiency gains were smaller in Member States which already had stringent efficiency requirements in place. Experience also shows that, thanks to the effects of the learning curve, the additional cost of building to low or nearly zero energy standards has

steadily diminished over recent years. In Member States that had put clear pathways towards nZEB in place, the additional costs are estimated at 0 to 10%, which ensures short back-back times.

On *existing* buildings being renovated, the EPBD clearly does not help to achieve cost-effective improvements of energy performance, with most of the potential being left untapped. According to the International Energy Agency World Energy Outlook (2012), without ambitious building renovation policies, four fifths of the existing cost-effective energy savings potential risk being left untapped by 2035. This can be related to the fact that cost-optimal calculations are complex methodologies, and give Member States too much room for manoeuvre (e.g. optional consideration of societal costs and benefits, discount rate, primary energy factors).

6. Do you think that the aim of ensuring the same level of ambition across the EU in setting MEPR within the EPBD has been met? Why/Why not?

The aim of ensuring the same level of ambition across the EU in setting MEPR has only been partially met, as there is still a wide disparity of requirements between MS, which cannot be explained by the difference in climatic conditions, especially regarding new buildings. For example, the definition of an nZEB energy performance ranges from 0 to 270 kWh/m²/y. This is due to the poor understanding of MS regarding the importance of setting ambitious and holistic energy performance requirements as part of a well-communicated multiannual plan, in order to profit from all related benefits. This should be done on the basis of taking better account of the content of EPBD Annex I, especially in relation to general design parameters linked to the location and orientation of the building. A lack of political will and implementation might also explain that the level of ambition when setting MEPR was not the same across the EU. Additionally, the big permitted range in the cost-optimal methodology gives significant freedom to MS when setting their MEPR.

7. Has the EPBD effectively addressed the challenges of existing buildings' energy performance?

The EPBD has only addressed *some* of the challenges of existing buildings' energy performance, as the current EPBD does not focus sufficiently on existing buildings (being renovated). The energy renovation of existing buildings must be seen as the priority for the EPBD Review. In addition to consuming 40% of all EU primary energy and emitting 36% of all CO₂ emissions, buildings use 61% of all gas imports and 39% of electricity. Today, 75% to 90% of the existing building stock is still inefficient. Moreover, according to a poll undertaken by QUALICHECK in September 2015, 33% of participants assessed existing buildings as the necessary focus in the context of the EPBD Review, before quality (32%) and compliance (24%).

More can be done to improve the energy performance of existing buildings, such as:

- Adopting a legally binding definition of “deep renovation”, rather than solely using the definition of “major renovation” for applying MEPR. Currently, the European Commission defines a “deep renovation” as a renovation leading to 60% or more energy efficiency improvements (European Commission, Staff Working Document, “Financial support to energy efficiency in buildings”, SWD (2013) 143,

18 April 2013, page 11). EuroACE believes that the deep renovation of the building stock should ensure that by 2050 the building stock in the EU will be at nZEB level. At building level, through a deep or staged-deep renovation, all the cost-effective energy savings potential should be tapped, in order to avoid any lock-in effect. Staged-deep renovation, consisting as it does of a series of coherent and planned steps undertaken over time and achieving the full savings potential, is what most building owners (will) undertake;

- Ensuring that the level of requirements is really set at the cost-optimal level by narrowing the gap of - 15% to - 5%;
- Adopting a strong long-term vision for the entire building stock (until 2050) and drafting solid national renovation strategies (EED Article 4), equipped with clear timeframes, objectives, and milestones, which focus on financing and take full account of the multiple benefits that arise;
- Improving the quality of EPCs (see reply to Q27, Q30, Q32);
- Developing one-stop-shops to address the main barriers to building renovation, notably access to financing and skilled, certified craftspeople;
- Better enforcement of national transposition laws, notably by promoting on-site inspections and controls

8. Has the EPBD set effective energy performance standards for new buildings?

As such, setting the level of energy performance requirements for new buildings is a competence of the MS, and should continue to be so. Some EPBD provisions such as Article 5 (cost-optimality) and Article 9 (nZEBs) have been important in driving change, although the impact has been less important in MS where the improvement of MEPR had already been triggered by domestic developments. According to an Ecofys report (October 2014), about half of the MS are already using the definition of nZEB. More progress needs to be achieved. Moreover, increasing the ambition is still needed in several MS, which have not been sufficiently ambitious, especially since cost-optimal levels and nZEB levels are expected to converge by 2020 in all MS. All in all, the EPBD should be considered as a process which will enable incremental progress towards highly energy efficient buildings (nZEBs) being enshrined in all building codes. As implied by the adoption of the Energy Efficiency First principle, the nZEB definition shall first of all require the significant reduction of the energy demand of the building. This principle shall be maintained in the EPBD, and extended to include that buildings are made 'demand-response ready' and that they offer demand-side flexibility. This is a prerequisite to the successful integration of buildings in energy systems and to the emergence of Smart Buildings, as defined by EuroACE (more information available at <http://www.euroace.org/LinkClick.aspx?fileticket=ULREOmME8b8%3d&tabid=192>).

9. Will the 'nearly zero energy buildings' targets be met? Why/Why not?

While some MS will reach the nZEB target, it seems that nZEB targets will most likely not be met on time in every MS. This is due to implementation challenges, as well as lack of ambition in some MS in setting the nZEB definition, as shown in an Ecofys report (October 2014). This applies to both new buildings and existing buildings being renovated, as there should be only one definition of an nZEB in each MS. Nonetheless, the learning curve is very high if MS adopt a strategy to plan the adoption and the introduction of nZEB level requirements. Therefore, it is very important to adopt an nZEB target,

but it is equally important to develop a roadmap to implement it, especially to give investors and market players the regulatory predictability and stability they need.

Solutions to improve the evolution of the building stock towards a nZEB-level include:

- Improve the definition of nZEB (see reply to Q18, Q19), and improve guidance on how to develop nZEB levels for building renovations;
- Improving the work on renovation of existing building into nZEBs, as in Article 9(2), notably by linking the nZEB national plans (EPBD Article 9) and the national building renovation strategies (EED Article 4). This would allow linking the renovation depth (nZEB level) and renovation rate.
- Setting well in advance a target deadline (2050) with intermediate milestones (e.g. 2030, 2040);
- Issuing (mandatory binding) templates for the nZEB plans at least, or even for the national building renovation strategies;
- Exploring opportunities deriving from the concept of “adaptive building permits”, which contain different MEPR depending on the date of completion of the construction or renovation;
- Adopting adequate sanction mechanisms at national level (in relation with EPBD Article 27).

10. How successful has the inclusion of Energy Performance Certificates in the EPBD been? Have the certificates contributed to improvements in energy performance of buildings?

The inclusion of provisions related to the EPC in the EPBD is a positive development as they give information to owners and tenants about the energy performance of a building, and help them monitor the evolution of the energy performance. EPCs are starting to have an impact on the value of properties. A study (Bio Intelligence Service, Ronan Lyons and IEEP, *Energy performance certificates in buildings and their impact on transaction prices and rents in selected EU countries*, 19 April 2013) has shown that a one-letter improvement could lead to an increase of 2% to 10% in the price of the property. Interestingly, another study in France (available at <http://www.batiweb.com/actualites/eco-construction/la-valeur-verte-des-maisons-et-appartements-en-2014-15-10-2015-27211.html>) showed that there is added-value to improved energy performance of buildings (property price increase between 7 and 12%), and that the negative impact of not undertaking energy renovation can be as much as -18%.

Improvements to the EPC need to be considered:

- Transform current EPCs into more dynamic products, covering all performance aspects of the building over its entire lifecycle, as in FR (Passeport Efficacité Energétique, The Shift Project) or DE (*Sanierungsfahrplan* in Bade-Württemberg, under development at federal level). This would empower owners and/or tenants with a strategic renovation plan aimed at bringing the building to a performance level which is compatible with the objective of an nZEB level building stock in the EU by 2050;
- Introduce mandatory and publicly available national databases of EPCs, based on IT tools;
- Ensure that detailed tailor-made requirements are included and taken-up, ;
- Strengthen the uptake of EPCs by real estate and property managers;
- Ban the practice of selling EPCs online or by telephone;

- Improve the link between EPCs and access to financing (e.g. linking the EPC to an interest rate, property tax band, or providing an EPC for free to owners who decide to renovate their buildings into nZEB);
- Develop one-stop shops to provide advice and knowledge;
- Improve competences, increasing independence of energy auditors and certifiers, and improving accreditation procedures to boost trust in EPCs;
- Promote the development of on-site inspection controls, and the creation of adequate sanction mechanisms (in relation with EPBD Article 27), as today, it is possible in some Member States to buy or rent a property without an EPC being displayed

11. What has worked well in the EPBD? What needs to be improved?

Some provisions of the EPBD have set the basis for a progressive regulatory framework, while ultimately the level of ambition lies with MS, e.g. for requirements such as:

- The request to set and review MEPR at least every five years (Article 4);
- The request to set MEPR at cost-optimal level for the replacement or retrofitting of building elements that have a significant impact on the energy performance of the building (Article 4);
- The development of energy performance requirements for new buildings towards nZEB (Article 9);
- The development of EPCs and awareness-raising to trigger demand.

Nonetheless, there are many more provisions of the EPBD which could be improved and strengthened:

- Tightening cost-optimal levels (in relation with the too wide - 15% margin);
- Ensuring convergence in nZEB definitions, in particular to secure that nZEB buildings are future low-energy demand buildings;
- Defining cost-optimal nZEB-level requirements for existing buildings being renovated;
- Strengthening renovation and EPC requirements (see also Q7, Q10 and Section C);
- Better defining Technical Building Systems requirements, notably by including control systems;
- Improving national building renovation strategies and their implementation (see also Q26);
- Improve data comparability, compliance and market surveillance;
- Ensuring better implementation of EPBD Annex I, particularly in relation to the siting and orientation of buildings, to account for passive solar gain, in addition to heat loss when setting energy performance requirements for building elements.

12. Is the EPBD helping to contribute to the goals of EU climate and energy policy (reduce greenhouse gas emissions by at least 40%; increasing the share of renewable energy to at least 27%; increasing EE by at least 27%; reform of the EU emission trading system)?

Over the last ten years, there has been a decoupling between economic growth and energy consumption in the EU. According to Eurostat, between 2006 and 2013, whilst the GDP has continued to increase or has remained stable, the primary energy consumption at EU level has decreased from 1,725 Mtoe to 1,575 Mtoe, i.e. -9%. According to the ODYSSEE-MURE project, final energy consumption of buildings has decreased by 0.9% annually since 2008, while the GDP has increased by 0.3% annually in the same time. This can be partly attributed to the EPBD, which is contributing to the goals of EU

climate and energy policy. As buildings consume 40% of EU final energy, and as they emit 36% of CO₂ emissions, the reduction of the energy demand in buildings must continue to be a key priority for the EU. A lower overall energy consumption in buildings also helps MS to meet the 27% RES target. It also enables the unleashing of the other multiple benefits linked to ambitious building renovation, such as job creation, improved public finances, improved health, comfort, and indoor air quality (see VELUX, *Healthy Homes Barometer*, 2015, and International Energy Agency, *Capturing the Multiple Benefits of Energy Efficiency*, 2014).

According to an Ecofys study (Ecofys, *Renovation tracks for Europe up to 2050: building renovation in Europe – what are the choices*, June 2012), a high energy efficiency scenario to renovate the European building stock can deliver 80 to 90% reduction in CO₂ emissions of the building stock by 2050. Due to the long lifetime of buildings, existing buildings and energy renovations must become an additional focus of the EPBD in order to ensure that the full cost-effective saving potential is reached for each building. Therefore, EuroACE calls for a binding 40% target for energy efficiency by 2030, so as to reflect more accurately the potential of energy savings in the building sector. Moreover, a sectoral target, applied to the building sector, could be a relevant driver for achieving a better energy efficiency policy.

13. Is it in line with subsidiarity? What should continue to be tackled at EU level and what could be achieved better at national level?

According to Article 194(1) TFEU, subparagraph (c), which states that the “*Union policy on energy shall aim, in a spirit of solidarity between Member States, to [...] promote energy efficiency and energy saving [...]*”, energy efficiency policy and moderation of demand are clearly items which fall under EU competence. Article 194(1) does not contradict Article 194(2), which states that Member States have the “*right to determine the conditions for exploiting its energy resources, [the] choice between different energy sources and the general structure of its energy supply*”. All in all, energy efficiency and more specifically, energy performance of buildings, has to be defined at EU level, notably in terms of level of ambition and overall goals. This is even more the case after the Energy Union Communication (February 2015) recognised the building sector as a key priority sector for achieving EU objectives. Some flexibility can be (and is) granted to the Member States when implementing EU legislation (e.g. setting more detailed requirements), but there is a need to avoid fragmentation of the Internal Market and to ensure thorough implementation. In that sense, the EPBD is fully in line with subsidiarity. As a matter of fact, the Directive takes into account nationally-determined climatic conditions, and gives Member States the competence to set requirements, cost-optimal calculations and EPC obligations, whilst ensuring some comparability and convergence, in order to meet commonly agreed objectives.

14. Are the objectives of the EPBD delivered efficiently?

The delivery of the EPBD objectives was satisfactory regarding new buildings, in MS which established a clear long-term regulatory framework within the EPBD deadlines. But overall, the delivery of the EPBD objectives could have been much more efficient, if the MS would transpose the directive well, and implement it thoroughly. As a matter of fact, the numerous EU Pilots between the Commission and the MS on the EPBD implementation clearly shows that MS are facing serious challenges when it comes to

transposing EU legislation and applying the requirements. For example, 26 EU Pilots have been sent for non-notification of cost-optimal reports, and 8 EU Pilots were sent for non-notification of nZEB reports. In May 2015, the European Commission sent a Letter of Formal Notice to France for partial wrong transposition of some EPBD requirements. In June 2015, there were two reasoned opinions. Austria and the UK have been asked to notify more information to the Commission before referral to the Court of Justice. Therefore, more guidance from the European Commission to MS is needed in order for them to deliver efficiently the requirements of the EPBD and to thus achieve its objectives.

15. Has the EPBD created any unnecessary administrative burdens? If so, please provide examples

The transposition and implementation of EPBD provisions require some administrative effort, as any other EU legislation. However, if transposed intelligently, the EPBD does not create unnecessary administrative burdens. It is an important tool to accompany market transformation and the delivery of low energy buildings.

16. Has the EPBD created any unnecessary regulatory burdens? If so, please provide examples

The adaptation of building regulations at all levels, including building codes, to the EPBD provisions, requires some regulatory effort. If transposed intelligently, the EPBD does not create unnecessary regulatory burdens. However, the lack of convergence of requirements on Technical Building Systems and difficulties faced by the building sector to follow the implementation of EPBD Article 8 may nonetheless qualify as a regulatory burden, potentially leading to a fragmentation of the Internal Market, a lack of transparency and a lack of predictability of EU and national laws.

B. Facilitating enforcement and compliance

17. Is compliance with the provisions of the EPBD adequate?

No, and compliance with EPBD provisions could be much improved, as shown by the 26 EU Pilots for non-notification of cost-optimal reports, and 8 EU Pilots for non-notification of nZEB reports. Full implementation must be seen as a key element for success. In a poll by DENEFF (*Branchenmonitor Energieeffizienz 2014*, May 2014), 70% of German companies found implementation of EU legislation to be an important driver in the energy efficiency field. Better transposition and implementation, enforcement and targeted on-site controls would help to achieve a higher compliance rate. This is not only a matter of quantity (e.g. number of articles well transposed and properly implemented), but also a matter of the quality of transposition and implementation. QUALICheck (<http://qualicheck-platform.eu/>), found some serious issues with compliance, e.g. on EPCs and quality of works. In this respect, the quality of national transpositions and the quality of workmanship (to implement the changes) is fundamental. For example, in Ireland, the National Standards Authority (NSAI) operates a certified air-tightness tester scheme, in order to certify companies or persons for this specific high-quality competence. Another way to improve quality of transposition and implementation, is to

incentivise quality requirements. This has been done in the UK, France (RGE certification) and Belgium (effective post-insulation of existing cavity walls).

Others ways of improving compliance are to:

- Develop Key Performance Indicators in order to track progress;
- Set procedures to obtain more data on quality of works;
- Set quality requirements in national legislation (according to QUALICheck (September 2015), 65% of participants in a poll were not satisfied with compliance checks by MS);
- Set clear procedures and responsible actors to decide in case of non-compliance (according to QUALICheck, most MS do not have control mechanisms after the building permit phase);
- Promote the introduction of (targeted) on-site inspections in national transposition laws;
- Create one-stop shops to raise awareness (e.g. the “energy renovation facilitator” in the JRC Report “Energy Renovation: the Trump Card for the New Start for Europe”), and knowledge;
- Incentivise compliance with quality requirements through a link to financing;
- Improve the skills of the whole supply chain and public authorities through training and certification schemes, as an appropriate qualification leads to more trust

18. Is the definition of nZEBs in the EPBD sufficiently clear?

No.. Although Article 2(2) sets the main criteria, defining an nZEB, there are several concepts related to RES which remain very vague (i.e. “*very significant extent*” and the “*nearby*” location). This might explain why only 15 MS have a final nZEB definition in place (April 2015), and 13 MS still need to refine the existing definition. This lack of clarity leaves the door open to different interpretations in different MS, as they are responsible for setting the energy performance requirements of nZEB-level buildings in their jurisdictions. As the TABULA / EPISCOPE project has shown (<http://episcopes.eu/index.php?id=97>), MS have used different parameters, both in terms of quantity and quality, to define an nZEB. For example, the PEF is nationally determined and the definition of an nZEB energy performance ranges from 0 to 270 kWh/m²/y, although most MS define it at around 45 or 50 kWh/m²/y (for residential buildings).

To improve the nZEB definition, it would be necessary to redraft it by putting into practice the “Energy Efficiency First” Principle, i.e. making sure an nZEB is first about energy efficiency improvements and securing low energy needs, and then about inclusion of RES. Buildings should also be made ‘demand-response ready’ in order to offer demand-side flexibility. This is a prerequisite to the successful integration of buildings in energy systems and to the emergence of Smart Buildings as defined by EuroACE (more information available at <http://www.euroace.org/LinkClick.aspx?fileticket=ULREOmME8b8%3d&tabid=192>).

It means that buildings must firstly be made as energy efficient as possible, reducing their energy demand and decreasing the time needed for heating or cooling a building, thus making it comfortable, healthy and responsive to a changed energy system.

More clarity is needed on which parameters and input data to use, in order to allow for more convergence and comparability of national definitions, whilst leaving flexibility to permit MS to take account of national and climatic characteristics. A link to the energy performance class in EPCs could also be made, as is already the case in some MS. Another improvement would be the introduction of maintenance, supervision and control requirements, in order to continuously optimise energy performance. Finally, this improved definition would allow more use of targeted financial incentives, e.g. providing more financing or at a better rate, if a building is renovated to nZEB level.

19. Is the nZEB target in the EPBD sufficiently clear to be met?

In addition to an unclear definition of the concept of nZEB, the pathway toward nZEBs is uncertain. As a matter of fact, the deadlines included in EPBD Article 9(1) are not sufficiently clear. MS need more guidance and intermediary milestones, in order to adopt national legislation to transpose the EPBD requirements on time. For example, in the Brussels Region, a Law already passed in 2011 imposed tightened energy performance levels for new buildings (Passive House level) as from 2015, i.e. four years in advance. This enabled the market players to prepare themselves for the upcoming tighter requirements. Overall, the deadlines currently set at national level do not sufficiently give the right signals to the market, although from a technological point of view, the move towards nZEB is possible. Indeed, there is no technology gap.

20. If not, what, in your view, are the missing factors that would ensure compliance with:

a. Minimum energy performance requirements in new buildings?

Missing factors to ensure compliance with MEPR in new buildings are targeted on-site inspections to verify compliance and quality, accompanied by severe sanctions in case of non-compliance. Overall recommendations concerning nZEBs are included in Q18.

b. Minimum energy performance in major renovations of existing buildings?

Missing factors to ensure compliance with MEPR in major renovation of existing buildings are targeted on-site inspection to verify compliance and quality, accompanied by severe sanctions in case of non-compliance and a stricter definition of “major renovation” so that significantly more renovation projects are included.

c. Minimum energy performance for the replacing/retrofitting parts of the building envelope (roof, wall, window, etc.) and replacing/upgrading/installing technical building systems (heating, hot water, cooling, etc.)?

Missing factors to ensure compliance with MEPR for the replacement or retrofitting of parts of the building envelope and TBS include the development of individual renovation roadmaps (tailor-made recommendations), holistic vision on the different elements of the envelope, better definition of requirements applied to TBS (as a non-comprehensive approach of building renovation leads to

untapped energy savings potential), on-site inspection to verify compliance and quality, and severe sanctions in case of non-compliance.

d. Minimum renewable energy requirements to meet the nZEB target by 2020?

The nZEB definition, requiring nearly zero energy demand from buildings, should be maintained, as should the requirement to start considerations by maximising energy efficiency. A target for what this means should be further considered by the EU. The residual demand should be supplied by renewables such that the building supplies as much energy to the grid as it takes from the grid over the full year. That way, a flexible approach is maintained minimising energy demand and optimising RES use. Given the diversity of building design solutions, climatic conditions and access levels to RES, having a RES requirement is sensible as in most regions, the nZEB level cannot be achieved without using renewables.

e. Certification of the energy performance of buildings, including tailor-made recommendations for the improvement of the energy performance of buildings?

Missing factors to ensure compliance with EPC requirements are for example:

- A limited validity of certification of inspectors and auditors;
- Minimum requirements for education level, including training and working experience, for inspectors and auditors;
- Operationalisation of EPC recommendations into a proper improvement plan to explain to building owners how to engage into renovation, and what savings the building can technically and cost-effectively deliver (e.g. individual renovation roadmaps);
- The obligation to implement the recommendations included on EPCs within a defined timescale;
- More awareness at the level of building owners and tenants of the multiple benefits of building renovation.

f. Regular inspections of heating and air-conditioning systems?

It is necessary to permit flexibility to building owners and market actors on how best to monitor the energy performance of heating and air-conditioning systems, whilst at the same time ensuring that inspections on heating and air-conditioning systems are not reduced to just a “tick-the-box” exercise. Non-compliance should be discouraged by severe sanctions. These inspections, if to boost energy performance, should be accompanied by recommendations for improvements and a calendar to follow-up. A link to financial support could be introduced. More recommendations are included in the reply to Q79.

21. Do you think the cost-optimum methodology gives sufficient evidence regarding the actual cost of renovating buildings on top of the additional cost for NZEB?

Using the cost-optimal methodology has proven to be useful to drive MEPR in MS where these requirements were less advanced.

However, several factors which are influencing the cost-optimal calculations could be improved:

- A more harmonised PEF;
- A lower discount rate;
- A tightened margin (e.g. from -15% to -/5%);

All in all, the cost-optimum methodologies should be made more transparent at MS level, in order to be able to, at least, compare them between the different MS, as we know that currently, they are using different parameters. A good cost-optimum methodology as any other cost-benefit analysis should adopt a lifecycle approach, taking into account future economic and societal benefits of energy savings.

22. Are there any cost-effective measures for ensuring compliance at local and regional level that could be replicated and used to improve compliance on a larger scale?

In order to ensure compliance at local and regional level, some cost-effective measures could be introduced, such as targeted on-site inspections focusing on quality and compliance, accompanied by severe sanctions in case of non-compliance. More specifically, in order to avoid that these on-site inspections are just “tick-the-box” exercises, it should be ensured that they are validated through a robust certification. Finally, improving market surveillance would remove one of the main obstacles to tapping the full energy saving potential of the EPBD. According to industry estimates (ECOS <http://ecostandard.org/?cat=108>), 10% to 20% of the expected energy savings are wasted due to non-compliant products on the market.

23. What do you think of the various ways of calculating building energy performance at national/regional level? Please include examples.

The calculation methodologies are different between each MS. As a matter of fact, MS use different input parameters, e.g. different definitions of “useful floor area”. There are not even common principles for nZEBs as noted in Q18. Therefore, it is extremely difficult to compare the national calculation methodologies. It is desirable to get more comparability of these calculation methodologies, notably by using more convergent parameters. This should be done on the basis of taking better account of and better defining the content of EPBD Annex I, especially in relation to general design parameters linked to the location and orientation of the building.

24. What measures are missing that could simplify the implementation of building regulations to make sure that buildings meet the required high energy performance levels?

There are several measures which are missing in order to ensure implementation of building regulations.

- Develop Key Performance Indicators in order to track progress;
- Set procedures to obtain more data on quality of works;
- Promote the setting of quality requirements and sanctions in national legislation;
- Set clear procedures and responsible actors to decide in case of non-compliance;
- Promote the introduction of (targeted) on-site inspections in national transposition laws;
- Ensure that on-site inspections for products and systems are validated through robust certification;
- Create one-stop shops to raise awareness and knowledge;
- Incentivise compliance with quality requirements through a link to financing;
- Improve the skills of the whole supply chain and public authorities through training.

C. Energy Performance Certificates (EPCs) and stimulating energy efficient renovation of the building stock

25. Are the available data on the national/regional building stock sufficient to give a clear picture of the energy performance of the EU's building stock, as well as the market uptake of energy efficiency technologies and the improvement of the energy performance of buildings in the EU?

There is enough data to prioritise buildings as a key sector and to develop ambitious renovation strategies. Yet, MS need to get a better picture of their national building stock. In this regard, data is especially missing on building renovation and uptake of deep renovation works. Having access to good data on the European building stock would help the European Commission to draft a more relevant proposal in the framework of the EPBD Review, as it would enable a more targeted approach, especially when it comes to setting some thresholds (e.g. floor area), and identifying building typologies to be tackled first. The lack of data is linked to the lack of transparency in the data *collection*, which should be more systematic and should allow for aggregation at EU level. It could be interesting to engage with regional and local decision makers on this topic. Dynamic EPCs, transformed into building renovation passports, with the support of an encompassing IT platform, would be useful in providing monitoring data about the status of individual buildings, about works already performed and about works to be performed. All in all, a centrally managed register for energy performance in buildings could help to give a clearer picture of the EU building stock, and would also help to monitor progress over time; therefore leading to better designed and applied policies. In this respect, BPIE initiatives (“Buildings under the Microscope” Report, Data Hub, and Building Observatory) can be seen as the way to proceed.

26. Are the long-term national renovation strategies adopted sufficient to stimulate the renovation of national building stock? What examples of best practice could be promoted across the EU and how?

The long-term national renovation strategies, as foreseen by EED Article 4, are a good tool to stimulate building renovation at national level. They are also widely recognised as a positive development by market players. For example, in Germany, according to a poll, 80% of the companies involved in the energy efficiency market found that more could be done on the national energy efficiency strategy, and that more policy stability was needed (Deutsche Unternehmensinitiative Energieeffizienz (DENEFF), *Branchenmonitor Energieeffizienz 2014*, May 2014). However, the existing building renovation strategies need to be improved. First, MS did not seize this opportunity to adopt a clearly long-term strategy on how to upscale energy renovation of their building stock, needed to provide the stable and reliable regulatory framework required to stimulate investment. Therefore, the forward-looking perspective needs to be enhanced, notably with the introduction of true “new measures” and with real implementation on the ground.

The wording of EED Article 4 could also be improved and its requirements strengthened to include:

- A clear objective of an nZEB level building stock by 2050, with milestones for 2030 and 2040, which would serve as a progressive implementation plan to guide the market;
- A more coherent planning, reporting, monitoring and sanctions approach, with the aim to boost deep renovation of the national building stocks with a more forward-looking perspective;
- A mandatory consultation process with stakeholders in each MS, as for example the BUILD UPON Project is seeking to do for the second version of the strategies, expected to be delivered in 2017;
- A true reporting and monitoring requirement delivering effective implementation of the national strategies;
- A better linkage with EED Article 5 (3% yearly renovation of central government buildings), with EPBD Article 9(3) – national plans on nZEBs, and with the Building Observatory led by the European Commission together with BPIE;
- A possibility to link the requirement included in EED Article 4(a) – overview of national building stock – with the population census exercise;
- Strengthening of EED Article 4(e) to ensure that building energy renovations are planned to unlock the known multiple benefits, particularly in regards to delivering better indoor climate, health and comfort.

27. Have EPCs played a role in increasing the rate of renovation, the extent of renovation, or both? For instance, are EPC recommendations being defined as the most effective packages of measures to move the performance of buildings and/or their envelopes to higher energy classes?

EPCs give information in a structured way to owners and tenants about the energy performance of a building, are a tool to monitor the evolution of the energy performance, and also help to increase the value of properties. For instance, in the UK, a 2013 study by the DECC showed that making energy savings improvements could increase values by 14% on average. Positive examples of well-designed

EPCs include Denmark and Portugal. However, no direct link between EPCs and the rate or depth of renovation in the EU can currently be drawn. According to results from the QUALICHeCK project & EASME, there are currently 24 million EPCs in circulation in 14 selected MS. As each EPC is worth between 30 and 200 euros, this represents a big investment, and therefore, quality must be ensured.

For increased impact EPCs should:

- Improve convergence of national calculation methodologies and input data;
- Evolve into more dynamic products, such as electronic “Building Renovation Passports” covering the entire lifecycle of the building, and facilitating decision-making for building owners, as in France or Germany (*Sanierungsfahrplan* in Bade-Wurttemberg, to be extended to the federal level);
- Assess the various ways to reduce the deviation between declared energy performance and actual in-use energy performance, e.g. by requiring EPCs to be delivered after delivery of the project, using “as-built” energy performance, and integrating in-use data
- Take into account all aspects of renovation and multiple benefits, such as improved thermal, visual, acoustic comfort, indoor air quality and health;
- Be stored in mandatory and publicly available national databases, based on IT tools;
- Ensure that detailed tailor-made requirements are included and taken-up;
- Be taken up more by real estate and property managers;
- Not be issued via websites or through simple phone calls;
- Lead to improved access to financing (e.g. linking the EPC to an interest rate, providing a free EPC to owners who renovate their buildings into nZEB, or using an EPC based on as-designed energy performance to agree a grant but giving funds only after completion of works, using an EPC based on as-built energy performance);

Additional ideas:

- Link the property tax to EPC levels (e.g. stamp duty tax, or recent development in Spain);
- Develop one-stop shops to provide advice and knowledge;
- Improve the competences of the energy auditors and certifiers, and improve accreditation procedures to boost trust in EPCs;
- Promote the development of on-site inspection and control

28. Is setting a minimum renovation target for Member States to undertake (e.g. each year; percentage of building stock) important and requires further attention in the context of meeting the goals of the EPBD?

Yes. A renovation target must serve an overall objective regarding energy savings to be realised in the building stock, and the final energy performance to be achieved. Therefore, when setting a minimum renovation target for MS, both the rate and the depth of renovation must be considered.

A renovation target should be applied to the building stock in order to realise the full energy savings potential. The level of this target (rate), should ensure that the building stock evolves towards nZEB performance levels by 2050, taking into account that not all energy renovations will be full deep renovations undertaken at once, but may use a staged-approach, due to economic constraints placed

on the building owner. The setting of regulatory measures at national level could be promoted so as to increase the renovation rate. This would for example include the introduction of a regulatory “consequential renovation” requirement, linked to the realisation of technical or aesthetic works on the buildings, as in France, or the removal of the possibility to rent out the most inefficient buildings, as will soon be the case in the UK. A first step to get the process started (and to ensure responsibility towards taxpayers) would be to extend the minimum renovation rate included in EED Article 5 (i.e. 3% each year) to all public buildings, using the definition contained in EPBD Article 12, i.e. buildings occupied by a public authority and frequently visited by the public, and not only the restrictive concept of buildings owned and occupied by central government.

It is also important to ensure that the depth of renovation is ensured in the long-term, i.e. that renovations will, at building level, be (staged) deep renovations, with the objective to reach an nZEB level building stock in the EU by 2050. If the renovation rate is considered, in isolation from the depth of renovation, it might lead to a huge part of the energy savings potential being untapped. In relation to setting MEPR for energy renovation of existing buildings, the EPBD should apply the concept of “(staged-) deep renovations”, that tap the full cost-effective energy savings potential, avoiding any lock-in effect. Currently, most renovations are not part of a deep renovation roadmap for the building, which often leads to a problematic lock-in effect of energy savings and benefits. Therefore, the EPBD should ensure that barriers to rolling out energy efficient building renovations are solved.

29. Are obligations or binding targets for renovation or any other mandatory measure (e.g. mandatory minimum thermal efficiency standards for rental properties) missing from the EPBD to ensure that the directive meets its goals? If, yes, what kind of obligations and targets?

Introducing obligations or regulatory signals for renovations, or more broadly, mandatory measures in the EPBD, is the best way to progress towards better energy performance in buildings. Such obligations could *inter alia* be a mandatory minimum EPC level for rental properties, whether commercial or residential buildings. In the UK for example, it will soon be forbidden to rent out properties with an EPC of level “F” or “G”. However, it is important to underline that that introduction of regulatory measures must be placed in the wider framework of a well-thought out strategic plan, supported by adequate financing, and ensuring implementation and compliance, in order to deliver positive effects. A revised EPBD should propose that MS set binding targets for the (staged-) deep renovation of the worst performing buildings, but leave it to national regulators to develop detailed measures. In fact, a special emphasis should be put on the planning and putting into practice of such renovation targets (on rate and depth), by adopting and implementing well-designed renovation strategies, with a long-term perspective, in coordination with the national building renovation strategies (EED Article 4).

30. Are EPCs designed in a way that makes it easy to compare and harmonise them across EU Member States?

No. Currently, the EPCs are not designed in a way which allows for comparison and harmonisation across the EU. Indeed, EPCs are still designed and implemented at the national and regional level. Therefore, there are very different EPCs in terms of content (since there are different calculation methodologies), design and quality. The EPBD article 11(9) calls for the creation of a voluntary common EU certification scheme for the energy performance of non-residential buildings. This is a good measure; however, it should have been in force by 2011, whereas it is still not developed.

31. Do you think that the 'staged deep renovation' concept is clear enough in the EPBD?

The concept of “staged deep renovation” can be confusing, especially for non-specialists. Therefore, it would need to be translated into a clearer definition. First, it would be useful to clearly define in a binding document what exactly a “deep renovation” is. For the moment, only a Commission Staff Working Document mentions “deep renovations” as renovations bringing 60% or more energy improvements. Deep renovation should mean the realisation of a building's full long-term energy savings potential, avoiding any lock-in effect, and contributing to reach the objective of an nZEB level building stock by 2050.

Staged deep renovation could refer to coherent and planned steps undertaken towards this full savings potential. Tools such as the “Building Passport” or a “Building Logbook” could help the wider public to understand the concept of “staged deep renovations”, which would make them more acceptable and interesting to undertake. These tools should provide for a clear renovation roadmap at building level, leading to a very low energy demand level (nZEB level) at the end of the process.

Experience shows that staged-deep renovation is what market actors are most likely to undertake, following the economic lifecycle of the building. In the Danish national renovation strategy or French Energy Transition Law (2015), energy efficiency investments are promoted whenever a retrofit or replacement of a building element takes place, as this has been identified as the most cost-effective way to reduce energy consumption of buildings. These findings support the promotion of the concept of staged-deep renovation. It should be ensured that staged-deep renovations become mainstream and deliver savings compatible with the objective of an nZEB level building stock in the EU by 2050.

32. Have EPCs raised awareness among building owners and tenants of cost-efficient ways of improving the energy performance of the buildings and, as a consequence, help to increase renovation rates across the EU?

Even if MS adequately transposed measures related to EPCs into their national legislation, facts are showing that often, real estate agents are not showing an EPC to the new owner or new tenant. This is greatly hampering any influence of EPCs on building owners and tenants. Consequently, if EPCs have an effect on the price of properties, it does not seem that they are sufficiently used in practice to unleash renovation works, as the current yearly renovation rate is still at around 1%. This might also be due to

the fact that even if EPCs are issued in case a building is sold or rented out, often, the (not mandatory) tailor-made recommendations are missing from the EPC. This also explains why EPCs, although being a good tool, cannot deliver their full potential in helping to increase renovation rates across the EU MS. EPCs do not yet serve as a dynamic tool accompanying building owners, accelerating the decision-making process towards engaging energy renovation works.

In order to unleash this potential, recommendations include:

- Linking EPCs and access to financing;
- Including the multiple (societal) benefits into EPCs in order to raise awareness, e.g. on indoor air quality, health and comfort – as according to Fraunhofer, 80 million Europeans live today in damp and mouldy buildings (see also BPIE, *Indoor air quality, thermal comfort and daylight*, March 2015). Such awareness-raising would encourage building owners to undertake energy renovations, as capturing multiple benefits has been shown in several studies (including VELUX, *Healthy Homes Barometer*, 2015) to be a primary motivator for Europeans;
- Strengthening of certification in order to improve trust;
- Developing national databases using IT tools and based on comparable calculation methodologies;
- Encouraging Member States to enforce EPC advertisement in sales and rentals
- Transforming the EPCs into more dynamic tools, like the Building Passport, would enable awareness raising about the cost-efficient ways to improve the energy performance of the building.

33. Should EPCs have been made mandatory for all buildings (a roofed construction having walls, for which energy is used to condition the indoor climate), independent of whether they are rented out or sold or not?

Yes, but before making the EPCs mandatory for all buildings, whether they are rented out, sold, or not, the first step should be to ensure that this provision is effectively implemented on the ground. As a matter of fact, even if MS adequately transposed this measure into their national legislation, facts are showing that often, real estate agents are not showing an EPC to the new owner or new tenant. However, it totally makes sense to ask for an EPC at this stage, as it is at this moment (change of owner or tenant) that building renovation is most likely to occur. Nevertheless, making EPCs mandatory, within the right policy framework, for all buildings, independently of whether they will be sold, rented out or not, can be a good trigger to renovation. This can be understood as “consequential renovation”, i.e. ensuring that energy efficiency improvements are made as soon as other types of works are happening on the building (e.g. aesthetic changes, equipment changes, accessibility improvements). A second argument in favour of making EPCs mandatory for all buildings is the issue of quality of long-term building renovation strategies (EED Article 4). These national strategies have to provide, as a basis, an overview of the national building stock, not only in terms of number and age, but also in terms of energy performance. Therefore, equipping every building with an EPC would also allow national authorities to draw a more accurate picture of the national building stock. Consequently, the policy measures which will be decided on this basis will be more tailored and directly targeted at the specifics of the national building stock. All in all, having a mandatory EPC for each building would improve the relevance and effectiveness of the national renovation roadmaps, and trigger more building renovation.

D. Smart Finance for Smart Buildings: Financing energy efficiency and renewable energy in buildings and creation of markets

34. What are the main reasons for the insufficient take-up of the financing available for energy efficiency in buildings?

There are several reasons explaining why there is an insufficient take-up of the financing available for EE in buildings:

- A too strong reliance on public funds and subsidies;
- No earmarking of public funds towards energy efficiency in buildings (e.g. in the EFSI);
- Too many administrative burdens to get public financing;
- A lack of awareness among consumers about the multiple benefits that come with energy renovation, such as lower bills, better comfort and indoor air quality, improved health and productivity;
- A lack of confidence among investors, because of regulatory instability, therefore there are stop-and-go investments;
- Limiting rules on public debt and deficit, and the existing accounting treatment (ESA 2010 rules) of public investment in energy efficiency, which do not allow for an off balance sheet treatment to EE investments, especially at regional and local level;
- Detrimental (EU and national) public procurement rules to overall energy efficiency contracts;
- Too high interest rates, when they should be at around 2% over 10 to 25 years;
- Too small contracts because of the lack of aggregators, when there could be an interesting potential in social housing for example.

The EFIG Report (*Energy Efficiency – the first fuel for the EU Economy - How to drive new finance for energy efficiency investments*, February 2015) provides a thorough analysis of the reasons why some available financial mechanisms have not been taken up for investing in energy efficiency projects.

35. What non-financing barriers are there that hinder investments, and how can they be overcome?

The lack of (sufficient) formatted data to boost investor confidence can be considered as a non-financing barrier hindering investments. To overcome it, the collection and sharing of (more converging and comparable) data should be promoted. Moreover, more awareness-raising needs to be done on the multiple benefits unleashed by energy efficient building renovation, in order to convince consumers. There is also a lack of visibility around the fact that all buildings should be renovated (lack of political prioritisation). Other non-financing barriers hindering investments in energy efficient buildings are mentioned in the EFIG Report.

36. What are the best financing tools the EU could offer to help citizens and Member States facilitate deep renovations?

In order to help citizens and MS facilitate deep renovations, the EU should develop financing tools which are easily accessible, affordable and available on the long-term, as regulatory stability has been identified by investors as a key driver. The EEFIG Report (*Energy Efficiency – the first fuel for the EU Economy - How to drive new finance for energy efficiency investments*, February 2015) contains several good recommendations on how to improve financing tools and access to finance for energy efficiency projects.

Such financing tools could include:

- Tax exemptions, also from regional and local taxes, proportionally linked to the achievement of low-energy performance levels;
- VAT reduction for renovation goods and services;
- A salary sacrifice scheme, as developed in Ireland by the Sustainable Energy Authority;
- Low interest rates linked with deep renovation projects and/or nZEBs;
- Property tax reductions linked to EPCs;
- Energy Performance Contracting aimed at high energy savings;
- Risk-sharing facilities;
- First-loss guarantee funds;
- On-bill financing;
- Ensuring subsidy schemes focus on those works realised by qualified professionals (e.g. RGE/eco-conditionality scheme in France).

The EU should also direct increased percentages of funding to private projects, as currently, some funds and technical assistance are only directed towards the public sector.

37. What role do current national subsidies for fossil fuels have in supporting energy efficient buildings?

Current national subsidies for fossil fuel consumption have a negative role as they perpetuate the use of polluting fossil fuels, and do not help to support energy efficient buildings. Those subsidies actually undo what governments are trying to trigger through awareness-raising programmes and subsidies towards adequate energy renovation works. If such national subsidies are granted to vulnerable consumers / energy poor people, it will further hamper building renovation, as it will appear as a short-term solution. Therefore, such fossil fuel subsidies should be phased out rapidly, and the equivalent amount should instead be used to fund renovation programmes, as in Lithuania

38. Have energy efficiency and renewable energy projects been combined to maximise their financing? How can the EU help?

The European Commission has announced the launch of the “Smart Financing for Smart Buildings” initiative. However, the concept needs to be further fleshed out. Therefore, EuroACE suggests adopting, as a first step, the following definition of what a Smart Building is (based on the following Position Paper <http://www.euroace.org/LinkClick.aspx?fileticket=ULREOmME8b8%3d&tabid=192>) A Smart Building should be defined as a well-designed building where energy efficiency comes first, where the right materials and equipment have been specified and installed and which is connected through the smart grid to its neighbourhood. It has a functional, comfortable and healthy indoor environment and its intrinsic low energy demand enables the cost-effective use of renewable energy sources. Being fully integrated into the wider energy system it can, through demand response and energy storage, ensure increased flexibility and deliver better value to owners and occupants. A Smart Building empowers its owner or occupant to take informed decisions about energy use throughout the lifetime of the building through the provision of reliable, protected, real-time data on the building energy production and consumption. Since a Smart Building’s intrinsic low energy demand enables the cost-effective use of renewable energy sources, incentives for energy efficiency and incentives for technologies using RES could be assessed in a more comprehensive manner. Today, these two strands of incentives are treated separately, without taking into account the overall building’s consumption and the reduction of energy demand.

39. How is investment in high-performing buildings stimulated and what is being undertaken to gradually phase out the worst performing buildings? Is it sufficient?

Different national subsidy schemes exist on building renovation, but only a few focus on high-performing buildings (e.g. KfW in Germany). This is not sufficient. A step forward could be to develop financing schemes that incorporate some preferential conditions (e.g. lower interest rate) to projects aiming at increasing the number of nZEBs, or at promoting renovation of existing buildings towards nZEB performance levels. Other measures could be a preferential property tax for highly energy efficient buildings (as will be the case in Spain), or a ban to rent out the most energy inefficient buildings (as will be the case in the UK).

40. What is being undertaken to solve the problem of 'split incentives' (between the owner and the tenant) that hampers deep renovations? Is it sufficient?

The issue of ‘split incentives’ is not sufficiently taken into account yet, as 65% of European buildings face split incentives (according to the JRC), even though EED Article 19 addresses barriers and measures that could overcome these. A solution to split incentives will need to include several measures, such as the following (partly based on Joint Research Centre, *Overcoming the split incentive barrier in the building sector, 2014*):

- Minimum standard for rental properties, which can apply to the whole sector, i.e. residential and commercial, public and private, and which can be made easier if tied with specific financing support schemes for owners (e.g. UK, Flanders in Belgium);

- Revision in rent acts to introduce flexibility which would allow voluntary agreements between landlords and tenants or in multi-owner buildings, and would make it easier to redistribute benefits – Green Leases (e.g. France Energy Transition Law Article 14, Emilia Romagna in Italy, Netherlands)
- Mandatory EPCs for all buildings in order to increase awareness and provide more information to a wider public;
- Improve skills of professionals (certifiers and auditors) to increase trust in their advice among consumers;
- Specific financing schemes for multi-owner buildings (e.g. Netherlands, Bulgaria, Latvia);
- Increase transparency in energy use and costs.

41. Was

- a) The scaling-up of existing funds sufficient to meet the goals of the EPBD?
- b) The creation of aggregated facilities (through standardisation of Energy Performance Contracts and clarification of regulatory, fiscal and accounting issues) sufficient to meet the goals of the EPBD?

E. Energy poverty and affordability of housing

42. What measures have been taken in the housing sector to address energy poverty?

At the EU level, no measure has been specifically adopted in the housing sector in order to address energy poverty. It seems that very few measures have been adopted in the housing sector at national level in order to address energy poverty. A national study performed in the UK estimated the cost of poor housing conditions for the health service at £1.4 billion per year, out of which £848 million was due to excess cold, representing 60% of total health costs. For the City of Liverpool, poor housing conditions are estimated to lead to 500 premature deaths and 5000 illnesses that require medical intervention every year.

The report from Insight_E (*energy Poverty and Vulnerable Consumers in the energy sector across the EU – analysis of policies and measures*, May 2015) provides a solid overview on the topic and according to the BPIE, several MS allocated part of their budget to fight against fuel poverty. However, most of these programmes consisted in *income support* (e.g. “winter fuel payments” in the UK) or energy price support, less often in energy efficiency programmes (e.g. the “Better Energy Warmer Homes Scheme” in Ireland, the “Warm Front Scheme” in the UK). Other ways to fight fuel poverty by addressing energy savings is the CESP / CERT programme in the UK, in which energy and gas suppliers were obliged to meet CO₂ reduction targets through supporting households to implement energy saving measures (2008-2012). Results include 32 million tons CO₂ being saved, and 27,000 jobs being created (BPIE, *Alleviating Fuel Poverty in the EU: investing in home renovation, a sustainable and inclusive solution*, May 2014, p. 32-39).

One reason which might explain why the issue of fuel poverty has not been widely addressed through energy efficiency programmes might be the issue of “split incentives” between owners and tenants. However, energy poverty should be addressed through a global approach aimed at solving the issue in a long lasting manner and that approach should be based on the energy renovation of housing. A shift is needed in order to ensure that public money serves the improvement of peoples’ homes.

43. Should have further measures tackling energy poverty been included in the EPBD?

Several solutions to energy poverty have been identified (BPIE 2014, p.5). First, subsidies could be provided to heat homes, but this cannot be considered as a good solution, as it has a negative impact on public finances. A second solution could be to regulate the fuel price. However, as tariff regulations need to be phased out in the framework of EU legislation, this is also not a good solution. Consequently, these first two solutions can only be viewed as temporary solutions in case of emergency situations, e.g. fuel price increase, excessive winter deaths (BPIE 2014, p.29). The only sustainable solution to energy poverty is reducing the energy demand in existing buildings through ambitious renovations as this measure addresses the root cause of the problem, has a positive impact on public finances (decrease in fuel subsidies, decrease in health costs), and also captures other wider benefits (increased productivity of employees, creation of local jobs, etc..)

To achieve it, several measures shall be introduced, such as:

- Improving data collection on energy poverty in order to draft better regulations;
- Better coordinating national long-term strategies on health and energy poverty with the national building renovation strategy (EED Article 4), learning from examples such as the Liverpool Health Homes Programme;
- Considering an EU-wide target to eradicate energy poverty by a certain medium-term deadline;
- Focusing on elderly people, who are more likely to have lower income, who usually need higher indoor temperatures and who are more prone to diseases (BPIE 2014, p.7) - this should also enable joined-up improvements to ensure applicability and adequate thermal comfort at the same time;
- Dedicate specific financial support to projects addressing the issue of energy poverty through building renovation;
- Focusing on social housing to overcome issues related to decision-taking (split incentives), as for example the *Energiesprong* project in the Netherlands.

44. Has tackling energy poverty been a requirement when constructing new buildings and renovating existing buildings in Member States?

Even though awareness of the issue is increasing, it is not generally the case that tackling energy poverty has been a requirement when constructing new buildings or renovating existing buildings, although there are some exceptions. This is despite the knowledge that in 2012, 11% of the total European population was unable to keep their home adequately warm, increasing to 24% when referring to low-income people (BPIE 2014, p.4). According to Fraunhofer, 80 million Europeans live in damp and mouldy buildings.

The number of people victims of fuel poverty has been steadily increasing since 2009 (BPIE 2014, p.19). A first step to tackle the issue should be to develop a proper EU-wide definition. This work has begun within the Citizens' Energy Forum, as well as within the Vulnerable Consumers Working Group of the European Commission, but it needs to be operationalised. Currently, around ten MS (FR, GR, MT, RO, UK, IE) have adopted a definition of what is a "fuel poor population" (BPIE 2014, p.11). It is important to notice that in the EU, fuel poverty does not relate to *access* to energy, but to its *affordability*. Indicators to be included in the EU definition of energy poverty could be arrears on utility bills, the inability to keep homes adequately warm, and the existence of dwellings with a defect, e.g. leakages in the roofs, damp walls, floors or foundations (BPIE 2014, p.4).

Since January 2015, the Brussels Capital Region requires an nZEB level for all new buildings and buildings undergoing renovation. This would help to drastically decrease the energy poverty in the Region.

45. Are energy costs for heating and air conditioning being made available to interested buyers/tenants?

Energy costs for heating and air-conditioning are partially made available to interested buyers and tenants through the EPC, or via individual meters in some MS.

F. Ensuring new highly efficient buildings using a higher share of renewable energy

46. What are the best policies at district and city level to increase energy efficiency in buildings? Have specific targets on renewable energies in buildings been included?

The best policies at district and city level to increase energy efficiency in buildings is first to ensure that local authorities have an overview of the local building stock, its energy performance, its potential for CO₂ and energy reduction, and its likely evolution to meet long-term goals. In fact, as in EED Article 6(3), which "*encourage[s] public bodies, including at regional and local levels [...] to follow the exemplary role of their central governments*", the EPBD could promote the adoption and implementation of *regional and local* renovation strategies, based on the model of the national renovation roadmaps, according to EED Article 4. These local and regional renovation strategies could be based on a thorough assessment of the energy needs, thanks to innovative tools, such as the French EQUITEE software (<http://www.equitee.fr/>). A thorough monitoring of progress of reduction of energy demand in buildings, coupled with a long-term vision, are key elements to ensure an improvement at the district and city level in terms of energy efficiency of buildings.

Next to securing low energy demand at district and city level, best policies to increase energy efficiency in buildings, with a view to balance the uptake of RES, are those that also promote energy 'effectiveness' (when and how energy is used), and the flexibility of the energy demand of buildings. Specific attention to the building fabric, particularly airtightness, is necessary to ensure that a low

temperature heating system (as with heat pumps) can function effectively. Therefore, efficiently designed ventilation strategies are also essential. Progressivity in local taxes can also help to boost the building renovation rate, as it helps private owners to take action.

47. On the basis of existing experience, are provisions on targets or specific requirements for new buildings, beyond the current nZEB targets, missing in the EPBD which could help achieve the energy efficiency 2030 target? If so, in what types of targets or requirements?

EuroACE believes that the additional focus of a revised EPBD shall be put on existing buildings, which should be renovated to reach an nZEB level building stock in the EU by 2050, whilst retaining current nZEB requirements for all new buildings.

48. Which building sectors have been addressed as a priority (public/private, residential/non-residential, industry, heating & cooling)?

All buildings shall be considered in the EPBD, whether public or private, residential or non-residential. A priority sector for the EPBD should be the energy renovation of existing buildings. In particular, the worst performing buildings should be tackled first, since they have the greatest potential for improvement. EuroACE points out that heating & cooling is not a sector in itself (as implied by this question), but rather a service derived from the consumption of energy, whether in the buildings or industry sectors.

49. Has having no EU set targets (indicative or binding) for the sustainable public procurement of nZEB buildings by public authorities affected the development of nZEBs?

In the current EPBD, the only requirement related to nZEB and public buildings is included in Article 9, i.e. new public buildings should be nZEB from 2019 onwards, and existing buildings are encouraged to be renovated towards nZEB level. This has had a positive impact, since professional property owners are fully aware that the building portfolio of public authorities will need to change and be upgraded.

Nevertheless, there is no specific target in EED Article 6 on sustainable public procurement, e.g. a mandatory target requiring public authorities to buy or to rent nZEBs. This should also apply to existing buildings being rented out or bought by public authorities through public procurement. Setting a binding requirement for sustainable public procurement, e.g. public authorities could only rent out or buy a building which has been renovated to nZEB level, would help in achieving energy efficiency targets, and ultimately lead to the nZEB level building stock in the EU by 2050. All in all, the rules for public procurement should be reformed regarding tendering for buildings.

EU legislation on Green Public Procurement is currently being reviewed, and a proposal on the table may require office buildings to achieve at least an energy performance level of class C – a level which is clearly unacceptable and not consistent with the nZEB definition and requirement in the EPBD. Consistency with the EPBD, EED Article 6 and Annex III, and the above-mentioned improvements should be ensured, and there should be better coordination between Commission services on this issue.

50. Has the EPBD framework improved the self-consumption of electricity in buildings?

51. Does the EPBD address the issue of embedded energy? If so, in what way?

The EPBD does not address the issue of embedded energy, as it only considers the in-use (actual) energy, and it should keep its focus on energy efficiency. Embedded energy is addressed by other EU initiatives, such as CEN/TC350 EN15804 and EN15978, Green Public Procurement, or ecodesign.

52. Is demand response being stimulated at the individual building level and if so, how?

Demand Response is currently not being stimulated at the individual building level.

However, some recommendations to ensure it is stimulated include:

- Using more intelligent controls and automation, which could enable more Demand Response to be used, by activating all devices according to each building's and consumer's needs;
- To improve the nZEB definition, it would be necessary to redraft it by putting into practice the "Energy Efficiency First" Principle, i.e. making sure an nZEB is first about energy efficiency improvements and securing low energy needs, and then about inclusion of RES. Buildings should also be made 'demand-response ready' in order to offer demand-side flexibility. This is a prerequisite to the successful integration of buildings in energy systems and to the emergence of Smart Buildings (more information available at <http://www.euroace.org/LinkClick.aspx?fileticket=ULREOmME8b8%3d&tabid=192>).
- Defining a standard communication and service protocol for products and operators to allow for full communication, performance measurement, interval readings, accuracy and timeliness;
- Such Demand Response readiness of the Technical Building System should feature in the EPC recommendations for improvement.

The benefits of an efficient building stock to deliver reduced peak demand and enhanced flexibility in the grid should also be taken into account when considering the role of buildings in the energy system. More information can be found in a study by Ecofys (The role of energy efficient buildings in the EU's future power system, October 2015).

53. What obligations are missing at EU level and national level, and at regional and local level to meet the goals of the EPBD?

Overall, the EPBD should include better provisions on energy renovation of buildings, in order to ensure that existing buildings are renovated, so that the building stock in the EU will achieve an nZEB level by 2050. The regulatory framework for the energy performance of buildings, whether applied to new or existing buildings, should reward integrated approaches that ensure optimisation of all factors that contribute to a high energy performance, including decisions on the building envelope, technical building systems (including lighting), maintenance regimes and controls.

G. Links between the EPBD and district and city levels, smart cities, and heating and cooling networks

54. What are the best policies at district and city level for increasing energy efficiency and use of renewable energy in buildings?

There is a strong ambition amongst municipalities across the EU to tackle climate change, and initiatives to decrease energy demand stemming from buildings, such as the Covenant of Mayors, should be encouraged and further continued. The best policies at district and city level to increase energy efficiency in buildings is first to ensure that local authorities have an overview of the local building stock and its energy performance. In fact, as in EED Article 6(3), which “*encourage[s] public bodies, including at regional and local levels [...] to follow the exemplary role of their central governments*”, the EPBD could promote the adoption and implementation of *regional and local* renovation strategies, based on the model of the national renovation roadmaps, according to EED Article 4.

Moreover, as the focus of the EPBD should remain at the building level, while at the same time taking account of the influence and opportunities offered by the surrounding environment, it is clear that viable cost-effective energy efficiency measures will greatly facilitate the sustainable coverage of energy demand. Next to the national renovation strategies, best policies to increase energy efficiency in districts and cities, with a view to balancing the uptake of RES, are those that also promote when and how energy is used, and the flexibility of the energy demand of buildings. More specifically at local level, exemptions from local taxes can help to boost the building renovation rate, as it encourages and helps private owners to take action. Finally, a thorough monitoring of progress, coupled with a long-term vision, are key elements to ensure an improvement at the district and city level in terms of energy efficiency of buildings.

55. Are there any separate (new) obligations set at city and district level missing from the EPBD which would help increase energy efficiency and use of renewable energy in buildings?

56. How has the information exchange on smart technologies which contribute to compliance of the EPBD, been promoted in cities?

57. Are smart meters and their functionalities contributing to meeting energy efficiency targets and the proper implementation of the EPBD? Are other targeted meters for heat, gas and water have specific provisions such as those for electric meters needed?

Smart meters indeed contribute to meeting energy efficiency targets and the proper implementation of the EPBD, as they help decision-making for the realisation of energy savings. However, they cannot be regarded as the unique solution, as their impact also depends on what is done to address other barriers to energy efficiency. Intelligent controls systems also contribute to meeting energy efficiency targets and proper implementation of the EPBD by providing data from all installed equipment. This holistic, systems approach ensures that the input from each piece of equipment is taken into account, measured and then connected to the right action by the occupants.

58. Has the promotion of smart cities, smart buildings, sustainable transport solutions, smart mobility, and similar initiatives been linked with the EPBD and its aims? If so, how?

EuroACE has specifically developed a Position Paper on the question of Smart Buildings, which is available on the EuroACE website

(<http://www.euroace.org/EuroACEActions/PolicyOverview/PositionPapers.aspx>).

59. Have obligations been set at a national/regional level in relation to buildings and district heating and cooling, or in relation to buildings and storage? Why/Why not?

If obligations at national or regional level in relation to buildings and district heating & cooling, or in relation to buildings and storage are to be set, they should be part of coherent, long-term strategic national or regional plans, that take full account of the decreasing energy demand stemming from buildings, as we should be aiming at an nZEB-level building stock in the EU by 2050.

60. What incentives are missing, that would help promote efficient district heating and cooling or meeting the goals of the EPBD?

Before planning efficient district heating networks, the first step should be to take into account the long-term implications of a reduction of H&C demand stemming from buildings through renovation (i.e. achieving an nZEB-level building stock in the EU by 2050). As already underlined, the focus of the EPBD should remain at the building level. The influence and opportunities offered by the surrounding environment should be understood and taken into account. As a consequence, H&C supply shall not be regulated within the EPBD, apart from the link to efficient planning (i.e. adequately matching H&C to a decreasing demand stemming from the building stock).

61. Have cost-optimal policies been devised that improve the performance of buildings so that they use less heating and cooling, while ensuring a decarbonised energy supply?

Building regulations based on the cost-optimal calculation methodologies should in principle reduce the permitted energy demand of buildings. Hence, they contribute to reduce the heating & cooling demand, which represent an important share of the energy demand of buildings. Logically, this also reduces greenhouse gases emissions as a high percentage of heating and cooling in buildings relies on the combustion of fossil fuels.

62. Does the EPBD and its definition of NZEB reflect the requirements that could derive from the energy systems of nearly zero-emissions districts and cities?

While the current nZEB definition, emphasising the low energy demand stemming from buildings, and the coverage of the remaining energy demand by RES, can be improved according to the recommendations fleshed out earlier (Q18-19), it does form a good basis for nearly zero emissions districts and cities. Actually, EuroACE believes that highly energy efficient buildings (nZEB level in the EU by 2050), where energy demand has been reduced, are fundamental for the energy transition towards

a more decarbonised supply, and therefore towards a sustainable and secure energy system. This has notably been shown in a study from Ecofys (The role of energy efficient buildings in the EU's future power system, October 2015).

H. Awareness, information and building data

63. What do you think of the quantity and quality of information on the importance of energy efficiency provided to consumers by the European Commission? By national authorities? By regional authorities? By local authorities? By local companies?

Most people are not aware of the multiple benefits (e.g. jobs, productivity, health, comfort) that improved energy performance of buildings could bring. A recommendation would be to investigate how to monetise these multiple benefits and to incorporate them into the cost-optimal methodologies. Additionally, doing more on awareness-raising (at all levels) could help to increase consumer awareness and confidence and broaden the social support for an ambitious policy in this area. The European Commission should also provide more guidance to Member States and regional authorities, notably through a reinforced Concerted Action initiative.

Although required to do so in the framework of the long-term national renovation strategies (EED Article 4), Member States have not yet completed a thorough overview of their building stock, both in terms of building specifications (age, type, climatic zone), and in terms of energy performance. This is of concern as such an overview should be the basis for developing a well-informed policy to improve the energy performance of buildings.

64. Has the directive promoted information on opportunities for consumer-friendly smart meters and interoperable energy efficient appliances?

Firstly, the need for information is wider than just smart meters and includes building automation technologies as a whole. The EPBD has not promoted information on opportunities for consumer-friendly smart meters and interoperable energy efficient appliances. It is important to highlight that equipment becomes a smart appliance only if it has the capability to react to demand response requests. Smart appliances therefore contribute to demand response, but they are not enough, because they work autonomously. On the other hand, intelligent controls systems enable demand response by activating all devices according to the building's needs and provide consumer-friendly data from all installed equipment. As consumers don't yet have enough information on the potential of controls, the EPBD could address this issue by providing a clear definition and raising awareness.

65. What relevant building data has been collected at EU and Member State level, and city and district level? Who has access to this data?

According to an ongoing study carried out by ICF International for the European Commission in 7 targeted Member States, there is more information on new buildings than on existing buildings. As the

additional focus of the EPBD should be on the energy renovation of existing buildings , more information must be gathered on this topic. Concerning access to data, EuroACE believes that national, publicly available databases on EPCs, based on IT tools, would be good instruments to monitor progress and boost energy efficient building renovation.

66. How can data on the energy performance of a building and its related renovation work, across its life cycle, best be managed and made available?

To improve the management and availability of data on energy performance of buildings and renovation works, several measures could be introduced:

- Improve the organisation of procedures to collect, declare, control and certify data;
- Enable all buildings to be equipped with an EPC;
- Developing publically available (e.g. on the web) national databases, based on the same parameters in order to allow for some comparison across the EU – a first step has been undertaken in Scotland by the Energy Saving Trust to build such a database at regional level (<https://www.scottishepcregister.org.uk/>);
- Improve data transparency, as financial institutions need to access transparent (even if not perfect) data to be able to handle uncertainties;
- Transform the static EPC into more dynamic tools, such as electronic “Building Passports” (as in France) or such as the *Sanierungsfahrplan* (as in Germany, Bade-Wurttemberg, with developments at the federal level);
- Develop one stop shops to increase knowledge and information-sharing (e.g. as introduced by the 2015 Energy Transition Law Article 22 in France).

67. Has building data harmonisation been achieved?

Building data harmonisation has not been achieved. In this regard, the development of Key Performance Indicators, which would be easily comparable across Member States, would be a positive evolution.

68. Is there a need for a central EU database of EPCs and qualified experts?

EuroACE believes that great progress can be achieved to boost energy efficient building renovations by enabling more comparability between national mandatory, publicly available EPC and qualified experts databases, based on IT tools and more convergent calculation methodologies. Access to these databases should also be ensured, underlining the need for easily comparable, yet national databases. In this framework, the project led by the Climate KIC and Knight Frank is a first step, as it has started to develop a single index for benchmarking and comparing nationally designed EPCs. A central EU database for EPCs could be developed for a specific segment of the market, i.e. commercial buildings, in the framework of EPBD Article 11(9). Concerning the possibility of a central EU database of qualified experts, it would be an interesting development, as currently, one of the biggest challenges is to give to homeowners an access to the right qualified expert in their country.

I. Sustainability, competitiveness and skills in the construction sector

69. How does the construction sector cost-effectively demonstrate and check compliance with the EPBD while also upgrading the skill and knowledge of tradespeople and professionals?

Upgrading skills and knowledge in the construction sector is needed to ensure a thorough implementation of the EPBD. Currently, it seems that only half of the MS have mandatory training requirements (*Egmont, Tania Zgajewski, The energy performance of buildings: promises still unfulfilled, May 2015*). Introducing a robust certification based on common standards by independent bodies for professionals in the construction sector would ensure that they deliver high quality works and services, better choose and install products for the right purpose, therefore gaining the consumers' trust. This evolution will be even more needed over time, as buildings need to be renovated into an nZEB level building stock and become Smart Buildings, as the use of EPCs will increase, as the challenges of upgrading poor building envelopes from hugely varying building types and climate grow, and as technical systems and product technology will become more complex, especially when it comes to interoperability and demand-response. Consequently, the right training opportunities need to be put in place, notably in the field of ICT, and shall be linked to the right financing mechanisms. In this area, the BUILD UP Skills can be viewed as a good project. Other best practices include, inter alia, in Ireland, the accredited mandatory training programme Qualibuild or regulatory requirements for Continuous Professional Development for construction workers through the Construction Industry Register. Other ways to ensure compliance by the construction sector, especially when it comes to nZEBs, include

- Involving the full construction team in order to achieve the highest standards;
- Planning periodic inspection of building sites to validate compliance and performance.

70. Would it have been useful to extend Eurocodes to include energy performance in buildings and other relevant aspects? If so, why?

While Eurocodes cover the building structure (structural strength), building energy performance is a much wider concept, covered by the EPBD, therefore justifying the current division of scope.

71. Are energy, materials, waste and water use addressed in the EPBD?

Materials, waste and water use are not addressed in EPBD but in other EU initiatives (e.g. TC 350, eco-design, Green Public Procurement). These should be kept outside the EPBD, which should keep its focus on energy performance of buildings and energy efficiency. DG ENV has already launched an initiative in this regard in July 2014 – COM(2014)445 on *resource efficiency opportunities in the building sector*. What is more, there is currently a study (until 2017) for the development of a common EU framework of indicators for the environmental performance of buildings. In addition, the Commission is in the process of preparing a new mandate to CEN to align TC350 standards with the PEF method. These processes should be monitored closely in order avoid overlap and to ensure coordination and compliance with the EPBD and its objectives.

J. Buildings systems requirements

72. Based on existing experience, do you think the setting of minimum requirements in the EPBD for TBS is missing? Would have TBS minimum requirements contributed to the improvement of buildings' energy performances?

The EPBD Article 8(1) requires MS to set requirements for Technical Building Systems “*in respect of [their] overall energy performance, the proper installation and the appropriate dimensioning, adjustment and control*” when they are newly installed, replaced or upgraded. The Directive does not prescribe minimum requirements applicable to all MS and also specifies that these requirements shall only be applied “*if they are technically, economically and functionally feasible*”. While EuroACE fully supports the need to adapt legislation to national context, we cannot see how the adoption of 28 different requirements (or more, taking regions into account), that may or may not be applied, can send the market the right signals. Legal certainty, predictability and economies of scale that can arise from the completion of the Internal Market are key requirements to drive investments. In fact there is no clear overview on how Article 8 has been adopted at national level. Many stakeholders report that no requirements have been set at national level. In the EPBD Concerted Action, there is only one short summary of measures adopted pursuant to Article 8 in Germany (Concerted Action EPBD, October 2013, p.199), and two references to these requirements in Malta and the Netherlands, but with no further details. Minimum requirements have also been adopted in Denmark.

Proper sizing, installation and maintenance of TBS contributes markedly to increase the energy performance of buildings. There should be a better definition of requirements applicable to Technical Building Systems at EU level, including control technologies, and there should be a better enforcement and monitoring of those requirements at national level. The requirement stemming from EED Article 8 on energy audits for energy companies could be linked to the requirement on regular maintenance programmes and remote servicing, which allow for a constant monitoring of the energy performance of the building, avoiding any loss.

73. Based on existing experience, do you think in the EPBD minimum requirements for TBS focusing on other factors than heating, air condition, large ventilation systems and domestic hot water e.g. certain building categories, building size, etc., is missing?

In our experience, such minimum requirements for TBS (Article 8) are not being implemented. TBS are regulated through equipment efficiency limits under the Ecodesign Directive, which does not set such limits at system efficiency level. To achieve further energy savings, the focus of the EPBD minimum requirements for TBS (Article 8) should be at the system level and set requirements for the correct sizing, installation and a continuous maintenance of the equipment.

TBS should include control technologies, as they are part of energy calculation methodologies in the new EPBD standard (M480), and can integrate and manage all other TBS. Control technologies ensure that designed conditions are met during the operation phase, therefore closing the gap between as-

designed and actual energy performance. Control Technologies also allow for an optimised interaction between all installed energy saving technologies. A first step before including control technologies in the EPBD minimum requirements for TBS would require a proper definition for Building Control Technologies.

TBS should also include elevators and escalators, as their part of a building's energy consumption is currently at 4 to 8%, but set to rise in low-energy buildings. Additionally, elevators can also produce energy for the building (by re-injecting the braking energy) In the framework of safety regulation (Directive 2006/42/EC), elevators are already regularly serviced and inspected, so the energy consumption element could be added to these inspections.

Finally, other TBS which must be included in this framework (with appropriate requirements) are lighting and supermarket refrigeration systems.

74. Based on existing experience, do you think in the EPBD requirements is missing for regular inspections of the TBS to ensure:

a. That systems' performance is maintained during their lifetime?

A study performed for a French trade association (FEDENE, Rénovation énergétique: valorisation de l'aspect services et maintenance d'une installation de chauffage et ECS en chaufferie collective, May 2014), on three multi-family residential buildings with collective heating systems, showed that a lack of appropriate maintenance of the heating system in operation can lead to an increase in energy consumption of 20% on average over 10 years (the increase is exponential with 10% additional annual energy consumption after 5 years, 18% after 7 years and 35% after 10 years). The cumulated increased energy bill over 10 years amounted to €18 000 for buildings with a new boiler, and €20 000 for buildings with an old, less efficient boiler. Similar experience is occurring in Denmark. This clearly shows that current inspection requirements, as set out in EPBD Article 14 and 15, do not ensure that systems' performance is maintained over time.

Maintenance services should therefore be further promoted by the EPBD with a view to ensuring that equipment is optimising the efficiency potential and that configurations are done correctly. Further recommendations are included in reply to Q79. To ensure correct installation, installers would need to be certified on efficiency and systems interoperability at building level.

Finally, the current focus on inspections of heating and air-conditioning systems also leads to the overlooking of important energy savings potential. In order to avoid that, these inspections should be supported by continuous monitoring, such as is the case in Building Management Systems. As showed by the HARMONAC project (Concerted Action EPBD, Ian Knight, Automatic monitoring and legislation to meet EPBD requirements, June 2013), studying the HVAC systems in 400 buildings across Europe and analysing the sub-hourly data with monitoring systems, only 37% of the energy savings potential have been spotted by inspections. The project shows that inspections will only achieve 3.8% of savings potential, rather than 10.4% (therefore neglecting 62% of the potential savings), because they focus on operational and maintenance issues alone.

b. That owners/occupiers are properly informed about the potential improvements to the efficiency of their systems?

The current EPBD requirements on inspections and performance requirements for TBS are very vague. For owners and occupiers to be properly informed on the potential improvements to the efficiency of their systems, there are several possibilities:

- Introduce mandatory energy audits of systems (comparable to audits in EED Article 8), including recommendations for cost-effective energy efficiency improvements concerning sizing, running, insulation of pipes, and maintenance;
- Include information on potential improvements in the EPCs / Building Passports as well, in order to promote a whole building approach and ensure that the right combination of measures and solutions between the fabric and the equipment are put in place;
- Ensure the right combination of equipment and controls. In many cases, equipment can be perfect, but if the control system doesn't exist to activate devices and adapt them to the needs of the building and its occupants, the energy efficiency potential decreases and improvements cannot be identified.

c. That replacement/upgrading of the technical building systems is triggered?

Replacement and upgrading of TBS is not sufficiently triggered by the implementation of the current EPBD, especially when it comes to small- and medium-sized renovation projects. Due to the lack of regulation and awareness regarding controls systems, buildings in Europe are not well equipped in terms of control systems or the proper installation and maintenance of TBS. Another way to trigger replacement or upgrading of the TBS is to include such measures in the recommendations attached to the EPCs / Building Passports, or to tie them with audits (see above-mentioned reply to Q74b).

75. Have inspections required by the EPBD, been incorporated into or more tightly linked to other inspection/certification/energy auditing activities and schemes under other EU or national directives?

The inspections of HVAC equipment required by EPBD Articles 14 and 15 are supposed to evaluate the efficiency of the equipment and its installation, but according to companies' experience, this does not lead to sufficient efficiency improvements. Additionally, many Member States have chosen the alternative proposed by the EPBD (paragraph 4). More focus is needed on the full implementation of EPBD Articles 14 and 15, ensuring that regular inspections of HVAC systems effectively lead to energy performance improvements, through improvement recommendations and follow-up. These inspections could also be coordinated with the refrigerant leakage inspections required by the F-Gas Regulation.

76. Are the requirements for building elements set by Member States optimised to avoid market barriers limiting the installation of building products complying with EU requirements/standards e.g., under eco-design requirements?

Requirements on building elements are usually not set at EU level. However, building elements are made of different construction products, which have to be compatible with the Construction Products Regulation (whose functioning is currently being assessed) and the Ecodesign Directive (both EU legislation). Therefore, there should not be any market barrier, since building elements are made of products themselves regulated at EU level.

K. Operational management and maintenance

77. Based on existing experience, does the EPBD promote the key ways to ensure that buildings meet stringent efficiency targets in their operation?

The current EPBD does not ensure that buildings meet stringent efficiency targets at operation stage, since in most MS, the MEPR are based on “as-designed” energy values, and not on “as-built” energy values. It would be relevant for a revised EPBD to also consider as-built performance as, in order to ensure consistency between as-designed and operational efficiency, the building (as a system) must be complete. A revised EPBD should therefore encourage joined-up thinking in varied approaches to compliance, and the provision of guidance to building users. Comparisons of as-designed energy demand and actual consumption would be useful. As buildings become more and more energy efficient, an increased resolution (high level of details) of the methodology is required, similar to the PHPP (passive House Planning Package).

Additionally, an option would be to introduce control and maintenance requirements on TBS. In fact, Building Management Systems (which include controls system) should be part of the renovation requirements, as it is the right combination of equipment and controls which enables to close the gap between as-designed, as-built and in-use energy performance of buildings. Deep renovations of buildings shall adopt a holistic approach, addressing all elements contributing to the energy performance of the building, ensuring that whenever the envelope of the building is improved, equipment, controls and integrated automation systems are installed or improved as well. More recommendations are included in the reply to Q74a.

78. Based on existing experience, does the EPBD promote the best way to close the gap between designed and actual energy performance of buildings?

A number of reports show that there is a performance gap between the as-designed energy and the in-use (actual) energy performance of buildings. For example, according to QUALICHeCK, in Sweden, the average difference between as-designed and measured energy performance is around 25%. EuroACE does not consider that the current EPBD sufficiently addresses this issue. It is important to notice as well that this performance gap is due to a combination of poor workmanship, faulty product

specifications, inappropriate building design, inappropriate input data, behaviour of building owners and/or tenants and incorrectly programmed building operation systems. Therefore, these might be interesting issues to tackle, in order to close the gap. Careful consideration as to their inclusion in the EPBD should be undertaken.

Some solutions directly linked to the energy performance of the building could be introduced, such as:

- Better communication between the different professionals involved (design stage, operation stage, renovation stage);
- Training of the actors in the full supply chain;
- Guidance to users on how to use the building and its systems efficiently;
- Mandatory quality controls;
- Mandatory requirements related to blower door tests or co-heating tests;
- Continuous and regular servicing and maintenance of TBS
- Other recommendations are included in the reply to Q69.

All in all, introducing a target on in-use (actual) energy performance could be an interesting option, but its linkage with the target on as-designed and as-built energy performance needs to be carefully considered, for the above-mentioned reasons.

79. Based on existing experience, are the provisions provided by the EPBD to stimulate a proactive, innovative maintenance market effective?

The use of electronic monitoring and control systems (useful for maintenance) is already encouraged by EPBD Article 14(1) and 15(1§2), by allowing MS to reduce the frequency of inspections of heating and air-conditioning systems when an electronic monitoring and control system is in place. The EPBD could go further, by guaranteeing less onerous inspections requirements, or even presuming compliance with inspection requirements, for those buildings equipped with monitoring systems, thereby giving the market the predictability and certainty it needs for further investments.

One benefit will be a reduced size and cost of inspection schemes endorsed both by national administrations and companies, compensating partly the higher costs of monitoring systems. A study by the University of Turin Department of Energy (Energy savings in HVAC systems by continuous monitoring: results of a long-term monitoring campaign on buildings, March 2013) estimated total inspection costs at €1,940 and total metering cost at €3,200. The premium price will be quickly paid back, but it might help to convince those owners and operators who are considering automatic monitoring schemes but are still undecided.

Thus, the Commission should consider, for EPBD Articles 14 and 15, the wording proposed by Ian Knight to the EPBD Concerted Action (Automatic monitoring and legislation to meet EPBD requirements, June 2013, p.4), i.e. *“compliance [with inspection requirements] can also be demonstrated through formal involvement in an approved automatic monitoring scheme”*. Monitoring schemes could also be used to demonstrate compliance with EPBD Articles 6, 7 and 8 which would increase even more their attractiveness for larger building owners. As recommended by the EEFIG, building on the analysis of key

drivers for energy efficiency, and considering the impressive untapped potentials related to the use of building automation technologies, the monitoring of building operational performance could also be made mandatory for sizeable energy users in the commercial and public buildings segment.

Further information can be found in the replies to Q74A and Q78.

L. Further comments

EuroACE would like to refer to its Position Paper, which has been submitted to DG ENER, using the email address ener-consultation-epbd@ec.europa.eu, and which is available on its website, <http://www.euroace.org/EuroACEActions/PolicyOverview/EnergyPerformanceofBuildingsDirective.asp> [x](#).

Abbreviations used in its Reply are the following:

CEN: European Committee on Standardisation

EE: Energy Efficiency

EPC: Energy Performance Certificate

GHG: Greenhouse Gas

H&C: Heating and Cooling

HVAC: Heating, Ventilation and Air-Conditioning

MEPR: Minimum Energy Performance Requirement

MS: Member State

nZEB: Nearly-Zero Energy Building

PEF: Primary Energy Factor

RES: Renewable Energy Sources

SWD: Staff Working Document (of the European Commission)

TBS: Technical Building Systems

TFEU: Treaty on the Functioning of the European Union