QUALICHeCK Towards better quality and compliance

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Technology	*Aspect*	*Country*
Transmission characteristics, ventilation, heating, hot water, cooling, renewable energy systems	Quality of the works	Germany

THE LIST OF ENERGY-EFFICIENCY EXPERTS FOR GERMAN FEDERAL FUNDING PROGRAMMES

Previous studies have shown partly substantial variations in quality to occur in both energy consulting and in services relating to energy-efficient construction and refurbishment in the scope of the federal funding programmes [1]. In 2011, the German Federal Ministry for Economic Affairs and Energy (BMWi), the German Federal Office of Economics and Export Control (BAFA) and the KfW Bankengruppe (KfW banking group) have decided to establish a nationwide, uniform database of experts qualified in energy efficiency. This measure is intended to ensure the quality of energy consulting services and energy-efficient construction and refurbishment under several funding schemes. The list of energy-efficiency experts contains exclusively experts whose qualifications have been verified. Not only have these experts to meet certain requirements with regard to their vocational training, but the qualifications of the listed experts is also subject to regular reviews.

Residential buildings ☑	Non-residential buildings ☑	Specific buildings: Architectural monuments
New buildings ☑	Existing buildings ☑	

Context

The German Federal Government intends to accomplish virtual climate neutrality for the entire building stock by 2050. To achieve this goal, a larger share of renewable sources of energy in heat consumption is required, along with more energy-efficient buildings. In order to provide a clear-cut framework for action to implement the energy transition in the building sector, the government has presented its "Energy Efficiency Strategy for Buildings" [2]. Two important elements of the "Energy Efficiency Strategy for Buildings" are constituted by energy consulting and the consolidation and reinforcement of the CO_2 Building Rehabilitation Programme, which includes KfW funding programmes for energy-efficient construction and refurbishment. To assure the quality of energy consulting services and the quality of planning and implementing new constructions and retrofitting projects under the funding programmes *"On-site advice (BAFA)"*, *"Energy-efficient construction and refurbishment - Residential buildings (KfW)"*, *"Energy consulting for medium-sized businesses (BAFA)"* and *"Energy-efficient construction and refurbishment - Non-residential buildings (KfW)"*, the German Federal Ministry for Economic Affairs and Energy (BMWi), the German Federal Office of Economics and Export Control (BAFA) and the KfW Bankengruppe (KfW) have decided to keep a list of energy-efficiency experts [3]. The energy-efficiency experts list is a nationwide uniform database, where qualified energy-efficiency experts for funded energy consulting and for high-efficiency retrofitting projects and new buildings are registered.

Objectives and problems addressed

By compiling an energy-efficiency experts list, the German Federal Ministry for Economic Affairs and Energy (BMWi), the German Federal Office of Economics and Export Control (BAFA) and the KfW Bankengruppe (KfW), on the one hand, pursue the goal of eliminating quality defects in both energy consulting and in implementing the planned measures under the energy-efficient construction and refurbishment schemes. On the other hand, they aim at developing and enhancing the energy-efficiency experts list in order to ensure the quality-controlled implementation of the federal funding programmes.

Also, the energy-efficiency experts list will facilitate consumers' search for a qualified expert capable of providing energy consulting and/or realizing building projects. Competent consultancy provided by energy advisers and specialist planners is fundamental to builders who want to do energy retrofitting or perform structural measures. The uniform qualification standards are intended to increase the builders' trust in the competence of the listed experts.

The goals pursued by further developing the energy-efficiency experts list can be summarized as follows:

- ✓ Securing the quality of the services offered by the expert by checking on the energy-efficiency expert's qualifications prior to enrolment in the list
- ✓ Ensuring the listed energy-efficiency experts' up-to-date technical knowledge by regularly checking their qualifications
- ✓ Nationwide, uniform qualification requirements for all experts who wish to be registered
- ✓ Simplified consumers' search for a local expert suited for their projects
- ✓ Professional, independent and non-biased energy consulting for builders and for small and medium-sized enterprises by appropriate energy-efficiency experts
- ✓ The energy-efficiency experts will assure the building project's superior quality of planning and the quality of works
- ✓ Quality-assured implementation of the federal funding programmes

Approach to overcome identified problems

Regulatory background

The energy-efficiency experts list was initiated as early as in 2011 by the German Federal Ministry for Economic Affairs and Energy (BMWi), the German Federal Office of Economics and Export Control (BAFA) and the KfW Bankengruppe (KfW banking group). On a national level, the energy-efficiency experts list creates uniform qualification standards in the scope of several federal funding programmes, namely:

- ✓ On-site advice (BAFA): On-site energy consulting for residential buildings [4]
- ✓ Energy consulting for medium-sized businesses (BAFA): Energy consulting in small and medium-sized enterprises [5]
- ✓ Energy-efficient construction and refurbishment – Residential buildings (KfW):
  - KfW loan (153): Energy-efficient construction (for the construction or first purchase of a new KfW Efficiency House)
  - KfW loan (151/152): Energy-efficient refurbishment - loan (for retrofitting a property to a KfW Efficiency House standard or taking energy-related individual measures)
  - KfW subsidy (430): Energy-efficient refurbishment – Investment subsidy (for retrofitting a property to a KfW Efficiency House standard or taking energy-related individual measures)
  - KfW subsidy (431): Energy-efficient construction and refurbishment – Subsidy for construction supervision (for planning and construction supervision by energy-efficiency experts)
- ✓ Energy-efficient construction and refurbishment – Non-residential buildings (KfW):
  - KfW loan (276/277/278): KfW Energy-efficiency programme – Energy-efficient construction and refurbishment (Reducing energy costs in commercial buildings)
  - KfW loan (217/218): IKK – Energy-efficient construction and refurbishment (Investment in low-energy non-residential buildings)
  - KfW loan (220/219): IKU – Energy-efficient construction and refurbishment (Investment in low-energy non-residential buildings)
- ✓ KfW Efficiency House Monument as well as architectural monuments and other structures particularly worthy of protection:
  - KfW loan (151/152): Energy-efficient refurbishment - loan (for retrofitting a property to a KfW Efficiency House standard or taking energy-related individual measures)
  - KfW subsidy (430): Energy-efficient refurbishment – Investment subsidy (for retrofitting a property to a KfW Efficiency House standard or taking energy-related individual measures)
  - KfW subsidy (431): Energy-efficient construction and refurbishment – Subsidy for construction supervision (for planning and construction supervision by energy-efficiency experts)

The first four of the abovementioned funding programmes represent four categories, which the experts may choose for their registration entry under www.energie-effizienz-experten.de. Organisation and

maintenance of the experts list for these four categories is managed by the German Energy Agency, Deutsche Energie-Agentur GmbH (dena).

In 2012 the energy-efficiency experts list was supplemented by the category *"Energy consultant for architectural monuments"*. Entries in this category are dealt with separately by the coordination unit "Energy consultant for architectural monuments" on the website www.energieberater-denkmal.de.

Is registration in the energy-efficiency expert list mandatory?

For the schemes *"On-site advice"* and *"Energy consulting for medium-sized businesses"*, which are funded by the German Federal Office of Economics and Export Control (BAFA), enrolment in the energy-efficiency experts list is voluntary. A person's eligibility to file applications for these funding programmes is exclusively determined by the German Federal Office of Economics and Export Control (BAFA).

However, to become eligible for receiving loans from the federal funding programmes (KfW) for energy efficiency in residential buildings, it has become mandatory in 2014 to consult an expert for energy-related sectoral planning and construction supervision, chosen from the quality-controlled list of energy-efficiency experts. The enrolment of the expert for the funding programmes "*Energy-efficient construction and refurbishment - Residential buildings"* under programme numbers 153, 151/152, 430 and 431 has thus become obligatory.

At present, there is no obligation to involve an expert enrolled in the energy-efficiency experts list when claiming money from funding programmes dedicated to the construction of new buildings and the refurbishment of existing commercial, communal and social non-residential buildings. With this, the listing of an expert for funding programmes *"Energy-efficient construction and refurbishment - Non-residential buildings"* under programme numbers 276, 277, 278, 217/218 and 220/219 is not mandatory, but occurs on a voluntary basis.

As funding for the energy-related retrofitting of architectural monuments and other structures particularly worthy of protection is part of the KfW programme *"Energy-efficient construction and refurbishment - Residential buildings"*, it is obligatory to consult a listed energy-efficiency expert who is able to supervise the construction measures at monuments and architectural monuments or other structures particularly worthy of protection. Under this funding scheme, exclusively recognized energy advisers who are registered in the energy-efficiency experts list in category *"Architectural monuments and other structures particularly worthy of protection"* are entitled to work.

Promotion programme	Registration in the energy-efficiency expert list is…
✓ BAFA: *"On-site advice"* and *"Energy consulting for medium-sized businesses"*	✓ Voluntary
✓ KfW: *"Energy-efficient construction and refurbishment - Residential buildings"*	✓ Obligatory
✓ KfW: *"Energy-efficient construction and refurbishment - Non-residential buildings"*	✓ Voluntary
✓ KfW: *"Architectural monuments and other structures particularly worthy of protection"*	✓ Obligatory

Table 1: Overview of connected promotion programmes to the energy-efficiency expert list and whether it is obligatory that the consulted expert is registered in the list.

Prerequisites for being registered in the energy-efficiency experts list

The precondition for enrolling in the energy-efficiency experts list is submitting verification documents for the requested qualification, which comprises a basic and an additional level of qualification [6], [7]. The required qualifications differ depending on the category of registration. All in all, there are five categories:

1. Category *"On-site advice (BAFA)"*
2. Category "*Energy-efficient construction and refurbishment - Residential buildings (KfW)"*
3. Category *"Energy consulting for medium-sized businesses (BAFA)"*
4. Category *"Energy-efficient construction and refurbishment - Non-residential buildings (KfW)"*
5. Category *"Energy adviser for architectural monuments"*

For the first four categories, the requirements to the basic and the additional qualification levels are specified in the Book of rules [8]. For the fifth category, *"Energy adviser for architectural monuments"*, a

detailed specification is given separately in the certification scheme [9]. Table 2 summarises the basic qualification, the additional qualification and the document that specifies the rules for each of the five categories.

Promotion programme	Basic qualification	Additional qualification	Document with detailed rules
1. BAFA: *"On-site advice"*	✓ EnEV § 21: first higher education degree for specific professions or specified crafts-men/technicians	✓ Certification as BAFA adviser ✓ Further education with 130/210 teaching units	✓ Book of Rules [8]
2. KfW: *"Energy-efficient construction and refurbishment - Residential buildings"*	✓ EnEV § 21: first higher education degree for specific professions or specified craftsmen technicians	✓ Further education with 130/210 teaching units or 2 reference projects	✓ Book of Rules [8]
3. BAFA: *"Energy consulting for medium-sized businesses"*	✓ Relevant university degree or relevant vocational training ✓ At least 3 (or 5) years of full professional experience	✓ Certification as a BAFA adviser ✓ Further education with at least 16 teaching units	✓ Book of Rules [8]
4. KfW: *"Energy-efficient construction and refurbishment - Non-residential buildings"*	✓ EnEV § 21: first higher education degree for specific professions	✓ Further education with 150 teaching units or 1 reference project	✓ Book of Rules [8]
5. KfW: *"Architectural monuments and other structures particularly worthy of protection"*	✓ EnEV § 21: first higher education degree for specific professions or specified craftsmen technicians	✓ Basic course on energy efficient buildings or additional qualification based on work as an expert or documented reference projects ✓ Further education on listed buildings or proof of special expertise	✓ Certification scheme [9]

Table 2: Required qualification for being part of the energy-efficiency expert list.

Basic qualification

For any category with the exception of the category *"Energy consulting for medium-sized businesses (BAFA)"* the basic qualification must be fulfilled and documented by submitting the authorisation to issue energy performance certificates acc. to § 21 of the German Energy Saving Ordinance (EnEV) [11]. The basic qualification for these categories is fulfilled by persons holding a first higher education degree qualifying for entry into a profession, e.g. in architecture, structural engineering, civil engineering, technical building systems, physics, building physics, mechanical engineering, electrical engineering or in another technical or scientific discipline with a focus on one of the aforementioned subjects.

For the categories *"On-site advice (BAFA)"*, *"Energy-efficient construction and refurbishment - Residential buildings (KfW)"* and *"Energy adviser for architectural monuments"* the basic qualification is also fulfilled

by professional groups like craftsmen/ master craftsmen, interior designers, state-certified and recognized technicians.

To apply for registration in the category "Energy consulting for medium-sized businesses (BAFA)", the experts need to have a basic qualification, i.e. a relevant university degree or relevant vocational training. Besides, they need to have at least three (or five) years of full professional experience (depending on the type of degree/final certificate). They are further required to document their current activity as an energy adviser. The candidate should have a higher education degree qualifying for entry into a profession in the disciplines of energy technology, electrical engineering, process engineering, combustion technology, environmental engineering, technical building services, supply technology, civil engineering, physics, mechanical engineering or architecture, as well as in another technical or scientific discipline with a main focus on one of the aforementioned subjects. Also eligible are specific professions such as state-recognized or state-certified technicians or professionals with a master craftsman's certificate completed in one of the following areas: heating, ventilation, air-conditioning, electrical, refrigeration, metal, environmental, building, insulation, mechanical or physical engineering.

Additional qualification

1. Category *"On-site advice (BAFA)"*

To successfully register in the category *"On-site advice (BAFA)"* another two qualifications are required in addition to the basic qualification, namely

- ✓ Certification as a BAFA adviser and
- ✓ Further education in accordance with the module "Consulting" with 130 or 210 teaching units (or documentation of a corresponding teaching assignment)

Registration in this category requires prior certification as an expert with the German Federal Office of Economics and Export Control (BAFA). Approval for registration is granted by BAFA itself. Further, additional qualification requires a successfully completed further education in the module "Consulting" (mandatory). Depending on the type of degree/ final certificate acquired, 130 or 210 teaching units are required as base options for further education. A detailed description of the contents and the scope of the module is given in the Book of rules [8].

As an alternative to opting for further education in the module "Consulting" it is also possible to furnish proof of specialized technical knowledge in energy-efficient construction acquired by responsible teaching assignments at universities/colleges or by instructor assignments in other institutions. In this case, it is a condition that this person has taught the contents specified in the further training catalogue given in the Book of rules [8]. Verification of the teaching activities is provided by the person's reference (testimonial) and a confirmation issued by the provider of further education specifying contents and scope of the teaching assignment.

2. Category *"Energy-efficient construction and refurbishment - Residential buildings (KfW)"*

To successfully register in the category *"Energy-efficient construction and refurbishment - Residential buildings (KfW)"* another two qualifications are required in addition to the basic qualification, namely

- ✓ Further education acc. to module "Planning and implementation - Residential buildings" with 130 or 210 teaching units (or verification of a corresponding teaching assignment) or
- ✓ Reference projects: 2 completed KfW Efficiency Houses

Similar to registration in the category "*On-site advice (BAFA)"*, it is mandatory for registration in this category to document the successful completion of a further training course to obtain the additional qualification. The further training is to be completed in the module *"Planning and implementation - Residential buildings"*. Depending on the type of degree/final certificate acquired, 130 or 210 teaching units are required as base options for further education. A detailed description of the contents and the scope of the module is given in the Book of rules [8]. As an alternative to opting for further education in the module *"Planning and implementation - Residential buildings"* it is also possible to obtain additional qualification for registration in this category by supplying evidence of corresponding teaching assignments.

Instead of passing the further education measure the expert is allowed to present two completed reference projects to prove his/her additional qualification. The reference projects must have been completed and comply with specific energy performance standards. They must have been independently planned, constructed or retrofitted by the expert as high-performance buildings. As an alternative to a residential building it is also allowed to use a non-residential building as one of the two references. The second reference must be a residential building.

3. Category "*Energy consulting for medium-sized businesses (BAFA)*"

To successfully register in the category "Energy consulting for medium-sized businesses (BAFA)" another two qualifications are required in addition to the basic qualification, namely:

- ✓ Certification as a BAFA adviser and
- ✓ Further education with at least 16 teaching units

Registration in the category "*Energy consulting for medium-sized businesses (BAFA)*" requires prior certification as an expert with the German Federal Office of Economics and Export Control (BAFA). Approval for registration is granted by BAFA itself. The additional qualification further includes an advanced education course comprising at least 16 teaching units, which must be have been completed less than 2 years prior to the date of registration. The admissible contents of the additional qualification are summarized in the Book of rules [8].

4. Category *"Energy-efficient construction and refurbishment - Non-residential buildings (KfW)"*

To successfully register in the category *"Energy-efficient construction and refurbishment - Non-residential buildings (KfW)"* one of the following qualifications is required in addition to the basic qualification:

- ✓ Further education covering basic topics of energy-efficient construction and retrofitting with a total of 150 teaching units or
- ✓ Reference project: 1 completed KfW Efficiency House

The category *"Energy-efficient construction and refurbishment - Non-residential buildings (KfW)"* was added to the energy-efficiency experts list only in late 2015. The requirements regarding the additional qualification in this category are being prepared. As a transitional arrangement, registration in this category currently requires a successfully completed further education course dealing with basic issues of energy-efficient construction and retrofitting, comprising a total of 100 teaching units and successfully completed further training regarding the application of German standard DIN V 18599 [12] for non-residential buildings (with 50 teaching units including the exam and the project report):

- ✓ For experts who have already registered in the category "Energy-efficient construction and refurbishment – Residential buildings (KfW)" and/or "On-site advice (BAFA)", the abovementioned further education course comprising 100 teaching units is assumed to have been completed and verified.
- ✓ For experts who have already registered in the category "Energy consulting for medium-sized businesses (BAFA)", the scope of 100 teaching units is reduced to 84 units.

Instead of passing the further education measure the expert is allowed to present a completed reference project in the field of construction or refurbishment of highly energy-efficient non-residential buildings to document his/her additional qualification. The applicant is required to have conducted the energy performance verification for this reference project independently and in person. Furthermore, the applicant must examine and ascertain the building's compliance with the required minimum energy requirements.

5. Category "*Energy adviser for architectural monuments"*

According to the certification scheme for expert energy advisers for architectural monuments and other structures particularly worthy of protection in the scope of KfW energy retrofitting programmes [9], the basic qualification is required plus verification of additional qualification in the field of energy efficiency plus another verification of additional qualification in the field of energy retrofitting protected historical buildings and other structures particularly worthy of protection.

In the field of energy efficiency, the additional qualification can be verified by:

- ✓ Basic course "Planning and retrofitting of energy-efficient buildings" or
- ✓ Additional qualification based on work as an expert or
- ✓ Documentation of balance sheets as reference projects

In the field of refurbishing listed buildings and structures particularly worthy of protection it can be verified by:

- ✓ Documentation of appropriate further education or
- ✓ Proof of special expertise

Prolongation of registration in the energy-efficiency experts list

In times of rapid developments in the area of building energy performance, high-quality work requires continually updated, state-of-the-art knowledge and practical experience in the respective field of work.

Due to quality assurance requirements and to make sure that the expert's professional knowledge is still up-to-date, the expert must prolong his/her registration entry at regular 3-year intervals. For a successful prolongation the expert must prove that he/she has attended further training courses and acquired practical experience. Acceptable verification documents for further education require evidence of at least 16 teaching units in the category *"Energy adviser for architectural monuments"* or at least 24 teaching units in all other categories, all of which must have been completed within the previous three years.

Proof of the practical experience required for *"On-site advice (BAFA)"* and *"Energy consulting for medium-sized businesses (BAFA)"* can be furnished by documenting at least one energy consultation that was given and funded. This is done by submitting the consultation report with a corresponding content and structure. For KfW funding programmes (categories *"Energy-efficient construction and refurbishment - Residential buildings/Non-residential buildings (KfW)"*) documentation of a planning service or construction supervisions for KfW Efficiency Houses performed by the expert himself/herself is required. In addition, there is the option of proving practical experience by documenting individual measures that were implemented. The category *"Energy adviser for architectural monuments"* also requires documentation of practical experience, including at least one project where the expert personally rendered energy-related sectoral planning services or was responsible for the correct execution of the construction work. Alternatively, the expert may submit documentation of a personally rendered, correctly executed construction supervision involving energy retrofitting of an architectural monument or other structures particularly worthy of protection. All verification documents for practical experience will be subjected to an automated plausibility check, examining the data with regard to completeness and plausibility. It is also possible to perform randomly selected in-depth inspections of the services rendered (see section "Quality assurance system" below).

If there is no current practical experience verification available for a certain category, the expert is alternatively allowed to document an increased amount of further education of 24 additional teaching units in the category *"Energy adviser for architectural monuments"* or 32 additional teaching units for all other categories. The option of replacing the practical experience verification with further education certificates cannot be used twice in a row to prolong the list entry for the same category. In case the conditions are not fulfilled because documentation is incomplete or the data is lacking plausibility, the expert is given the opportunity to complete missing evidence. If the conditions are still not fulfilled, the expert's entry in the energy-efficiency experts list will be hidden from the due date of renewal. The process for the prolongation of list entries is shown in the diagram below.

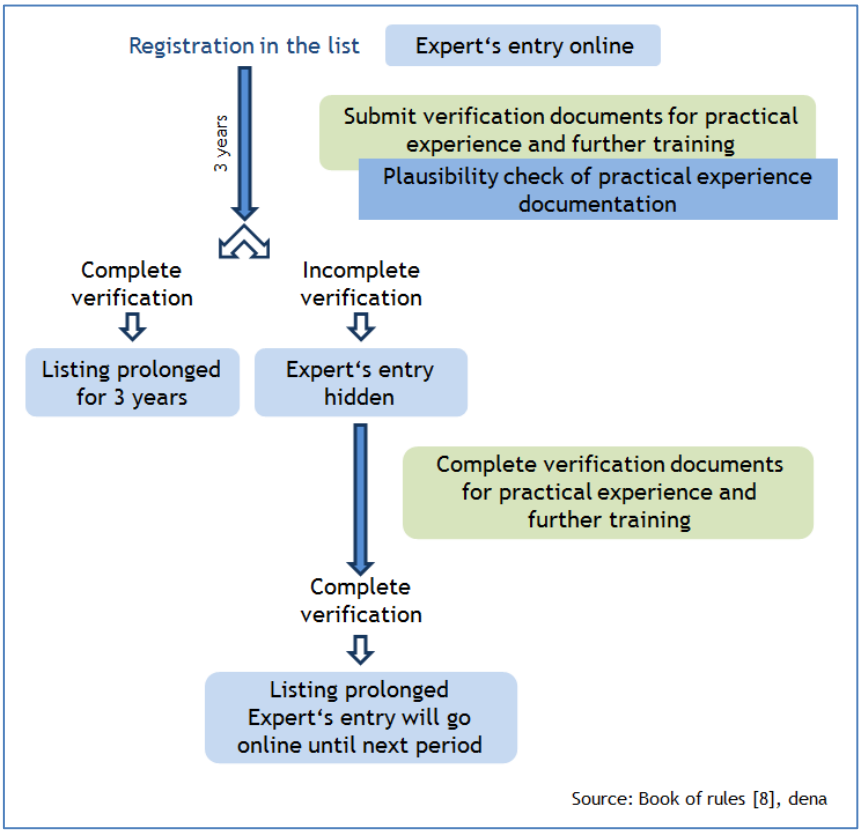


Figure 1: Process for the prolongation of list entries

Further details or possible alternative procedures for prolonging the listed entry are described in the book of rules for the energy-efficiency experts list [8] and the certification scheme for expert energy advisers for architectural monuments and other structures particularly worthy of protection [9].

The quality assurance system for the energy-efficiency experts list

The energy-efficiency experts are intended to be capable of planning and consulting clients in a professional, independent and non-biased way if new constructions are to be realised or an existing building shall be retrofitted to improve its energy performance. In addition, they should meet the high requirements imposed on experts for high-performance new constructions and retrofitting projects as well as energy consulting. To ensure these qualities, the experts will undergo extensive quality inspections prior to their registration with the list of energy-efficiency experts. A multi-stage quality assurance system was developed for managing the energy-efficiency experts list, which allows to ascertain and check the experts‘ qualifications at regular intervals. This quality assurance system comprises three stages.

1. In the first stage of the quality assurance system an expert’s basic and additional qualifications will be checked at first registration. The expert’s database entry will only be published after the examination of the verification documents has been successfully completed.
2. In the second stage of the quality assurance system the verification documents required for prolongation of the expert’s list entry will be reviewed. Every three years the experts are required to submit evidence that they have attended relevant further training courses. In addition, they need to document their practical experience for every funding programme they wish their entry to be prolonged for. Depending on the respective funding programme, they may document an energy consultation or the design or construction supervision of a KfW Efficiency House (new construction or retrofitting project).
3. In a third step, all documents on practical experience are subjected to an automated plausibility check, which serves to examine the data with regard to completeness and plausibility. Further, there will also be random in-depth inspections of the services rendered. The registered expert is obliged to cooperate in an in-depth inspection. The aim is to ascertain whether services rendered (planning and construction supervision) comply with the standards and were performed correctly. The in-depth inspection is divided into two parts. In a first step, the documents bearing relevance to the construction project (energy consultancy report, planning or construction supervision of the Efficiency House) are checked for completeness, content accuracy and compliance with the funding guidelines.
   If there appears to be a need for further clarification after review of documentation, a neutral external auditor (specialized inspector) will do an additional on-site examination of the expert’s services at the respective building. The external auditor prepares a documentation summarizing the examination. If the outcome of the evaluation is negative, the expert will face conditions and consequences (see section "Compliance concerns related to EP certificates and to the QM approach").

An in-depth inspection can be initiated if:

- ✓ the plausibility check of the data and documents submitted by the expert has revealed inconsistencies
- ✓ the expert has been picked at random for inspection (randomly selected inspections)
- ✓ KfW requires an in-depth inspection. In this case it is also possible to check a project that has not been submitted as documentation of practical experience.

The procedure for an in-depth inspection is described in Figure 2:

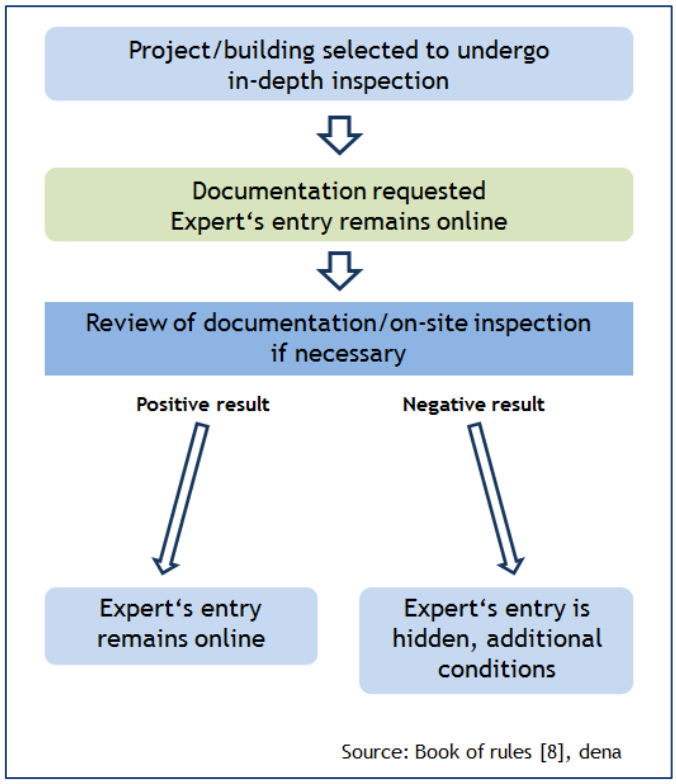


Figure 2: Procedure for the in-depth inspection

Presentation in the energy- efficiency experts list

The expert is registered online in the energy-efficiency experts list under www.energie-effizienz-experten.de. The required verification documents proving that the candidate meets the prerequisites must either be uploaded or the application (including the respective documents) must be sent to the coordination unit by mail, email or fax. If the examination of the required verification documents yielded a positive result, the entry is activated and displayed online under www.energie-effizienz-experten.de. If the check failed to prove the expert's eligibility, missing verification documents can still be supplied at a later date. The expert will neither be registered nor activated until these verification documents have been submitted.

- ✓ After review, the activated entries appear in the result summary of the experts list when entering the ZIP code or the last name. The entries are marked differently, depending on the respective category.

The following data will be registered and published:

- ✓ Name of the expert (first and last name, title/degree)
- ✓ Name of the company, if known
- ✓ Vocational training/course of studies
- ✓ Current post
- ✓ Address, phone, email address if desired
- ✓ Website, if available
- ✓ List of the categories, in which the expert applied for registration and for which he/she submitted documents
- ✓ For employees of commercial investors or the like, e.g. housing or real estate enterprises: notification that the expert is only available for projects of the company mentioned
- ✓ For members of partner networks: name and logo of the associated networks

Figure 3 shows a search result.

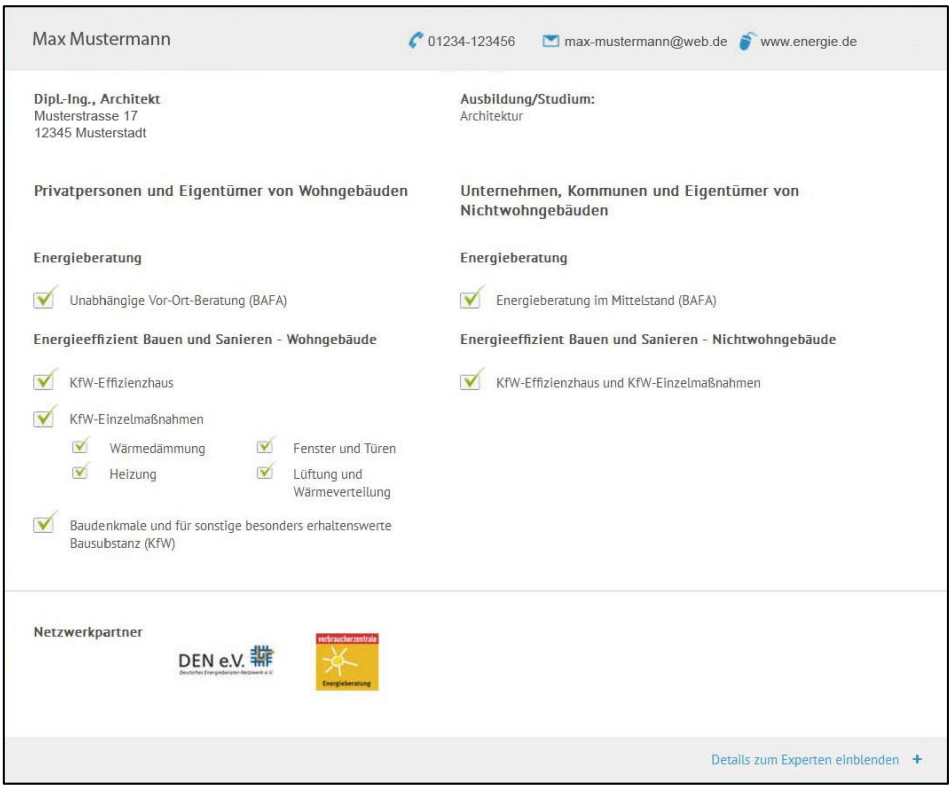


Figure 3: Exemplary search result for an expert with indication of his/her personal data such as name, name of the company, email address, completed vocational training/ studies, indication of the categories for which the expert is qualified and activated online, plus information on membership in partnering networks (if any). Source: www.energie-effizienz-experten.de.

In addition, the expert can give further details including technology focuses (e.g. waste heat) and focal sectors (e.g. buildings used for office-like businesses, handicraft businesses, health care and social services sectors etc.).

Market acceptance of the approach

At present, about 13,800 professionals have registered with the experts list. More than 1,000 experts are currently qualified for non-residential buildings. In this context it should be noted that registration for the category *"Energy-Efficient Construction and Refurbishment - Non-Residential Buildings (KfW)"* only became possible in late 2015 and that it is not obligatory. According to the stakeholders (German Federal Ministry for Economic Affairs and Energy (BMWi), KfW Bankengruppe, German Federal Office of Economics and Export Control (BAFA) and Deutsche Energie-Agentur/German Energy Agency, dena) there is a tangible demand for qualified experts in the market. This is underlined by a total of approximately 52,000 search queries per month. Further, stakeholders indicate that energy advisers get every 3rd order due to their registration with the experts list.

Compliance concerns related to EP certificates and to the QM approach

No reporting ☐	Wrong reporting ☑	Not meeting the performance requirements ☑

Compliance concerns related to EP certificates (see QUALICHeCK terms and definitions)

Generally, registration with the energy-efficiency experts list is on a voluntary basis. If the expert wants to become active in particular federal funding programmes, however, registration in the energy-efficiency experts list cannot be avoided, but is mandatory (see section "Approach to overcome identified problems"). In the scope of the contract signed by the experts when registering with the energy-efficiency experts list, they agree to cooperate and comply with any requirements relating to verification management. The expert will face serious consequences if he/she submits inappropriate verification and/or further training documents, if the expert's services are found to be considerably defective, if contribution payments are delayed, if the expert has been found to be unreliable or if any other essential

contractual duties are violated. Depending on the degree of non-compliance with the obligation to provide verification documents, conditions will be imposed on the expert, his/her entry for one or several categories will be hidden or the contractual relationship will be terminated.

The following sanctions can be imposed on experts:

- ✓ Attendance of further training or courses of instruction
- ✓ Submission of documentation on practical experience, which will be subjected to in-depth inspection
- ✓ Shortening the registration period to one year

In case the entry is partially or fully hidden, either the respective category is hidden or the entire entry of the expert is not displayed while searching the list. During this period, the expert cannot work on federal funding programmes, for which enrolment is obligatory.

In case of effective termination, the entry will be eliminated from the energy-efficiency experts list.

Financial aspects

Organisation, management and maintenance of the energy-efficiency experts list are associated with manpower and financial efforts made by the coordination units German Energy Agency (Deutsche Energie-Agentur, dena) and the Association for Science and Technology of Building Maintenance and the Preservation of Monuments (Wissenschaftlich-Technische Arbeitsgemeinschaft für Bauwerkserhaltung und Denkmalpflege, WTA). The amount of the costs incurred on the two coordination units in this context is unknown. Part of these costs is covered by the one-off payments for first registration and by current revenues from the annual contributions paid by the listed experts.

The expert can be registered in five categories of the energy-efficiency expert list (see section "Approach to overcome identified problems"). As the entry in the category "Energy adviser for architectural monuments" is handled separately, the costs for registration and maintenance of the list in this category are charged separately/ additionally. In addition to the annual contribution or to both annual fees the experts will be charged costs relating to further training and continuing education courses, which vary depending on the scope of the webinar/ seminar/ course.

Costs for registration in the energy-efficiency experts list

The costs for the expert's registration with the energy-efficiency experts list in the categories *"On-site Advice (BAFA)"*, *"Energy-efficient Construction and Refurbishment - Residential Buildings (KfW)"*, *"Energy Consulting for Medium-sized Businesses (BAFA)"* and *"Energy-efficient Construction and Refurbishment - Non-residential buildings (KfW)"* are € 50 plus VAT (single payment). The annual contribution amounts to € 100 plus VAT, irrespective of the number of categories the expert wishes to register for. The costs for registration plus the first annual contribution are not charged before the activation of the expert's entry (online publishing). The annual contribution will be reduced if the expert is registered via a network partner. At present, registration via network partners is only possible for the funding programmes *"On-site Advice (BAFA)"* and *"Energy-efficient Construction and Refurbishment - Residential Buildings (KfW)"*. The revenues are used solely for organisational purposes, technical advancement of the list and for data verification. In summary:

- ✓ One-off fee of € 50 plus VAT
- ✓ Current payment of € 100 plus VAT per year (members of partnering networks are charged a reduced annual fee)

For the certification procedure and the first registration in the category *"Energy adviser for architectural monuments"* a fee of € 100 plus VAT is charged on filing the application. If an application is rejected after examination by the coordination unit, the share of € 20 for registration is paid back. From the first year after approval and registration an annual contribution of € 100 plus VAT must be paid. The annual contribution is used for maintaining the list and for prolonging the approval. In summary:

- ✓ In the first year, a one-off fee of € 100 plus VAT
- ✓ In the second and the following years, a recurring payment of € 100 plus VAT p.a.

Overall evaluation

The list of energy efficiency experts continues to be augmented and advanced. Meanwhile, the expert can opt for registration in five different categories. The prerequisites for registration are described in detail in a related document (Book of rules [8], certification scheme [9]); possible alternatives are also given here.

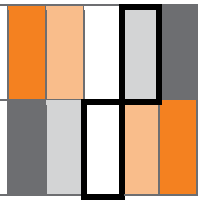
To facilitate verification management (mainly in the field of further training and continuing education of the experts), the scope of the further training and continuing education courses has been clearly defined and the required thematic content has been summarized in an inventory. Besides, a list of appropriate providers of continuing education and training is also compiled. The energy efficiency experts list is associated with additional effort and additional costs for all stakeholders. The energy-efficiency experts list is not only beneficial to the German Federal Ministry for Economic Affairs and Energy (BMWi), the German Federal Office of Economics and Export Control (BAFA) and for the KfW Bankengruppe (KfW), it also holds advantages for the builder. The energy-efficiency experts list makes it easier for the consumer to find a suitable, qualified local expert. The qualifications of the energy-efficiency experts are clearly presented and the builder can rely on the assured competence of the registered expert. Further benefits and drawbacks associated with the quality assurance system are listed in Table 3.

Pros	Cons
✓ The consumers‘ search for an appropriate local expert is made easier ✓ The quality of the services provided by the expert is assured ✓ High quality of planning and/or high quality of the works is assured ✓ The builder is supported by experts whose qualification has been verified based on nationwide, uniform qualification standards ✓ Regular checks and the mandatory attendance of further training and continuing education courses ensure the expert’s up-to-date technical knowledge	✓ Additional efforts and additional costs incurred for all parties involved ✓ Random in-depth inspections do not represent an exhaustive check of the services rendered by the expert - only part of the building projects controlled by the expert will be checked. ✓ Under certain circumstances, the precisely defined additional qualifications may hinder the acceptance of experts with longstanding practical experience and extensive professional expertise for list registration.

Table 3: Overall pros and cons of the approach

Level of complexity
(dark orange = simplest)

Potential for replication
(dark orange = best)



Prerequisites

To make the concept of the energy-efficiency-experts list work, it is essential to create a database for the experts to register. Preferably, the establishment and the maintenance of this database should be handled by a coordination unit that has already gained some experience in managing similar lists and verification procedures. If the coordination unit is not sufficiently qualified in the technical disciplines, it is recommended to involve appropriate bodies for support. In addition, the required basic and additional qualifications and the necessary certificates of further training and practical experience must be precisely defined. To avoid misunderstandings, it is also recommended to compile a clearly structured inventory of the required evidence of further training and the respective training focus, listing appropriate providers of continuing education and training. Regarding plausibility checks of these certificates it is recommended to use automated checking processes as far as possible. To be able to do on-site quality checks of the projects, further independent specialized inspectors must be involved.

Hints	Pitfalls
✓ The basic and additional qualifications should be defined according to the task. ✓ Regarding the scope of the required qualification certificates, a sound balance between costs and benefits must be found for all parties involved. ✓ The time interval during which the list entry has to be prolonged and relevant evidence must be furnished needs to be appropriately defined. If too short a time span is chosen, the expert may fail to comply with the required certificate of practice. ✓ The share of randomly performed in-depth inspections must be high enough to have an impact on the listed experts while still remaining feasible. ✓ Involving further coordination units, which will check the expert's qualification for one or more categories, will facilitate the task. ✓ Inventories that clearly describe the scope and contents of further training and continuing education courses and a list of appropriate providers of continuing education and training will facilitate verification management for all stakeholders.	✓ The coordination unit in charge of the task needs to be appropriately qualified itself or must be supported by a suitably qualified body. ✓ Checking the verification documents on the experts' practical experience for plausibility requires detailed knowledge of energy performance certificates and the calculation method used. ✓ The complexity of the verification management and the mandatory participation in in-depth inspections may have a deterrent effect on the potential energy efficiency-experts.

Table 4: Overall hints and pitfalls to avoid when developing such an approach

References

[1] Deutsche Energie Agentur (dena)/ The German Energy Agency (dena): Experten für Energieeffizienz finden. [Finding experts in energy efficiency.] Website: https://www.dena.de/themen-projekte/energieeffizienz/gebaeude/beraten-und-planen/energieeffizienz-expertenliste [accessed Feb. 12, 2017]

[2] Bundesministerium für Wirtschaft und Energie (BMWi)/ The German Federal Ministry for Economic Affairs and Energy (BMWi): Themenseite Energiewende im Gebäudebereich. Energieeffizienzstrategie Gebäude. [Issues of the energy transition in the building sector. Energy efficiency strategy buildings.] Website: http://www.bmwi.de/Redaktion/DE/Artikel/Energie/energieeffizienzstrategie-gebaeude.html [accessed: Jan. 26, 2017]

[3] Die Energieeffizienz-Experten für Förderprogramme des Bundes/ The energy efficiency experts for federal funding programmes: Über die Expertenliste. [On the Experts List.] Website: https://www.energie-effizienz-experten.de/service/ueber-die-expertenliste/ [accessed: Jan. 26, 2017]

[4] Bundesamt für Wirtschaft und Ausfuhrkontrolle (BAFA)/ The German Federal Office of Economics and Export Control (BAFA): Energie. Vor-Ort-Beratung. [Energy. On-site advice.] Website: http://www.bafa.de/DE/Energie/Energieberatung/Vor_Ort_Beratung/vor_ort_beratung_node.html [accessed: Jan. 26, 2017]

[5] Bundesamt für Wirtschaft und Ausfuhrkontrolle (BAFA)/ The German Federal Office of Economics and Export Control (BAFA): Energie. Energieberatung im Mittelstand. [Energy. Energy consulting for medium-sized enterprises.] Website: http://www.bafa.de/DE/Energie/Energieberatung/Energieberatung_Mittelstand/energieberatung_mittelstand_node.html [accessed: Jan. 26, 2017]

[6] Die Energieeffizienz-Experten/ The energy efficiency experts for federal funding programmes: Sie sind Energieeffizienz-Experte. Ersteintrag als Energieeffizienz-Experte. [You are an energy efficiency

expert. First registration as an energy efficiency expert.] Website: https://www.energie-effizienz-experten.de/sie-sindenergieeffizienz-experte/weitere-informationen/ [accessed Feb. 01, 2017]

[7] WTA Wissenschaftlich-Technische Arbeitsgemeinschaft für Bauwerkserhaltung und Denkmalpflege GmbH/ Association for Science and Technology of Building Maintenance and the Preservation of Monuments (WTA): Anerkennung zum Energieberater für Baudenkmale. [Certification as an energy adviser for architectural monuments.] Website: http://www.wta-gmbh.de/energieberater/ [accessed Feb. 02, 2017]

[8] Deutsche Energie-Agentur (dena)/ The German Energy Agency (dena): Regelheft für die Eintragung in die Energieeffizienz-Expertenliste für Förderprogramme des Bundes: Vor-Ort-Beratung (BAFA), Energieeffizient Bauen und Sanieren – Wohngebäude (KfW), Energieberatung im Mittelstand (BAFA), Energieeffizient Bauen und Sanieren – Nichtwohngebäude (KfW). [Book of rules for registration with the energy-efficiency experts list for federal funding programmes: On-site advice (BAFA), Energy-efficient construction and refurbishment – Residential buildings (KfW), Energy consulting for medium-sized businesses (BAFA), Energy-efficient construction and refurbishment – Non-residential buildings (KfW).] Status as of Sep. 01, 2015. Available at https://www.energie-effizienz-experten.de/service/downloads/ [accessed Feb. 07, 2017]

[9] Vereinigung der Landesdenkmalpfleger in der Bundesrepublik Deutschland und Wissenschaftlich-Technische Arbeitsgemeinschaft für Bauwerkserhaltung und Denkmalpflege e.V./ Union of Regional Conservationists in the Fed. Rep. of Germany and Association for Science and Technology of Building Maintenance and the Preservation of Monuments (WTA): Anerkennungsschema. Sachverständige Energieberater für Baudenkmale und sonstige besonders erhaltenswerte Bausubstanz für die KfW-Programme zur energetischen Sanierung (KfW-Programme Nr. 151/152, Nr. 430, Nr. 431, Nr. 218, Nr. 219). Endfassung nach Abstimmung mit dem BMWI (Bundesministerium für Wirtschaft und Energie). [Certification scheme. Professional energy advisers for architectural monuments and other structures particularly worthy of protection for the KfW programmes on energy retrofitting (KfW programmes no. 151/152, 430, 431, 218, 219). Final version after consultation with the Fed. Min. for Economic Affairs and Energy.] Available at http://wta-gmbh.de/energieberater/dokumente/ [accessed Feb. 07, 2017]

[10] Die Energieeffizienz-Experten/ The energy-efficiency experts: Aktuelles. Neueste Meldungen. [Latest news.] Website: https://www.energie-effizienz-experten.de/service/aktuelles/ [accessed Feb. 09, 2017]

[11] Bundesregierung/ The German Federal Government: Verordnung über energiesparenden Wärmeschutz und energiesparende Anlagentechnik bei Gebäuden (Energieeinsparverordnung – EnEV). [Energy saving Ordinance – EnEV]. Unofficial reading version, status as of 28 October 2015. Available under www.bbsr-energieeinsparung.de/EnEVPortal/DE/EnEV/EnEV2013/Download/Lesefassung_EnEV2013.pdf?__blob=publicationFile&v=11. [accessed: Jan. 9, 2017]

[12] DIN V 18599: Energetische Bewertung von Gebäuden - Berechnung des Nutz-, End- und Primärenergiebedarfs für Heizung, Kühlung, Lüftung, Trinkwarmwasser und Beleuchtung, Teile 1-11. [DIN V 18599: Energy efficiency of buildings — Calculation of the energy needs, delivered energy and primary energy for heating, cooling, ventilation, domestic hot water and lighting — Parts 1-11] Beuth-Verlag. Berlin (2016).