guarantEE

Building Energy Services in Europe

Pilot Project Report

Deliverable D5.1

Horizon 2020

Grant Agreement No. 696040

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Executive Summary

- 35 projects have been commenced under the guarantEE programme, comprised of 640 buildings with a combined floor area of 2.7 million m^2
- Schools featured in the greatest number of projects, followed by offices, residential buildings, sports halls and healthcare facilities
- The vast majority of projects were undertaken by public bodies; only 5 private sector projects and one semi-public project have been included
- The baseline annual energy spend ranged from €14,000 to over €3.5 million. The greatest proportion of projects had a baseline energy spend of €100,000 to €500,000, with a median of €360,000.
- Lighting upgrades were the most commonly implemented measures, mostly to LED fixtures. Monitoring and control was the next most frequently implemented strategy, followed by HVAC upgrades. Building envelope measures also feature strongly, being implemented in 20 projects and demonstrating the suitability of EPC for deep retrofit projects.
- Renewable energy solutions only featured in a small number of projects, indicating that energy efficiency measures are still more cost effective to implement
- The majority of projects are preparing contracts with a guaranteed savings period of 5 years or longer with the ESCo, but not longer than 15 years due to the additional risk attached
- Average guaranteed savings of 38% are expected over the range of projects
- The majority of projects had an investment budget of €250,000 to €5 million
- Almost half of the projects were fully financed by the client, while just under 30% of the projects were fully financed by the ESCo. This result firmly rebuts the viewpoint traditionally held by some property managers that EPC is nothing more than a financing mechanism for the client.
- Subsidies of up to 30% of investment costs are often available in the partner countries
- Open tender and negotiated tender were the two most common procurement methods, together accounting for over 75% of the projects. Only four projects employed competitive dialogue, with another two contracts employing a restricted procedure.
- The project preparation phase, includes all tasks from project identification to the preparation of procurement documentation, typically took over six months and is comparable to the "traditional" approach for projects of similar scale
- Various approaches to the Triple-Win scenario have been successfully implemented in a wide range of projects, allowing the benefits of EPC to be split between building owners and tenants
- Contract Variants, including simplified M&V procedures, additional termination of contract clauses and rules regarding the public funding of ESCos have been successfully developed and implemented
- Model Processes have been identified, which may allow synergies to be exploited in EPC projects where the client is already engaged in energy management or audit processes, such as those required for ISO 50001 accreditation

Introduction

The European climate and energy efficiency targets can only be achieved if private capital is mobilised for the implementation of sustainable energy projects. Energy service contracts, such as Energy Performance Contracting (EPC), could be instrumental in bridging the gap between energy efficiency and financial markets. Energy services such as EPC help building owners in the modernisation of their facilities. The planning, financing, implementation and maintenance of a set of technical measures are outsourced to an experienced energy service company (ESCo). Through the provision of a performance guarantee, the ESCo can finance the energy conservation measures through future energy savings. This guarantees energy and cost savings to the client while the ESCo takes on the technical and performance risks. It is this performance guarantee mechanism that opens energy efficency projects to private finance.

The guarantEE project continues to fosters the use of Energy Performance Contracting in the public and private sector across Europe especially through the developing of innovative EPC solutions for rented facilities and by making EPC more flexible to better serve private sector clients. GuarantEE continues to support the delivery of EPC projects across Europe, along with the promotion and development of the role of the EPC project facilitator. To date guarantEE has supported the delivery of 35 EPC projects across the partnership.

The main concept of guarantEE is to address two of the most relevant barriers to EPC in order to significantly enlarge the potential for new projects and boost the EPC demand side:

1. The split incentives dilemma: The split incentives dilemma typically occurs in rented facilities where the main beneficiary of energy saving measures is the user / tenant, while the responsibility for energy efficiency related investments is with the owner. To encourage the building owner to invest (or let an ESCo invest) in energy efficiency measures, (part-)financing of the measures through the beneficiary (the user/tenant) can be a key to make the investments happen, thus creating a triple-win situation, in which the tenant enjoys lower energy costs while the owner or the ESCo gains access to a share of the savings achieved to allow for the necessary investments.
2. Limited flexibility: The limited flexibility of the EPC contract models can restrain market growth, especially among private building owners. The critical issues are project duration (preference for shorter contracts, e.g. five years), termination for convenience, simplified M&V, using synergies with energy management requirements (for SMEs). Furthermore, specific aspects such as load management in EPC and EPC with multiple building owners (quarters, business parks) will be addressed to make EPC fit for the energy challenges of the future.

In addressing these barriers the guarantEE project has developed a number of solutions which are captured in a number of project outputs that can be found in the knowledge portal on the project website[1]. A number of these proposed solutions were tested by the project partners in the pilot projects delivered during the course of this project. The aim of this report is to evaluate the success of the implemented EPC pilot projects. It examines the structural data (client sectors, building types, etc.) and quantitative indicators (guaranteed savings, CO_2 savings, investments, etc.). It also examines the overall

[1] https://guarantee-project.eu/knowledgebase/)

pilot project results, including newly developed EPC business models, contract variants and model processes as applied in the projects.

The guarantEE project is funded by the European Union's Horizon 2020 research and innovation programme and involves 13 partners from across Europe.

Germany	Berliner Energieagentur (lead partner)	Lithuania	Public Investment Development Agency
Austria	Grazer Energieagentur	Netherlands	Rijksdienst voor Ondernemend Nederland
Belgium	Factor4	Norway	*Norsk Enøk og Energi AS (partner until 05/2018*
Czech Republic	ENVIROS	Romania	TUD Financial Solutions SRL
France	Île-de-France Énergies	Slovakia	Energy Centre Bratislava
Ireland	Codema – Dublin's Energy Agency	Slovenia	Institut "Jožef Stefan"
Italy	Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico Sostenibile	Spain	Institut Catala d'Energia

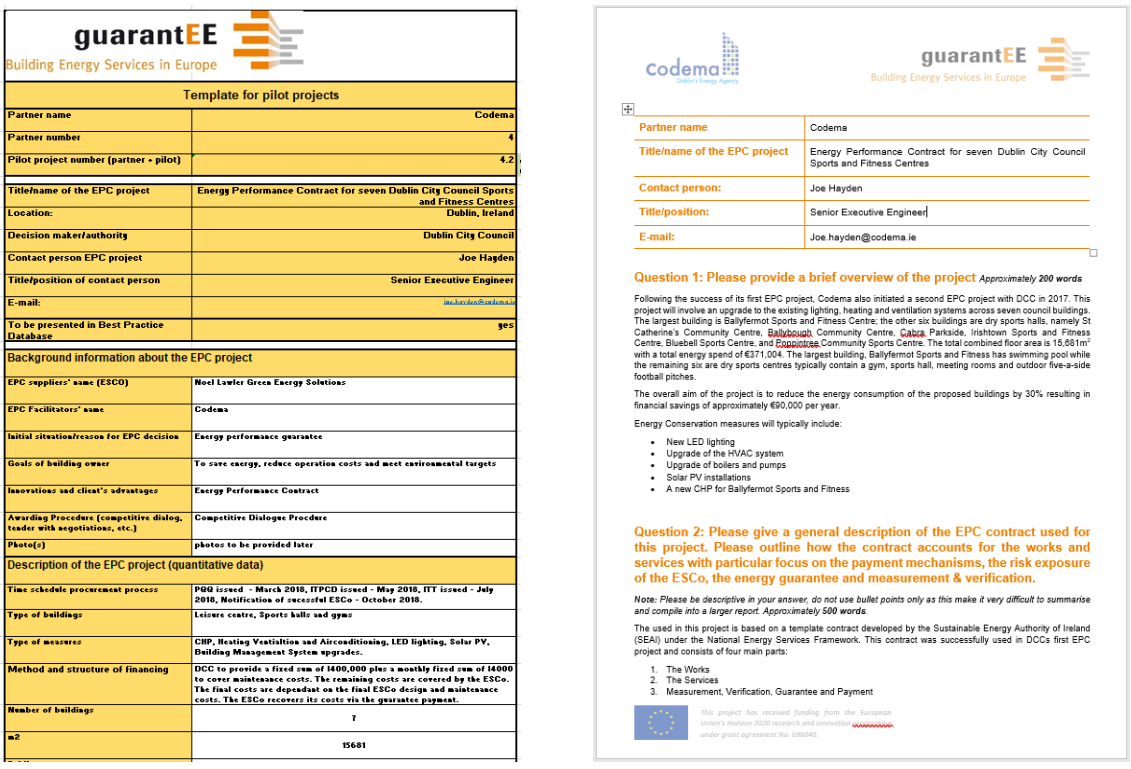
Figure 1: GuarantEE partnership

Methodology

The information in this report was collected using three separate questionnaires. The first is an excel-based questionnaire, the *Pilot Project Diary (Figure 1)*, which captured the main structural data (client sectors, building types, etc.) and quantitative indicators (guaranteed savings, CO_2 savings, investments, etc.) of all the projects initiated as part of the guarantEE project. The second is the *Procurement and Contract Questionnaire (Figure 1),* a word-based questionnaire which captured more detailed information on the type of contract used, contract variants, the method of procurement and details of where the triple-win solutions were employed in the pilot projects.

The pilot project diary reports, which were completed as part of Work Package 4, have been evaluated and analysed. In total, 35 reports were returned by the project partners and included in this analysis. The results are presented graphically and described in detail. A breakdown is provided of the structural data and quantitative performance indicators, which gives a general overview of the scope of the various different projects.

In the final sections of this report, the applied procurement processes, EPC business models, new contractual variants and models are summarised and commented on. This is based on the data submitted as part of the 35 pilot diary reports from WP4 and the more detailed descriptions provided in the WP5 Procurement and Contract Questionnaire. A total of 23 completed questionnaires were received and included in this analysis.



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Template for pilot projects	
Partner name	Codema
Partner number	4
Pilot project number (partner + pilot)	4.2
Title/name of the EPC project	Energy Performance Contract for seven Dublin City Council Sports and Fitness Centres
Location:	Dublin, Ireland
Decision maker/authority	Dublin City Council
Contact person EPC project	Joe Hayden
Title/position of contact person	Senior Executive Engineer
E-mail:	joe.hayden@codema.ie
To be presented in Best Practice Database	yes
Background information about the EPC project	
EPC suppliers' name (ESCO)	Noel Lawler Green Energy Solutions
EPC Facilitators' name	Codema
Initial situation/reason for EPC decision	Energy performance guarantee
Goals of building owner	To save energy, reduce operation costs and meet environmental targets
Innovations and client's advantages	Energy Performance Contract
Awarding Procedure (competitive dialog, tender with negotiations, etc.)	Competitive Dialogue Procedure
Photo(s)	photos to be provided later
Description of the EPC project (quantitative data)	
Time schedule procurement process	PQQ issued - March 2018, ITPCD issued - May 2018, ITT issued - July 2018, Notification of successful ESCo - October 2018.
Type of buildings	Leisure centre, Sports halls and gyms
Type of measures	CHP, Heating Ventialtion and Airconditioning, LED lighting, Solar PV, Building Management System upgrades.
Method and structure of financing	DCC to provide a fixed sum of 1400,000 plus a monthly fixed sum of 14000 to cover maintenance costs. The remaining costs are covered by the ESCo. The final costs are dependant on the final ESCo design and maintenance costs. The ESCo recovers its costs via the guarantee payment.
Number of buildings	7
m2	15681

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Partner name	Codema
Title/name of the EPC project	Energy Performance Contract for seven Dublin City Council Sports and Fitness Centres
Contact person:	Joe Hayden
Title/position:	Senior Executive Engineer
E-mail:	Joe.hayden@codema.ie

Question 1: Please provide a brief overview of the project *Approximately 200 words*

Following the success of its first EPC project, Codema also initiated a second EPC project with DCC in 2017. This project will involve an upgrade to the existing lighting, heating and ventilation systems across seven council buildings. The largest building is Ballyfermot Sports and Fitness Centre; the other six buildings are dry sports halls, namely St Catherine's Community Centre, Ballybough Community Centre, Cabra Parkside, Irishtown Sports and Fitness Centre, Bluebell Sports Centre, and Poppintree Community Sports Centre. The total combined floor area is 15,681m² with a total energy spend of €371,004. The largest building, Ballyfermot Sports and Fitness has swimming pool while the remaining six are dry sports centres typically contain a gym, sports hall, meeting rooms and outdoor five-a-side football pitches.

The overall aim of the project is to reduce the energy consumption of the proposed buildings by 30% resulting in financial savings of approximately €90,000 per year.

Energy Conservation measures will typically include:

- New LED lighting
- Upgrade of the HVAC system
- Upgrade of boilers and pumps
- Solar PV installations
- A new CHP for Ballyfermot Sports and Fitness

Question 2: Please give a general description of the EPC contract used for this project. Please outline how the contract accounts for the works and services with particular focus on the payment mechanisms, the risk exposure of the ESCo, the energy guarantee and measurement & verification.

Note: Please be descriptive in your answer, do not use bullet points only as this make it very difficult to summarise and compile into a larger report. Approximately 500 words.

The used in this project is based on a template contract developed by the Sustainable Energy Authority of Ireland (SEAI) under the National Energy Services Framework. This contract was successfully used in DCCs first EPC project and consists of four main parts:

1. The Works
2. The Services
3. Measurement, Verification, Guarantee and Payment

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 680040.

Figure 2: Example of Pilot Diary and Procurement and Contract Questionnaire

Pilot Project Evaluation

Overview of Projects

This section examines in detail the data collected from the project diary questionnaire. Building types and energy efficiency measures undertaken are evaluated, including estimates on energy and CO_2 savings. The key suitability criteria for EPC projects such as annual energy spend and investment costs are investigated, with procurement, financing and contractual methods also described and commented on.

Building Types

A total of 35 projects, containing almost 640 individual buildings, with a combined floor area of over 2.7 million m^2, have signed or are in the process of signing EPC contracts under the guarantEE project. The range of building types involved in the projects is presented in Figure below. Schools featured in the greatest number of projects, followed by offices, residential buildings, sports halls and healthcare facilities. This clearly demonstrates the strength of the EPC approach when it comes to the aggregation or grouping of buildings to create projects of scale. This project aggregation approach is critical if Europe is to successfully meet its climate targets. It provides one of the solutions to bridging the gap between the energy efficiency and financial worlds as EPC has the potential to offer projects of scale with measurable and verified energy savings which can be used as collateral.

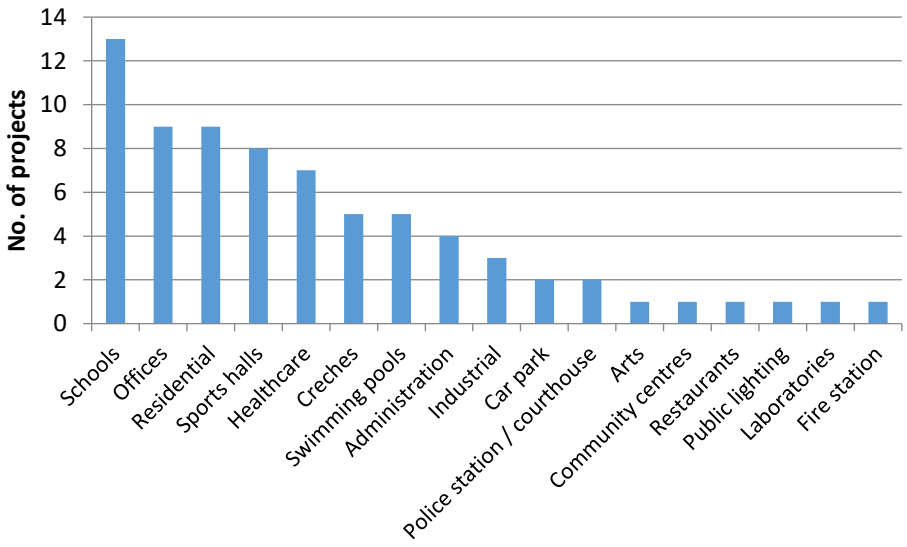

Figure 3: Building types

The vast majority of these projects were undertaken by public bodies, with only 5 private sector projects and one semi-public project. The private sector building types consisted of residential buildings, one

warehouse building, twenty manufacturing buildings and twenty-seven indoor swimming pools. This chart clearly shows that EPC is still a more popular approach for the public sector.

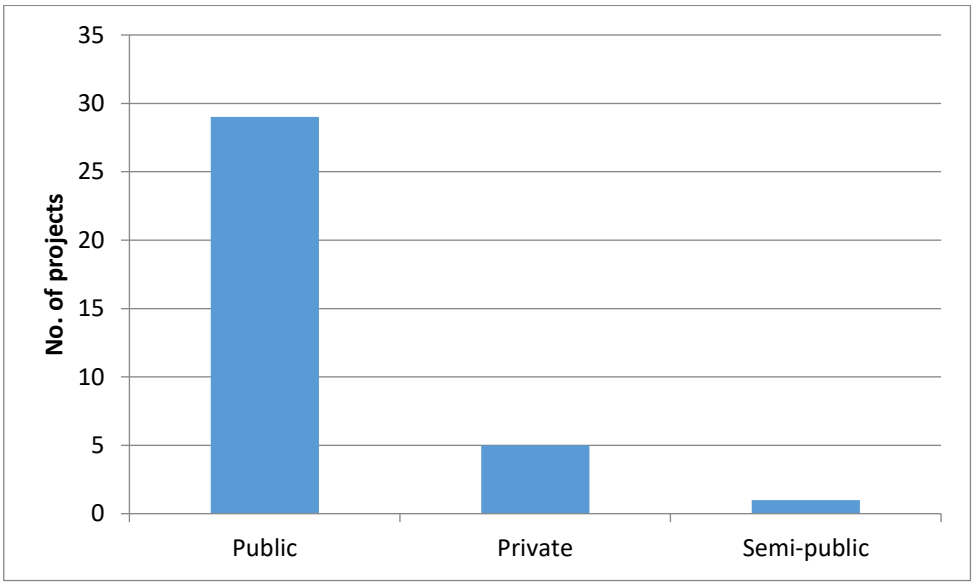

Figure 4: Sectoral Breakdown

Baseline Energy Spend

The baseline annual energy spend for the various projects ranged from €14,000 for the smallest project to over €3.5 million for the largest. Figure 5 presents a breakdown of energy spend per project. The greatest proportion of projects had a baseline energy spend of between €100,000 and €500,000, with a median spend of €360,000. Again, this clearly demonstrates the strength of the EPC approach when it comes to the aggregation of buildings to create projects of scale.

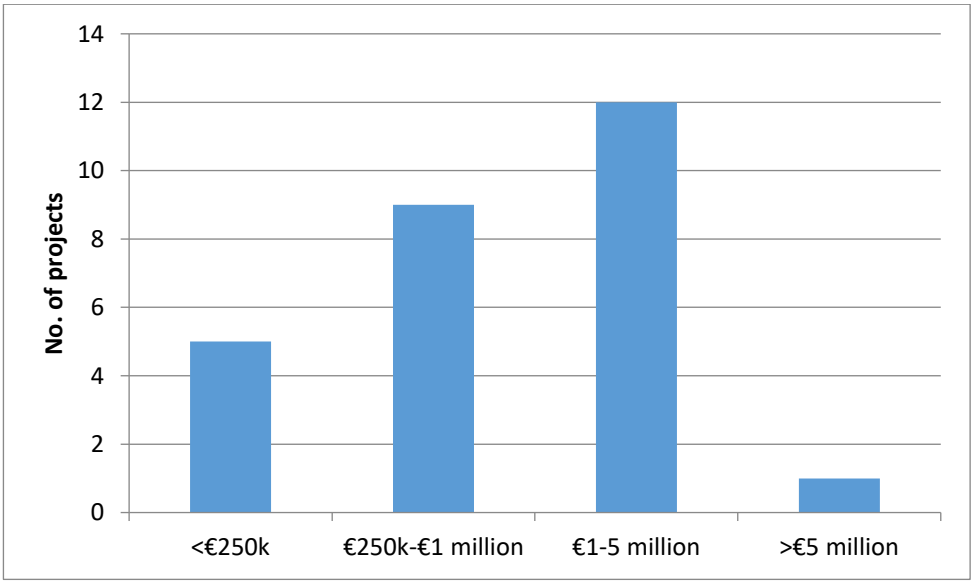

Figure 5: Baseline energy spend

Measures Implemented

The range of energy efficiency measures implemented varied greatly between projects, from simply the takeover of operational management of facilities to deep retrofitting of the building envelope and its energy systems. A full breakdown is provided in Figure 6. Lighting upgrades were the most commonly implemented upgrades, mostly to LED fixtures. Monitoring and control was the next most frequently implemented strategy, followed by HVAC upgrades. Building envelope measures also feature quite strongly, being implemented in 20 projects and demonstrating the suitability of EPC for deep retrofit projects. However, renewable energy solutions only featured in a small number of projects indicating that energy efficiency measures are still more cost effective to implement.

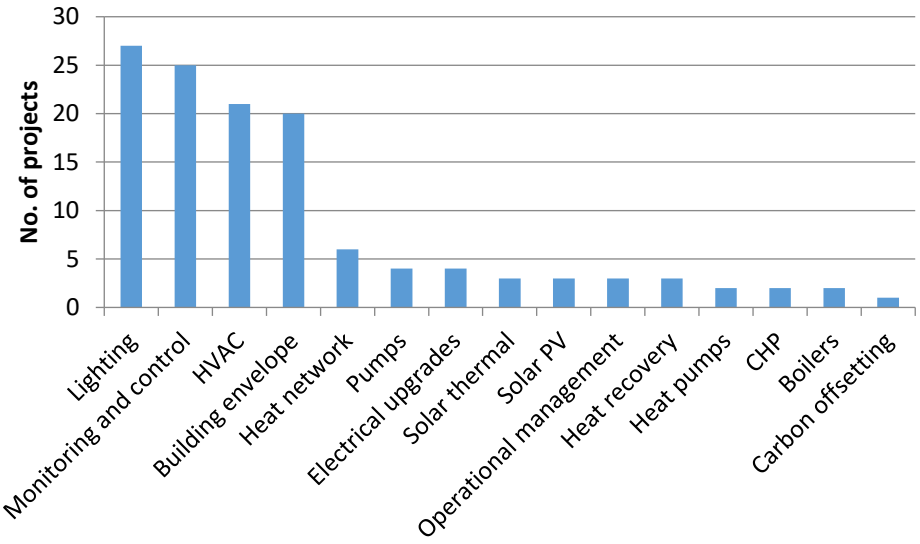

Figure 6: Range of Measures Implemented

Contract Period

As seen in Figure 7, the majority of projects are preparing contracts with a guaranteed savings period of 5 years or longer with the ESCo. This allows for the implementation of measures with longer payback periods and time for the project savings to cover the investment cost. A number of contracts have been signed for an initial period of five or six years, which may then be extended until such a time that the project costs have been fully paid back, if this is not achieved within the initial contractual period. Some clients had initially hoped to define a longer guarantee period of up to twenty years, however, a number of issues arose which made this unfeasible. The lack of competencies in the market was identified as a limiting factor in a number of countries. Suppliers did not have the skills required to model the most effective energy saving measures over such long periods and were thus unwilling to take the risk. The short term of guarantees on construction materials, of typically 5-7 years, was identified as a risk factor by certain ESCos. The uncertainty associated with the potential change of use of buildings over the contract period was also cited as a concern with longer-term contracts.

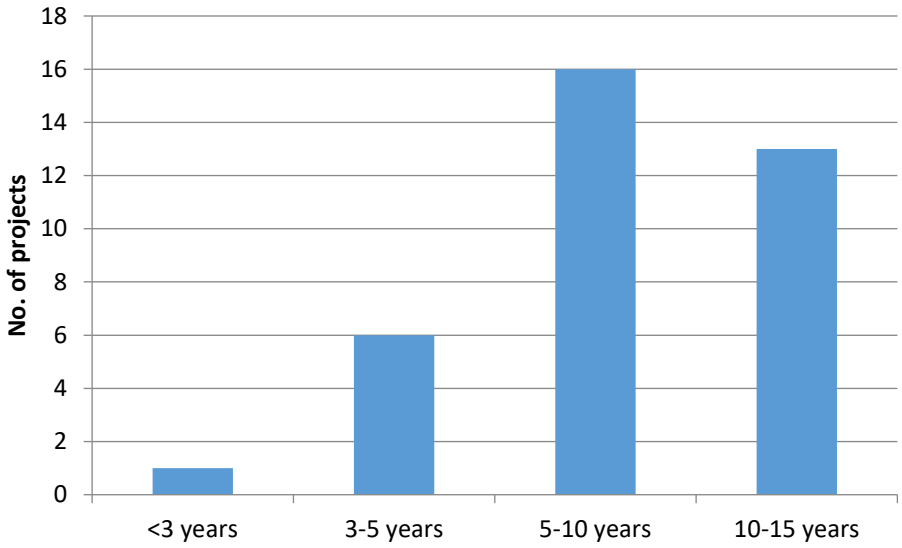

Figure 7: Contract period

Guaranteed Savings

The guaranteed savings target set out in each contract also varied significantly, depending on the type of facility and the measures implemented. This trend is illustrated in Figure 8. One project is aiming for an energy-neutral facility, effectively requiring 100% guaranteed savings. For typical projects, the guaranteed savings are far lower, with an average of 38%. In a small number of projects, the guaranteed savings were not defined as a percentage of the total baseline energy consumption. One project, for example, was focussed on the operational management of an existing underperforming solar thermal array and defined the required guaranteed savings as a 20% increase in solar thermal generation. While this action would reduce fossil fuel consumption and carbon emissions, it does not affect the baseline energy consumption.

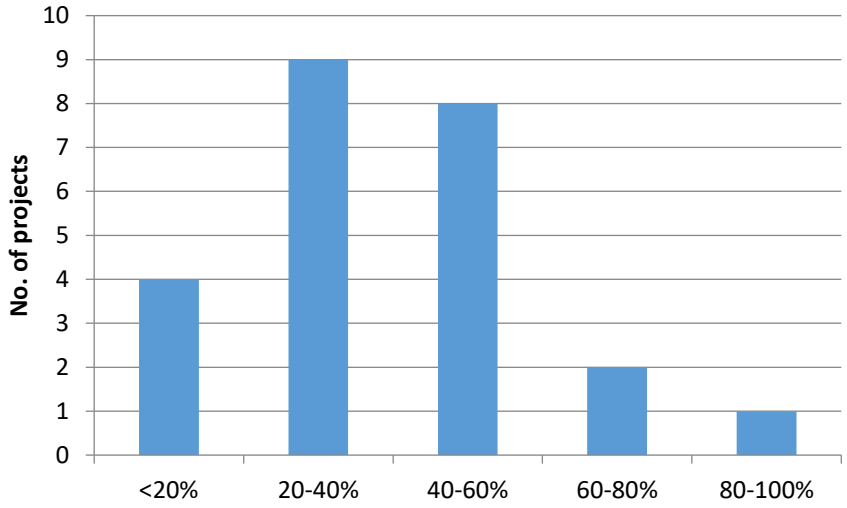

Figure 8: Guaranteed savings

EPC in Private Collective Housing

Compared to the industrial, service and social housing sectors, the private collective housing sector lags significantly behind the curve in the renovation of existing building stock in line with the European energy efficiency strategy. This brings both great opportunities and challenges in developing and adapting tools designed in more mature sectors.

In the guarantEE program, this issue was tackled in large-scale projects by both Energies POSIT'IF in France and TUD Financial Solutions in Romania. Some of the main obstacles to the development of this EPC market include non-professional and sometimes financially challenged building owners, trust issues and, in both France and Romania, legal uncertainty about the financial component of EPC as a potential banking activity.

The building owner needs to be accompanied for the entire duration of the project by a reliable and impartial facilitator. The facilitator should bring together design, financing, works and M&V. The importance of public support in this sector cannot be underestimated. In France, co-ownership taken in charge by Energies POSIT'IF typically benefits from 33% public aid, while financially modest co-owners may even receive up to 70-90% aid. This focus on fragile co-owners allows actions to be taken across a broader portfolio of buildings. The conditionality of public support is also fundamental, dictating both the level of ambition for the renovation and the way in which it will be carried out. The French 'Ville durable' scheme requires instrumentation and post-works measurement, which is an important nudge towards incentivized M&V.

In Romania, the municipality usually supports up to 90% of the investment cost towards energy and CO_2 emission reduction projects in this sector. This support scheme allows for a larger number of buildings to be involved in the projects, with 195 Owners' Associations now engaged between the four TUD projects, encompassing a total floor area of almost 1.7 million m^2. This will require a total investment of over €139 million. There is a contractual relationship between the Owners' Associations and the municipality. The Municipality is mandated to rehabilitate the residential multi-storey buildings by the owners, with the actual EPC contract signed between the Municipality and the ESCo. Through this contract, the ESCo must guarantee energy savings, typically around 40%, with continuous monitoring over a minimum period of seven years.

Total Investment

The range of capital investments made as part of the EPC contracts varied quite significantly; from a cost of zero for the takeover of operational management of a residential building, to over €5.5 million for the deep retrofit of another residential complex. A breakdown of the total investment costs is provided in Figure 9. While there were 5 projects carried out with a capital budget of under €250,000, the majority of projects had a larger budget of €250,000 to €5 million.

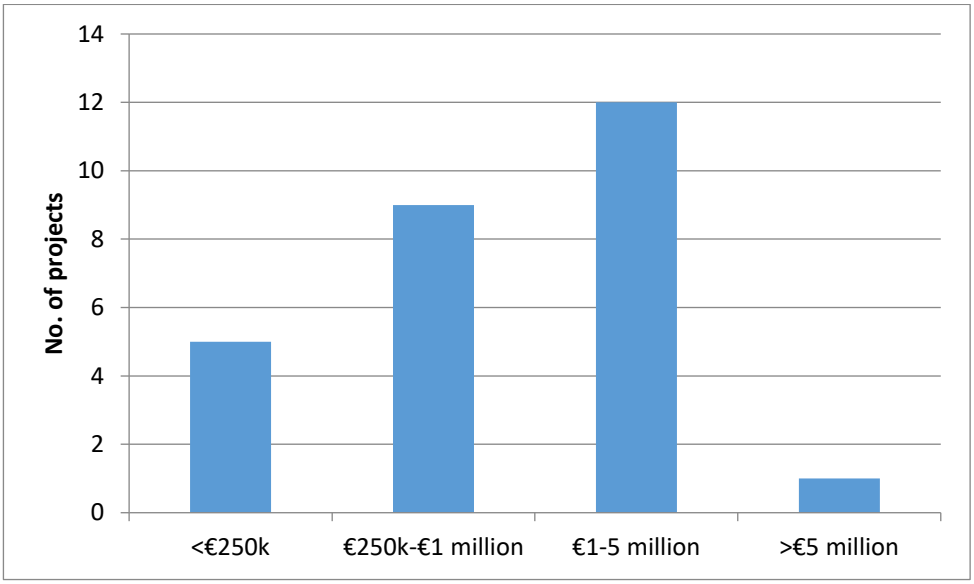

Figure 9: Total investment costs

Financing Model

Figure 10 shows that almost half of the projects were fully financed by the client, while just under 30% of the projects were fully financed by the ESCo. This result firmly rebuts the viewpoint traditionally held by some property managers that EPC is nothing more than a financing mechanism for the client. The remainder of the projects split the investment costs between the ESCo and the client. In ten projects, the clients availed of subsidies towards the investment costs. The value of these subsidies varied depending on the scale of the project, from a minimum of €12,000 to a maximum of over €1.2 million. The subsidies typically represented about 30% of the total investment cost. This broad range of financial models displayed again clearly demonstrates the flexibility of the EPC model in accommodating client finance, ESCo finance, private finance and grant subsidies.

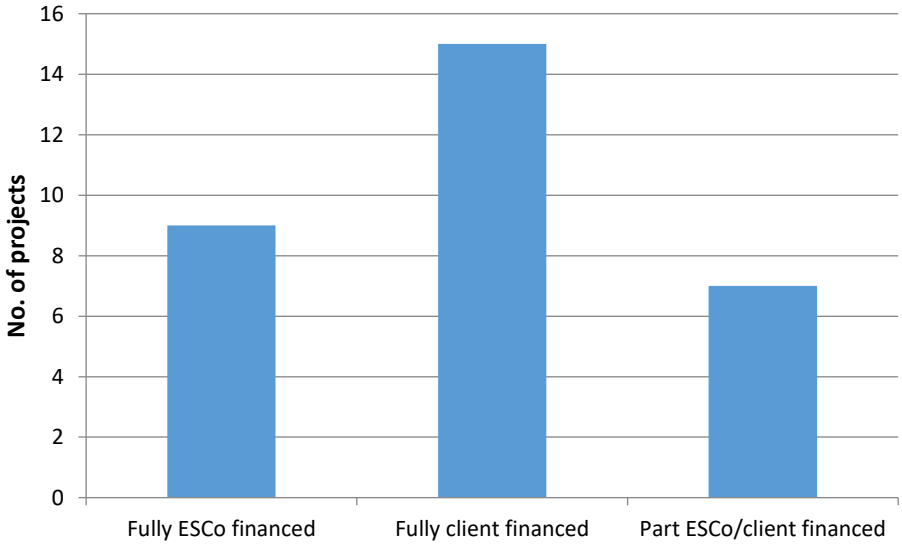

Figure 10: Financing model

Energy and CO_2 savings Vs Investment

The relationship between project investment costs and guaranteed savings in both Euro and CO_2 was also examined. The low R-squared values indicate that there is no statistically robust relationship in either case. It is very difficult to draw any solid conclusions from this data due to the large number of variables involved, such as the building type and age, the pre-existing energy systems and the implemented energy efficiency measures. Nonetheless, it is still likely that the driving factor for CO_2 reduction is not the same as that for energy cost reduction. Up until now, potential energy saving measures have typically been judged on the basis of cost savings rather than CO_2 savings. The total CO_2 saving between all of the projects assessed is estimated at over 14,100 tonnes per annum, based on guaranteed savings calculations. It is envisioned that CO_2 savings will be allocated a much greater weighting in contract awarding criteria in the coming years.

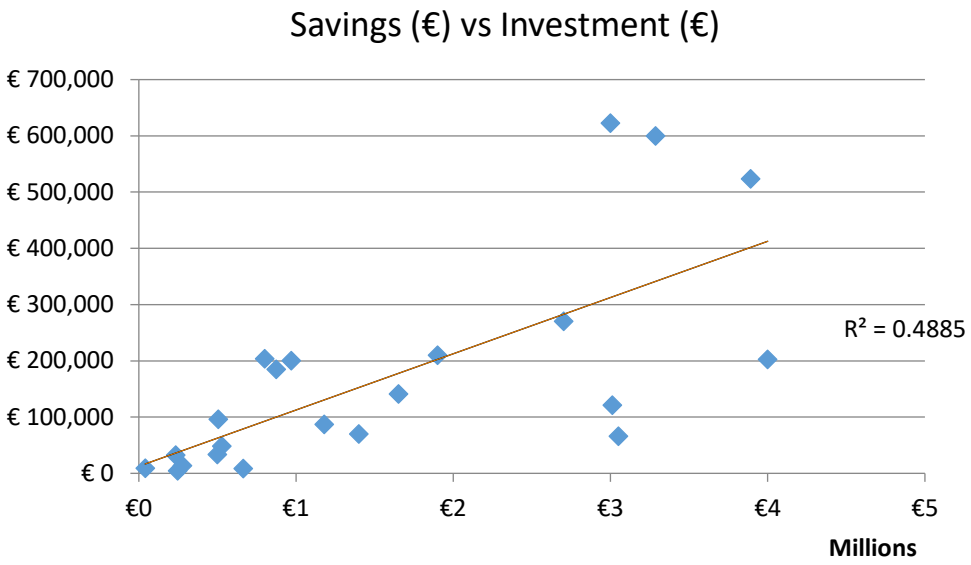

Figure 11: Savings € vs investment €

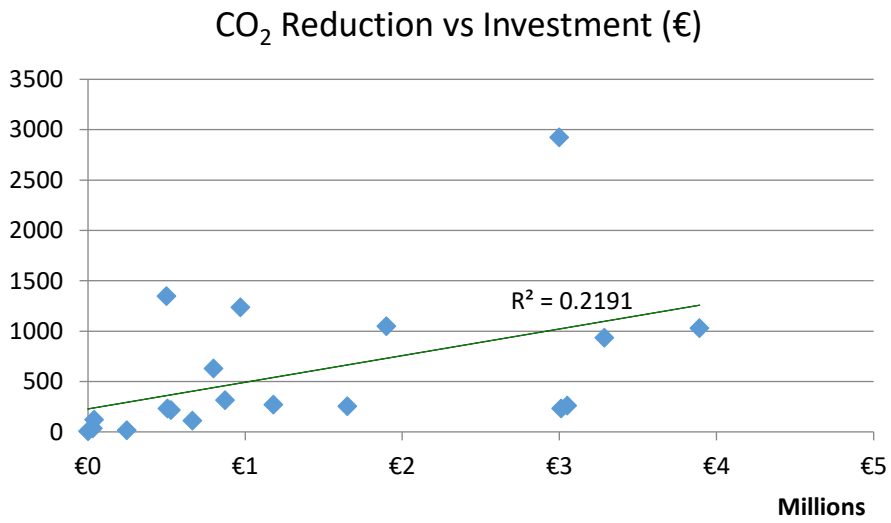

Figure 12: CO_2 reduction vs investment €

CO_2 Emission Compensation Scheme

The BEA Bremer Hoehe project will achieve a CO_2 saving of 233 tonnes / year compared to the status quo. In order to compensate for the remaining CO_2 emitted by the use of natural gas in their CHP, they have entered into a project with atmosfair. The emissions are compensated by enabling farmers in Nepal to switch from the environmentally harmful combustion of wood to small, self-powered, biogas plants. In these very simple plants, cow manure is mixed with water and fermented in a digester to produce climate-neutral biogas.

In total, atmosfair wants to promote the acquisition of around 20,000 small biogas plants with grants and microcredits in Nepal with its "Biogas Support Program", thereby making an effective contribution to the deforestation of protected forests and to an environmentally friendly energy supply. The program is certified by the United Nations International Clean Development Mechanism and the International Gold Standard. The CO_2 emission reduction is officially deposited and proven by the German Emissions Trading Authority (DEHST). Further details on the atmosfair project are available at: https://www.atmosfair.de/en/climate-protection-projects/biogas-biomass/nepal/

Procurement procedure

A breakdown of procurement procedures is provided in Figure 13. As almost all of the projects analysed were in the public sector, direct awarding of contracts was very seldomly seen, with only two projects procured in this manner. Open tender and negotiated tender were the two most frequently observed procurement types, together accounting for 27 of the contracts examined (77% of all projects). Only four projects employed competitive dialogue, with another two contracts employing a restricted procedure.

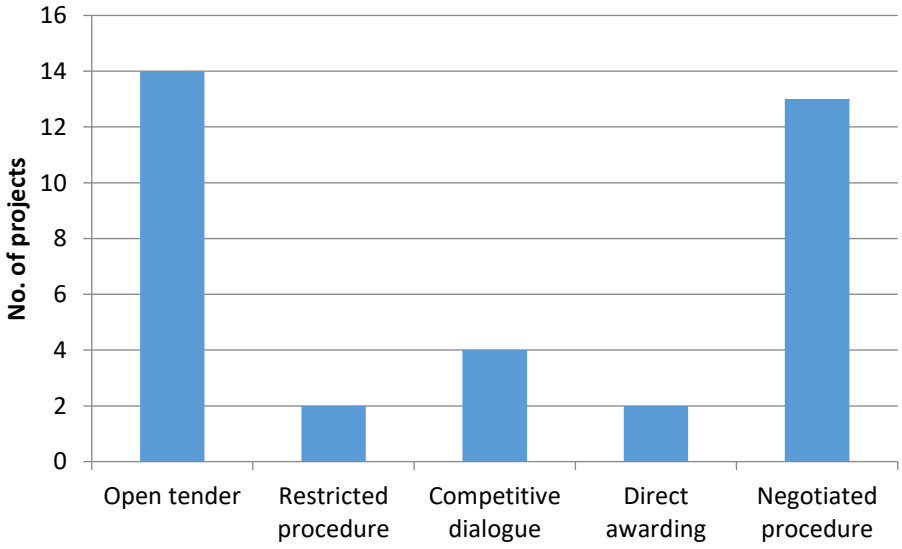

Figure 13: Procurement procedure

Project Development Timelines

Project development timelines varied for the 35 guarantEE projects, which is to be expected (Figure 14). The project preparation phase, which includes all the task from project identification to the preparation of procurement documentation typically took over six months which is comparable to the "traditional" approach for a project of a similar scale. Once the procurement phase started, this was typically completed in under six months with only four projects taking more than one year.

The results from the projects implemented as part of guarantEE clearly refute the perception that EPC should only be considered if external finance is required, that EPC is only suitable for large multi-million Euro projects or that it is significantly more difficult and costly to procure and implement than "traditional" projects. This needs to be reflected in how we talk about EPC at a national and European level.

In many cases there has been a steep learning curve for all parties involved, and these timelines would be expected to shorten considerably in subsequent projects.

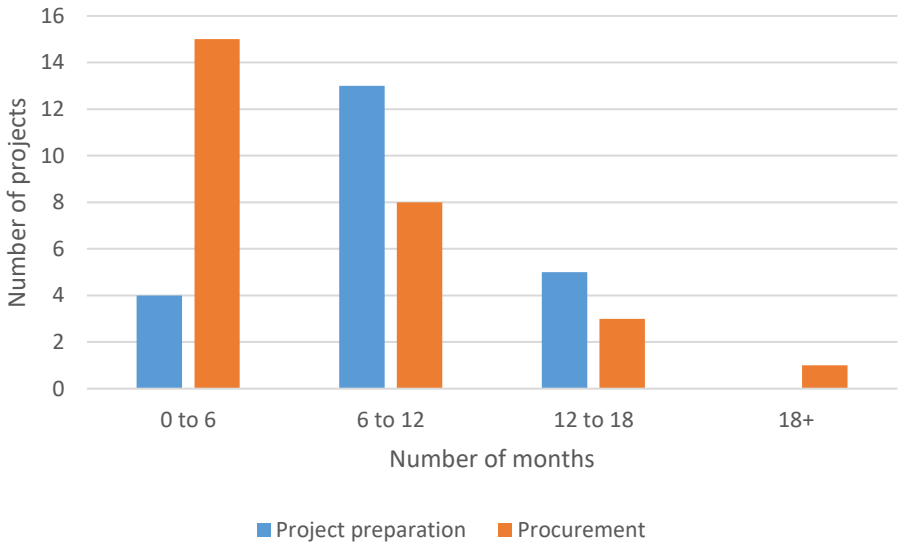

Figure 14: Project development timelines

The split incentives dilemma

A significant challenge to the implementation of EPCs is the "Split Incentive Dilemma", whereby the benefits of energy saving investments (usually carried out by the building owner) are not enjoyed by the owner but by the tenant. To encourage the building owner to invest in energy efficiency measures a solution to overcome this split incentive is required. The guarantEE projects developed the Triple-Win solution in which the tenant enjoys lower energy costs while the owner or the ESCO gain access to a

share of the savings achieved to allow for the necessary investments. The Triple-Win solution was tested in 11 of the pilot projects.

Triple-Win

When the EPC client is the owner and user of a facility, it is considerably easy to visualize the added value in all respects (energy savings, additional asset value, improved comfort etc.) as all the benefits of the EPC investment are directly recovered by the client. When a third party is involved, such as a tenant, then it becomes more difficult to fairly distribute the costs, benefits and risks of the project.

Figure 1 Split Incentives Dilemma

In this case there are 3 parties involved:

- The owner of a facility;
- The tenant/user of a facility;
- The ESCO performing the energy saving measures (ESM).

Generally, it is advisable to look for solutions that generate benefits for all involved parties. To achieve this, there are essentially two available variants:

1. Bilateral agreement between owner and ESCO, e.g. through all-inclusive rents with guaranteed comfort-conditions, supported through technical appliances for their monitoring and management.

2. Bilateral agreement between tenant and ESCO, e.g. by billing the energy efficiency investments directly to the tenant, e.g. through on-bill-financing within an energy-supply-contract.

Case 1: Owner and tenant concluding an EPC contract

Case 1 refers to situations where both the owner and tenant agree to contribute financially to the implementation of the measures. An ESCo and possibly an EPC facilitator will be engaged jointly by both partners to implement the project. Projects of this type are typically quite rare; no such projects have been implemented under the guarantEE project.

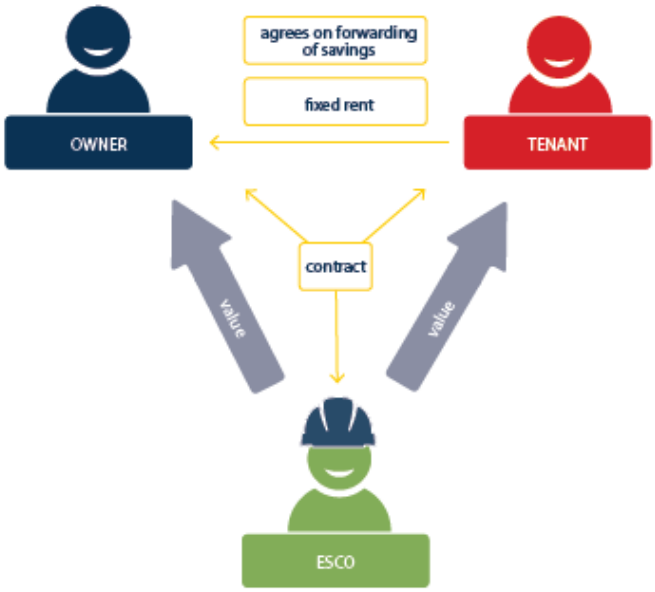

Figure 16: Owner and tenant concluding an EPC contract

Case 2: Owner concluding an EPC contract

Variations on the Case 2 scenario were implemented in 7 projects. In this situation, the owner enters a bilateral agreement with an ESCo to carry out the project. The tenant benefits from increased comfort and cost savings. These savings must be partially passed on to the owner. This may be via a savings splitting agreement (Case 2a), an increase in rent (Cases 2b and 2c), or, in the case of all-inclusive rental agreements, the full extent of the savings will be enjoyed by the owner (Case 2d).

The public-private partnership EPCs implemented by IJS in Slovenia utilised Case 2a, whereby the savings enjoyed by the tenants, public bodies including schools and a health centre, are forwarded on to the building owner, the Municipality. In Norway, Oslo Boligbygg implemented Case 2a for a municipal residential project. Most of the apartments are rented by benefit claimants, perceived to have little or no personal incentive to save energy as both rent and energy bills are paid for by social benefits. Oslo Boligbygg, a municipal enterprise and the owner of the buildings, entered into “green leases” with the municipality, who are the formal tenants for most of the buildings. Oslo Boligbygg will get the benefit of the savings in the common areas, while the municipality will see the savings benefit in the apartments. A further benefit for Oslo municipality is that Oslo Boligbygg shall contribute to the municipality’s overall energy saving targets.

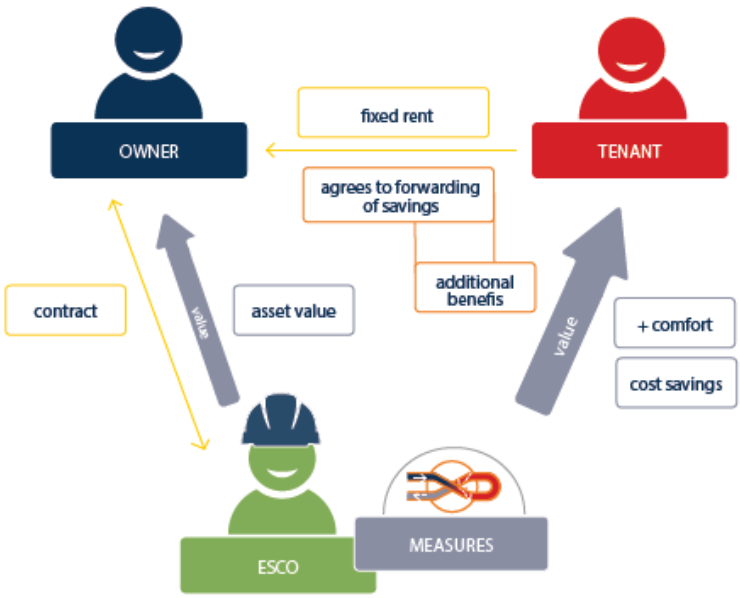

Figure 17: Case 2a: EPC-contract with forwarding of savings

The BEA also implemented Case 2a in two EPC projects on residential buildings, each owned by private housing co-operatives. The owner carried out the works, but since each building is commonly owned by the tenants, all tenants profit equally from the implemented energy performance measures.

GEA facilitated a project whereby the client (the municipality) occupies the buildings, but the owner is a real estate company. In this case, the owner undertook the investment, while the tenant receives increased comfort. A compensation agreement falling into the Case 2 category will need to be put in place, but this has not yet been developed.

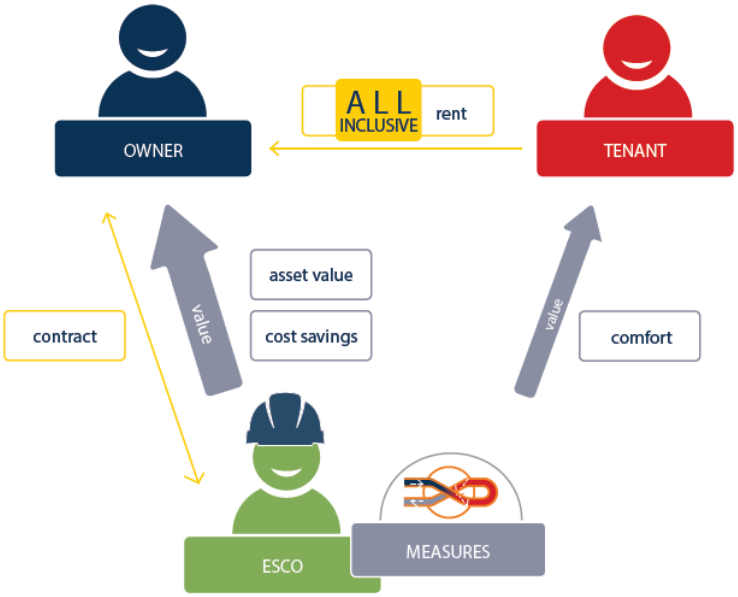

Figure 18: Case 2d: All-inclusive-rent already in place

ENVIROS carried out another EPC project of this type on a student accommodation complex. The rent is set at a standard rate and includes bills. It is yet to be decided whether or not the rent should be increased under Case 2d to reflect the higher standard of comfort now provided.

Case 3: Tenant's intention for an EPC-contract

The third scenario identified (Case 3) relates to a situation whereby the owner grants permission to the tenant to engage with an ESCo to implement the EPC. The owner only has to agree to the measures in the framework contract being implemented and then has no further input into the process. In order to simplify the process, The EPC contract length is typically specified as shorter than the agreed rental period.

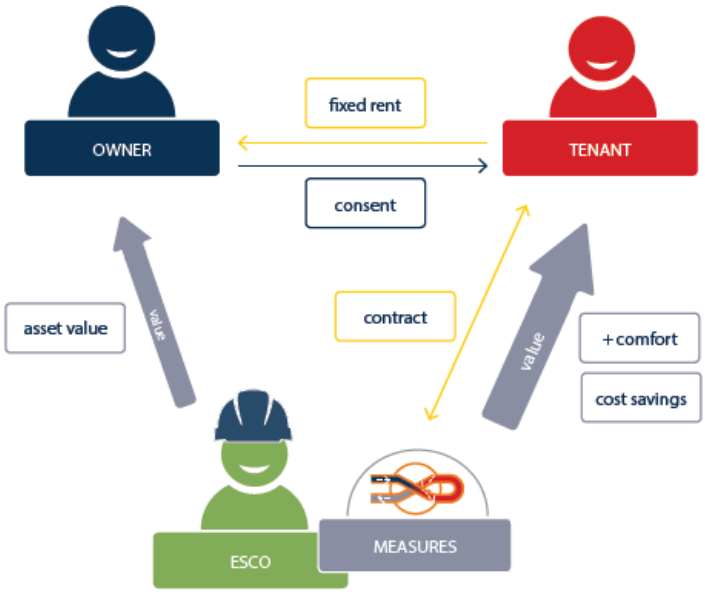

Figure 19: Case 3a: EPC contract with owner's consent

The Municipality of Naples in Italy have implemented Case 3a in their A-SCETATE project. It has agreed a rent for the use of the building for a period of 12 years minimum to the non-profit association "Maestri di Strada". The tenant provides for the energy conservation measures to be applied to the building. The duration of the rental contract is longer than the duration of the EPC contract, so the tenant can agree an EPC contract with the owner's consent (Case 3a). The tenant will benefit from reduced operating costs and improved internal comfort. The owner, Naples Municipality, can benefits from a refurbished building with increased value while also greatly boosting its image. The owner will receive their usual rent from the tenant after the refurbishment work will be already paid to the ESCO.

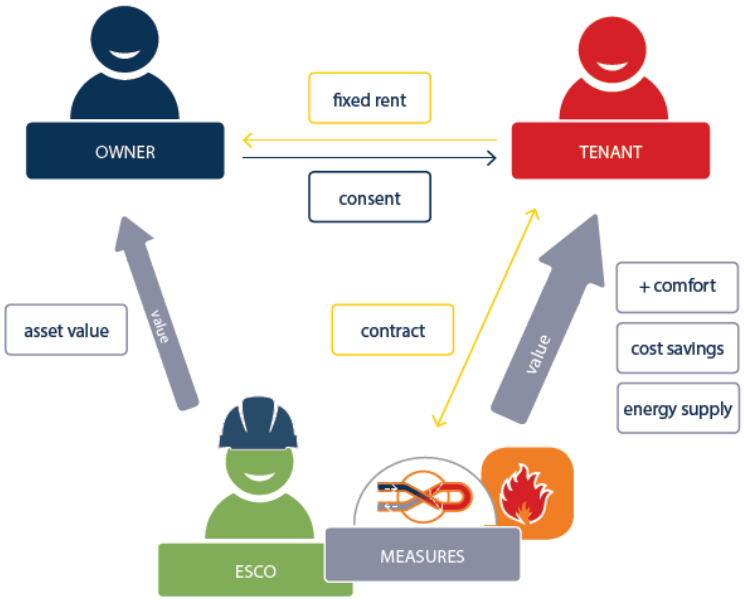

Figure 20: Case 3b: Direct contracts with tenants, combined with energy supply

Factor 4 use the concept of a residual value to help provide a solution in scenarios of this type where the rental agreement is terminated before the contract with ESCo reaches its natural end. The residual value is based on the Dutch standard NEN 2767, whereby the maintenance state of all major building elements are graded by a certified inspector on a scale of 1 to 6, with 1 being the ideal case and 6 the worst case. The scores from the various elements are then combined to give an overall score for the building. By ensuring that the ESCo commits to maintaining a minimum residual value to the owner at the end of the contract, the residual value at any point in the contract can be easily calculated and remunerations made where necessary.

Contract Variants

The limited flexibility of the EPC contract models can restrain market growth especially among private building owners. Critical issues include project duration (preference for shorter contracts of 5 years rather than 10 years), termination for convenience, simplified M&V and the use of synergies with energy management requirements (for SMEs). A number of solutions to the limited contract flexibility were tested in the pilot projects.

Three important contractual issues have been identified which may require additional clauses to be included in the contracts. These are described in detail below. In situations where modifications were needed to be made to the standard programme contract and there was no dedicated legal team in-house, external legal expertise was commonly sought by facilitators.

Ordinary termination of contract

The residual value concept included in the Factor4 project allowed for a simple and flexible exit option, where the ESCo is rewarded for the available residual value of the project at the time that the contract is ended. A similar clause has been included by JSI, whereby in the case of a unilateral decision to break the contract, the current market value of the assets is estimated by independent experts. A payment is then made to the ESCo based on this valuation, after a penalty or bonus of 15% is applied, depending on the reason for which the contract is being broken.

VIPA included an additional termination clause in their contracts describing the procedure where the contract needs to be terminated through no fault of either party (force majeure). This clause allows either party to unilaterally terminate the contract without having to go through the courts once certain specific conditions exist. A payment will be made to the ESCo to compensate for the monthly remunerations which would otherwise have been made in order to cover the investment costs.

Codema included a termination clause which allows the client to unilaterally terminate the contract, requiring a notice period of 20 working days to be given to the ESCo. The ESCo will be compensated accordingly, based on the guaranteed savings expected (if in the first 3 years of the guarantee period) or an average of the actual annual payments already made (if in 4th or later year of guarantee period), minus any amount already paid to the ESCo by the client.

In GEA's contracts, a similar clause was added to make it possible for the client to end the contract under certain pre-conditions. For example, if the ESCo fails to reach its savings guarantee, the client is free to end the contract. Also, in the case of "end of usage" of the building, the contract may be terminated before the contractual end date. In this case, the contract contains a mechanism to ensure that the ESCO does not receive exorbitant profits, but also no losses.

Simplified M&V

The Irishtown Stadium project facilitated by Codema used a variation of the simplified M&V process. For this lighting upgrade project, it was assumed that the savings, once achieved, would remain consistent.

Spot checks were completed by the ESCo both during and on completion of the works. This was followed by an energy bill comparison using regression analysis after three months to ensure that overall savings were being achieved. The time period of 3 months was felt to be too short though, and this significantly affected the overall accuracy of the calculation. A period of at least 6 months would be preferred.

A similar approach was adopted by BEA for a project consisting only of LED lighting upgrades to a warehouse facility. In this case, calculations were carried out beforehand without any measurement after. This was deemed suitable as the project consisted only of LED lighting, and so the savings were quite easy to predict.

Another example of simplified M&V was used in a BEA project which focussed solely on improved operational management of an existing solar thermal array. In this case, the monitoring equipment was already in place on the solar thermal array and the remainder of the building's energy system was not covered under the scope of the contract, therefore allowing a simple M&V plan to be developed.

In the M&V plan implemented by VIPA, the cumulative energy savings after a 5-year period are calculated and compared against the initial guaranteed savings. It is only at this point that the ESCo will either be fined or receive a bonus based on their performance in relation to their guarantee, rather than on an annual basis. This approach removes the need for an annual review, while still ensuring that the ESCo achieves their stated targets.

An alternative M&V approach is being used for the A-SCETATE project in Italy. A BIM (Building Information Modelling) model has been developed to cover the entire lifecycle of the building, from design through to operational management. This will allow for real-time acquisition and evaluation of the building's energy systems data, leading to better planning of maintenance activities and a reduction of management costs, including those relating to M&V.

Acquisition of Public Funding by the ESCo

In some jurisdictions, concerns have been raised about the levels of public funding being passed on to ESCos. In the Czech Republic, ENVIROS applied for public subsidies which are in place to help fund energy efficiency measures. A number of mandatory efficiency measures were included in the tender specification to satisfy the requirements of this subsidy programme; however, the subsidies were later refused by the Ministry of Industry and Trade due to the fact that the funding was being combined with an EPC. Similarly, the State of Lower Saxony in Germany was not able to pay a contribution to building costs due to a decree on EPC which prohibits this. In this case, the full costs of implementing the measures (€1.7 million) were borne by the ESCo, with their compensation claim based on the savings they actually achieve. The ESCo will keep 100% of the cost savings over the course of the contract, so it is strongly in their interests to maximise savings. At the end of the 12-year contract, full ownership of the facilities will return to the State of Lower Saxony. In Austria, GEA negotiated a clause to limit the benefit to the ESCo, stating that the ESCo may receive a remuneration of up to 10% (with a maximum of €10,000) of any acquired subsidies.

Model Processes

The guarantEE project described the ways in which synergies may be exploited in EPC projects where the client is already engaged in energy management or audit processes, such as those required for ISO 50001 accreditation. Not much further detail was provided in the project partners' survey responses as regards energy management systems currently implemented; however, many public bodies will already be engaged in these activities in order to comply with the EU Energy Efficiency Directive. Many organisations had investment grade energy audits carried out on their facilities as part of the EPC process. The results from these audits will be very helpful for feeding into an ongoing register of opportunities and for setting baseline energy consumption levels in the organisation. The M&V operations will also allow for much more detailed energy audits going forward.

Factor4 included a calculation of the residual value of the facilities in their project contract, using calculations based on the Dutch standard NEN 2767, as described earlier. By requiring the ESCo to guarantee a certain residual value at the end of the contract period, this ensured that the ESCo implemented energy saving measures with a long technical lifespan, such as insulation and the use of high-quality materials. It also encouraged the ESCo to undertake a comprehensive preventative maintenance programme throughout the lifetime of the contract. Further benefits include a simple and short contract and a simpler decision process when investment is required to replace equipment. A further innovative feature of the contract is the inclusion of a number of KPIs which affect the ongoing payments to the ESCo, apart from those relating directly to energy savings. These include user comfort, maximum permitted equipment downtime and the required use of circular materials to minimise the environmental impact of the implemented measures. The implementation of the official standard NEN 2767 also means that judicial concerns are almost completely eliminated.

While EPC contracts often specify that the ESCo maintains any new and existing equipment in the facilities over the guaranteed savings period, other contract models leave this responsibility to the client. In the case of one of the projects facilitated by the Energy Centre Bratislava, the ESCo designs and installs the new systems and then trains the existing facilities maintenance team on the operation and maintenance of the new equipment. The ESCo then does not operate or maintain the plant, but simply monitors its operation and reports back to the client if any abnormalities are observed. This is in addition to carrying out the usual M&V activities on a monthly and annual basis.

In one ENVIROS project, the boiler houses were operated by a third party and so this had to be factored into the EPC from the start. Energy efficiency measures and renovations were allowed only where there was no contradiction to the operator's original contract and the investments agreed in their contract. Demand side measures were allowed, and the resulting effect on the heat price discussed and agreed upon.

Conclusion

The guarantEE programme has demonstrated the significant amount of flexibility available when undertaking EPC projects. Aggregation allows for buildings which would otherwise be considered too small to be pooled together and included in an EPC project. Similarly, various buildings of different types are often pooled together to make the contract more attractive to ESCos. EPC is no longer viewed as a simply a financing mechanism, with the majority of the guarantEE projects being fully funded by the building owner. In many cases, government subsidies of up to 30% are often available to assist the development of projects. Guaranteed annual savings of 35-40% are typical, with contract lengths of 5-15 years. The most commonly implemented energy saving measures are LED lighting, monitoring and control and HVAC upgrades. Renewable technologies are still seen to be less cost-effective than energy efficiency measures and are therefore not commonly deployed. Public sector projects tend to dominate the EPC market in most of the partner countries. Procurement methods therefore follow the typical public processes of open or negotiated tender, rather than direct award. Triple-win strategies are continuously evolving in order to help share the benefits of EPC between building owners and tenants and secure buy-in from both parties. While standard contract templates have been developed by many national bodies, variants of these contracts have been successfully developed and tested under the guarantEE project, introducing even greater flexibility to the EPC market.