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Quality assurance for energy performance certificates

January 2011

CONCERTED ACTION
ENERGY PERFORMANCE
OF BUILDINGS

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1 Introduction

One of the main objectives of the Energy Performance of Buildings Directive 2002/91/EC is the promotion and improvement of the overall energy performance of buildings. One of the main provisions is the development of certification of buildings, in order to make energy consumption levels visible to owners, tenants and users, and to raise the awareness on energy efficiency whenever a building is constructed, sold or newly rented out. The Energy Performance Certificates (as required by Article 7) can thus be a significant and powerful tool to inform citizens about energy saving options, including information on the economic impact, and to create a demand-driven market for energy efficient buildings and for services regarding energy efficiency.

The Energy Performance Certificate is an official instrument and a source of information for prospective tenants and purchasers. Lack of quality can destroy the credibility of this instrument, lead to problems within official acts and give false facts regarding the compliance with the legal national requirements. In order to implement certificates as a meaningful and reliable source of information, numerous countries have decided to implement a quality assurance system for the Energy Performance Certificates. The Concerted Action made a review of the national approaches regarding the Quality Assurance (QA) scheme for the Energy Performance Certificates. The objectives were:

- To provide an overview of the existing approaches in the different Member States regarding QA schemes and structures.
- To outline similarities and differences regarding the framework and the resulting structure of the QA schemes.
- To gain experience about the typical quality faults found in the operational schemes in the Member States, as well as the typical mistakes of qualified experts.

2 Structural approaches to QA

2.1 Type of QA schemes

There are two different options for setting up a Quality Assurance system for the Energy Performance Certificates:

- A mandatory scheme
- A voluntary scheme

A mandatory QA scheme has an impact on all qualified experts and certificates. This kind of QA scheme can be based on the law regarding the Energy Performance Certificates. It can also be based on an agreement between the government/issuing authority and the sector.

A voluntary QA system is a market-based system. Not all qualified experts/certificates will be part of a QA scheme, and the customer has the choice between qualified experts/certificates that meet the requirements of the QA system and those that do not. Figure 1 gives an overview of the status of all MS on QA schemes as of 2009.

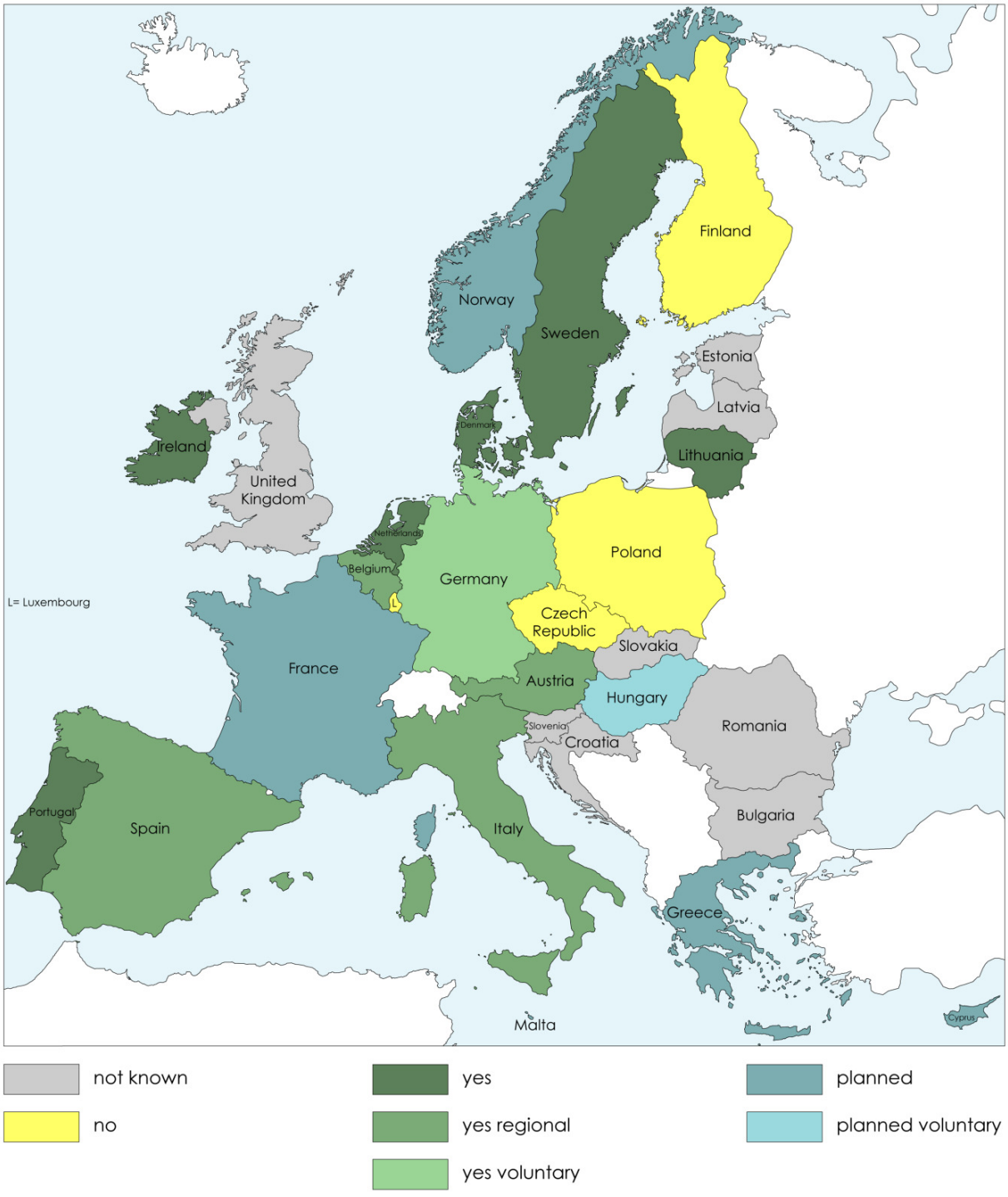

Figure 1: Existing & planned QA schemes

Some countries make a distinction between the QA schemes running for new buildings, existing buildings and public buildings, i.e., some countries have/are planning a QA scheme for new buildings, but not for existing buildings. Other countries have one single QA scheme which is applicable to all kinds of building categories.

2.2 Who runs the QA scheme?

Throughout the EU countries, there are different approaches regarding the implementation of the QA system. The different schemes depend mainly on the frameworks as defined by the national regulation. The QA scheme is to be implemented and realised:

- By the government / administration / issuing authority, or
- by a private firm (i.e., a private accreditation body), or
- by the government / administration and a private firm (i.e. the government appoints a private firm to take over the implementation tasks).

Different approaches/methodologies have been identified regarding the setup of the QA scheme. This is arranged:

- in consultation between the sector, the accreditation bodies and the government/issuing authority, or
- following the ISO 9001. This approach is linked with the way qualified experts are accredited. In practice, the ISO 9001 is only applicable to firms, and, thus, only countries which have an accreditation of firms can use the ISO 9001 for the QA scheme. Countries using a system based on the ISO 9001 are, e.g., Denmark and the Netherlands. Or
- as a private initiative without government involvement (e.g. Germany).

2.3 Sanctions system as part of the QA scheme

Lack of quality in the issued certificates can lead to sanctions against the qualified expert. There are different kinds of sanctions:

- Loss of accreditation
- Obligation to follow training
- Invalidation of the issued certificate
- Obligation to issue a new certificate for free
- Imposition of a fine on the qualified expert
- Further investigation on other certificates issued by the specific qualified expert

Most countries make use of more than one possible sanctions if the certificate does not meet the quality requirements of the QA scheme. Out of a total of 17 countries where the QA system is fully defined:

- 11 countries (57%) follow up on other certificates issued by the qualified expert
- 9 countries (47%) deem the identified poor quality certificate invalid
- 8 countries (42%) state that lack of quality can lead to a loss of accreditation (of the issuer or of the whole company)
- 7 countries (36%) introduce direct sanctions against the qualified expert (obligation to follow training/imposition of a fine)

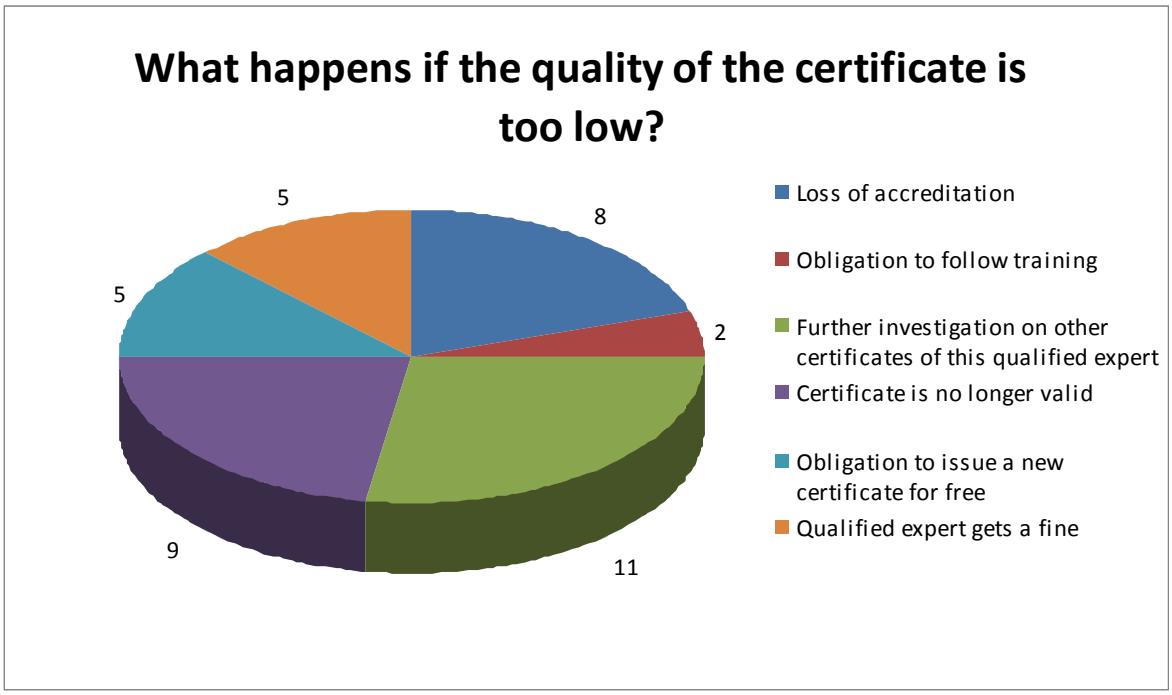

Figure 2: Sanction if the QA check shows that the quality is too low

2.4 Which certificates are checked?

There are generally two different ways of checking certificates: The audit of the certificates can be either random or targeted. Most countries make use of both random and targeted audits:

- 11 countries use a random sampling
- In 9 countries, complaints from clients can trigger an audit
- In 6 countries, out of range values will trigger an automatic audit

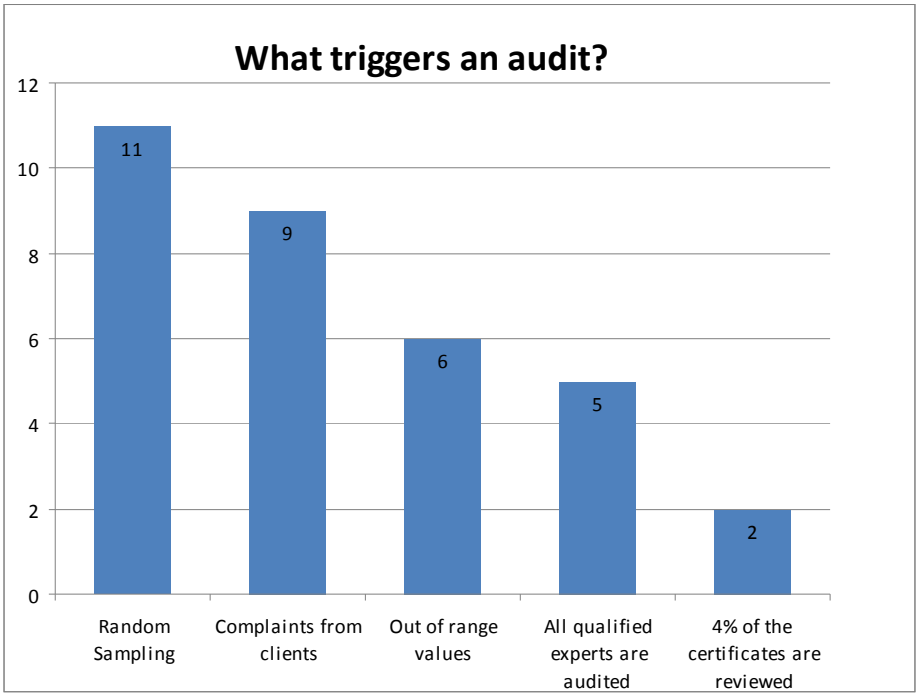

Figure 3: Triggers for an audit

2.5 Different kinds of audit

There are different types of audit:

- Automatic checks (i.e. uploaded certificates are electronically checked on plausibility)
- Manual checks (i.e. an inspector manually examines the certificate issued by a qualified expert)

If the QA scheme uses manual checks, two different approaches can be noted:

- Desk audit: the inspector checks the certificate at his/her office/desk
- On-site audit: the inspector visits the building/building site in order to collect data, and compares/checks the data against reality.

Most countries use manual as well as automatic checks to realise audits/quality checks:

- 11 countries use desk audits for the QA scheme (new residential buildings)
- 8 countries use automatic checks and/or on-site audits on a sample

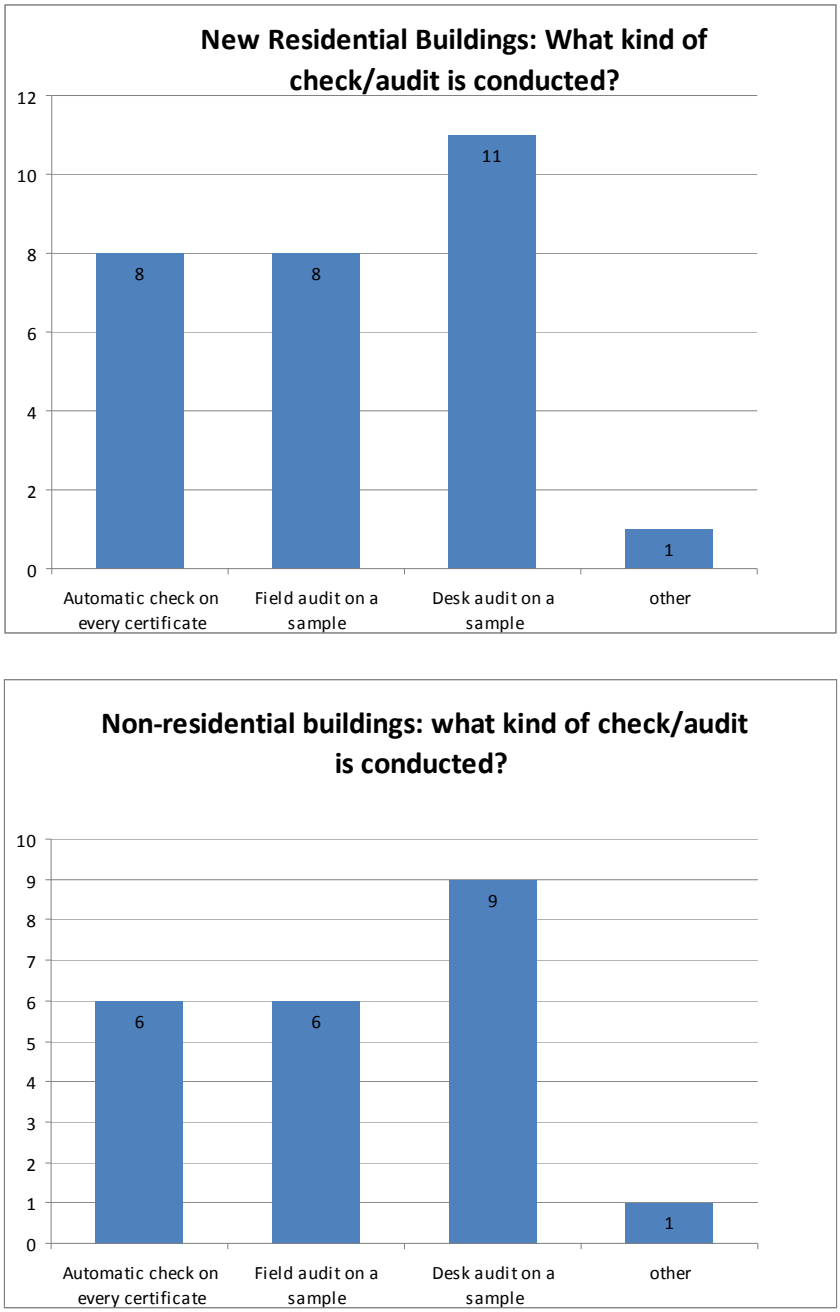

Figure 4: Types of audits/quality checks

2.5.1 Automatic check

What emerges from MS experiences is that an automatic audit of the Energy Performance Certificate cannot check the correctness of the certificate itself. The automatic audit focuses only on the plausibility of the data. In some countries, if the certificate does not pass the automatic check on plausibility, the qualified expert will either be notified /asked to check the data/input, or, alternatively, they will not be enabled to issue or print the certificate. In other countries, a manual desk check is automatically ordered.

2.5.2 Manual desk check

In this type of QA audit, the inspector will check the certificate at his/her office (desk check). Depending on the situation, the qualified expert of the certificate that is checked will be contacted. The way of choosing which certificates to check depends on the existence of a central database.

Below are some possibilities:

- If there is no central database, the auditor/inspector will e.g. contact the qualified expert, asking them to produce a list of issued certificates. This list must be delivered to the auditor. The auditor will check some certificates out of the list and will contact the qualified expert again, in order to get the input data of some specific certificates.
- If there is a central database, the auditor/inspector can, e.g., decide to contact the qualified expert in order to get the plans (of new buildings), or to get more details about some input data. In most countries, the auditor will check if the input of the qualified expert is correct, e.g. correct areas, U-values, materials, installation, orientation, etc.

In most cases, every input in the software can be checked by comparison or recalculation. The auditor can also check if the inspection protocol is correctly used, e.g., for the definition of the heated volume of an existing building.

On the basis of this audit, the auditor will make a list of possible mistakes and points for which the qualified expert has no proof of his input values. The auditor assesses the impact of the mistakes and weak points. In most countries, a desk audit will be conducted for only one certificate for each qualified expert.

2.5.3 Manual check - on-site audit

In case of an on-site audit, the inspector visits the building/building site. In most countries, the permission to enter the building or building site must be incorporated in the national law, in the form of access rights.

For new buildings, the building can be visited during the construction process. In that phase, the inspector can check, e.g., the insulation, which is very hard to check after the construction is completed. Another possibility is to visit the building when it is finished. At that stage, heating/cooling installations, lighting, ventilation, solar shading devices, renewables, and some insulation measures can be checked. To arrange for such a check, an appointment with the building owner is required, as well as their permission to visit the building.

In case of existing buildings, in most countries, the inspector checks all input values by remaking the certificate. When inspecting the building, they follow the same procedure that the qualified expert has used. The on-site visit gives the inspector more information in order to compare and check the data included in the certificate. The on-site audit is always followed by a process similar to the desk audit, for comparison purposes, as well as for the compilation of the list of mistakes.

3 Necessary basis and features of an effective QA system

Having a QA system in place is not automatically a guarantee in itself of the professional integrity of the certification scheme. The QA systems must also **comply with certain minimum standards**, and refer to qualitative boundary conditions. Trust in certificates strongly depends on trust in the QA system.

A QA system must have a firmly defined structure, clear goals, and transparent rules and criteria. It must be secured that there is no variation of the QA level in the national (or regional) framework. That is why a **constant evaluation** of the QA system is important.

Only a completely **independent** QA system is acceptable.

It is highly unlikely that a QA system could succeed without a clear and public **back-up** from the authorities.

A prerequisite for a smooth and high-grade operation of any QA system is to have adequate (in number and in professional expertise) **human resources** available, depending, of course, on the nature of the QA operation (field checks, desk checks etc.).

In many cases, **outsourcing** will be necessary. But this, again, calls for strict criteria for the selection of subcontractors (most of all: independency and expertise).

The QA operation needs a reliable and constant **financing**. Depending on the extent of the QA activities, self-financing is possible, but often additional (budgetary) resources will be necessary to secure the professional integrity of the system.

It is recommendable to design a **flexible** QA system – not only with regard to individual tasks, but also in order to allow a transition from "high-pressure checks" to "low-pressure" ones, if and when the imperative monitoring of the outcome proves that the overall quality of the certificates (i.e. the work of the qualified experts) has risen to an adequate and generally acceptable level. A logical effect of such a transition is the reduction of costs for running the QA system.

Support by information technology is vital to any QA system: on one hand, for example, via a database with QA procedures and (partial) execution of administrative tasks; on the other hand, via filing of activities and results, statistical processing of outcome, and similar.

An important part of the QA activities is **communication**. Clear information to the individual qualified experts being checked is fundamental, but it is equally importantly to provide **feedback** to the preceding stages of the certification scheme (e.g. training and examination). This helps in making timely and proper **adjustments to the processes**, in order to upgrade the overall quality level.

A good QA system, thus, has not only a **restrictive** function (penalisation of poor quality), but also an **educational** and **motivational** one.

Of course, the primary goal is to **secure the good quality** of the certificates, and, in this way, to assure that clients receive adequate value for their money.

4 Feedback and corrective actions with QA results

Most Member States have developed **special procedures** of quality assessment, usually including Frequently Asked Questions (FAQ) and feedback procedures, training, as well as a wide range of "penalties". The kind of the mistake (serious/not serious) plays an important role in some of the QA systems.

A **list of FAQ** is the most popular instrument, usually divided into a "technical" and a "procedural" part. Difficulties, or at least a significant work volume, often arise when the questions are not clear. Usually, the questions are placed by the qualified experts, and the answers are given by administrative bodies and their scientific partners.

In Belgium, the qualified experts are invited to **regular information meetings**, partly based on the FAQ. Accepting this invitation is not mandatory, but the fact that the invitation is issued by the responsible administration body leads to the presence of a high rate of qualified experts.

Newsletters are also used in order to regularly inform qualified experts and other interested parties.

Some Member States have introduced a kind of **mistake-rating**: A list of mistakes is compiled, and the mistakes are divided into several classes, ranging from "serious" to "not harmful". Usually, in case of a

"not harmful" mistake, the certification simply has to be redone. For "serious" mistakes, the consequences range from "redo" to a fine or suspension (in Portugal).

A **penalty point system** for mistakes has been developed by Ireland. In case of a wrong certificate, there is a penalty if the request made by the controlling authority is not answered. A certain number of penalty points within a year leads to required corrective training or suspension. The termination of registration will be imposed if a third suspension of registration results within two years of the second suspension. In the case of termination of registration, the SEAI will consider, on a case-by-case basis, whether re-registration would be permitted and, if so, what requirements must be met in order to facilitate the re-registration of such a person as a BER assessor.

Regular training is another element of the QA. Some Member States provide training (i.e. once per year) as a prerequisite for keeping the licence. Common mistakes are sometimes included into the regular training, thus ensuring that, at least, the new qualified experts will not make the same mistakes.

A **code of conduct** had been discussed in some Member States, but none of them has realised it. The US RESNET introduced a code of conduct for its voluntary scheme. This code of conduct deals mainly with conflicts of interest.

5 Common errors detected by QA schemes in some countries

Country	Problem
The Netherlands	Building inspection = a problem: mistakes in • Surface areas • Interpretation of conditioned spaces • Insulation level of the buildings' envelope
Finland	No information about QA problems in issued certificates. There is no central collection of certificates, but there are some complaints about certificates that are 'too good' (rating class higher than the quality perceived by the users), as well as about two certificates, with different values, for the same building.
Portugal	• Improvement measures are not detailed enough to implement • Lack of data to issue a correct certificate according to the method. The result is a guess based on experience, but without evidence • Qualified experts are not used to keep proof/justification • On the side of the ADENE (the certification authority): it takes too long to give feedback on the QA check to the qualified experts (in some cases, 6 months) • In general, experts believe that the QA is important, but they do not want a QA check on their work
Spain	Not yet known. The assumption is that the misunderstanding of input data will be a common problem.
France	There is yet no detailed knowledge on this topic: • Qualified experts use too frequently the default values instead of the real data. This is not really wrong, but it is not a good reflection of the real situation • Qualified experts are not careful: quick work, resulting in low quality certificates
Germany	• Misinterpretation about conditioned spaces, e.g. garages. • Mixture of uses

	• Missing data • Out of range values • Non-residential: the new standard is complicated • Problems with following the code of conduct of the voluntary system: e.g. not visiting the building
Romania	No operating QA system yet. It is mandatory to send a certificate electronically, but the certificates are coming in all kinds of formats (there is no single format specified). First findings about reasons of bad quality: • No unique and unambiguous methodology • Knowledge gaps • Software not accredited: mistakes in software
Slovakia	• Inspection on issued certificates is not conducted yet • Mistakes due to not understanding the process • Trainers teach different approaches • Problems with the use of software tools: 'all' buildings are in class A: that is not normal
Italy	• No attention to the real situation • The results of the recommendations are not calculated
Croatia	New buildings: Energy Performance Certificate on design – no following-up of design during construction. Adaptation of the expert's knowledge to different buildings: different persons have to work together for the issuing of one certificate (1 expert for the envelope, 1 expert for the technical installation).
Ireland	Insufficient evidence retained by BER assessors in support of data entered in the data file: • Start – Year of construction of existing dwellings • Heat loss areas • Heat loss U-value calculation and thermal conductivity values • Glazing properties and performance data • Water storage volume • Ventilation – number of sheltered sides • Ventilation – mechanical ventilation systems • Lighting and internal gains - % of low energy lighting • Heating system controls • Heating efficiency/efficiency adjustment factors • Renewable technologies BER assessors do not carefully review the audit requirements prior to submitting an audit
Belgium/ Brussels Region	New buildings: definition of heated volume

6 Conclusions

The majority of the Member States recognise the role of the **QA as a vital component of the certification scheme**. Many of them already have a QA system in operation, and several others are planning to introduce one in the near future.

Differentiated approaches to the QA reflect divergent starting points, past national practice, and also variant structures of EPBD-related national legislation. However, the choice for a **mandatory QA system outnumbers by far the voluntary option**.

A QA system serves as a safety mechanism, securing the integrity and legitimacy of the certification scheme. It provides an overview of the work of the qualified experts, as well as of the consistency and accuracy of the certificates.

It **detects poor quality**, identifies the reasons for **bad practice**, feeds information back to preceding stages, **helps improve training and examination steps**, motivates qualified experts for keeping up quality levels, and **helps maintaining the trust on the side of the clients**.

There are several basic rules for any QA system to satisfactorily fulfill expectations. **It must be independent, transparent, highly professional, and it must have clearly documented and communicated rules**. It must be effective, financially secured, publicly supported by the authorities, and must have adequate human resources available with no conflicts of interest.

Even the QA system itself must have appropriate QA instruments established in order to continuously self-evaluate its operation and delivered results.

Outward and two-way communication is highly advisable, for example by a help desk, FAQ, newsletters, etc.

The role of the QA systems is at least twofold:

- To identify bad practices, and eliminate incompetence
- To provide constructive and educational feedback, as well as input for the continuous improvement of the scheme

The present experience and the reasoning evolving from the observation of the QA systems in other frameworks indicate **the importance of having an intense QA at the early stages of the operation of certification schemes**. This is crucial for establishing the reputation of the overall scheme and for gaining the trust of the public. During this phase, **many weak points can be identified and corrected**, including editing the training content or adjusting the examination level.

Later on, when evaluations show a more or less constant and acceptable quality level, the intensity of the QA can be lowered (for example: fewer detailed checks, fewer field tests), which can significantly reduce the cost of running the QA system.

This report is funded by the Community's Intelligent Energy Europe programme under the contract IEE/CA/07/333

Supported by INTELLIGENT ENERGY EUROPE

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