CONCERTED ACTION
ENERGY PERFORMANCE OF BUILDINGS

# (CoCa) Synergy and Networking to maximise impact of the EPBD

## Status in December 2016

AUTHOR

**Ezilda Costanzo, *Italian National Agency for New Technologies, Energy and Sustainable Economic Development, ENEA, Italy***

KEYWORDS

**collaboration; EED; RES integration; building data; EU projects**

## 1. Introduction

A shared focus on building performance is within the scope of several initiatives that aim to conduct or support the implementation of EU energy policy. The coordination of resources can maximise impact and avoid duplication of work occurring in Europe and, beyond that, focuses on improving building energy performance. This is pursued by monitoring projects and initiatives funded at EU and national level that contribute to the successful implementation and uptake of the EPBD, by promoting capitalisation of actions and providing opportunities for brainstorming sessions and knowledge transfer during the CA EPBD IV plenary meetings and the back-to-back stakeholder events.

The Central Team on "Collaboration with other Concerted Action (CAs) programmes and EU projects" (CoCa) investigates elements that are common with the other CAs (CA RESD[1] and CA EED[2]). This notably includes RES integration in buildings, energy efficiency policy for monitoring and development, integration of databases, strategies for energy renovation of existing buildings, the role of consumers, financial instruments to activate the market, smart meters data collection and the role of flexible buildings for smart grids, training and accreditation.

Exemplary country initiatives that support the coordinated implementation of the EPBD and other directives also provide data for this analysis.

The interaction of the EPBD with CEN standards is also briefly analysed. CA EPBD IV supports the national implementation of CEN standards by discussing typical conditions and values for calculations.

The collaboration theoretically covers most of the EPBD articles and mainly focuses on EPBD Articles 2, 3, 4, 5, 6, 7, 9, 10, 11, 18 and 19 (review) in this reporting period.

# 2. Objectives

An effective implementation of the EPBD can only be achieved if key stakeholders are engaged in the process. In order to support this, the CA EPBD collaboration and networking with other EU initiatives aims at:

## 2.1 Creating synergies with other Concerted Actions for EU energy policy implementation

Collaboration with other CAs aims at pooling different expertise and facilitating the joint implementation of common/complementary topics of the directives, maximising impact and avoiding redundancy.

The aim is to investigate and discuss topics that appear in the directives, collecting views and insights from MSs through discussions in plenary meetings, and sharing outcomes with the other CAs. Specific objectives so far included:

- investigating barriers and solutions for wider penetration of RES in NZEB and smart buildings;
- highlighting EPBD links with and contributions to long-term renovation strategies (EED Article 4);
- providing guidance to measure and promote energy performance in public buildings (EED Article 5).

## 2.2 Maximising impact of various initiatives in the EU

A lot of experience on EPBD implementation has been gained through EU funded research and innovation programmes and projects (IEE, Horizon 2020), involving a wide range of stakeholders. Dissemination of best practices and knowledge management of outcomes from these initiatives is key to stimulate new ideas for the most efficient implementation of the EPBD.

The engagement of key EU stakeholders is particularly important in the search for better data, methodologies and tools to monitor the progress of energy performance of buildings and to improve decision-making in the building sector.

Contributions from specific initiatives (QUALICHeCK, CEN)[3] have been considered, insofar as they analysed energy performance requirements' enforcement “on the ground” and the national viability of EU common energy performance calculation standards.

Improved knowledge of innovation and new technology initiatives on building digitalisation and optimisation of building systems allows exploring the principles of - and the barriers to - smart ready buildings and their potential to further supporting a more efficient and consumer focused energy system.

# 3. Analysis of Insights and Main Outcomes

## 3.A. Analysis and insights

The following paragraphs describe topics and results of discussions in the CA EPBD IV on common or complementary issues with other CAs as well as EU initiatives and projects, carried out from November 2015 to December 2016.

### *3.A.1 Commonalities and complementarity with other CAs*

The first CA EPBD IV plenary meeting (Copenhagen, November 2015) allowed for an overview of collaboration priorities between the three CAs, which were all represented during the meeting. This was actually the only common meeting opportunity, but bilateral exchanges were also ensured during that period.

#### *3.A.1.1 Coordinated implementation of the three directives and collaboration priorities with the other CAs*

Coordinated implementation of building-related articles in the three directives depends on the specific national institutional framework and on how responsibilities are assigned and coordinated.

A questionnaire sent to the experts of the CA EPBD IV showed that in 50% of MSs implementation of the three directives lies within the same ministries or organisational teams or at least with teams frequently liaising with one another during their work.

The same survey, answered by 16 MSs in November 2015, allowed for the prioritisation of topics for collaboration:

- methodologies for measuring the progress of energy efficiency, including regular reporting to the EU Commission on NZEB (EPBD Article 9), on financial incentives (EPBD Article 10) and on monitoring and verification (EED Articles 4, 5, 7, 14);
- RES in buildings (EPBD Articles 2, 3, 4, 6, 7, 9, Annex I; RESD Articles 3, 13, 14, 16; EED Article 14);
- use of EPCs and integration with other datasets like heating and air-conditioning inspection data (EPBD Article 18), governmental buildings data and existing building stock (EED Articles 5, 4);
- financial instruments and policy packages (EPBD Article 10, EED Articles 4,7, RESD Article 3);
- synergy between inspection of heating and air-conditioning systems (EPBD Articles 14-15) and energy audits of enterprises (EED Article 8);
- intelligent metering of technical building systems (EPBD Article 8) and smart metering of customer energy consumption (EED Article 9) that can potentially share data display, transmission, and storage;
- modelling of the building stock and developing/monitoring action plans for the energy performance of buildings (EED Articles 4-5, EPBD Article 9);
- coordination of capacity building actions (EPBD, EED, RESD).

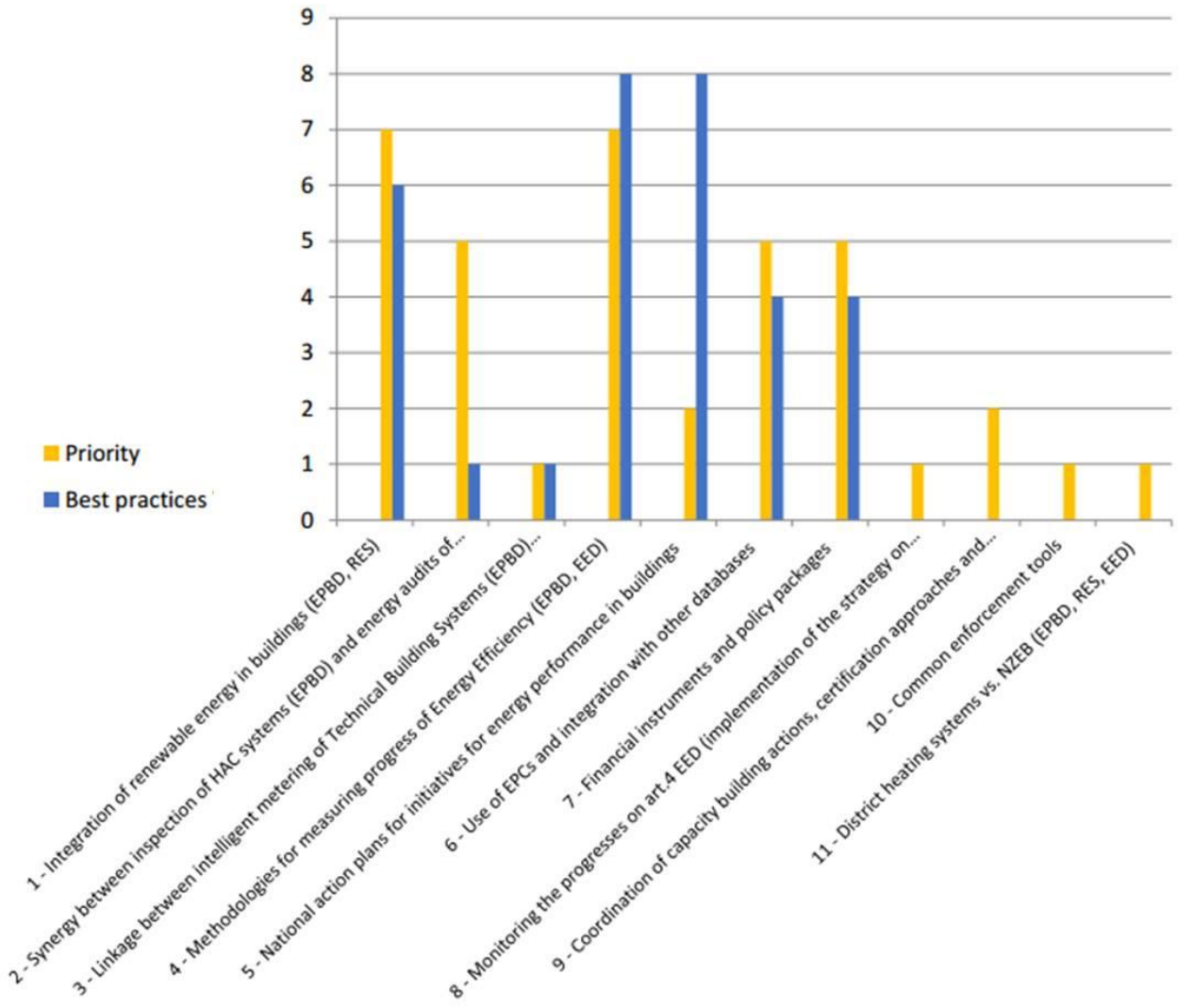


*Figure 1. Priorities for collaboration with and experience from other CAs. From CA EPBD CoCa session, at the CA EPBD IV plenary in Copenhagen, November 2016: Reply by 16 MSs)*

### *3.A.1.2 Vision on collaboration priorities from CA EED and CA RESD*

During the first CA EPBD IV plenary meeting in Copenhagen, the above listed topics found support by CA EED members. Moreover, it was underlined how the RES and the EPB Directives can complement and help each other to achieve respective goals: high RES integration and high energy performance. CA RESD further indicated that support schemes for district heating and cooling (RESD Article 3) and the role of the consumers (and prosumers[4]) including information and training (RESD Article 14) are collaboration priorities.

In particular, comprehensive assessment of alternative measures, district heating and cooling (DHC) and combined heat and power (CHP), was raised as a common interest between the three directives.

| | |
|---|---|
| **Highlights of 3.A.1** | The overall strategy for collaboration of the three CAs is set during a yearly meeting between the coordinators, while other opportunities for collaboration and information exchange are considered when setting up the relevant CA plenary meeting agendas. Because of differences in timing of the ongoing contracts for the three CAs, no formal joint WG could be established between them, but continuous interaction was ensured through mutual participation in CA meetings and information exchange. |

## *3.A.2 Better data to monitor and take action on building performance*

There is often limited access to good quality data on the building stock characteristics, although this is needed to efficiently monitor EPBD implementation and to enable sensible decisions on the energy use of the building stock. The following paragraphs describe relevant initiatives that were presented at CA EPBD meetings in the period 2015-2016 to capitalise MSs' knowledge in this field.

### *3.A.2.1 The EU Building Stock Observatory – data collection by the CA EPBD*

The **EU Building Stock Observatory**[5] was launched by the European Commission on 30 November 2016, as part of the "Clean Energy for All Europeans" policy package. The Observatory monitors the energy performance of buildings across Europe through a range of indicators and tracks several aspects including: energy efficiency of buildings (at national and EU level), certification schemes, available financing for building renovations, energy poverty levels, etc.. The successive CA contracts on the EPBD had already been collecting relevant information on some of the key characteristics of the European building stock from MSs. These data were referred to as "Key Implementation Decisions" (KIDs), as they aim at measuring the status of the EPBD implementation in each EU country. The CoCa Central Team is currently considering how to create better interaction between the CA EPBD KIDs and the EU Building Stock Observatory, to avoid duplication of efforts in the collection of data and to improve the accessibility of the CA EPBD data thanks to the Observatory's searchable databases and data mapping tools.

### *3.A.2.2 Integration and use of EPBD databases*

MSs are currently establishing building-related databases with different purposes, data structure and administrators, as well as different access rights and formats for users. Efforts remain, however, rather uncoordinated and there is a general lack of information on buildings combined with energy issues. The IEE **EPISCOPE**[6] project (involving 17 EU countries), started from classification of building typologies according to their energy related properties (based on the previous IEE TABULA project), and developed a methodology to monitor the progress of building energy performance with regards to national targets. For example, the Slovenian building stock was modelled based on integration of the EPC database with other public databases. This resulted in Slovenia finding differences between data sources, proving the advantages of the use of EPC data for the EED's NEEAPs and for EED's Article 4 renovation strategies, which led to the creation of an energy register of buildings (EnRen). This is a comprehensive database which integrates the national real-estate registry (REN) 2008, with renovation data from Eco-fund subsidies, EPC data from 2015 and the results of the REUS 2015 survey on energy efficiency on a sample of households.

IEE **REQUEST2ACTION**[7] (involving 9 EU Countries) investigated the use of EPCs to target retrofit funding and programmes. In Scotland, the EPC database was combined with 10 other datasets, including RES and fuel poverty, to create a comprehensive, reliable, up-to-date energy performance profile for all the properties.

The project found solutions to remove erroneous records, establish EPC representativeness and statistically predict performance when EPCs were not available. Improved access to EPC-related datasets and EPC-related services are expected to facilitate analysis and decision making from financiers in The Netherlands, from local authorities in Slovakia and from regional authorities in Italy and Scotland (UK).

**EEPPA**[8], the Climate KIC study on the commercial and technical potential for an EU wide EPC services company, showed that access to relevant EPC data is still difficult. In particular, privacy issues still impede disclosing data to the private sector (banks, property portfolio holders). While current technical challenges of an EU wide EPC database is prohibitive, commercial services based on national/regional EPC data are practicable mostly for local administrations.

As reported by **BPIE**[9], widespread EPC registers in the EU are a precious source of information. However, they are dramatically different in scope and comparison at EU level is currently challenging. The setting up of a database for EED Article 5 is a less common approach: only ten MSs in 2015 had a database for public buildings and some of them include only governmental buildings. In spite of the potential overlapping, possible links between an EPC database and EED Articles 4 and 5 are not fully utilised and considered.

| | |
|---|---|
| **Highlights of 3.2** | MSs have taken advantage of their participation in EU funded projects on building stock data both to develop harmonised databases and/or to integrate existing databases. Otherwise, the wider use of EPBD databases is not common practice in MSs.<br><br>The CA EPBD is currently considering how to enhance the use of and the access to national EPBD Key Implementation Decisions (KIDs). Integration into the new EU Building Stock Observatory, a comprehensive framework of building and energy data, appears to be an interesting opportunity. |

### *3.A.3 RES integration in buildings and Smart buildings*

Buildings are playing an increasingly active role in the transition of the energy sector from a fossil-fuel based supply and passive consumer role towards:

- energy flexible buildings supporting RES-based energy systems, matching energy demand and generation from various renewable sources;
- empowered users/occupants who can interact with the building through control, anticipate operation or maintenance and ultimately contribute to a higher building performance;
- automated maintenance and efficient operation of buildings thanks to electronic monitoring and control.

Business models can provide investment opportunities for building owners (e.g., facilitating access to capital, financing of up-front costs, outsourcing of technical and economic risks, and offering further energy related services) and for other actors involved. A CA EPBD IV technical session in Vilnius investigated existing business cases and provided evidence of the main barriers to the wider introduction of RES and building energy flexibility. The topic is relevant for EPBD Article 10 on financial incentives and market barriers, but also Articles 6 and 7 on economic feasibility of high-efficiency alternative systems in existing and new buildings, Article 9 on NZEB (action plans) and Article 19 on the EPBD review.

### *3.A.3.1 Business models for RES integration*

Some countries have legislative frameworks that may support new business models, but there is low awareness across the CA EPBD participants about these mechanisms. Examples include:

- A business model for heat pumps rolled out by energy service companies (ESCOs) in Denmark that can raise consumer's awareness on heat pumps and at the same time create a new way of funding where the consumer will just pay for the service while the selected ESCOs will be responsible for investment and maintenance.
- Croatia has a regulatory framework for green electricity purchase and an action plan for green public procurement. According to this legislation, local governments should consider district-heating projects using RES for new development areas. RES integration is encouraged by green electricity certification. Large companies buy guaranteed green electricity and benefit from marketing their social responsibility and sustainability.
- In Portugal, a 'one-stop-shop' is being created to connect the supply-and-demand side for the implementation of RES measures (solar thermal, PV, biomass). Political and market conditions highly influence the role of the various actors for RES penetration.
- ESCOs are currently being involved in some countries (Greece, Slovenia, Italy) for public buildings. MSs complain that some of the actors (e.g., heat suppliers) are motivated more by financial benefits than by energy efficiency or emissions reduction. Moreover, the split incentives barrier is to be taken into account by business models and their feasibility varies according to the country-specific regulation in the rental sector.
- In all the presented cases, the development of new business models took advantage from existing governmental schemes that are considered as a value to capture, provided that they are steady enough. Therefore, governments play an important role in supporting business models, facilitating access to capital and changing legislation.

### *3.A.3.2 Business models for smart buildings*

Traditionally, energy companies matched demand and supply of electricity by controlling the rate of generation. This is becoming harder since more and more renewable electricity is produced in periods when there is low need to use it. The importance of storage is dramatically growing and the decrease in prices for decentralised solutions could change the demand-response ratio.

According to a presentation from BPIE in the second CA EPBD IV meeting in Vilnius[10], "*in 4-5 years, a growth of 70% is expected in demand-response, with a high potential in the heating and cooling sector. Dynamic energy pricing is needed to provide incentives to modulate demand*". Smart metering and controls enable a reduction of the energy consumption and a smart interaction between buildings, their occupants and the energy system. A pilot project in Ireland using smart meters, dynamic prices and consumer information showed that the participants who had an in-home display were able to reduce consumptions by 3.2% overall and by 11.3% at peak-time[11].

In Germany, the use of grid-optimised storage systems, helping to reduce grid stress and increase local grid capacities is incentivised through a repayment grant covering up to 100% of investment costs with a term of 5, 10 or 20 years. Both heat storage and battery storage with PV and grid connections are supported. Electrical systems that are eligible for this scheme include new PV systems with batteries, new electric battery systems for existing PV (installed after 2013), and PV systems smaller than 30 kWp. Only stationary

storage systems are eligible for funding but consumers who are generating surplus electricity can use it for any purpose, including charging electric cars.

| | |
|---|---|
| **Highlights of 3.A.3** | According to MSs, the main barriers to a wider introduction of RES for NZEB and solutions for smart buildings reside in cost, information, grid capacity, lack of skills, dealing with social acceptance, usability and political barriers.<br><br>Relying on the individual response of households will not work without aggregators and innovation driven by technology companies. Technical regulations, clear guidance and RES integration with smart buildings are needed in the EPBD. |

## *3.A.4 Long term renovation strategies*

CA EPBD analysed the relationship between long-term strategies for "cost-effective deep renovations of buildings" (EED Article 4) and the goals of achieving savings within the EPBD.

Some countries (e.g., Spain, Denmark, Croatia, Lithuania), appear to better respond to the (EED Article 4 (a) to (e)) requirements of the strategy, also linking them to the EPBD implementation experience. Nevertheless, as emerged from the public event organised by the CA EPBD IV in May 2016, the relationship between implementation of EED Article 4 and EPBD Article 9 (plans for NZEBs) but also between EPBD cost-optimality and cost-effective approaches of renovation remain insufficiently explored. It also emerged that national teams working on renovation strategies are rarely the same as the teams working on the EPBD, confirming the survey previously mentioned (see paragraph 3.1). According to the first evaluation of MSs' renovation strategies[12], a range of innovative approaches to stimulate investment already exists. These regulatory, financial, and communication schemes are often mentioned in MSs' lists according to EPBD Article 10. Important improvement suggestions highlighted include scenario analyses that can be further linked to EPBD implementation monitoring data and clearer picture on the non-residential sector. Links between achieving higher renovation rates, funding and data use (e.g., from EPC) have to be strengthened in the future.

Some outstanding examples, like the Horizon 2020 **SUNShINE** project[13] proved feasibility of ambitious renovation (65% energy consumption reduction through measures on space and water heating) and innovative bankable and aggregated investment projects[14]. In Latvia this resulted in encouraging the homeowner through a simple and transparent process, including a central IT platform to store data, benchmarks, and stakeholder networking. Guidelines, inbuilt monitoring and standardised contracts, were considered to be elements of the successful model for stimulating deep renovation.

## *3.A.5 Contribution from other initiatives*

Further dialogue and collaboration occurred on other topics addressed over the 2015-2016 period. They are presented below and further detailed in other Central Team reports.

### *3.A.5.1 Improving the energy performance of heritage buildings*

When dealing with major renovation, the EPBD and the EED contain an exemption for heritage buildings. EED Article 5 (Exemplary role of public bodies' buildings) allows two approaches, either compiling a default

inventory of relevant buildings or an alternative approach including estimate of improvements. CA EED contributed to the CA EPBD debate to give policy guidance for advancement in energy performance of heritage buildings, highlighting the existence of energy efficiency programmes (eight within the NEEAPs) that also include military and historic buildings. CA EED also showed the results of an internal survey compiling knowledge of energy consumption data, level of importance of different heritage buildings, pros and cons from the MSs' experiences about the "default" or the "alternative" approach.

Definition of cost-effectiveness of the governmental buildings renovation projects, incentivising programmes, information on "before-after" energy performance in EPCs for public funding of Article 5(1) projects and deeper knowledge of actual energy consumptions that can help de-risking investments (e.g., from ESCOs) were identified as possible common fields of interest between the two CAs.

| | | |
|---|---|---|
| Concerted Action for the Energy Efficiency Directive (CA EED) | Concerted Action for the Renewable Energy Sources Directive (CA RES) | European Committee for Standardisation (CEN) |
| Buildings Performance Institute Europe (BPIE) | EPISCOPE | IEE QUALICHeCK |
| REQUEST2ACTION | EEPPA | SUNShINE |
| European Commission, Joint Research Centre (JRC) | | |

*Figure 2. List of external stakeholders and projects contributing to CA EPBD IV*

### *3.A.5.2 CEN Standards*

The CA EPBD IV Core Team members also had the opportunity to discuss relevant developments of CEN/TC 371 standards on energy performance of buildings, in particular the study carried out on behalf of the European Commission on their usability, based on example cases. Comments from the MSs about practical implementation of the new CEN standards and on the transition from the current ones were collected and communicated to the contractors developing the study. The outcomes of this work are summarised in the Central Team Report on "Technical Elements".

### *3.A.5.3 Reliability of EPCs and quality of the works*

The **IEE QUALICHeCK**[15] project (involving 9 EU Countries) collected best practices in relation to the quality of the EPC input data and the construction works, including compliance with applicable standards and application of penalties. CA EPBD feedback on key success factors was aligned with the recommendations from the project that are not common practice in all MSs yet, e.g., systematic and targeted control on the quality of the construction work, collection of EPC data in a central database or certification of products

## 3.B. Main Outcomes

The main areas to be considered for a coordinated implementation of EPBD, EED and RESD have been identified and discussed within the CoCa Central Team:

- priorities among collaboration practices (CA EED and CA RESD at CA EPBD, Copenhagen November 2015);
- cost-optimality/cost-effectiveness of measures for EED Article 5 (CA EPBD at CA EED, The Hague March 2016);
- role of RES in NZEBs (CA EED at CA RESD, Vienna May 2016);
- management of public heritage buildings regarding energy efficiency (CA EED at CA EPBD, Vilnius June 2016).

Collaboration with the other CAs and EU initiatives contributed to the following outcomes:

| Topic | Main discussions and outcomes | Conclusion of topic | Future directions |
|---|---|---|---|
| **Contribution from/to**<br>• Complementarity with other CAs<br>• CA EPBD<br>• CA EED<br>• CA RESD | Discussion about priorities for collaboration.<br>A transfer of knowledge occurred during the different CA plenary meetings (in 6 CA meetings) and through continuous informal exchange. | Common topics have been identified and analysed:<br>• promotion and role of RES;<br>• methodologies for measuring progress of energy efficiency in public heritage buildings;<br>• cost-optimality/cost-effectiveness;<br>• financial instruments and policy packages. | Future CA EPBD work on RES integration (primary energy factors, attractive DHC) and smart buildings could feed into the other CAs' work and stimulate further common effort. |
| **Better data to monitor and take action on building performance**<br>• EU Building Stock Observatory<br>• IEE EPISCOPE<br>• IEE REQUEST2ACTION<br>• EEPPA (Climate-KIC) | Discussion focused on:<br>• combination between CA EPBD KIDs and the EU Building Stock Observatory;<br>• integration and wider use of EPBD databases to help energy efficiency progress monitoring and decision making. | Integration of KIDs in the EU Building Stock Observatory is at study (a CA EPBD IV working group has been set up).<br>Wider use of EPBD databases can help understand the housing stock, monitor energy efficiency progress and develop a strategy, but it is not a common practice. | Further investigation is ongoing on the benefit of improved display of and access to KIDs.<br>Further debate on wider use of EPBD databases could address interaction with EED (Articles 3, 4 and 5). |
| **Business models for RES integration and smart buildings**<br>• BPIE | Interests, roles and needs of stakeholders in energy services business are changing, with an emerging tendency among consumers to invest in private energy generation and building automation. Knowledge of innovative business models was investigated. Main barriers and role of actors were discussed. | Barriers for RES integration reside in cost, information, grid capacity and skills, social acceptance and usability. Low awareness of solutions like business models and how to link them to existing incentives emerged. There is no clear opinion on who should make the initial investment for the transition. Disruptive market change would require aggregators. | Attractive RES share from DHC in buildings is in the agenda of CA EPBD plenary in February 2017.<br>Integration of buildings into the wider energy system, relationships to and impacts on other key sectors (e.g., electro-mobility in the transport sector), role of the consumer and of building energy management systems, de-risking investments, are elements of the 2016 Clean Energy for |

| Topic | Main discussions and outcomes | Conclusion of topic | Future directions |
|---|---|---|---|
| | | | all Europeans policy package.<br>External stakeholders (e.g., automation industry) should be involved in the discussion. |
| **Long term renovation strategies**<br>• EC JRC<br>• H2020 SUNShINE | Level of interaction between long-term strategies for "cost-effective deep renovations of buildings" and the goals of achieving savings in EPBD was investigated in the CA EPBD plenary meeting in May 2016, following up from a JRC assessment, MSs' best practices and the SUNShINE project. | Opportunities for better integration in the new upcoming version (definitions, cost-optimality, ambition of one-stage or step-by-step renovation, NZEB plans).<br>SUNShINE project proved the success and feasibility of a holistic approach. | The renovation rate and the renovation depth (step-by-step or one-stage) are to be better linked and brought together. This will be further investigated at the plenary meeting in February 2017. |
| **Heritage buildings and public buildings**<br>• CA EED | Examples of ways to finance heritage buildings and measure progress was provided. | MSs would welcome an integrated approach involving different responsibilities (teams, ministries) and competences (CA EPBD, CA EED). | Coordination and conflicts of integrated solutions covering EED and EPBD might be further addressed.<br>See CT2 report. |
| **EP calculation standards**<br>• CEN/TC371 Chair | Feasibility of application of CEN standards. | MSs' brainstorming and feedback. | See CCT1 report. |
| **Compliance and quality**<br>• IEE QUALICHeCK | Success key factors for better quality of EPC input data and quality of construction works were discussed. | General alignment with QUALICHeCK results.<br>Monitoring and control are not common practice in MS. | See CCT3 report. |

# 4. Lessons Learned and Recommendations

**Better building data** are a prerequisite for monitoring and decision-making, in particular for building renovation and exemplary public buildings. When combined with wider datasets, EPC data are valuable for monitoring and decision-making, especially if these datasets include information on building products, technical systems and real consumption. Experience reported within EU projects on this subject is not a common practice yet.

In the framework of a CA EPBD IV survey on Key Implementation Decision (KIDs), MSs' delegates agreed for the EPBD KID indicators to be improved. Their integration into the EU Buildings Stock Observatory is under investigation and this could help complementing existing statistics. In doing so, current data gaps in MSs could be reduced, and data visualisation and access to EU building performance data could be improved.

Several opportunities for better integration of EPBD requirements with the EED Article 4 in **building renovation strategies** have emerged. Financial packages with a holistic approach, taking into account the responsibility of the building owner are still rarely deployed. Nevertheless, they are regarded as a successful practice to stimulate cost-effective deep renovations of buildings. A unique definition, solving the dichotomy between "deep renovation" and "major renovation", would be well received by the MSs. The renovation rate and the renovation depth should be better linked.

The CA EPBD participants have little experience in linking existing incentive schemes with business models that can stimulate investment in **RES integration and smart buildings.** MSs consider that including clear requirements for both aspects in the EPBD is recommendable.

The opportunity of a univocal method for the assessment of the technical, environmental and economic feasibility of high-efficiency alternative systems for decentralised energy supply systems based on RES could prompt further collaboration between the CAs. In this framework, calculation of primary energy factors and attractiveness of district heating and cooling systems to fulfil minimum levels of RES in NZEBs are being investigated (the CA EPBD has set up a dedicated working group on this subject, at the agenda of the February 2017 plenary in Malta). These topics have great potential to develop synergies between the three directives.

**Smart buildings** are a priority in the framework of the EPBD review. Considering the novelty of the subject, future CA EPBD meetings will allow for brainstorming with particular focus on ICT solutions for optimal operation of the building and interaction with the grid. Such discussions will benefit from involvement of external stakeholders and other CAs' experience on the role of consumers, investors and demand-response service providers.

# Endnotes

1. www.ca-res.eu/
2. www.esd-ca.eu/
3. http://qualicheck-platform.eu/, www.cen.eu/Pages/default.aspx
4. 'Prosumers' are active energy consumers, because they both consume and produce electricity
5. https://ec.europa.eu/energy/en/eubuildings
6. EU IEE EPISCOPE project (2013-2016), http://episcope.eu/iee-project/episcope/
7. EU IEE REQUEST2ACTION project (2014-2017), http://building-request.eu/
8. Climate-Kic European Energy Performance of Performance of Properties (EEPPA) pathfinder project, 2nd phase, http://www.climate-kic.org/projects/european-energy-performance-of-properties-analysis-eeppa/
9. Presentation in Copenhagen CA EPBD IV meeting, November 2015, based on experience in the EU Building Stock Observatory, in the data hub (www.buildingsdata.eu) and on the study “Energy performance certificates across the EU, a mapping of national approaches”, BPIE 2014
10. Based on the publications “The active role of buildings in a transforming energy market”, BPIE 2015, “Driving transformational change in the construction value chain”, BPIE 2016, “Smart buildings in a decarbonised energy system”, BPIE 2016.
11. This pilot project conducted a cost-benefit analysis of 12 scenarios to implement smart metering in Ireland, also addressing residential apartments, “Smart Buildings in a decarbonised energy system”, BPIE 2016.
12. 2016 JRC, Synthesis Report on the assessment of Member States' building renovation.
13. EU H2020 SUNShINE project (2015-2018), http://sharex.lv/en
14. http://cordis.europa.eu/programme/rcn/664696_en.html
15. EU IEE QUALICHeCK project (2014-2017), www.qualicheck-platform.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement № 692447.

*The sole responsibility for the content of this publication lies with the authors. It does not necessarily reflect the views of the European Commission. Neither the EASME nor the European Commission are responsible for any use that may be made of the information contained therein.*