



T3.1 DRAFT GUIDELINES OF EUROPEAN TECHNICAL QUALITY CRITERIA

January 2018

Version 1.2

QualitEE Project

This document has been developed as part of the project titled “QualitEE – Quality Certification Frameworks for the Energy Efficiency Services” supported by the EU’s Horizon 2020 program.

Date

January 2018

Authors

Task Lead:

Klemens Leutgöb

Klemens.leutgoeb@e-sieben.at

e7 Energie Markt Analyse GmbH

Austria

www.e-sieben.at

Disclaimer

The QualitEE project receives funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 754017. The sole responsibility for the content of this presentation lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EASME nor the European Commission are responsible for any use that may be made of the information contained therein.

LIST OF CONTENTS

1	INTRODUCTION.....	4
2	THE QUALITY CRITERIA	5
2.1	QC 1 ADEQUATE ANALYSIS	5
2.2	QC 2 QUALITY OF IMPLEMENTATION OF TECHNICAL ENERGY EFFICIENCY IMPROVEMENT MEASURES.....	9
2.3	QC 3 SAVINGS GUARANTEE	12
2.4	QC 4 VERIFICATION OF ENERGY SAVINGS	15
2.5	QC 5 VALUE RETENTION AND MAINTENANCE.....	19
2.6	QC 6 COMMUNICATION BETWEEN THE EES PROVIDER AND THE CLIENT	22
2.7	QC 7 COMPLIANCE WITH OF USERS' COMFORT REQUIREMENTS.....	25
2.8	QC 8 INFORMATION AND MOTIVATION OF USERS	28
2.9	QC 9 COMPREHENSIBLE CONTRACTUAL STIPULATIONS FOR THE CONTRACTING OF SPECIFIC REGULATORY REQUIREMENTS	30

1 INTRODUCTION

The **GUIDELINES OF EUROPEAN TECHNICAL QUALITY CRITERIA** are targeted at public and private clients, all sizes of energy service providers, financial institutions, procurement staff and policy makers. They aim to respond to the **urgent market need for standardisation of energy efficiency services**. The criteria and information that have been developed form the basis for certification of energy efficiency services and represent a major step towards European standardisation of energy efficiency services.

The guidelines define and operationalize technical, economic, communicational, and other criteria, which allow a comprehensive set of quality criteria to be applicable in quality assurance and certification schemes. Assessment criteria are introduced as well as evidence and verification processes. The criteria set is partly based on “preliminary quality criteria for energy efficiency services” developed for the Austrian market within the *Transparens* project.

This version represents draft guidelines that will undergo a comprehensive feedback process until the end of the year 2018. Feedback will be obtained at a series of **European discussion workshops**. The draft guidelines are also available online at qualitee.eu for comments.

2 THE QUALITY CRITERIA

2.1 QC 1 Adequate analysis

Background and significance

The analysis of an energy-consuming unit (building, industrial establishment, facility etc.) with respect to possible energy-savings including the identification of possible energy efficiency improvement (EEI) measures is often the first step in an EES. The quality of analysis will thus, also have an enormous impact on the overall quality of EES.

The adequacy of the analysis depends on the precise prerequisites for the execution of such analysis:

If, for an object (property, industrial establishment etc.), there is no (currently valid) analysis at all, there will be a need for a high level analysis, in which all relevant energy-flows are analyzed, from which proposals for action are derived and assessed with respect to their economic, environmental and organizational impacts. As a fundamental objective, the goal of identifying all relevant economically viable EEI measures will be pursued.

If a recent high level analysis is already available, that covers all relevant energy-flows, it may be reasonable to perform a special analysis for selected works.


The determination of quality criteria for the analysis is based on the standard EN 16247-1, which represents a good assessment template.

Assessment criteria and verification process

The assessment criteria and verification process are described in table 1.

Table 1 Assessment criteria and verification process for QC 1 Adequate analysis

AC	Assessment Criterion	Proof	Assessment	Comment
1-1	Agreement on the process of energy analysis pursuant to EN 16247-1	<p>The following components of the analysis process must be implemented:</p> <p>(1) Introductory contact (covering at least; targets, area of application, thoroughness, time-frame, criteria, availability of data)</p> <p>(2) Opening consultation (covering at least; stipulation of responsible persons at the client organisation, clarification of access, data protection, confidentiality)</p> <p>(2a) Definition of the scope of services and design and the framework conditions</p> <p>(3) Identification of existing data and data collection methods</p> <p>(4) On-site visit</p> <p>(5) Analysis (covering at least; breakdown of energy consumption, temporal progression, adaptation factors)</p> <p>(6) Reporting format</p> <p>(7) Final consultation (covering at least; presentation of report)</p>	<p><u>ex-ante</u>: Was the analysis agreed in accordance with the standard?</p> <p><u>ex-post</u>: Documentation of the process in the analysis report?</p> <p>Pursuant to the standard, however, the process must be</p> <p>(1) adequate, (2) complete, (3) representative, (4) traceable, (5) expedient and (6) verifiable</p>	<p>Should a specific component of service not be adequate, reasons shall be provided accordingly (e.g. the unfavorable cost-benefit-ratio of a specific component for a given project)</p> <p>All specifications shall be discussed with the client and agreed in writing.</p> <p>If there are country-specific standards on energy audits, they may be applied supplementary to EN 16247-1 (for example VDI 4602)</p>
1-2	Adequate data collection and analysis	<p>The following requirements must be met:</p> <p>(1) All relevant energy consuming areas shall be captured</p> <p>(2) Data analysed and presented as load</p>	<p><u>ex-ante</u>: Has compliance with the requirements stated in the 'proof' column been agreed?</p> <p><u>ex-post</u>: Actual compliance with</p>	<p>If specific energy-consuming areas are not analyzed, reasons shall be furnished accordingly (e.g. negligible share of overall energy</p>

		<p>profiles (development of energy consumption/energy input over time)</p> <p>(3) Specification of target values relevant for energy consuming areas and other parameters (e.g. comfort, light levels, etc.)</p> <p>(4) Energy consumption benchmarks shall be specified for all relevant energy consuming areas</p> <p>(5) Interdependencies must be duly taken into consideration.</p> <p>(6) Factors influencing energy consumption (such as whether conditions, usage patterns, output volumes etc.) shall be defined, approved by the client and worked into the baseline</p>	<p>the requirements stated in the 'proof' column in the analysis report?</p>	<p>consumption).</p> <p>Itemized list of adjustment factors and times including the assignment of the types of trade and building.</p>
1-3	Adequacy of the derivation of recommended energy efficiency improvement (EEI) measures	<p>The minimum criteria of Annex III of the Energy Efficiency Directive (2012/27/EU) shall be met.</p> <p>(a) Recommended actions to be ranked on the basis of their energy saving potential and economic feasibility (ROI).</p> <p>(b) Recommended actions to be based on dynamic methods of calculation with due consideration for the life cycle of an action (including consideration of residual values)</p> <p>(c) The basis of calculation for the economic feasibility analysis shall be agreed with the client and documented transparently (e.g.</p>	<p><u>ex-ante</u>: Has compliance with the requirements stated in the 'proof' column been agreed?</p> <p><u>ex-post</u>: Actual compliance with the requirements stated in the 'proof' column in the analysis report?</p> <p>In the process, the following shall be checked for the individual EEI measures proposed:</p> <ul style="list-style-type: none">  proportionality of the energy savings from proposed EEI measures related to the 	<p>If a sensitivity analysis is contractually obligated, the determinant parameters of the sensitivity analysis shall be agreed with the client.</p>

		<p>calculated interest rate, projections of price increases).</p> <p>(d) Implementation of sensitivity analysis for the determinant parameters.</p> <p>(e) Comparison of the available systems with the most efficient facilities in the market</p> <p>(f) Assessment of availability of financial support through public programmes</p>	<p>overall amount of energy consumption</p> <ul style="list-style-type: none"> ✔ representativeness, if the assessment of measures is extrapolated similar projects ✔ realistic assumptions in assessment of recommended measures 	
--	--	--	---	--

2.2 QC 2 Quality of implementation of technical energy efficiency improvement measures

Background and significance

In many cases, the rendering of an EES is connected with the implementation of technical measures. A broad spectrum of quality standards can be met in practice while rendering services in this respect. QC 2, therefore, stipulates a range of quality standards that must be complied with when implementing technical measures. In the process, compliance with such standards that regulate the implementation of technical measures is of paramount importance. Moreover, it must be ensured that the operator of the facility will be in a position to operate the newly installed facilities after the end of the project.

Assessment criteria and verification process

The assessment criteria and verification process are described in table 2.

Table 2 Quality of implementation of technical energy efficiency improvement measures

AC	Assessment criterion	Proof	Verification	Comment
2-1	Performance of services in accordance with applicable standards, statutes and official permits	<p>Compliance with technical standards relevant for the implementation of technical measures, covering among others the following topics:</p> <ul style="list-style-type: none"> ✔ General provisions for construction services ✔ Individual technical standards for those technical systems that are improved by the EES ✔ Compliance with official permits that are relevant for the rendering of EES 	<p><u>ex-ante:</u> (a) Does the Contract commit the EES provider to comply with the standards stated in the 'proof' column, with official permits and statutory conditions applicable to the object? (b) Does the Contract commit the EES provider to verify the official permits applicable to the object with respect to their relevance to the EES to be rendered?</p> <p><u>ex-post:</u> Were the standards, statutory conditions and official permits complied with while rendering the services?</p>	A complete, exhaustive list of standards to be complied with cannot be compiled here due to the heterogeneity of EES. Furthermore, country-specific technical standards must be applied.
2-2	On-schedule delivery	<p>Stipulation of schedules for the implementation of technical measures, together with the client</p> <p>Compliance with the stipulated schedules</p> <p>Processes for the adjustment of schedules shall be clarified with the client and contractually agreed</p>	<p><u>ex-ante:</u> Does the Contract contain either a fixed schedule or a process that defines how the service provider will consult and agree schedules with the client?</p> <p><u>ex-post:</u> Were agreed schedules complied with during technical implementation?</p>	
2-3	Commissioning of services and documentation of	Availability of the respective approaches and tools for the	<u>ex-ante:</u> Does the Contract contain a commitment to apply the respective	

	services rendered	commissioning of services (e.g. records of acceptance)	<p>approaches and tools for the commissioning of services?</p> <p><u>ex-post:</u> Were the agreed tools and approaches applied in practice?</p>	
2-4	Induction of users or operating personnel	Availability of and compliance with induction standards	<p><u>ex-ante:</u> Does the Contract contain a plan for the induction of users?</p> <p><u>ex-post:</u> Was the agreed plan complied with?</p>	
2-5	Ensuring the functionality of newly installed facilities after the end of the Contract	<p>The following actions shall be taken:</p> <ul style="list-style-type: none"> ✔ Disclosure of maintenance requirements and agreements between the EES provider and the client regarding the execution of maintenance ✔ Commitment to the availability of spare parts and the required software over a fixed minimum period of time ✔ Stipulation of warranty periods and contacts in warranty cases. 	<p><u>ex-ante:</u> Does the Contract contain the regulations stated in the 'proof' column?</p> <p><u>ex-post:</u> Were the agreed regulations complied with?</p>	<p>In practice, the availability of software has proven to be critical after the end of the Contract. A minimum period of steady maintenance should relate to the payback period of the action (e.g. at least, twice as long).</p>

2.3 QC 3 Savings guarantee

Background and significance

Some EES come with the promise that savings of a specific size will be realized. Such promises – routinely known as savings guarantee – must meet specific requirements for them to truly be beneficial to the client.

Typically, two different types of saving guarantees are offered:

Saving guarantee type 1 (“Guaranteed Savings”): The reduction of remuneration must be, at least, commensurate with the level of the non-attainment of a guarantee promise. This is the usual saving guarantee in an energy performance contract.

Saving guarantee type 2 (“Shared Savings”): The achieved savings will be shared between the energy efficiency service provider and the client in a specific proportion. Frequently this type of Contract is called “shared-savings contract”.

If the guarantee is limited only to the agreement of a certain energy price – as this is the case for energy supply contracting – the quality criterion on savings guarantee will not be applicable.

Assessment criterion and verification process

The assessment criteria and verification process are described in table 3.

Table 3 Assessment criteria and verification process for QC 3 Savings guarantee

AC	Assessment criterion	Proof	Verification	Comment
3-1	Dependency of remuneration on adherence with the savings guarantee	<p>Saving guarantee type 1: The reduction of remuneration must be, at least, commensurate with the level of the non-attainment of a guaranteed energy savings.</p> <p>Saving guarantee type 2: The achieved savings will be shared between the EE service-provider and the client in a specific proportion.</p>	On the basis of contractual terms that relate to the guarantee of energy savings	Both types will lead to a differentiation with regards to the quality of the guarantee promise: In general, type 1 is preferable to clients, because the maximum level of payment is known up front. Under certain conditions (e.g. unfeasible conditions for M&V), however, type 1 saving guarantees are difficult to implement, or even not preferred by the client.
3-2	Guaranteed savings achieved (only applicable to saving guarantee type 1)	<p>Achieved savings are not lower than guaranteed savings.</p> <p>The following levels of deviations are applicable:</p> <ul style="list-style-type: none"> ✔ Minor deviation: achieved savings are lower than 100% of guaranteed savings and higher or equal to 95% ✔ Serious deviation: achieved savings are lower than 95% of guaranteed savings and 	<p>The verification of this criterion can be done only ex-post:</p> <p>Compare the amount of achieved savings stated in the M&V report with the guaranteed savings stated in the Contract.</p>	This criterion can be applied only to type 1 saving guarantees.

		<p>higher or equal to 80%</p> <p>✘ Unacceptable deviation: achieved savings are lower than 80% of guaranteed savings</p>		
3-3	Adequate intervals for the verification of compliance with guarantee promise	Verification of fulfilment of guarantee at least once each year.	<p><u>ex-ante</u>: On the basis of the contractual terms</p> <p><u>ex-post</u>: Were the agreed intervals complied with?</p>	In extraordinary cases there exists a specific type of contract where the compliance with saving guarantees is verified during or immediately after the trial period – usually connected with a full repayment of all the investment after initial verification of energy savings.

2.4 QC 4 Verification of energy savings

Background and significance

The identification and/or implementation of energy savings is at the center of EES. For this reason, the quality of an EES is also determined by the way that energy savings are verified. Energy savings cannot be measured directly but are always calculated. In simple terms, three approaches are differentiated:

1. Verification based on measured energy consumption: Even in places where measurement equipment is available for the purpose of recording energy consumption, energy saving is determined through the comparison of the current value with a reference consumption (frequently called a “baseline”). At the same time, factors impacting energy consumption that are not caused by EES must be “filtered out” (often referred to as an “adjustment process” e.g. for the impact of variations in weather conditions);
2. Engineering calculation of energy-savings: Usage of complex methods of calculation and simulation largely based on standards;
3. Expert estimation: Derivation from savings realized from similar and comparable cases.

On one hand, the adequacy of a verification process depends on the characteristics of EES implemented and on the other hand, also on the environment, in which the EES is implemented. For those EES that include saving guarantees (such as energy performance contracting or operational contracting) approach one (Verification based on measured energy consumptions) should be applied.

To develop an adequate method of determining energy-savings, two leading standards are available:

- ✔ IPMVP (International Performance Measurement and Verification Protocol)
- ✔ ISO 50015:2014 (Energy management systems -- Measurement and verification of energy performance of organizations -- General principles and guidance)

Assessment criteria and verification process

The assessment criteria and verification process are described in table 4.

Table 4 Assessment criteria and verification process for QC 4 Verification of energy savings

AC	Assessment criterion	Proof	Verification	Comment
4-1	Application of a standardized method for the calculation of energy-savings	<p>Application of one of the two standardized methods:</p> <ul style="list-style-type: none"> ✔ IPMVP ✔ ISO 50015:2014 	<p><u>ex-ante</u>: Is the application of the selected standards stipulated in the Contract? Is it stipulated precisely which of the approaches specified in the standards should be adopted?</p> <p><u>ex-post</u>: Was verification of the energy saving carried out in accordance with the stipulated approach?</p>	<p>Since IPMVP and ISO 50015 only offer a methodic framework, it is recommended to detail the specific method of verification for the EES in question, as well as the timing of M&V activities, specification of calculation algorithms, and M&V responsibilities. (e.g. agreement of a project specific M&V Plan as an appendix to the EES contract)</p>
4-2	Selection of the most appropriate approach to the verification of energy savings	<p>Justification for the selection of M&V approaches. Presentation of the benefits and limitations of the selected approach as compared with possible alternatives. Agreement between service provider and client.</p>	<p>Availability of such justification at the time of concluding the Contract (ex-ante)</p>	<p>Approaches based on measurement methods are more robust (in the context of verifying delivered savings) than engineering calculations and these in turn are more robust than estimations made by experts. Should one choose less robust methods, reasons shall be furnished accordingly. Permissible reasons are:</p> <ul style="list-style-type: none"> ✔ Impossibility of application; no measurement values are available; too complicated method of adjustment; ✔ measurement approach not sufficiently accurate

				<ul style="list-style-type: none"> Costs of the approach are relatively large when compared with the energy savings expected <p>The justification has to be made available to the client of an EES before the conclusion of a Contract.</p>
4-3	Clear definition of the baseline (reference consumption)	Determination of a baseline based on a separate assessment of baseline data	<p><u>ex-ante</u>: Is the baseline, against which energy savings will be verified, defined, justified and agreed between contracting parties?</p> <p><u>ex-post</u>: Has the agreed baseline been used for the verification of energy savings?</p>	The baseline needs to be defined before the EES project is started. This is particularly important for those projects where verification is based on measured energy consumption. But also for projects, where an engineering calculation or expert estimation of energy savings is justified (considering AC 4-2), the baseline needs to be defined and agreed ex-ante.
4-4	Clear definition of the basis of adjustment of the energy savings calculation	<p>Determination of a clearly defined adjustment methodology including:</p> <ul style="list-style-type: none"> transparent assessment of factors affecting energy consumption 	<p><u>ex-ante</u>: Is a specific adjustment methodology agreed between contracting parties? Has an evaluation been carried out that demonstrates that influencing factors are adequately accounted for, and based on historic data, in the agreed adjustment methodology? Has the accuracy of the proposed methodology been evaluated against the expected size of savings, and is the error small in</p>	<p>Adjustment of measured energy data is needed to “filter out” those influencing factors on energy consumption that are not resulting from the EES provided (mainly weather and usage conditions).</p> <p>The use of specific adjustment equations must be justified through analysis of historic data (e.g. Is the share of weather-independent heat consumption justified based on an adequate assessment of historic</p>

		<ul style="list-style-type: none"> ✔ presentation of specific adjustment equations ✔ specification of required data and information ✔ evaluation of accuracy of proposed methodology compared to the magnitude of savings 	<p>comparison.</p> <p><u>ex-post</u>: Savings verification carried out in accordance with specific methodologies. Documentation of all evidence for adjustment process and agreement between parties for any adjustments not stipulated in the adjustment methodology and equations (non-routine events)</p>	<p>consumption patterns? This is often achieved using regression analysis).</p> <p>Energy savings verification based on engineering calculation or expert estimation usually do not require adjustment.</p> <p>With respect to accuracy of the proposed methodology it is required that the error in the method should be small in comparison to the size of the savings to be measured.</p>
4-5	Transparency and agreement of M&V processes and related responsibilities	Agreement of a procedure for the implementation of M&V ("M&V processes")	<p><u>ex-ante</u>: Documentation or sign off that demonstrates that the client has understood the verification approach and related responsibilities</p> <p><u>ex-post</u>: M&V has been implemented in accordance with the agreed M&V processes; decisions and agreements between contractual parties relating to M&V are documented and signed-off</p>	M&V is not just related to the calculation of energy savings but refers also to the fulfilment of defined procedures and responsibilities.

2.5 QC 5 Value retention and maintenance

Background and significance

Some EES also cover services relating to the maintenance and repairs of newly installed or existing facilities. Quality of these services has a direct influence on the availability of the (energy) system and retention of its value. As these factors ensure desired benefits and long-term sustainability of projects beyond the contract duration, they also influence the overall quality of the EES.

Assessment criterion and verification process

The assessment criteria and verification process are described in table 5.

Table 5 Assessment criteria and verification process for QC 5 Value retention and maintenance

AC	Assessment criterion	Proof	Assessment	Comment
5-1	Compliance with the required system availability	Recording of operating times and downtimes Specification of system availability for highly sensitive areas: at least 96%	<u>ex-ante</u> : Obligation in the Contract <u>ex-post</u> : Submission of records differentiating between critical and non-critical failures	It makes little sense to mandate a general period of availability for less sensitive areas. For less sensitive areas this quality criterion, therefore, relates to the rectification of issues and the recording of the actual operative sequences experienced.
5-2	Rapid troubleshooting in case of malfunctions of technical systems	Registration of fault within 30 minutes of occurrence or reporting of the fault Correction of fault within a maximum period of 24 hours, or within 4 hours of regular working hours on average Saving fault records that should be reconciled with the client at least once each year.	<u>ex-ante</u> : Obligation in the Contract <u>ex-post</u> : Submission of fault records	The requirements are usual specifications in maintenance agreements.
5-3	Functionality of facility at the end of the Contract	The following actions must be continually performed in accordance with relevant standards a) Control of maintenance schedules and their execution b) Control of replaced system parts with respect to quality (State of the art)	<u>ex-ante</u> : Obligation in the Contract <u>ex-post</u> : Submission of the documents that are created as a results of the actions stated in the 'proof' column.	VDMA 24186 (Maintenance of technical building systems, Parts 0 to 7) is one example of a pre-defined standard on proper maintenance of building systems. It describes the service program for the maintenance of technical facilities and equipment in buildings.

		<p>and cost consideration through the term of the Contract</p> <p>c) List of defects, Correction of defects</p> <p>The following measures must be executed at the end of the Contract in accordance with relevant standards:</p> <p>d) Visual check, verification of function</p> <p>e) Verification of system test logs</p>		
5-4	Clear definition of responsibilities of the service provider with respect to maintenance and repair	Contractual stipulations that define the duties of the service provider with respect to maintenance and repair; illustration of interfaces in a system diagram and potentially through labeling of equipment on site.	Verification of contractual regulation	The precise services that the service-provider shall render and for which system parts shall be clearly defined. Otherwise misunderstandings between contractual parties may occur which will lead to reduced quality with respect to value retention and maintenance.

2.6 QC 6 Communication between the EES provider and the client

Background and significance

In addition to technical quality, the type and scope of communication between the EES provider and the client contributes to the quality of EES. EES providers assume only partial responsibilities from existing operating personnel. To avoid problems in the implementation of the EES the interfaces between contractual parties must be effectively managed through continuous and well-defined communication.

Assessment criteria and verification process

The assessment criteria and verification process are described in table 6.

Table 6 Assessment criteria and verification process for QC 6 Communication between the EES provider and the client

AC	Assessment criterion	Proof	Assessment	Comment
6-1	Disclosure of contact persons	Determination of contact persons in a document related to the Contract where respective tasks are described in detail Tracking in case of a change of contact persons or the scope of their tasks	<u>ex-ante</u> : Are contact persons and tasks written in a document related to the Contract? <u>ex-post</u> : Were changes to contact persons or their tasks recorded?	The place where contact persons and their roles are defined may be directly in the Contract or it may be a project manual. In case of a longer-lasting EES (e.g. contracting models), the communication of changes in the composition of the project team will be decisive.
6-2	Agreement on accessibility of data and data exchange (in both directions)	Contractual stipulations defining mutual access to data, which are important for project implementation Availability of an approach/tool, with which simple data exchange can be ensured	<u>ex-ante</u> : Is data access and exchange contractually agreed? Does the Contract foresee the application of a specific process or tool for data exchange? <u>ex-post</u> : Verification of satisfaction with data exchange; usage of the tool in practice	The technical options – such as energy monitoring systems or similar tools - are usually available. However, they are not always used in a target-oriented manner
6-3	Capturing and continual updating of all EEI measures taken by the EES provider	Availability of a tool that offers the option of capturing the measures in a clear and concise manner	<u>ex-ante</u> : Is the use of a tool for the capturing of the measures agreed between contractual parties <u>ex-post</u> : Additionally: Is the data entered in the tool up-to-date (take	It is important that the information on implemented EEI measures is also available directly on site – e.g. through a logbook

			random samples)	
6-4	Organisational measures for committing internal operating personnel	Stipulation of organizational measures that will facilitate the continuous exchange of information between the EES provider and the internal operating personnel (e.g. regular facility-based meetings), in adequate documents (e.g. project manual)	<p><u>ex-ante</u>: Is there a project manual (or any similar document), in which provisions are made for such organisational measures?</p> <p><u>ex-post</u>: Were the respective organisational measures implemented in practice?</p>	In addition to the collection of data and information in the adequate tools, direct communication between the EES provider and representatives of the client is necessary since this is the only channel through which uncertainties can be clarified in a rapid manner.

2.7 QC 7 Compliance with users' comfort requirements

Background and significance

The execution of EES shall not lead to any impediment on the comfort of the user. In this context, users' comfort requirements can be assessed either through physical parameters (temperature, air quality, luminous intensity, etc.) or captured by collecting feedback via a comfort survey tool.

Assessment criteria and verification process

The assessment criteria and verification process are described in table 7.

Table 7 Assessment criteria and verification process for QC 7 Maintenance of users' comfort

AC	Assessment criterion	Proof	Assessment	Comment
7-1	Definition of users' requirements (including regular review)	<p>As long as the respective parameters are affected by the EES, user requirements shall be verified and recorded:</p> <ul style="list-style-type: none"> ✔ Room temperature ✔ Humidity (only for special buildings such as laboratories, hospitals, etc.) ✔ Air exchange rate (or other indoor air quality parameters) ✔ Sound level (inside, outside) ✔ Illumination levels ✔ Water temperature (with due consideration of the issue of legionella) ✔ Disclosure of stipulated operating hours (covering also non-operating hours, holidays, vacations etc.) ✔ Reaction time during fault reports; Repair time during fault reports 	<p><u>ex-ante:</u> Is there a contractual regulation that covers the task of collecting users' requirements in the early phase of the project?</p> <p><u>ex-post:</u> Was the collection of users' requirements executed in practice and were they subjected regular review in the case of longer-term EES (every 2-3 years)?</p>	<p>Users' requirements are not always clearly defined. The collection and verification of users' requirements is therefore, a major component of every EES.</p> <p>The current comfort parameters are not always consistent with the real user requirements (e.g. in parts, there may be over- / under-supply).</p> <p>When determining users' requirements, it is also important to take into account existing standards, legal prescriptions (e.g. worker protection) and good practice.</p>
7-2	Regular verification of compliance with physical comfort parameters	<p>The following actions shall be implemented:</p> <ul style="list-style-type: none"> ✔ Regular evaluation of such comfort-related data points that are captured and saved in building automation 	<p><u>ex-ante:</u> Availability of contractual stipulations regarding verification of compliance with users' requirements and</p>	<p>Additional measurements should only be required where they can be performed at a reasonable cost.</p>

		<p>systems (at least once each year)</p> <ul style="list-style-type: none"> ✔ Additional measurements in cases, in which remarkable deficits in comfort are reported ✔ Corrective actions to ensure compliance with users' requirements 	<p>regarding corrective actions in case of non-compliance</p> <p><u>ex-post:</u> Execution of contractual stipulations in practice</p>	
7-3	Assessment of users' satisfaction	<p>One of the following two measures must be implemented:</p> <ul style="list-style-type: none"> ✔ Taking surveys of a statistically representative sample of users (at least once a year) ✔ Regular consultations with users (Contacts from all relevant usage zones, at least once each year) 	<p><u>ex-ante:</u> Availability of contractual stipulations regarding the process capturing users' satisfaction</p> <p><u>ex-post:</u> Execution of contractual stipulations in practice</p>	<p>In practice, taking surveys of users has recently become more streamlined because web-based solutions are already available and evaluation is also easier to standardize.</p> <p>It is recommended to assess users' satisfaction before the EES is implemented, so that any deficits in users' satisfaction can be related to the impact of the EES</p>

2.8 QC 8 Information and motivation of users

Background and significance

Since in most cases, users have a considerable impact on the energy consumption of an object and thus, also influence the success of EES, selected EES approaches entail actions for the information and motivation of users.

Taking into account the heterogeneity of user-information activities QC 8 contains just a “minimum package”. In real EES projects, however, it may be advisable to extend user-information activities beyond the minimum requirements as included in QC 8.

Assessment criteria and verification process

The assessment criteria and verification process are described in table 8.

Table 8 Assessment criteria and verification process for QC 8 Information and motivation of users

AC	Assessment criterion	Proof	Assessment	Comment
8-1	Development of a concept for the motivation of users	Availability of a concept that clearly differentiates between the different groups of users. In differentiating user groups, it is important to take into account different possibilities for intervention, different interests, different duties with respect to the operation of an object, etc.	Verification of concept	The relevant groups of users vary depending on the object; for hospitals, they are e.g.: <ul style="list-style-type: none"> ✔ Facility management staff ✔ Clinical staff ✔ Visitors ✔ Users (e.g. patients)
8-2	Establishment of a suggestion scheme for clients to improve energy efficiency	Availability of a suggestion scheme to facilitate the transmission of users' proposals to the EES. Availability of a feedback process to the user	<u>ex-ante:</u> Is there an obligation for the EES provider to establish a suggestion scheme and are there procedures for processing such suggestions? <u>ex-post:</u> Was the suggestion scheme truly established and used?	Documentation of the feedback process to the user in the form of an easily accessible tool (Suggestion, resultant action)
8-3	Provision of action-oriented information on the subject of energy efficiency	Availability of information on specific energy saving actions that can be implemented by different target groups	<u>ex-ante:</u> Is there an obligation for the EES provider to provide action-oriented information? <u>ex-post:</u> Evidence of implementation during the term of the project.	It is compulsory to make the information accessible through an effective information medium and/or information dissemination activities (e.g. training or seminars).

2.9 QC 9 Comprehensible contractual stipulations for the definition of specific regulatory requirements

Background and significance

Several years of experience in contracting projects, have shown that their quality is not just of a technical and communicative nature but that the shaping of the Contract also contributes decisively to the quality of a project. The Contract must contain regulations for individual issues that will repeatedly lead to problems in practice, if they were not regulated. In the process, it is less important *how* such issues are regulated than the fact *that* they are regulated. At the center of it all, are precisely the following issues, whose regulation is considered in separate quality criteria:

- ✔ Ownership transfer
- ✔ Handling of energy price risk
- ✔ Insurances
- ✔ Exit regulations
- ✔ Legal succession
- ✔ Unhindered access right and right of access
- ✔ Permissibility of different types of financing
- ✔ Regulation on intellectual property rights

Many examples of solutions for regulating such issues can be found, amongst others, in various documents elaborated in European as well as in international projects and programmes¹.

Assessment criteria and verification process

The assessment criteria and verification process are described in table 9.

¹ To mention a few of these programmes and projects: IEA Task 16 on Innovative Energy Services (<http://www.ieadsm.org/task/task-16-innovative-energy-services-energy-contracting-esco-services/>); EPC+-project (http://epcplus.org/upload/ue/wp4/D4_05_english.pdf); TRUST EPC South project: internal guidelines; The Transparens project: D3.1 Energy Performance Contracting Manual; EPC Contract Guidance Note of the UK Department of Energy & Climate Change: <https://www.gov.uk/government/publications/energy-performance-contract-epc>

Table 9 Assessment criteria and verification process for QC 9 Comprehensible contractual stipulations for the definition of specific regulatory requirements

AC	Assessment criterion	Proof	Comment / Example clause for a contractual stipulation
9-1	Ownership transfer	Availability of a contractual regulation in conformity with statutory provisions	<i>“Once the Contract is concluded, the CLIENT will have the option to acquire the equipment in property for a residual value detailed in point (___) of section (___) of this contract, provided the terms of the contract have been fulfilled and all payments have been made.”</i>
9-2	Handling of energy price risk	Availability of a contractual regulation in conformity with statutory provisions	<i>“The economic savings will be calculated for each of the liquidation periods (every (___) months), based on the energy savings verified, multiplied by the average invoice price of electricity (or other kind of energy) in the year for the installation subject of reference. If the average price has changed from the previous year above (___) or below (___), the values of (___) and (___) of the reference price of the previous year will be taken for the calculation of the Economic saving.”</i>
9-3	Insurances	Availability of a contractual regulation in conformity with statutory provisions	Although insurances to cover risks of a project are not always signed, this assessment criterion makes sense because it is becoming increasingly common to include products with extended warranties up to 5 years.
9-4	Exit regulations	Availability of a contractual regulation in conformity with statutory provisions	<i>“The contract will have a duration of (___) and may be terminated upon prior notice by either party, in advance of (___) with no need to plead any cause. In case the contract is terminated by the CLIENT before half the duration of the contract has elapsed, the CLIENT shall pay to (___) (___) of the outstanding amounts, estimated from the settlements made until the date. If half of the duration of the contract has already elapsed and the CLIENT terminates the contract before its completion, the CLIENT must pay to (___) (___) of the outstanding amounts, estimated from the settlements made to date.”</i>

9-5	Legal succession	Availability of a contractual regulation in conformity with statutory provisions	<i>"(____) may assign all of the rights and obligations arising from this contract to a third party without the prior consent of the CLIENT, provided that the conditions of the same are maintained unchanged. (____) shall inform the (CLIENT) duly and in writing about the rights and obligations transfer."</i>
9-6	Unhindered access rights and right of access	Availability of a contractual regulation in conformity with statutory provisions	<i>"The CLIENT will allow (____) personnel to access the facilities whenever necessary for reasons of maintenance and control of the service, installation or performance in the equipment."</i>
9-7	Permissibility of different types of financing (Cession, Leasing, Forfeiting)	Availability of a contractual regulation in conformity with statutory provisions	It is advisable to include an assessment criterion which specifies the different financing methods that may be incurred, since some of these methods may have direct influence on the client.
9-8	Regulation on intellectual property rights	Availability of a contractual regulation in conformity with statutory provisions	<i>"All information exchanged between the parties is the exclusive property of the party which supplied it. The exchange of information does not imply the assignment or transfer of any right of use or disposition to the other party. Neither party will use the information provided by the other party as its own unless expressly authorized in writing. The use of such information is restricted for the proper development of this service."</i>

