

Training

OVERVIEW AND OUTCOMES

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1. Introduction

Focus on the training of experts is essential in ensuring the transfer of knowledge on issues related to the Energy Performance of Buildings Directive (EPBD). Within the framework of Article 17 of Directive 2010/31/EU, Member States (MSs) must ensure that the energy performance certification of buildings and the inspection of heating and air-conditioning systems are carried out in an independent manner by qualified and/or accredited experts.

From 2013 - 2015, Concerted Action EPBD (CA EPBD) participants discussed the necessity of retraining those experts already authorised to issue Energy Performance Certificates (EPC), in order to tackle the new challenges that will come with the introduction of Nearly Zero-Energy Buildings (NZEB), and in order to assess effective approaches to training new experts. The training discussions were based on lessons learned since the beginning of the EPBD implementation, and took into account the conditions for new constructions, as well as renovation of existing buildings. In particular, the group considered the use of realistic energy saving estimations highly important during the process of preparing the recommendations for improvements to be included in the EPCs. Different areas of energy saving possibilities were considered to create a basis for co-ordinated approaches to training and accreditation of experts.

The CA EPBD also discussed the synergy between inspection (set in the EPBD) and energy audits (set in the Energy Efficiency Directive - EED), including joint training of experts/inspectors for both objectives.

This report addresses mainly the issue of training and qualification of experts. The same topics can also be found in other reports available from www.epbd-ca.eu, viewed from different perspectives.

2. Objectives

The principal objectives of the CA EPBD work were the identification of new problems and of those still remaining, connected to the activities of the experts in the process of energy performance certification and regular inspection of heating and air-conditioning systems. The group also explored possible synergies between issuing EPCs, carrying out the system inspections required by the EPBD and carrying out energy audits required by the EED.

2.1 Training requirements

A first group of objectives focused solely on the training of the experts themselves. There was a strong need to develop a wider understanding of the new requirements of the Directive 2010/31/EU related to experts in both areas of activity (EPCs and inspections). The main issues of discussion focussed on trainings based on modular education of experts, identifying the links between energy certification of buildings, inspection of technical systems and energy audits.

2.2 Training subjects

Most experts assessing buildings have been authorised in accordance with the national legislation in individual MSs, directly linked to Directive 2002/91/EC. Directive 2010/31/EU introduced different

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approaches to several topics, requiring a transfer of more knowledge and skills to experts. It was thus necessary to assess if there were additional training needs following the introduction of new concepts, such as NZEBs and cost-optimal levels on *minimum requirements of energy performance of buildings*, as well as the increased focus on integration of Renewable Energy Sources (RES).

Attention was also devoted to discussing the precision required for assessing the technical properties of buildings, building units and building components, as well as technical systems, *in view of the accuracy of the energy rating*.

The group also concentrated on training needs, namely on the need to retrain qualified experts, recognised on the basis of Directive 2002/91/EC, on how experts should be trained to interact with owners, on how to deal with real energy consumption and on how to produce better (more realistic) recommendations for energy efficiency investments.

3. Analysis of insights

3.1 Synergy between inspections (EPBD) and energy audits (EED), including training of experts/inspectors

The EPBD requires regular inspection of heating and air-conditioning systems (Articles 14 and 15). The EED has a requirement for energy auditing that includes reporting on heating and air-conditioning systems in buildings (Article 8). Some of the activities of an energy audit carried out for the EED are similar to those for an inspection for the EPBD, although the purpose and level of detail is different. There is, however, potential for integration or coordination. Therefore, it is necessary to analyse which procedures could be combined or shared, to meet both EPBD and EED requirements.

In most countries, regular inspections and energy audits are managed by different legislation. The inspection procedure is generally well-defined. The audit procedure, however, has not yet been exactly defined in many MSs, and its scope is much wider - it covers building structures, technical building systems and occupants' behaviour. Therefore, energy auditors could possibly prepare EPCs, but the EPC assessors cannot undertake energy

audits without further training. Reporting templates for inspections and energy audits are different, reflecting their different purposes and procedures. EPCs, inspections and audits are performed at different occasions and intervals, limiting the opportunity for shared activity. Carrying them out at the same time could offer significant opportunities for reducing costs and achieving more reliable results.

There are differences in the levels of education and length of experience required for the experts carrying out inspections and audits. Energy auditing requires a wider range of professional experience than inspections alone. Energy auditors also must have broader knowledge than the experts undertaking energy performance certification. In addition, the EPC results do not contain enough details to be used for heating and air-conditioning system inspections.

The greatest area of overlap is the requirement that an energy audit draws a reliable picture of overall energy performance and identifies the most significant opportunities for improvement. This is similar to the requirement for heating and air-conditioning system inspections for the EPBD, which must include an efficiency assessment and then make recommendations for the cost-effective improvement of the energy performance of the inspected system. In this regard, EPCs may provide useful input for broader energy audits^[1].

In some cases, experts that are authorised to carry out air-conditioning inspections also fulfil the preconditions to issue EPCs. Modular training of experts has some benefits, e.g., experts can be trained specifically in the particular sector they are interested in, and can expand their training as and when they wish, without having to undergo training in the areas where they are already qualified.

CA EPBD participants have identified significant potential interactions or intersections between the obligations and needs to be addressed by provisions in both the EPBD and EED regarding training, accreditation, certification and registration of experts. Experts may be needed for overall energy auditing or building assessment, or for specific assessment or inspection of particular technical systems within the buildings.

^[1] Such synergies are explored in the Commission guidance note on Article 8 of the Energy Efficiency Directive, available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52013SC0447&from=EN>

The quality and pace of improvement in the energy performance of buildings depends vitally on the number and quality of available experts. There are clear advantages of co-ordinated approaches, mainly to maximise synergies and avoid duplicated efforts. The institutional arrangements for developing and delivering suitable training and accreditation may often be complex and fragmented. Combining the obligations under EPBD Article 17 and EED Article 16 in particular, but also considering EPBD Article 20 and EED Articles 8, 16 and 17, MSs are required to ensure that certification and/or accreditation schemes for the qualification and training of experts are available for energy services providers, energy audits, energy managers and installers of energy-related building elements.

CA EPBD participants concluded that MSs should explore the provisions of Article 17 of the Directive 2010/31/EU with a particular focus on seeking national provisions that ensure the reliability of EPC experts and are coordinated with similar EED provisions for energy auditors. For both processes, the legal basis, methodology and the required level of education of experts/auditors are identical. The content of training should be modular for activities undertaken following the EPBD and/or the EED.

In terms of content, the main barriers are currently the lack of accredited institutions offering the required training at sufficient quality, and also a lack of individual assessors. From the process point of view, the biggest barrier is a conflict of interest, as EPC assessors are often certified by a public compulsory procedure, and energy auditors are normally part of voluntary schemes, so a dialogue is almost impossible. The most important key challenges were that EED auditors can use the EPC as part of the auditing process, the lack of national experience with energy audits in certain areas (e.g., of industrial projects) and, last but not least, the costs of the EPC, inspection or audit, and the consequences that could result from a situation in which the owner is not willing to implement the EPC recommendations.

Regular inspections and energy audits have been kept separate in almost every MS, at least at the regulatory and technical levels. Qualifications of experts carrying out inspections and audits overlap to some extent. There are opportunities for greater cooperation in programme operation, accreditation, codes of conduct, quality assurance, databases and publicity.

Training should be modular since the EPBD only covers one part of the broader boundaries of the EED.

Training programmes should have the same basis but should differ in details.

Energy auditors could possibly create EPCs, but the EPC assessors cannot perform energy audits. It should be possible, however, to have the same person (with adequate qualifications and training) accredited for both EPBD and EED.

3.2 Does Directive 2010/31/EU require retraining the experts?

The question if there is a need for re-training experts arose from the new approaches in the Directive 2010/31/EU, especially those focussing on training related to progress in establishing NZEBs and to updated calculation procedures, and the new control procedures for Energy Performance Certificates (EPC). There are particular issues which may possibly impact the updated calculation procedures and may result in the need for re-training. For example, cost-optimal and NZEB calculations can result in new and more strict requirements in MSs, which in turn can lead to more precise or more detailed methods for calculating the energy requirements, or at least some additional parts of the calculations to deal with solutions involving advanced and innovative technologies.

The analysis and discussion focused on whether the EPBD would require changes in the national training process for EPC issuers or inspectors (where applicable) and on clarifying the actual need for re-training experts who had already qualified according to Directive 2002/91/EC. Twenty-five countries indicated the need for additional training. Nine MSs consider starting with additional training a priority. In most of the MSs, legislation was amended (see Figure 1) and this led to an increase in the number of experts in one third of MSs. Most attention was given to dealing with NZEBs, integration of Renewable Energy Sources (RES) and calculation of alternative Heating Ventilation and Air-Conditioning (HVAC) systems. Cost-effective calculation for different refurbishment options was also an important aspect.

Most countries agree that training for on-site inspections is required. In order to be

Figure 1: Type of legislation used by MSs to establish training of experts.

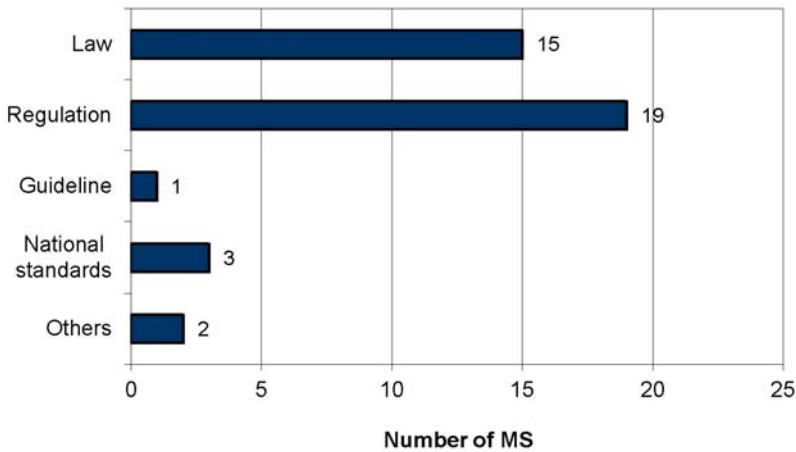


Figure 2: The EPC as final quality check during building renovations, using the "Gecko" EPC tool.

Work flow for building renovations
The EPC as guideline for all players



able to properly quantify the heating and cooling needs and to assess the correct sizing of the systems, the experts should have access both to the building and its technical systems during inspections. They need on-site training to be able to correctly identify the main characteristics of the systems (Figure 2).

On the other hand, MSs concluded that a special training on EPCs for NZEB was not necessary (i.e., specific training for producing EPCs or NZEB). Instead, awareness-raising and education for all professionals in the sector is the main policy and measure to support NZEBs in twelve MS (as opposed to training only for already registered experts).

Two examples of MS NZEB plans referring to training and education of experts are described next:

- > Cyprus: Examination of the current Vocational Education and Training System for technical occupations concluded that continuous review and upgrading of the existing programmes is an absolute necessity, as is the addition of new, targeted programmes on emerging critical technologies, the training of instructors to renew and enrich their knowledge, and the provision of incentives and measures to increase the flow of Cypriot young people into technical occupations.
- > Germany: Finding a well-qualified expert is one of the first steps in a high-quality, energy-efficient refurbishment, or when constructing a new building. The national list of energy efficiency experts for the support programmes of the Federal Government in the field of energy efficiency aims to improve the quality of local energy consulting services by means of uniform qualification criteria, proof of regular advanced training and random checks of the results.

Directive 2010/31/EU does not require significant re-training of experts in MSs, however twenty-five countries indicated the need for additional training.

The experts need to know more about the details of technical problems, how to integrate RES into existing buildings, advanced technologies and new materials.

Training for on-site inspections is required. The experts should be able to access both the building and its technical systems.

3.3. How to produce recommendations based on realistic energy savings in EPCs

As most MSs use fixed or other kinds of default values as inputs for energy performance calculations of existing buildings, it is expected that the calculated energy performance will differ from the measured energy consumption. EPCs are to be used as a means of comparison between buildings or building units, and not as a replacement for precise audits that produce more realistic estimates of energy consumption.

This topic was inspired by the revision of the calculation methodologies for certification that many MSs have been implementing. The discussion focussed especially on the following issues:

- > the effect of user behaviour on actual energy performance and the distinction between the real energy consumption and the calculated energy use;
- > realistic correction factors to be applied in the monthly method to provide results comparable to those achieved by hourly calculation;
- > the increased importance of more precise calculation methodologies to handle the (supposed) increasing number of high performance buildings.

National studies showed that the actual operating hours, actual internal temperature, occupants' behaviour and control strategy have the highest impact on energy performance and/or energy class.

As a consequence, the calculated energy savings from the energy upgrades recommended in the EPC will also deviate from the actual achieved energy savings. Adjusting input boundary conditions to the actual values, will often result in realistic (comparable with measured energy consumption) calculated energy demands. This even happens with simple, quasi-stationary calculation tools using monthly average values.

In existing buildings, the focus should be on further developing default values to come closer to realistic energy consumption calculations. Regarding the default values, U-values are critical, as well as indoor climate conditions and the outdoor climate. EPC recommendations thus need to be carefully considered. However, most MSs have decided to use standard or default values for EPCs or calculation of energy performance. Figure 3 gives some indications of this. For the MSs that use this strategy, training for experts on how to use these values in the calculations is very important (see 3.4).

The technical background of experts needs to be well adjusted to the needs of issuing EPCs, and their training needs to be designed to match the precise needs for energy certification.

Use of building-specific data could be helpful. Experts should be trained to select appropriate boundary conditions.

Time (cost) needed to collect relevant data must be considered.

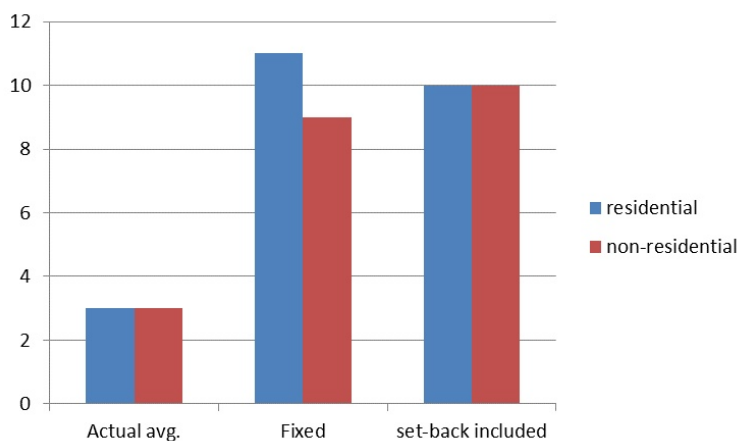
3.4. Training experts on how to take into account real energy consumption in EPC recommendations

Producing good recommendations for energy saving measures for existing buildings is an essential task for the expert when preparing an EPC. The EPBD requires the inclusion of cost-effective recommendations for improvement of the energy performance of a building (or building unit) in the EPCs (Article 11). These recommendations should thus be based on realistic energy savings that can be achieved following their implementation.

The energy performance of buildings is determined by building properties such as U-values, thermal bridges, leakages, solar heat gains, and efficiency of the heating/cooling systems. In addition, the actual energy consumption is influenced by user behaviour. If recommendations for energy efficiency investments are only based on the assessment of the technical building performance based on standard use patterns, energy cost reduction potential might not be realistic. Experience shows that occupants living in very inefficient buildings often do not heat all the rooms in the building/flat, or do so only part of the time, and therefore the actual energy consumption is less than that calculated based on the technical building data (prebound effect). Energy consumption is lower, but hygienic problems might occur.

The EPC has to avoid any influence from occupant behaviour, as it must serve as a neutral tool supporting the market choice of a new owner or renter. However, EPCs should show a realistic impact based on energy improvement recommendations depending on the actual use of the building. Experts must be trained to provide suitable recommendations.

Figure 3: Use of actual average or fixed values in the energy performance calculation in MSs (from a sample of MSs in 2014).



4. Main outcomes

Topic	Main discussions and outcomes	Conclusion of topic	Future directions
Does the EPBD require the retraining of qualified experts?	The amended national legislation, NZEB requirements and integration of RES and innovative technologies may result in the need for additional training for qualified experts.	In most MSs, retraining is voluntary, but there are retraining opportunities in most MSs.	MSs should consider establishing a mandatory continuous training programme, with regular training necessary to keep the qualified expert accreditation.
Training experts on how to take into account real energy consumption in EPC recommendations and estimate realistic energy savings in EPCs.	In most MSs, the EPC excludes any influence of the occupant behaviour and schemes often use fixed default values as input for energy performance calculations.	The recommendations in EPCs should not create false expectations for building owners and tenants.	Methods of calculation of recommendations should produce more realistic projections of energy savings, unlike the model to calculate the EPC energy indicator.
Training of experts and inspectors to take advantage of the synergies between inspections (EPBD) and energy audits (EED).	Both Directives require recommendations for cost-effective improvements and involve buildings and technical systems. Part of the work for inspections and for producing EPCs is also necessary in energy audits.	Energy auditors could possibly produce EPCs, but the EPC assessors may not be able to carry out energy audits. A clear definition of curriculum and required expertise for each activity is needed.	MSs should develop and offer modular education schemes to train experts that can perform EPBD and EED assessments, leading to substantial cost reduction for building owners.

5. Lessons learned and recommendations

Most of the experts assessing buildings in Europe receive authorisation in accordance with national legislation in the individual Member State (MS); this was directly linked with Directive 2002/91/EC in 2002.

Directive 2010/31/EU introduced a slightly different approach on several topics, e.g., the introduction of NZEB, RES and cost effectiveness calculations. MSs should require a continuous professional training programme to help qualified experts to remain up-to-date and thus allow them to retain their license, in addition to any voluntary training that MSs now offer.

The topics in which changes in training are necessary are to address new

requirements on energy performance, changes in EPC content, new calculation procedures, introduction of NZEB and increased influence of RES and advanced innovative systems, as well as recommendations that may be closer to reality and not lead to false expectations.

Modular training focused on application is also needed. This programme should include specific trainings to cover the needs of experts based on problems identified through quality assurance programmes. Ideally, synergies with training of EPC experts, inspectors of heating and air-conditioning systems, as well as energy auditors for the EED should be identified and implemented at the MS level.



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This individual report and the full 2016 book are available at www.epbd-ca.eu and www.buildup.eu