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INCREASING TRANSPARENCY OF ENERGY SERVICE MARKETS

EU Summary Report of Code of Conduct Application in EPC Pilot Projects

Co-funded by the Intelligent Energy Europe Programme of the European Union

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Transparense project
This document has been conducted within the framework of project "Transparense – Increasing Transparency of Energy Service Markets" supported by the EU program "Intelligent Energy Europe"

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Date
July 2015

Place
Berlin

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List of Abbreviations

EED	Energy Efficiency Directive
ESM	Energy saving measures
EPC	Energy performance contracting
ESCO	Energy service company
ESC	Energy supply contracting
IPMVP	International performance measurement and verification protocol
M&V	Measurement and verification
O&M	operations and maintenance
RFP	request for proposal
TPF	third-party financing

1 Executive Summary

Within the framework of the project TRANSPARENSE, which receives support from the program IEE (Intelligent Energy Europe) of the European Union, the European Code of Conduct for EPC has been developed (hereinafter Code) for energy service providers (ESCOs) implementing EPC projects. The objective of the Code is to increase the transparency of the EPC markets and ensure the high quality of the energy services provided by the ESCO. By adhering to the EPC core values and principles of the Code of conduct, the ESCOs and customers develop a solid foundation for a working partnerships based on trust and confidence. They are expected to utilise the Code in order to further develop energy services to meet their goals and expectations which shall be evaluated at a later stage.

EPC clients, providers and facilitators are encouraged to the Code of conduct to ensure minimum quality level in EPC projects by either referring to the Code's values and principles in the tender procedure or directly in the contract.

This report presents the overall evaluation of the Code application in the pilot projects in 20 countries participating in Transparense. The major stakeholders (both client and ESCO side) in the pilot projects of the country have been interviewed / asked to supply relevant information. For this, detailed questionnaires have been used, which were the main data source for the "Country Reports on EPC Pilot Projects Evaluation and Feedback" prepared by the project partners. The country reports are the main information source for this EU Summary Report.

As the pilot projects assessed were in various different stages and due to time restrictions, the Code could not be tested through all 4 phases in any of the projects. Still the evaluation brings about some interesting findings:

The variety of sectors and customers applying EPC in Europe is very large. While municipal clients still are the majority, there are also some regions where clearly private customers are more active than public ones. Respectively, the project sizes and durations vary significantly, reaching from baseline sizes of less than 20 k€ up to more than 15 M€, with the average around 1 M€. The average project achieves primary energy savings of more than 8.500 MWh[1] per year, translating to greenhouse gas reductions of more than 1.850 tCO_2 per year and project.

[1] In this report, the authors are using Arabic numerals with decimal comma (as it is standard in the whole of Europe except UK and IE), not with decimal point.

The average duration of the first three project phases "Preparation", "Procurement" and "Implementation" is by average at 18,2 months, so that it takes bit more than 1 ½ years until all measures are installed and the savings phase can start. The average contract duration is at 10,4 years, with the shortest at 4 and the longest at 20 years. The savings guaranteed range between 6% and 70%, with an average savings rate of almost 38%, depending strongly on the type of project[2] and the availability of extra funding (co-financing). Projects without co-funding still achieved average savings of >30%.

Assessing the customers' satisfaction with the project and the ESCO though all project phases concerning the quality criteria as defined in the Code, the contentment is generally high to very high. The expectations were met fully or almost fully. Specific challenges, which may happen in almost any project, never questioned the general suitability of the EPC model or the qualification of the ESCO involved.

Both clients and ESCOs made good experiences with projects where professional facilitators supported the client in the process.

Still, EPC remains a challenge especially for the client side. The complexity of the concept and the baseline calculation are seen as the biggest challenges in the process.

The ESCOs naturally are more familiar with the concept of EPC. But they do see challenges in the complex communication with a large number of stakeholders.

Looking at the 9 principles defined in the Code, the survey showed a great degree of fulfilment of these quality criteria. The customers' expectations were met to a very large degree. Only the goal to apply energy management in the projects is not always implemented to 100%. The reasons for this, however, are manifold. In some cases, it was the client side who did not agree with specific energy management measures. This shows that the Code – next to defining quality standards – can also play a role in informing both sides about what must be regarded as good practice in an EPC project.

[2] Lighting EPC projects often achieve very high savings by switching to LED.

2 Introduction

2.1 European Code of Conduct for EPC

The European Code of Conduct for Energy Performance Contracting defines the basic values and principles that are considered fundamental for the successful preparation and implementation of EPC projects within European countries.

The Code of Conduct has been developed in 2014 within the Intelligent Energy Europe project Transparense in cooperation with inter alia EPC providers [3], clients and European ESCO associations. The two organisations representing ESCOs at the European level - European Association of Energy Service Companies (eu.ESCO) and European Federation of Intelligent Energy Efficiency Services (EFIEES) have endorsed the European Code of Conduct for EPC and support its use when implementing EPC projects.

Within this text, EPC provider means an energy service provider[1] who delivers energy service in the form of EPC. Client means any natural or legal person to whom an EPC provider delivers energy service in the form of EPC.

The objective behind the Code of Conduct is to help establishing a harmonized European quality standard for EPC projects. The aim is to raise potential clients' confidence in the EPC business model and thus lead to higher demand for the EPC projects.

The Code of Conduct is a voluntary commitment of the EPC providers and is not legally binding. Meanwhile, more than 100 European ESCOs and 11 national ESCO associations have signed the Code of Conduct. By signing the Code, they publicly commit to the values and principles defined in the document. Both EPC clients and providers are now encouraged to fill the Code with life by applying the criteria within in their future EPC projects.

2.2 Code Application in Pilot Projects

Voluntary agreements offer the chance to establish between market partners quality standards without taking the long route of defining an official and legally binding standard for a certain business model (e.g. through standardisation bodies). At the same time, a voluntary agreement usually does not have an extensive verification framework: There are normally no ways to enforce by legal action the criteria defined, since it is not a legally

[3] Within this text, EPC provider means an energy service provider who delivers energy service in the form of EPC. Client means any natural or legal person to whom an EPC provider delivers energy service in the form of EPC. The Energy Efficiency Directive (EED) defines "energy service provider" as a natural or legal person who delivers energy services or other energy efficiency improvement measures to a final customer's facility or premises. "Energy service company" (ESCO) is a synonym of "energy service provider".

binding document. The value provided is credibility and trustworthiness, which an ESCO then has to confirm by reliably and successfully implementing the projects.

There are different ways to use the Code of Conduct in an EPC project to agree (between client and ESCO) on and apply the defined principles at different stages. In the Transparense project, a total of 36 EPC pilot projects have been supported in the testing of the Code of Conduct. Within the 36 projects three different strategies have been used:

1. ESCO signs the Code of Conduct

This can be regarded as the lowest level of commitment, which entails a non-binding commitment of the ESCO towards its customers generally.

2. Client refers to Code of Conduct criteria in the tender dossier

Here, the Code principles are used by the client to make the ESCOs provide details on its EPC quality management. Important: In the tender dossier, the client may ask from the ESCOs to guarantee the quality levels as defined in the Code. The signing of the Code by the ESCO cannot be made mandatory, but the client may accept the signing of the Code as a proof that the requested quality criteria are commonly accepted.

3. Inclusion of the Code in the contract

Here, the Code and its criteria receive specific weight, as they become part of the legally binding document between client and ESCO. There are, however, still different ways how to integrate the Code in the contract: The Code and its standards can be mentioned or referred to in the contract preamble, making it rather part of the guiding spirit between the contracting parties. Or the criteria could be included in the terms of reference with the Code being made annex to the contract. This would allow for some level of suability concerning the Code criteria.

By accompanying the pilot projects and evaluating the project status with questionnaires among clients and ESCOs, the Transparense partners have assessed the implementation of the Code criteria in the pilot projects. The results of these surveys will be explained in detail in the following chapters.

2.3 Methodology

The methodology applied for the testing of the Code was to develop three questionnaires and to use them in interviews with both client and ESCO side to assess the quality levels of the different criteria. The following questionnaires have been applied:

a) Basic project information
b) Questionnaire for Clients

c) Questionnaire for ESCO

A general challenge was the fact, that in the duration of the Transparense project (2013-15) there was not sufficient time to 1st develop the Code and 2nd to apply it in pilot projects (which normally are implemented over many years) during the 30 months project time. Therefore, there is presently no project for which the Code has been tested through all stages. Instead, the projects accepted as pilot projects were allowed to be at different stages when testing the Code: Some still in the project development phase, others in the procurement phase and so called 'later stage projects' after the procurement phase. Within the later stage projects, it was not possible to adjust the tender dossier or contract, so the partners had to look for such projects which had these documents already in compliance with the principles of the Code.

Additional value of the Transparense project in these cases was to overlook the principles related to the stages after the procurement phase, namely the implementation and the savings phase. By including the 'later stage projects' it was possible to enhance the awareness and collect experience among EPC market actors to make the adherence to quality levels – even if the quality levels in place were already high – an issue and a requirement for EPC project implementation. Even if specific criteria are already being respected, it still makes a difference to make quality management an issue between client and ESCO.

3 Quantitative Analysis

Within the Transparense project, a total of 37 EPC pilot projects have been supported in the 20 partner countries in the application of the European Code of Conduct for EPC. Since generally EPC projects take 1-2 years for project development, procurement and implementation and then have a contract duration of typically 4-12 years, the pilot projects in Transparense have been accompanied within the 30 months duration of Transparense only through a certain part of the project lifecycle.

The 37 projects had completed or reached the following phases at the time of evaluation in June 2015:

I.	Project preparation and development	37 projects
II.	Procurement phase (after publication of tender notice)	25 projects
III.	Implementation phase (after signing the contract)	19 projects
IV.	Savings phase (after installation of measures)	8 projects

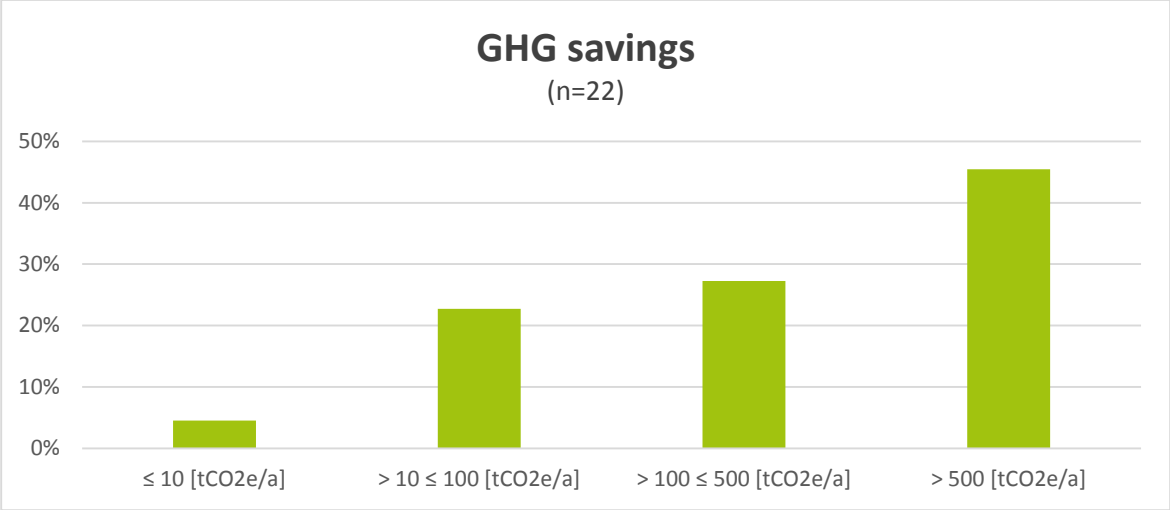
In the following evaluations, the number of projects assessed depends upon the following criteria:

- Project phase reached:
  Certain aspects can only be evaluated for projects having reached a certain phase or milestone (e.g. guaranteed savings are only known after contract signature)
- Data availability:
  Not all questions in the questionnaires have been answered consistently, resulting in varying numbers of projects covered with different questions
- Confidentiality:
  In some cases, a project evaluation was not possible due to confidentiality concerns on the side of the client or the ESCO

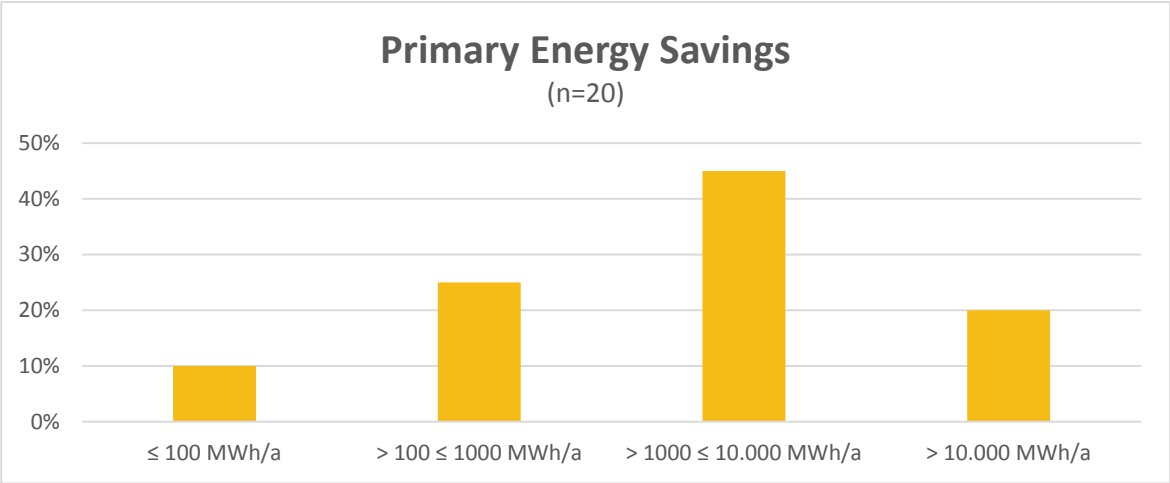
In all evaluation diagrams following, the number of questionnaires is being mentioned (e.g. n=25 means that 25 questionnaires have been assessed for the specific question)

3.1 Greenhouse Gas and Primary Energy savings

The evaluation of greenhouse gas (GHG) and primary energy savings was done for projects which had reached the milestone contract signature[4], based on the savings levels as guaranteed in the contract. It can, however, be stated, that the actually achieved savings are higher than the guaranteed savings in all pilot projects, which are already in the savings phase for at least one year.



For the calculation for GHG emissions, the CO_2-e emission factors as published by the Covenant of Mayors[5] have been used. The average GHG emissions saved per pilot project was 1.851 tCO_2e/a.



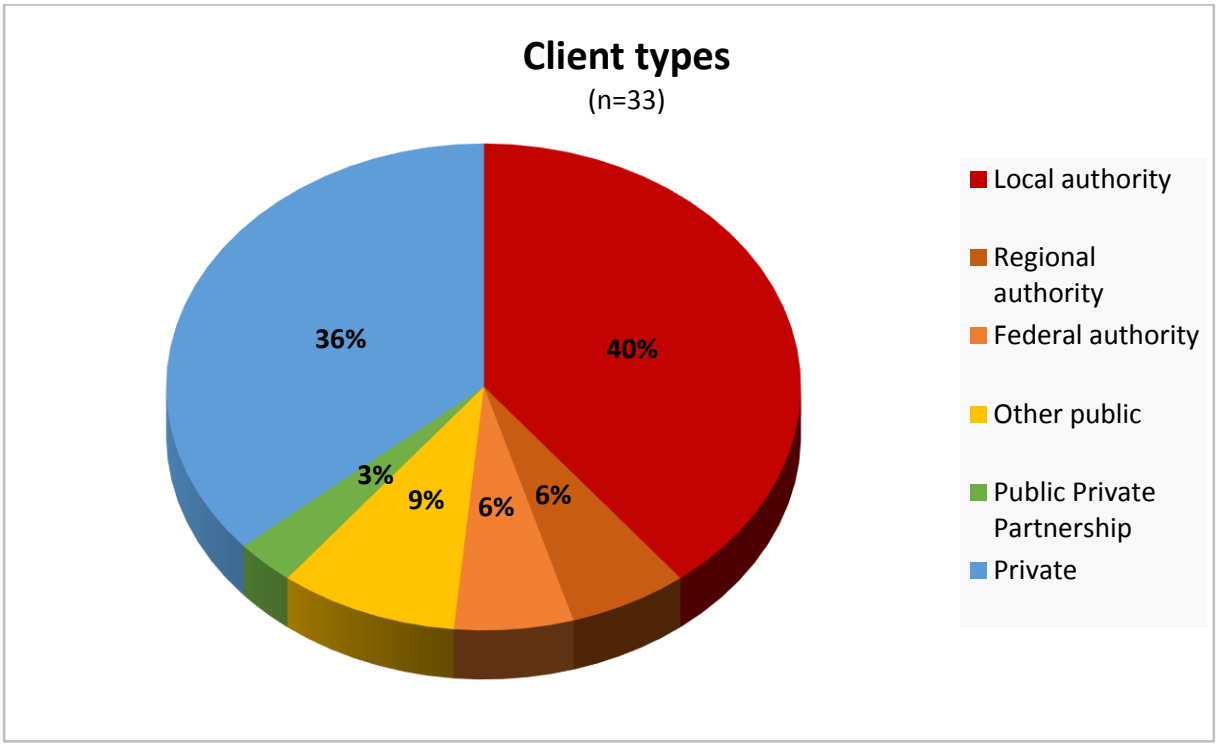
[4] Exception: In 4 lighting EPC projects, for which the contract was not yet signed, the expected savings have been calculated.

[5] http://www.eumayors.eu/IMG/pdf/technical_annex_en.pdf

For the primary energy savings, accepted primary energy factors from the respective countries have been applied. The average primary energy saved by a pilot projects was 8.536 MWh/a.

3.2 EPC clients and project types

The customer mix among the pilot projects assessed represents the typical picture of clients engaging in EPC in Europe currently. While >60% of the clients are from the public sector (with a very strong representation of municipalities with 40%), the remaining 39% comes from the private sector.



Project types

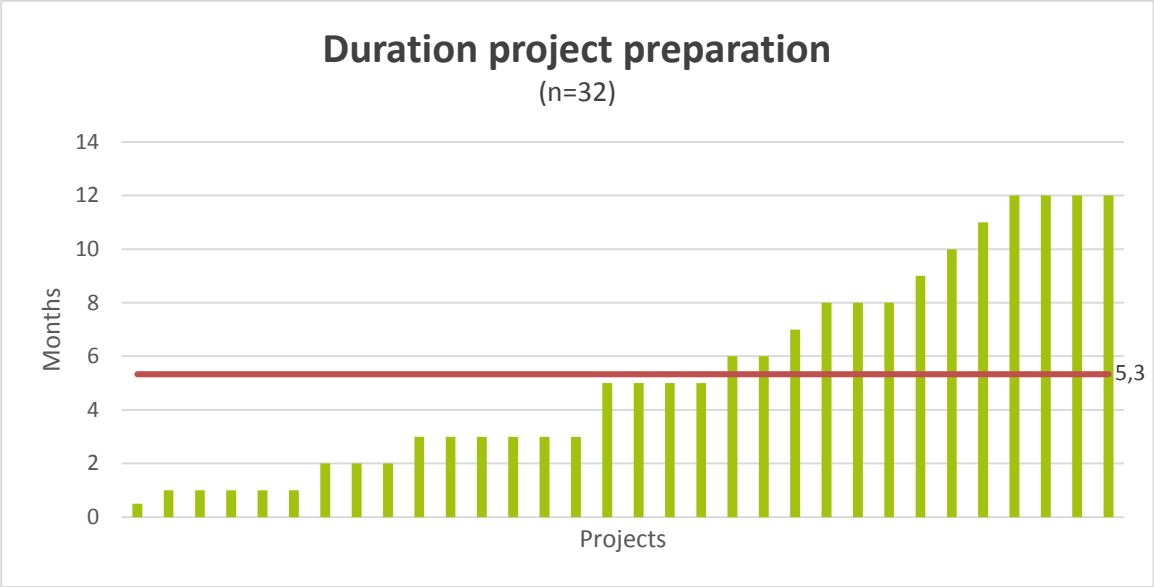
Among the 20 public sector projects, the most important buildings or areas addressed are schools (6 projects) and hospitals (4), while the remaining projects (10) are distributed among universities, administration buildings or street lighting.

The private sector projects represent a quite balanced mix between industry, tertiary sector and even residential housing projects.

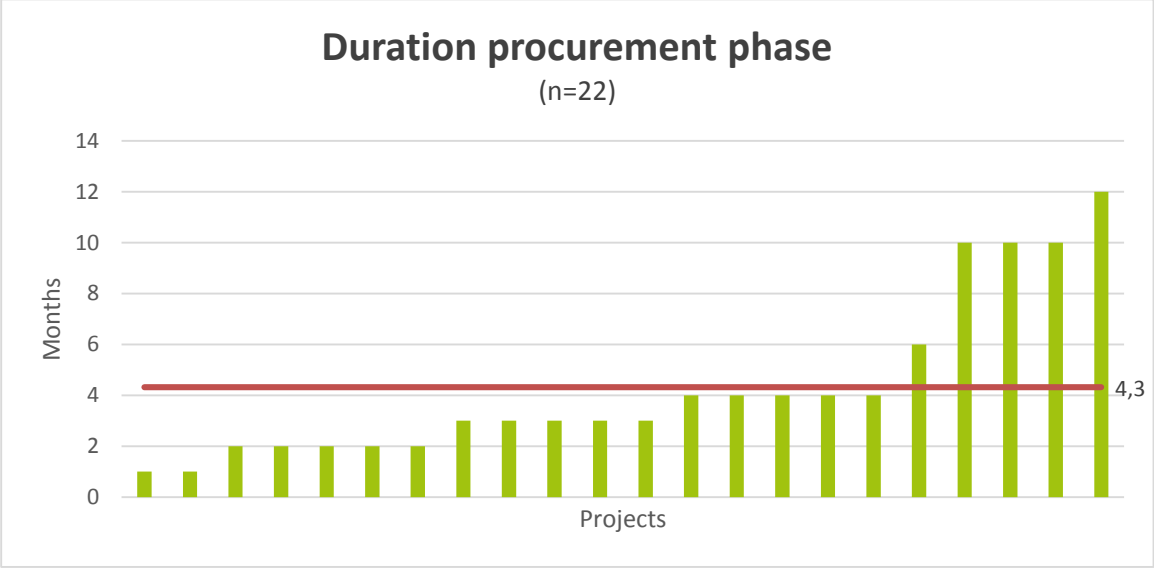
3.3 Project duration

The EPC project lifecycle is typically divided into 4 phases:

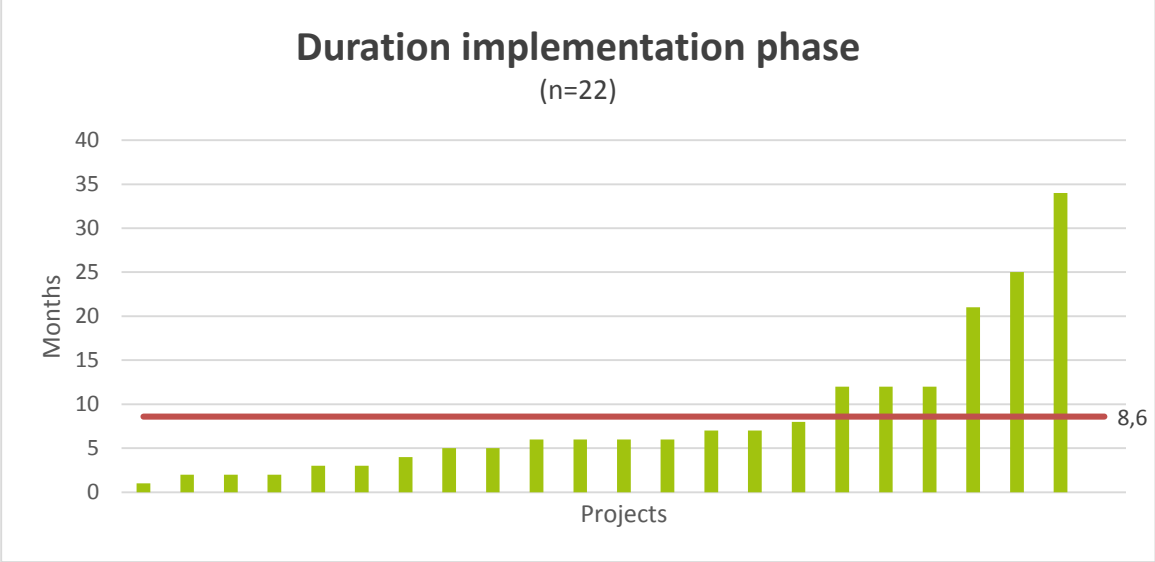
I. Project preparation and development
II. Procurement phase (after publication of tender notice)
III. Implementation phase (after signing the contract)
IV. Savings phase (after installation of measures)



By average, it took 5,3 months to prepare the EPC pilot projects supported in Transparense.



The average duration of the projects' procurement phase was 4,3 months.



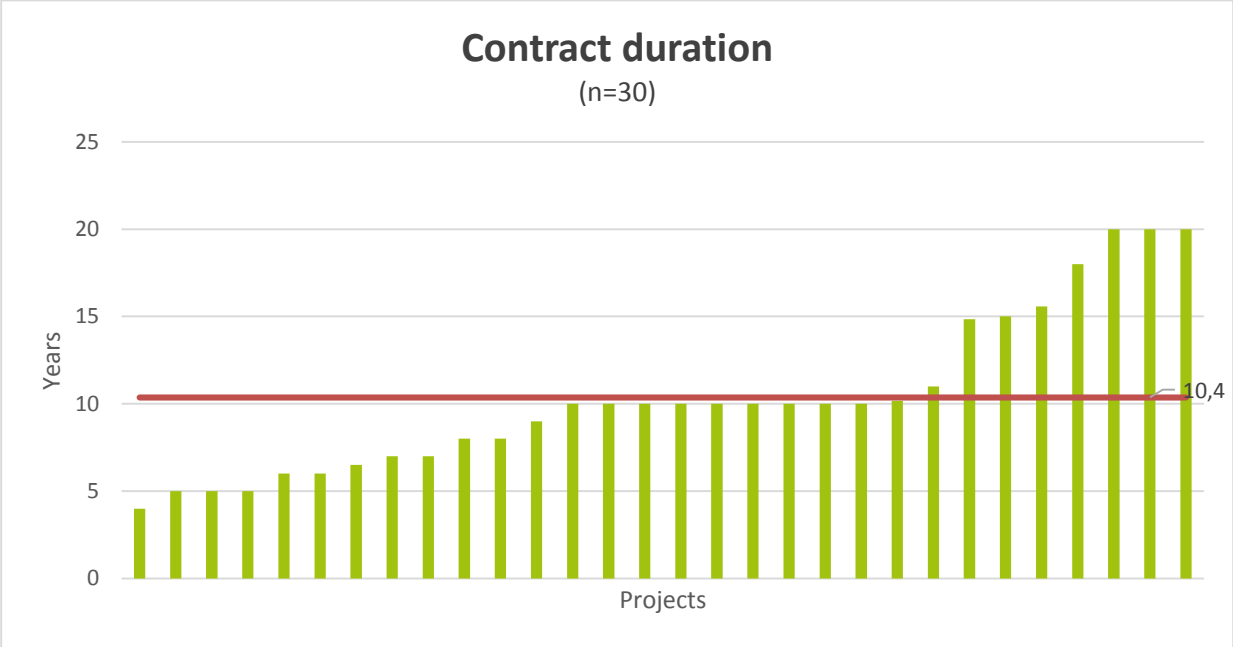
The implementation – meaning the installation of the energy saving measures – took 8,6 months in average.

By average the projects assessed needed a total of 18,2 months for the three project stages preparation, procurement and implementation. However, the graphs show that there is a large variety in the durations. Especially the implementation of measures strongly depends on the complexity of the chosen project. While in buildings with low complexity (e.g. schools) the installation of the energy saving measures is normally achieved within half a year, in more complex buildings (e.g. hospitals) or in building pools encompassing a large number of buildings, the time needed for installations can be considerably longer.

The effort to convince the building owner and the ESCO to apply and test the Code of Conduct was usually between 1 and 3 months. Only in a few exceptional cases, this process took longer. Sometimes the ESCO was addressed by the Transparense partner and convinced to apply the Code – e.g. in the Netherlands – but then they had to wait whether they win the project. This sometimes delayed the confirmation that the Code could really be tested.

At the time being, the Code of Conduct was still new and was neither well-known nor tested, which explains for some projects being more hesitant or cautious in applying this new instrument. Sometimes there was also the worry that a lot of additional administrative tasks would have to be fulfilled. On the side of the ESCOs, the support to the Code and the willingness to test it was generally high.

Contract duration



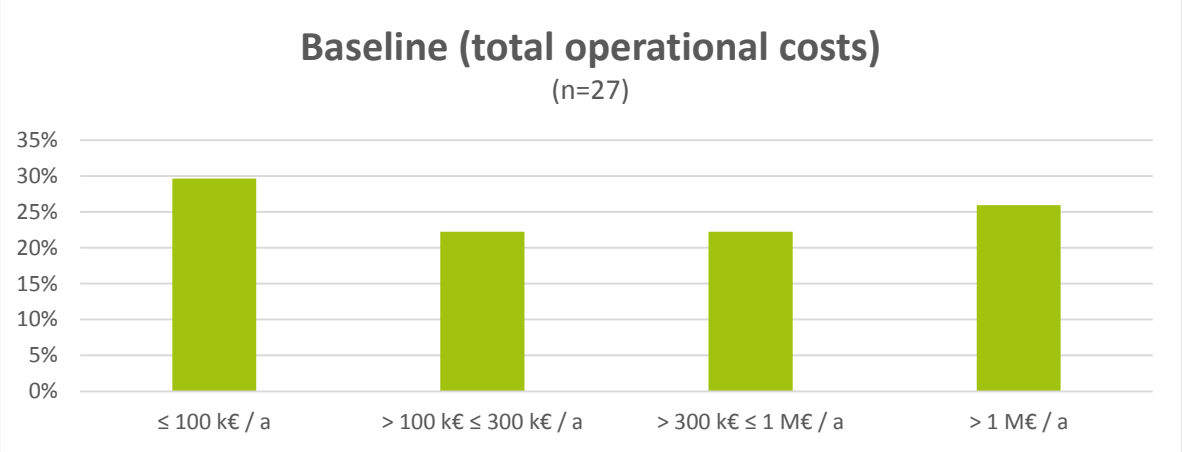
The duration of the EPC contracts (savings phase) of the pilot projects is mostly within the usual time frame of 4 to 15 years, with the average at 10,4 years duration. The private sector projects are within a range of 4 to 8 years of contract term, while the projects of public clients are all between 7 and 20 years.

3.4 Energy baseline, investments and guaranteed savings

Generally speaking, EPC projects require a certain minimum size to be economically viable. The main reason for this are the project's transaction costs (both on the side of the client and the EPC provider) which for the most part are independent of the project size. In order to receive a sufficient number of bids with attractive guaranteed savings, it is generally recommendable for clients to create larger projects, e.g. by pooling several buildings in one project.

Energy Baseline

The decisive parameter for describing an EPC project's size is the energy cost baseline. Normally, the baseline sums up the annual costs for all energy sources (e.g. electricity, natural gas, coal, heat, cooling) and is usually based on the utilities' annual invoices or on calculation and measurement. However, the baseline may also include the costs for e.g. water if water saving measures are being performed in the EPC. Furthermore, the costs (or estimations) of operation and maintenance costs can be included in the baseline as well.



Among the pilot projects documented, 52% have a baseline of up to 300k€/a, the remaining 48% being above 300 k€/a. The average baseline is at 1,38 M€.[6]

Savings: Expected and guaranteed

In Phase I (project preparation) the expected energy cost savings stated by the customer vary significantly. For 54% of the projects the customers expect 20% or more savings to be achieved.

[6] This average is so high mainly due to one very large hospital project with > 15 M€/a baseline. When excluding this project, the average baseline is at 843 k€/a.

As a result of the tendering process in Phase II the expected energy cost savings by the winning tenderer are obtained. The picture looks similar, and the ESCOs' savings estimated also exceed 20% for 54% of the projects.

At the end of the procurement phase, the energy cost savings are guaranteed by the ESCO in the contract. The graph shows, that the level of savings is now again higher than in the ESCOs' earlier expectations, with now 62% of the projects having 20% or more savings guaranteed.

Investment volume

The investment levels for energy saving measures in EPC projects strongly depend on the baseline and the size of the facilities, the measures foreseen, but also on the general EPC approach. While in standard EPC projects the investment volume is normally in the range of 0.5 to 2.0 times the annual energy baseline, there are also approaches ("EPC light") which focus on energy management activities which do not require any investments but still achieve savings of approximately 10%.

Among the Transparense pilot projects, the investment volumes are within the typical range compared to the projects energy cost baselines.

An important question in the context of the Code of Conduct application was whether the investments expected by the clients were met by the ESCOs. The graph depicts the customer expectations in Phase I (project preparation), compared to the offers of the winning ESCOs (Phase II) and the investment levels as guaranteed by the ESCO in the contract (Phase III):

It shows that the investments expected by the clients is very close to the level the ESCOs actually offer and also implement, with a slight tendency towards even higher investments.

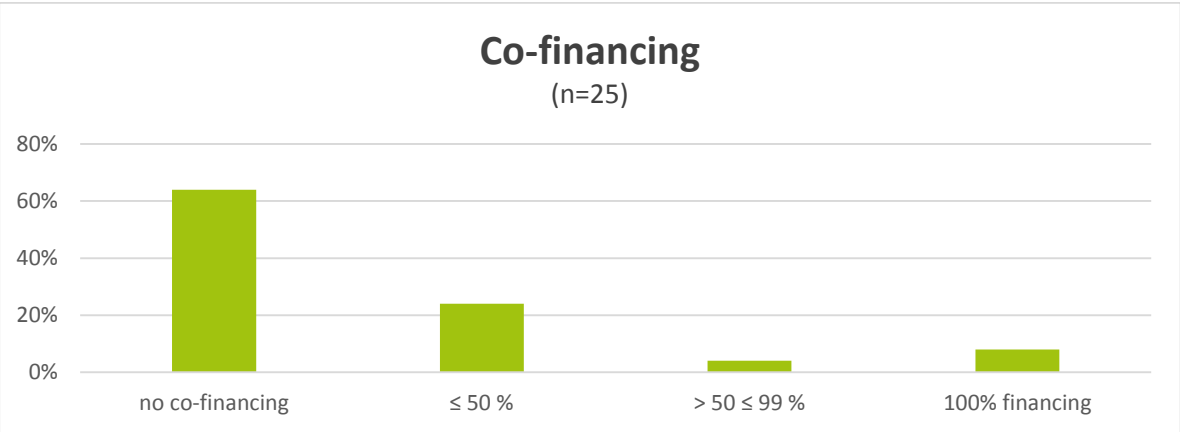
Asked whether the investments done are in line with the investment levels agreed upon in the contract, 69% of the clients confirmed that this was the case. But in 31% of the projects the actual total investment was different from the contractual. The reasons for this are different from project to project: In one case, the reduction in investment had political reasons and was reported to be accepted by all stakeholders without conflict. In another one the costs saved within a measure that turned out to be less expensive could be invested in additional measures. In a third project the costs significantly increased due to extra maintenance costs that were included in the contract in a contract revision.

Co-Financing

Another important question is: Who makes the investments? The standard EPC case in developed markets is the shared savings approach in which the ESCO finances all investments and the savings are shared between ESCO and client. Within the pilot projects assessed, this is the case for more than 64% of the projects.

Whenever the client wishes to include measures with a payback period longer than the contract term, and if cross-financing with other measures having a shorter payback period is not an option, this can be made possible through co-financing by either the client itself or some other funding source (e.g. public funding schemes).

In the extreme case, the client finances 100% of the measures, but the ESCO still guarantees a certain amount of savings (guaranteed savings approach).



4 Qualitative Analysis

4.1 Client perspective

In the following, specific aspects from Questionnaires D5.1 B filled in by the clients will be evaluated. Also, process related experiences from the pilot projects will be described.

As described in chapter 3 there are four project phases in EPC. The clients were asked whether or not the time schedule was kept during the initial three project phases before the final “Measurement and Verification” phase. According to the answers given, Phase I “Project preparation and development” and Phase II “Procurement procedure” were delayed in almost half of the projects. Apparently when the ESCO takes over during Phase III “Implementation and Operation” delays are less likely. Only 25 % of the projects were reported to be delayed during Phase III.

For the period between contract notice and contract signature 10 months is the timespan stated most often (mode value). Although this resembles the highest density in naming, the average period on the other hand is about 5.5 month, and the median of the distribution is 4. Therefore the usual procurement procedure is much shorter than 10 month. In one case signing the contract even took 17 months, which obviously is a statistical outlier.

As the graph below shows, about a quarter of the customers stated their expectations were “almost fully” and three-quarters stated their expectations were “fully” met during Phase I.

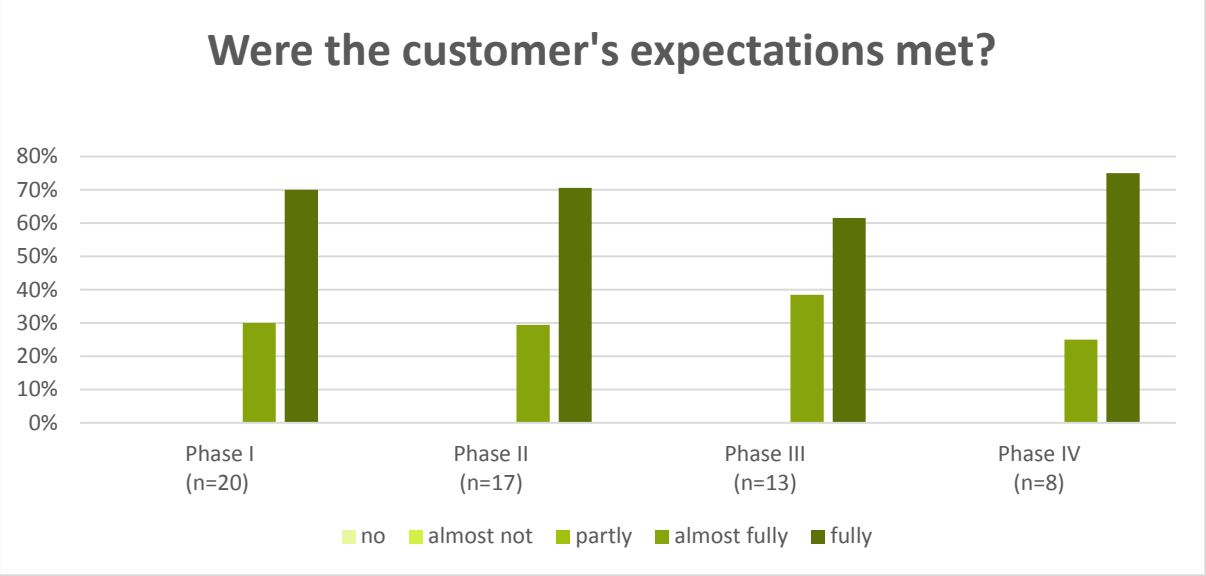
The customers’ expectations within Phase II are the same as for Phase I. The graph below shows all clients answered their expectations were met either “almost fully” or “fully”.

The feedback on customers’ expectations within Phase III remains stable in regard to those in Phases I and II.

Three-quarters of the clients had the assistance of a project facilitator at least during the project preparation.

Only for two of the projects within Phase III differences between procurement and contract were reported that had to be solved. In one project in Sweden, a steering committee was established by both client and ESCO to resolve occurring deviations. Thus all issues could be agreed upon in dialogue. In a Danish project, some differences manifested in disagreements on implementation details while the overall process and measures were implemented as expected.

In regard to the Phases I to III the feedback on customers’ expectations remains stable for Phase IV.



4.2 ESCO perspective

The ESCO questionnaire D5.1 C could be received from ten of the pilot projects. The results of the evaluation will be summarized in the following. The structure is given by the Code principles.

1. **Have you implemented the project economically efficient within the pilot project /Scale Fully 1-5 Not at all?**

In general the first principle of the Code is reported to be fulfilled by all ESCO companies at least ”almost fully”.

For the BG pilot project the ESCO stated that only profitable measures with a short payback period could be implemented in order to fulfil a legal restriction to keep the contract period below 10 years.

Two ESCO companies (ES, SE) stated, that economic maximization is not necessarily the only goal for the client and thus for the ESCO. Often less profitable refurbishment measures are intregrated in the tender and are being cross-subsidised by highly profitable measures. The ESCOs understood this was in contrary to the wording of the first principle of the Code. However, the ’maximisation of the net present value’ is done within the options fulfilling the client needs. Moreover this allows to add any measure with NPV higher then zero. This should be explained to both ESCOs and the clients when promoting the Code.

One ESCO (LV) specifically pointed out that besides economic efficiency also the comfort for the building users is an important criterion to take into account. Once again this is in line with the principle of the Code as described above.

2. **Have you taken over performance risks within the pilot project /Scale Fully 1-5 Not at all?**

The performance risk is generally taken over by the ESCO in all evaluated pilot projects. Some ESCOs still give valuable hints on risk related aspects:

In a DK project the ESCO recommends the client should budget for unforeseen renovation issues occurring during measurement implementation (mould, asbestos). This statement is backed up by the EPC project management in the municipality as well. Apparently this issue is not always finally regulated within the contract or communicated towards the project stakeholders.

Some ESCOs (HU, UK) point out that the conditions described in the tender documents, apart from adjustments made during the tendering process, are fixed within the contract (energy cost baseline definition, plant/building conditions). Therefore the performance risk might be altered due to incorrect data. If such a mistake is revealed the contractual partners should find a way to correct the baseline in a fair and transparent way that does not discriminate either of them, according to the fifth Code principle.

3. **Have you guaranteed the savings within the pilot project /Scale Fully 1-5 Not at all?**

All ESCOs report to have guaranteed the savings (either "fully" or "almost fully").

In a PT project the allocation of the benefits is unusual for EPC. In this lighting EPC project, in which more than 500 luminaires will be replaced by LED luminaires, the savings are split by the same share regardless of the total amount of savings. Although a strict savings guarantee was not seen necessary as the technological set-up (switch to LED) more or less guarantees savings to be achieved, which will be calculated / verified based on measured usage times of the luminaires, a saving guarantee of 50% of the initially calculated potential savings was agreed. The maintenance of the luminaires is guaranteed by the ESCO during the contract term. A minimum monthly fee is granted to the ESCO even if consumption falls below 20% of the baseline value, thus making sure the ESCO investments can be repaid even in case of drastically lower consumption.

4. **Have you supported long-term use of energy management within the pilot project /Scale Fully 1-5 Not at all?**

Generally long-term use of energy management within the pilot project is implemented by most of the ESCO companies. Still in some cases further improvements and some barriers were pointed out.

The ESCO in the DK project expressed the desire to further extend the energy management system. At the moment only buildings with high consumption are connected and buildings with smaller consumption are not recorded centrally via online measurement.

For two of the projects from ES and IT the ESCOs reported to have "almost not" implemented energy management measures. For ES such measures are planned for a renewed contract.

In GR the ESCO performs a lighting EPC-project. An energy management is not performed in the sense of measuring but by implementation of time schedules with determined lighting duration. In this case the effect of the measure itself can sufficiently be verified by calculations and energy management is not a necessary part of the project. Nevertheless further measurement activities might reveal further potentials for additional measures. E.g. according to the ESCO in PT lighting measures are combined with energy management.

An ESCO in a UK project points out the important fact that energy management on the operational level strongly depends on the client's willingness to participate in the efforts. An unwilling janitor or a couple of building users are easily capable to contradict all ESCO energy management efforts.

5. **Have you entered a long-term, fair and transparent relationship with the client within the pilot project /Scale Fully 1-5 Not at all**

All ESCOs report to have entered long-term, fair and transparent relationships. This is a noble goal in a relationship that might range from a couple of years up to 15 or more where conflicts most likely will occur and thus have to be resolved.

The LV project ESCO points out some important factors for a good relationship. A lot of communication efforts have to be made on the ESCO side to address the client properly due to the complexity of the contract and accounting system. On the other hand decentralized data on the client side is a barrier for a fair and transparent process that has to be actively addressed by the client. In some cases a facilitating third party, e.g. a project facilitator, is a good approach to cope with such issues.

6. **Have all your steps been fully transparent within the pilot project /Scale Fully 1-5 Not at all**

All ESCOs report to have made fully transparent steps within the pilot projects only. Additionally one ESCO reports to also have a special company compliance policy in place (DK) supporting this principle. Two ESCOs points out the positive effect of an external consultancy for the project transparency (NL, SI).

7. **Have you supported the client to find the most suitable financing option of the pilot project /Scale Fully 1-5 Not at all**

The financing is the topic with the largest variety within the self-evaluation from the ESCOs. Even though in some cases the ESCO answered to "not at all" have complied with this Code principle in the sense of finding the most suitable financing option they still have succeeded. Given that the legal or economic conditions or the nature of the project itself offered restricted options.

In BG for example the ESCO is obliged by law to finance EPC projects in the public sector. Thus finding the most suitable solution besides ESCO finance is only an option in private sector projects.

ESCOs from ES report that financing generally is the biggest barrier at the moment and the client might not be able to get third-party finance at all.

In one of the NL projects investment in installations is not part of the concept. Only low cost performance optimization measures are executed with no need for finance.

8. **Have you worked with qualified staff within the pilot project /Scale Fully 1-5 Not at all?**

All ESCOs report to have worked with qualified staff.

9. **Have you focused on high quality and care in all steps /Scale Fully 1-5 Not at all?**

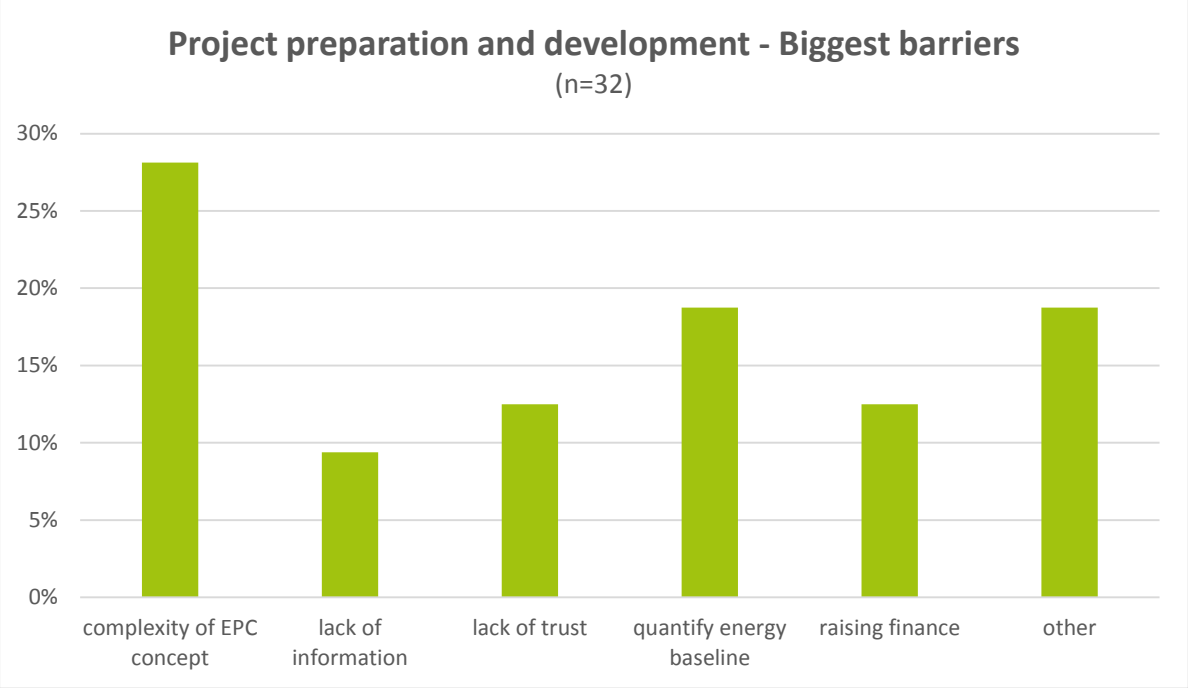
All ESCOs report to have focused on high quality and care in all project steps.

4.3 Barriers and success factors for the pilot projects

According to the clients feedback the "complexity of the EPC concept" is the biggest barrier named by more than a quarter of the clients. This statement is closely followed by the challenge of "quantifying the energy cost baseline", with a share of one-fifth.

Apart from that, "lack of information", "lack of trust" and "raising of finance" were named by 10 % of the clients each. "Other reasons" that were not explicitly named in the questionnaire add up to the remaining one-fifth.

The clients used different approaches to overcome the complexity barrier. Some consulted a project facilitator (DK, SI, DE). Other approaches were comparing different tender models and model contracts (ES), held stakeholder meeting providing explanations about expected savings (GR), achieved an adaption of regulations to enable the use of EPC (IT, SI) and participated in EPC seminars e.g. within the Transparense project (LT). The approaches have in common that knowledge was imparted to the client or regulations were altered in order to increase transparency.



Quantifying the energy cost baseline as the second largest barrier mostly was overcome by putting more effort into the process, namely the preliminary analysis including research and data collection (HU, ES, NO) or by consulting external experts (CZ).

The lack of information mostly was solved the same way as the complexity issue, meaning that clients used training courses (BG), did research (ES) or distributed FAQs and business case scenarios within their own organization and engaged non-executive directors within the process as well.

The lack of trust was tackled by consultations during which in some cases the introduction of the Code was used to build trust (CZ, LV). The lack of trust towards the concept itself that occurred within the engineering staff could successfully be reduced by involvement of the staff in the business case development. Also they could be convinced that EPC helps to solve backlog[7] maintenance issues and it does not threaten their jobs.

Raising finance is a general issue with no special approaches mentioned in the survey.

Another barrier mentioned is the necessity to prove the profitability of the EPC project. In case of the SE project the public procurement act does not allow certain qualitative qualification criteria which made the process more demanding. Afterwards the client considers involvement of external expertise as a reasonable means to facilitate the process.

[7] Backlog meaning tasks which should have been performed in the past but have not.

Uncertainty about contractual detail could be overcome by hiring a legal expert for drafting the contract (NL).

The ESCO perspective regarding the barriers and success factors naturally is different from the clients perspective although the ESCO questionnaires show great understanding towards the clients' needs to find the optimal finance solution as reflected in Code principle 7. Many barriers addressed are first of all clients barriers for which the ESCO offers possible solutions.

According to the survey, the most important aspect for the ESCOs is raising finance. In some projects taking care of the financing issue by the ESCO is explicitly seen as one of the major services for the client. Various financing options were used e.g.:

- Sale of long term receivables (CZ)
- Financing by the client (ES)
- Use of subsidies (LV)
- ESCO financing on their own balance sheet (LV, NL)
- Co-financing by public funds (UK)
- Equity of the client or loan (SE, UK)
- Consession model (SI)

Also some recommendations were made.

- ESCOs should be allowed to use longer payback periods in case of deep renovation projects, a view which generally is also shared by the clients (DK).
- Development of an alternative investment management fund in order to make forfaiting[8] a viable option in countries with less developed financial markets (LV).

The complexity of the EPC concept obviously is not a prime barrier for most ESCOs as they are operating within their own area of expertise. From the ESCO side the complexity was seen as a challenge to balance the various drivers: E.g. the while financial staff demands short payback periods, energy and environmental staff demands maximized energy and CO_2 savings and technical staff sees an opportunity to clear as much backlog maintenance as possible (UK). Stakeholder meetings during which – for setting the correct priorities – ranked NPV analyses were presented and the measures list was adapted accordingly, showed good success.

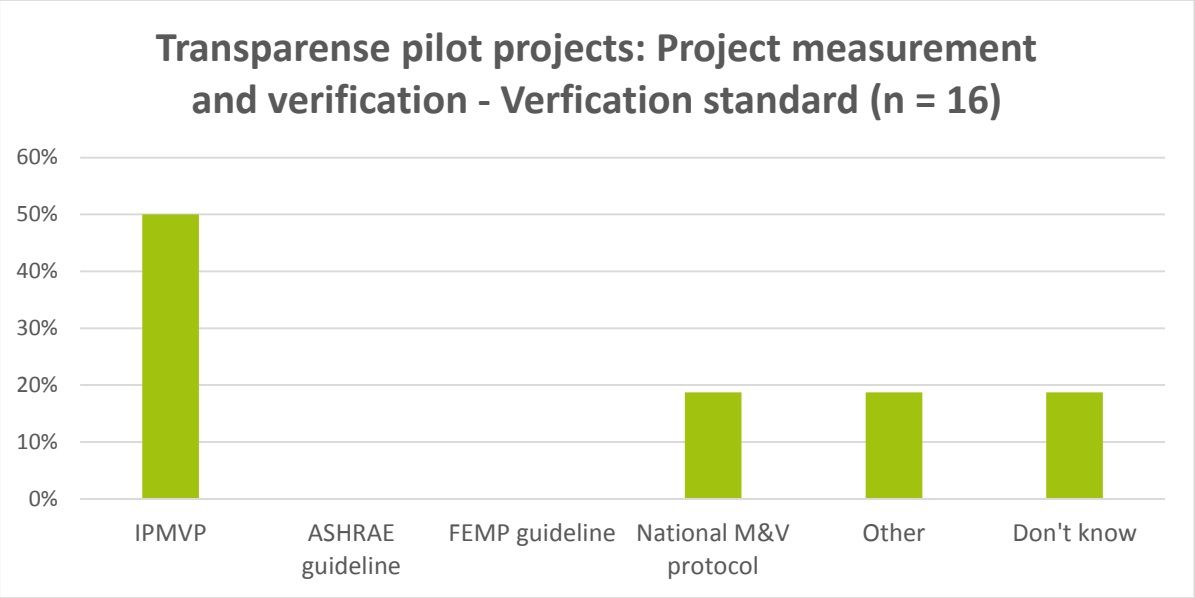
Lack of information is seen as an issue mainly on the client side. Some ESCOs recommend the client to hire facilitators or consult external expertise for the whole project or certain phases such as contract development, measurement and verification or invoice auditing (DK,

[8] Forfaiting means the selling of receivables (here: the ESCO rates from the client to the ESCO). So with forfaiting, the ESCO can arrange the financing through a financial institution by 'selling' the future ESCO rates to the bank.

LV, NL, SI). Communication is seen as key especially if the client does not fully understand the opportunities or has a distorted perception of some EPC aspects (LV, PT, UK, NL, SE).

The 'Lack of trust' barrier can be overcome by explaining everybody's role in the process, getting the staff on board, e.g. by a project board performing regular meetings and regular progress reports, and probably even by setting up some motivational or bonus programme (CZ, UK). Some ESCOs actively promote their compliance systems (DK). This can actually be amended by integrating the Code in the company compliance system. Also, adherence to recognized procurement processes can build trust (UK). In some countries the regulatory framework seems inappropriate for EPC still and administrators willing to take risks are needed in this early market phase (IT). Also, missing standardization seems to be a barrier such as baseline and contract templates with recognition value and a general platform endorsed by policy makers is proposed as a solution (LV).

Almost all ESCOs referred to the International Performance Measurement and Verification Protocol (IPMVP) as a useful guidance for quantifying the baseline (CZ, DK, NL, SE, UK). Still the involvement of an expert should definitely be considered (NL).



4.4 Lessons learned from consultations and pilot projects

Overall, the Code was perceived as clearly defined, reflecting all requirements on ESCOs and clients in EPC projects. However, two EPC providers from Sweden and the UK did not see the environmental and social aspects to be reflected in the first principle of the Code "The EPC provider delivers economically efficient savings". Thus it needs to be explained when presenting the Code that this principle allows for the inclusion of such aspects by internalising external costs and benefits in net present value (e.g. by CO_2 costing).

"The EPC provider delivers economically efficient savings"

The EPC provider aims at an economically efficient combination of energy efficiency improvement measures. This combination maximises the net present value of an EPC project for the Client defined as the sum of all the discounted costs and benefits (especially operational cost savings) associated with implementing the project.

This maximisation is carried out within the given boundary conditions (legal, client requests, user comfort). If e.g. comfort improvement for the building is requested by the client, this is seen as a constraint to the options among which the maximisation of NPV is considered.

All three characteristics of sustainability are combined within EPC. The social benefits of refurbishment measures, environmental protection by reduced energy use and the economic aspect all are part of the goal in an EPC project.

Annex: List of Pilot Projects

List of pilot projects, sorted by countries

Country	Project Name / Client	Private / Public	Facility type / type of buildings	Tender published	Contract duration	Investments (€)	Energy cost baseline (€/a)	Guaranteed Savings (%)	PE savings [MWh/a], guar.	GHG Savings [tCO2e/a], guar.
AT	BIG tender: Public schools througout Austria	public	20 public schools withing 1 building pool	October 2015 (planned)	10 years	confi-dential	confi-dential	confi-dential	confi-dential	confi-dential
AT	Public buildings in ownership of the Federal Ministry of Agriculture, Forestry, Environment and Water Management	public	Mix of office buildings and schools	January 2015	10 years	confi-dential	confi-dential	confi-dential	confi-dential	confi-dential
BE	EPC City of Ghent	public	6 schools, 5 office buildings, 1 fire department	August 2014	18 years	n/a	1.015.154	n/a	n/a	n/a
BE	Antwerp Worls Diamond Centre	private	Office building	n/a	9 years	41.410	214.879	5,8%	275	31

Country	Project Name / Client	Private / Public	Facility type / type of buildings	Tender published	Contract duration	Investments (€)	Energy cost baseline (€/a)	Guaranteed Savings (%)	PE savings [MWh/a], guar.	GHG Savings [tCO2e/a], guar.
BG	Renovation of municipal buildings (in Varna and Ruse) and lighting systems (in Bansko)	public	Ruse: 4 kindergartens, 1 sport facility Varna: 2 hospitals, 2 dormitories, 1 home for elderly people; 1 office building Bansko: public lighting system	May 2015 (first of several tenders)	10 years	2.120.000	n/a	41%	6.116	1.193
BG	University for National and World Economy, Sofia	public	University: 4 dormitory buildings (comprehensive renovation)	October 2012	10 years	767.000	218.000	39%	1.546	286
CZ	Pool of buildings in the city of Moravska Trebova	public private partnership	2 primary schools 3 administrative buildings	January 2014	10 years	430.000	420.000	15%	1.423	285
CZ	Prague Congress Center	private	Congress centre, hotel, administrative building	October 2014	11 years	4.614.370	2.678.473	33,5%	25.616	5.533

Country	Project Name / Client	Private / Public	Facility type / type of buildings	Tender published	Contract duration	Investments (€)	Energy cost baseline (€/a)	Guaranteed Savings (%)	PE savings [MWh/a], guar.	GHG Savings [tCO2e/a], guar.
DE	LBZB Hannover / Federal State of Lower Saxony	public	Boarding School: school, sports, administration buildings and dormitories	August 2015	n/a	300.000 (estimated)	315.000	n/a	n/a	n/a
DK	Guldborgsund	public	Pool of 59 municipal owned buildings, e.g. schools, sports centers, daycare centers, libraries, administrative buildings	May 2012	12 years	6.900.000	3.068.417	23%	5.993	1.273
ES	Mora, Toledo	public	Street lighting: 3.200 points of light	June 2013	15 years	3.200.000	172.800	75%	3.249	1.430
ES	Edificios Esther, Sevilla	private	Residential buildings + sport installations, 2 swimming pools, social club, restaurant and entertainment areas	n/a	6 years	31.500	14.386	28%	148	65
ES	Proteínas del Olivo SA, PRODOSA	private	Industry	n/a	2+2 years	42.000	n/a	15%	44	9

Country	Project Name / Client	Private / Public	Facility type / type of buildings	Tender published	Contract duration	Investments (€)	Energy cost baseline (€/a)	Guaranteed Savings (%)	PE savings [MWh/a], guar.	GHG Savings [tCO2e/a], guar.
GR	Bodosakeio Hospital, Kozani	public	Hospital + administrative building	April 2014	10 years	72.000	5.298	n/a	72	28
HU	Ceramic manufacturer in Romhány	private	Industry	n/a	6,5 years	322.580	532.250	15%	2.291	435
IT	Comune di Ospedaletto	public	Public lighting: 76 lanterns	February 2015	6 years	55.500	19.460	48%	42,5	19,8
LT	Kaisiadorys, Kaunas Region	public	Police Commissariat Building	October 2015 (planned)	10 years	1.100.000 (est.)	n/a	n/a	n/a	n/a
LV	Riga, multifamily buildings	private	2 residential buildings	n/a	20 years	614.945	n/a	48%	n/a	115
LV	Residential buildings in Salaspils municipality	private	3 residential buildings (multifamily)	May 2015	20 years	1.310.000	n/a	n/a	n/a	186
NL	Hanzehal, Municipality of Zutphen	public	Sports facility	n/a	10 years	500.000	41.000	21%	204	40

Country	Project Name / Client	Private / Public	Facility type / type of buildings	Tender published	Contract duration	Investments (€)	Energy cost baseline (€/a)	Guaranteed Savings (%)	PE savings [MWh/a], guar.	GHG Savings [tCO2e/a], guar.
NL	World Trade Centre at Schiphol, Amsterdam	private	Office building	July 2013	5 years	0	1.000.000	10%	2.650	486
NO	EPC Ringebu	public	23 buildings: schools, administration, sports, nursing homes, ...	March 2015	8 years	1.800.000	n/a	n/a	3.200	n/a
PL	Poczta Polska S.A. -in & outdoor lighting modernization	private	Terminal of Polish postal services distributor	July 2015	6 years	ca. 500.000	100.000	ca. 60%	2.499	676
PL	Warsaw City Hall - PPP for street lighting modernization	public	Street lighting modernization in Warsaw (around 30.000 light points)	Planned Nov.2015	8 years (minimum)	ca. 10.000.000	ca. 5.000.000	ca. 50%	54.000	14.600
PL	KGHM Polska Miedź S.A. in & outdoorlighting modrnization	private	Lighting refurbishment (>10.000 light points) in KGHM HGII.	2016	5 years (minimum)	ca. 900.000	353.600	> 50%	11.320	3.060

Country	Project Name / Client	Private / Public	Facility type / type of buildings	Tender published	Contract duration	Investments (€)	Energy cost baseline (€/a)	Guaranteed Savings (%)	PE savings [MWh/a], guar.	GHG Savings [tCO2e/a], guar.
PL	Municipality of Olszyna	public	ESCO project in street lighting modernization	Sept 2015	7 years	ca. 400.000	66.000	70%	1.203	316
PT	Dominó	private	Industry: Manufacturing Buildings	n/a	5 years	152.000	120.000	67%	n/a	n/a
PT	Monumental (Schneider Electric)	private	Tertiary sector – Multiple office building	August 2013	5 years	n/a	212.000	15%	n/a	n/a
SI	EPC Municipality Brda	public	Municipal administration: 1 school, 1 school/kindergarden, 1 admin. building	July 2014	15 years	374.038	90.162	55%	372,50	99
SK	City Hospital of Zlaté Moravce	public	Municipality, hospital: 14 buildings on hospital campus	Expected in 2015	< 8 years	500.000	235.217	48%	n/a	n/a
SE	Ludvika Municipality	public	50 buildings, e.g. schools, other public org.	N.A. Later stage project	20 years	11.000.000	2.700.000	20%	8.658	562

Country	Project Name / Client	Private / Public	Facility type / type of buildings	Tender published	Contract duration	Investments (€)	Energy cost baseline (€/a)	Guaranteed Savings (%)	PE savings [MWh/a], guar.	GHG Savings [tCO2e/a], guar.
UK	Barts Hospital NHS Trust - St Bartholomew's Hospital	public	Hospital	July 2013	7 years	3.437.860	2.687.400	25%	n/a	2.492
UK	Guy's and St Thomas' NHS Foundation Trust	public	Hospitals: Acute Healthcare buildings of both institutions	N.A. Later stage project	10 years (expected)	16.310.000	15.354.482	9,8%	44.209	8.000

A total of 37 pilot projects have been supported in the application of the Code in the context of the Transparense project. For various reasons, 3 of the 36 projects did not reach a phase which allowed to be included in the evaluation. The above list shows those 34 pilot projects, which have been (at least partly) been evaluated.

Definitions and glossary

Term	Definition
Client	means any natural or legal person to whom an EPC provider delivers energy service in the form of EPC
Energy Efficiency Directive (EED)	means Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency
energy efficiency improvement*	means increase in energy efficiency as a result of technological, behavioural and/or economic changes
energy efficiency*	means the ratio of output of performance, service, goods or energy, to input of energy
energy management system*	means a set of interrelated or interacting elements of a plan which sets an energy efficiency objective and a strategy to achieve that objective
energy performance contracting* (EPC)	means a contractual arrangement between the beneficiary and the provider of an energy efficiency improvement measure, verified and monitored during the whole term of the contract, where investments (work, supply or service) in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement or other agreed energy performance criterion, such as financial savings
energy savings*	means an amount of saved energy determined by measuring and/or estimating consumption before and after implementation of an energy efficiency improvement measure, whilst ensuring normalisation for external conditions that affect energy consumption
energy service*	the physical benefit, utility or good derived from a combination of energy with energy-efficient technology or with action, which may include the operations, maintenance and control necessary to deliver the service, which is delivered on the basis of a contract and in normal circumstances has proven to result in verifiable and measurable or estimable energy efficiency improvement or primary energy savings

energy service provider*	means a natural or legal person who delivers energy services or other energy efficiency improvement measures in a final customer's facility or premises
energy*	means all forms of energy products, combustible fuels, heat, renewable energy, electricity, or any other form of energy, as defined in Article 2(d) of Regulation (EC) No 1099/2008 of the European Parliament and of the Council of 22 October 2008 on energy statistics
EPC provider	means an energy service provider who delivers energy services in the form of Energy Performance Contracting
savings	means energy savings and/or related financial savings; the financial savings include the costs of energy provision and can also include other operational costs, such as the costs of maintenance and workforce
The International Performance Measurement and Verification Protocol (IPMVP)	is the widely referenced framework for "measuring" energy or water savings and is available at www.evo-world.org

Notes:
*Definitions according to the Energy Efficiency Directive