



# Learning Handbook

## Public Buildings Module

Innovative financing schemes to improve the energy performance of public buildings.

This module covers buildings and facilities owned, managed or controlled by public authorities. Facilities refer to energy consuming entities that are not buildings, such as wastewater treatment plants.

Authors: Axelle Gallerand, Jen Heemann, Mia Dragovic Matosovic, Diana Prsancova, Carolin Anders

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## List of Abbreviations

EE	Energy Efficiency
EEFIG	Energy Efficiency Financial Institution Group
EPC	Energy Performance Contracting
ESCO	Energy Service Company
EU	European Union
MRV	Measurement, reporting and verification
NPV	Net present value

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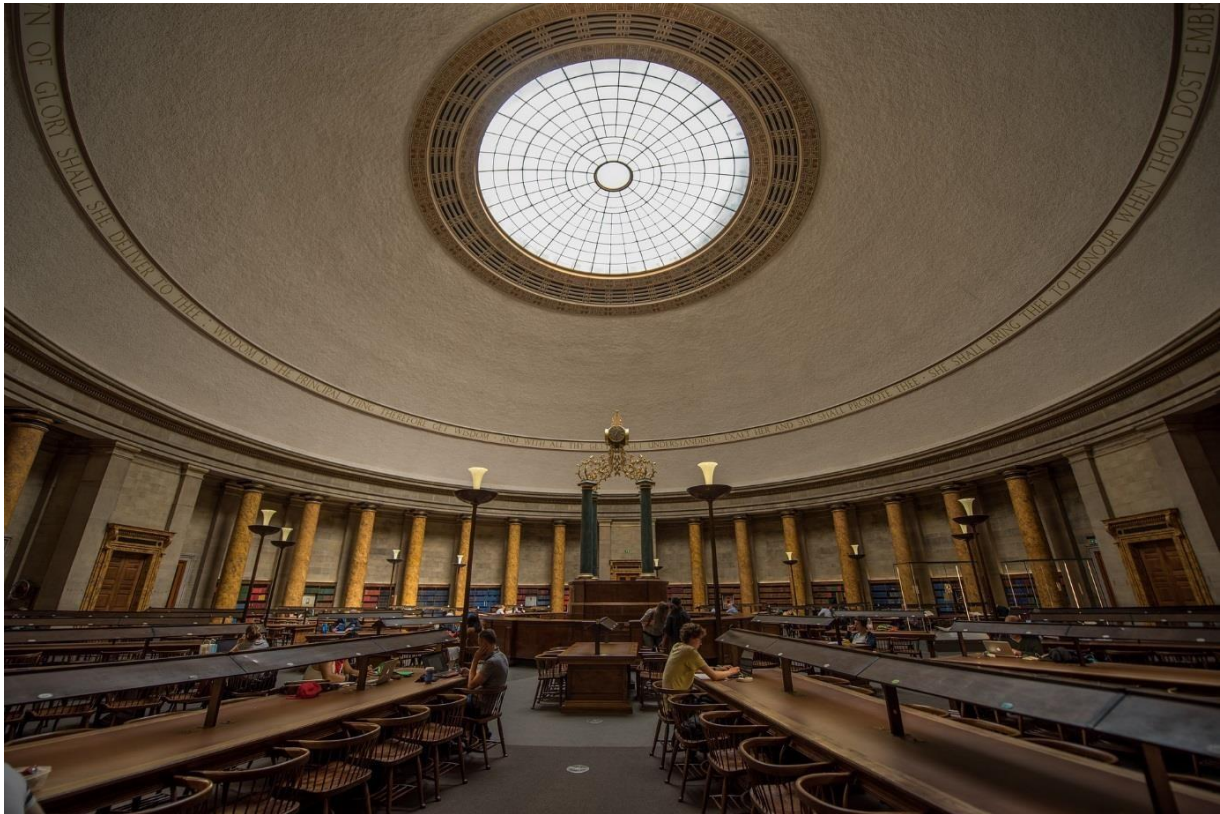
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# Module Description

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The module on public buildings covers buildings and facilities owned, managed, or controlled by public authorities. Facilities refer to energy-consuming entities that are not buildings, such as wastewater treatment plants.



# Module Objectives

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## Mentee

At the end of this module, mentees can achieve the following learning objectives:

- Understand the innovative financing schemes relevant to public buildings
- Recognise the barriers, incentives, advantages, and disadvantages of the innovative financing schemes
- Examine which sustainable energy and climate action projects can be financed by innovative schemes
- Analyse the success factors and lessons learnt from successful projects financed by innovative schemes

## Mentor

At the end of this module, mentors can achieve the following learning objectives:

- Share content knowledge on the topic of innovative financing schemes that are relevant under the public buildings module

- Share practical experience in implementing sustainable energy and climate action projects and support others in overcoming different barriers
- Showcase sustainable energy and climate action projects financed by innovative financing schemes
- Learn from other cities and regions about which projects they want to implement and which innovative financing schemes they want to apply

## Sectoral Challenges

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Public buildings cover about 12% of the area of the EU building stock. With energy efficiency investments in public buildings, the benefits are two-fold: (1) energy savings, productivity, and value improvements accrue to the owner while generating (2) increased employment, reduced emissions, and improvements to the public (Energy Efficiency Financial Institutions Group or EEFIG, 2015).

In a survey conducted by EEFIG (2015), the top ten (10) key drivers affecting demand for energy efficiency investments in public buildings are:

1. Rules on public authority accounting, procurement, and reporting
2. Leadership and awareness at key decision makers' level
3. Standardization
4. Buildings regulation, certification, and energy performance certificates
5. Facilitation and technical assistance
6. Effective enforcement of regulation
7. Clear business case
8. Regulation that impacts on timing and scope of the renovation
9. Regulatory stability
10. Measurement, reporting, and verification (MRV) and quality assurance

# Typical Projects

Typical projects under the sector of public buildings, can be drawn from the [PROSPECT+ Replicable Practices](#) and the following examples:

**Table 1:** Example of projects under public buildings

Action	CO2-saving potential	Estimated costs for the municipality	Cost-benefit ratio	Implementation time frame	Target group	Key actors
<b>Energy management for municipal buildings</b>	Medium	Savings above expenses	Very high	2-3 years	Municipality	The municipality, External experts
<b>Energy-saving contracting</b>	High	Very little to none or negative cost	High	1 year, the contract will last for 7-20 years	Municipality	Municipality and ESCO (contractor)
<b>Improvement of municipal indoor lighting</b>	High	Medium	High	1 month	Municipality	Municipality and ESCOs specialising in lighting
<b>Energy check for municipal buildings</b>	Medium	1000 euros (average per building)	High	1 month	Municipality	The municipality, Energy expert
<b>Building standards in new construction of municipal buildings</b>	Medium	About 10-15% higher than conventional buildings	Medium	1-2 years	Municipality	The municipality, External experts
<b>Implementation of renewable energy sources in municipal buildings</b>	Medium	<10 cents /kWh <sup>1</sup>	Medium	3 months	Municipality	The municipality, External experts

Adapted from the [SEAP ALPS Project](#)

## Energy management for municipal buildings

Energy management for municipal buildings helps municipalities towards the transition to sustainable fuels. It requires four actions to be implemented:

- Energy accounting (a monthly monitoring of electricity, heat and water consumption)
- Education of caretakers
- Regular adjustments to existing technical facilities such as heating, cooling and ventilation systems
- Annual report

<sup>1</sup> Source: Solar Power Europe 2016

## Energy Saving Contracting

Energy Saving Contracting is a possible solution for municipalities that need sustainable financing for public buildings. The energy service company (ESCO) ensures that the action will generate energy cost savings sufficient to pay for the project over the term of the contract.

## Improvement of (municipal) indoor lighting

Indoor lighting can have a significant impact on municipalities' budgets, especially because of the daily energy waste. Replacing normal bulbs with LED lighting is an effective solution to both reduce energy consumption and costs.

## Energy check for municipal buildings

Energy check helps cities in minimizing energy waste in public buildings. These controls, carried out by external experts, reveal the hidden potential and the pitfalls in the energetic system. Combined with proper training for the municipal staff, this solution guarantees energy-saving and promotes awareness-raising.

## Building standards in new construction of municipal buildings

Creating and implementing new standards for building energy efficiency can help municipalities in their transition towards sustainability. Cities that choose these solutions can also provide support to other municipalities, for example through the creation of guidelines and recommendations for implementing the new standard.

## Implementation of renewable energy sources in municipal buildings

Municipalities have a great impact on climate change, they can lead and upstream the transition toward sustainable pathways. Through their production of renewable energy, cities can drive this paradigm switch and can aim to be both economically and energetically independent.

# Good Practices

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The table below presents a summary of the financing schemes and examples of good practices, the city or region where the good practice is located, and the source(s) of funds.

**Table 2:** Good practices

Financing Scheme	City/Region	Good Practice	Source of funds
EPC	Rotterdam (NL)	Rotterdam Green Buildings	European Funding Programmes (INTERREG NEW) + Own Local budget (City of Rotterdam invested EUR 1 million)



Financing Scheme	City/Region	Good Practice	Source of funds
<b>EPC</b>	Greater London Authority, England and Wales (UK)	RE:FIT, The new Re:fit 4 energy performance contracting framework has just been launched, running for the period up to April 2024.	Project Development Assistance (ELENA) EUR 2,884,680 (LDN) EUR 2 228 227 (Wales) + Own Local budget (Greater London Authority GBP 270 000 (approx. EUR 307 000)+ Other public authorities' building owners + public financial institutions and funds such as Public Works Loan Board, Salix or London Energy Efficiency Fund.
	Marche Region (IT)	Marche Project	Eu Funds and regional funds <a href="https://h2020prospect.eu/replicable-practices/public-buildings">Public Buildings - Replicable Practices   PROSPECT+ (h2020prospect.eu), https://h2020prospect.eu/replicable-practices/public-buildings</a>
<b>Third Party Financing - EPC</b>	Ljubljana (SL)	(Energetska ObnovaLjubljane (EOL). So far, 48 facilities have been renovated. Among them, 25 buildings were comprehensively refurbished in accordance with the Regulations on energy efficiency in buildings (PURES) and the requirements laid down in the European Directive on energy efficiency of buildings.	Project Development Assistance (ELENA) + Own Local budget + Private Investments (bank consortium)
<b>ESCOs</b>	PRODESA (GR)	PRODESA aims to assist 7 municipalities in Athens Metropolitan Area to begin energy efficiency and renewable energy projects,using innovative financial tools and attracting private investments.	Public funding + ESCOs + Municipal funding + crowdfunding. <a href="https://h2020prospect.eu/replicable-practices/public-buildings">Public Buildings - Replicable Practices   PROSPECT+ (h2020prospect.eu), https://h2020prospect.eu/replicable-practices/public-buildings</a>
<b>Revolving Funds</b>	Koprivnica (HR)	Koprivnica Fund	Own Local budget (Municipality + Regional Authorities)
	Province of Liège (BE)	RenoWatt	Own Local budget + Private Sector Institutions and Investors + Financial Institutions Instruments (EEEF - Technical Assistance EUR)

# Funding Sources

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How can public authorities finance sustainable energy and climate action projects? There are different options for financing projects – from the city or municipality’s resources through direct budget allocation and via revolving funds to using grants from sub-national or European funds and the involvement of energy service companies (ESCOs) for energy performance contracting and financing by citizens through crowdfunding.

Look at the [quick reference guide](#)<sup>1</sup> for financing opportunities for local climate and energy actions from the Covenant of Mayors. The guide shows who the beneficiaries are, the participating countries, the focus areas, the type of funding, managing structure and coordination, and further information.

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<sup>1</sup> [http://www.covenantofmayors.eu/IMG/pdf/Quick\\_Reference\\_Guide\\_-\\_Financing\\_Opportunities\\_updated2016.pdf](http://www.covenantofmayors.eu/IMG/pdf/Quick_Reference_Guide_-_Financing_Opportunities_updated2016.pdf)

**Table 3:** Source of funds for sustainable energy and climate action projects

No.	Source of Funds	Description
1	<b>Own Local (City or Municipal) or Regional Budget</b>	Funds drawn from the budget of local or regional public authorities
2	<b>National Funds</b>	Subsidies provided by national governmental bodies or funding through grants from national programmes
3	<b>European Funds</b>	Grants and contracts from the European Commission from the Funding and Tenders portal.
	<b>Managed at the EU level</b>	Funds that provide technical assistance and project development, usually for demonstration/pilot projects (e.g. European Innovation Partnership on Smart Cities and Communities, INTERREG Programmes, such as the North-West Europe Programme)
	<b>Managed at the national, regional, or local levels</b>	Funding resources and technical assistance, such as the European Structural and Investment Funds, which are managed by national, regional, or local public authorities in partnership with the European Commission through operational programmes based on strategic goals or investment priorities
4	<b>European Banks</b>	These include European Investment Bank, European Fund for Strategic Investments, Private Finance for Energy Efficiency, European Energy Efficiency Fund, and European Bank for Reconstruction and Development
5	<b>Private funds</b>	Financing provided by private contractors, utilities, by institutional investors, crowdfunding, and through energy cooperatives

## Decision Tree

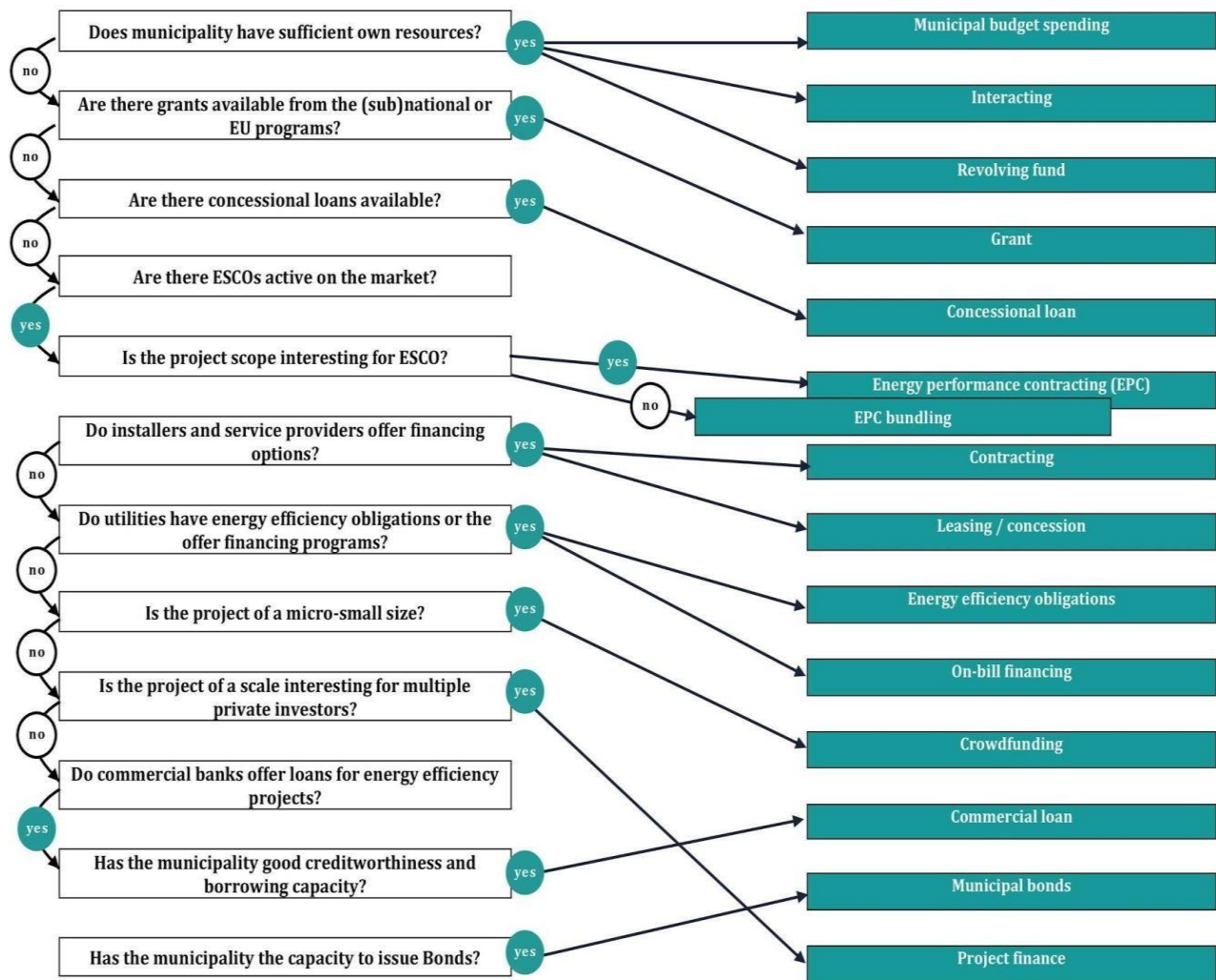
The decision tree represents a flow chart of the most appropriate financing mechanisms to address specific situations faced by municipalities in financing energy efficiency (EE) projects. The scheme is not binding as, in many cases, multiple mechanisms may be combined.

The first thing to address is whether the municipality has sufficient resources to fund the project(s) or not. If the municipality has sufficient financing for the project(s), it can allocate part of its budget for the project(s); by establishing a budget line item for a project and carrying out the mechanism of general budget financing. If the municipality does not have enough funds, it should seek any grants available from donors. If there are available grants, the municipality should apply for them. Often these grants do not cover the entire project cost as they represent a mechanism of partial budget financing. It is often possible that funds may also come from the national government; in this case, the municipality will capture a new budget for financing part of the project(s). If the fund does not come from the national government, it is possible to look for energy efficiency funds; this financing scheme is subject to EE fund eligibility criteria.

Besides these funds, commercial banks can also offer dedicated credit lines and/or risk-sharing programmes. To take advantage of these opportunities, the municipality must respond for its creditworthiness as well as its collateral and borrowing capacity.

Other financing systems can be found in commercial or financial ESCOs; if there are ESCOs in the market the municipality should develop favourable EPCs by negotiating them with ESCOs. If the ESCO is not an option, leasing or vendor financing programmes can be searched. In such a case, when the eligibility criteria are satisfied, similarly to the commercial financing scheme, the municipality should negotiate the leasing or the vendor financing agreement. Finally, if the municipality can issue municipal bonds it should create a municipal bond programme by taking into account the transaction costs and market situations.

Select the relevant financing model for sustainable energy and climate action projects using a simple decision tree below:



Source: Novikova, et al., 2017

**Figure 1:** Decision Tree

# Innovative Financing Schemes

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Innovative financing schemes are non-traditional ways of raising funds and facilitating sustainable energy and climate investments for cities and regions by mixing different sources (own fund, public and private funds) or engaging different partners (e.g. citizens, private sector) aside from established financial institutions (e.g. banks). Considering the frequency of best practices assessed by PROSPECT and PROSPECT+, this handbook will focus on Energy Performance Contracting and Revolving Funds.

**Table 4:** Innovative financing schemes under public buildings

<b>Energy Performance Contracting (EPC) and third-party - EPC</b>	Energy Performance Contracting (EPC) is a method to implement energy efficiency projects, by which an ESCO (Energy Services Company) acts as a unique contractor and assures all of the steps of a project, from audit through installation up to operations and maintenance. The ESCO delivers a performance guarantee on the energy savings and takes responsibility for the end result. The EPC contract is the contractual agreement by which the output-drive results are agreed upon.
<b>Revolving Fund</b>	A fund established to finance a continuing cycle of investments through initial amounts received from its shareholders, creditors or donors and later on through amounts received from reimbursements of provided funding or loans to projects. These recovered funds become available for further reinvestment in other projects under the similar scope (e.g. revolving funds for sustainable energy will use the loans recovered funds to financenew sustainable energy projects).

## Energy Performance Contracting

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What you need to know about energy performance contracting



## What is energy performance contracting?

Energy performance contracting, or EPC, is an innovative financing scheme offered by energy service companies (ESCOs) to public building owners who are in need of energy efficiency (EE) improvements but have limited financial means or technical capacities to implement such projects on their own. What makes EPC innovative is that an ESCO finances the project based on the guaranteed energy savings that will be generated in the future. In principle, the ESCO will only receive service fees – and get the return of investment – once the project delivers energy savings.

## What are the characteristics of EPC?

In EPC, a public building owner and an ESCO engages in a public-private cooperation – formalized by a contract. EPCs are usually long term with about a contract of 8 to 15 years. However, short-term contracts of 2-3 years are also possible for EE improvements that require low levels of investment. EE improvements can range from optimization of lighting, heating and ventilation to replacement or new installations of electrical devices up to deep renovation of building structures. EPC can be applied in public buildings whether existing or new as long as these have energy-saving potential. In EPC, the pooling of buildings is recommended to generate additional cost reductions and create economies of scale.

The difference between an EPC contract and any other turnkey project is that the company offering ESCO is not done once the (re)construction is done but is rather still responsible for the performance of the building(s), the savings that will occur, and the monitoring and building maintenance for the duration of the project. This ensures that ESCO has a stake in the building achieving savings and that the most efficient solution is offered.

## What is the typical content and structure of an EPC Contract?

The EPC contract between a public building owner and the ESCO has the following key elements as outlined in the Energy Performance Contracting Manual ([TRANSPARENSE Project, http://www.transparensen.eu/download-library/epc-manual](http://www.transparensen.eu/download-library/epc-manual)):

- The ESCO guarantees a certain amount of yearly savings (**guarantee of savings**) to be achieved throughout the duration of the contract
- The **volume of investment** to bring the guaranteed savings and a commitment by the client to pay the investment after its installation
- Clear **definition of a reference scenario** (baseline) of the future energy consumption;
- The obligation of the ESCO to provide a **report on yearly savings evaluation** that documents the actual amount of achieved savings in the respective year
- Responsibility of the ESCO for the **design and implementation of the energy-saving measures** correctly
- The obligation of the client to provide pre-agreed **conditions for the implementation** of the energy-saving measures
- The planned **duration of installation** of the investment
- **Ownership transfer** of the installed energy-saving technologies to the client
- **Means of payment** for the services and savings
- Declaration of the **purpose of operation of the facility** on which the contract covers
- **Length of the contract**
- **Method of recalculation** of the guaranteed savings in case any of the input parameters differs from the presumptions defined in the reference (baseline) energy consumption scenario
- **Final report** – prior to the end of the paying-off period the ESCO hands over to the client the final report including the total amount of cost savings, guaranteed savings, given reduction in the price and bonuses calculated for the entire paying-off period, etc.

## What is the role of the ESCO?

An ESCO usually operates as a commercial entity regardless if it is owned by a public entity e.g. public utility company. It also serves as a general contractor that provides the energy services required and offers a service package for the public building owner. ESCOs can provide the whole range of necessary energy services – from planning, management, implementation, and monitoring of energy management services and technical improvements. The ESCO shoulders the associated economic, technical, and administrative risks in carrying out the EE improvements. This, of course, depends on the investment size and contract duration. The main economic risk for ESCOs is not meeting the guaranteed energy savings which means reductions in EPC service fees.

## What is the role of the public building owner?

Public building owners, with the support of local facilitators, can design and plan an EPC project. Public building owners generally have low-to-medium economic risk levels. However, it should be noted that an EPC contract is usually contracted in energy (e.g. amount of kWh save due to the agreed baseline), not actual energy costs. This means that if either building usage levels or the energy prices change, this is a risk for the building owner. Energy savings still keep occurring, but the monetary savings are not evident. On the other hand, should an ESCO fail to provide its services, or should the calculated energy savings be lower than predicted, a public building owner can withhold payments and penalties can be set. Even if the ESCO has designed and planned the EPC project and installed and operated equipment and technical facilities, the public building owner retains full ownership of the public building. As the ESCO is asked to ensure the quality of the technical facilities from installation until the operation, such as repairing damages, the public building owner should grant ESCO staff unconditional access.

## What are local facilitators and their roles?

Local facilitators can be local or regional energy agencies, engineering offices, legal advisers, architects, and economics. Facilitators should be knowledgeable and experienced in EPC concepts and business models, techniques and economics of EE in buildings, and public procedures and codes of conduct. Commercial facilitators can be contracted. However, standard service procurement procedures should be followed. Local energy agencies may be involved without tendering if financed by the membership fees of municipalities. Facilitators can assist in the preparation of EPC contracts, and in managing EPC tender procedures and contract negotiations.

## What other financing sources can be used?

In most EPC projects, the ESCO is mainly the investor and financier. Other financing sources are usually not necessary for EPC projects that require low investments. However, in big projects, such as the deep renovation of public buildings, the owner may share investment costs, avail of subsidies, or makes use of other financing sources. These include subsidies, such as feed in tariffs for power generated from renewables or in combined heat and power plans, on specific technical measures and subsidies on interest rates paid by the ESCO which reduce financing costs. Find out more under *“How can EPC be combined with other financing sources?”*



## How can energy savings be guaranteed?

First, the ESCO and public building owners set the baseline energy consumption of the building prior to EPC. This can be based on the energy consumption costs prior to EPC (the reference year), such as, for example, the energy cost paid by a public building owner at a specific time of the reference year (e.g. € 100 on December 31, 2020). Some EPC contracts are agreed in energy units instead of monetary ones. These can be adjusted based on factors, such as the occurrence of extreme climatic conditions or time and intensity of occupancy. Since the baseline energy consumption is determined in the contract as a fixed rate, any increases in energy prices do not significantly impact the EPC contract.

Using the baseline energy consumption, the ESCO can calculate and guarantee annual energy cost savings to the public building owner throughout the contract period. Both ESCO and the public building owner will establish how to evaluate and verify the energy savings that will be generated after the EE project is implemented. The ESCO ensures that the energy savings will be achieved, while the public building owner guarantees the payment of EPC service fees to ESCO.

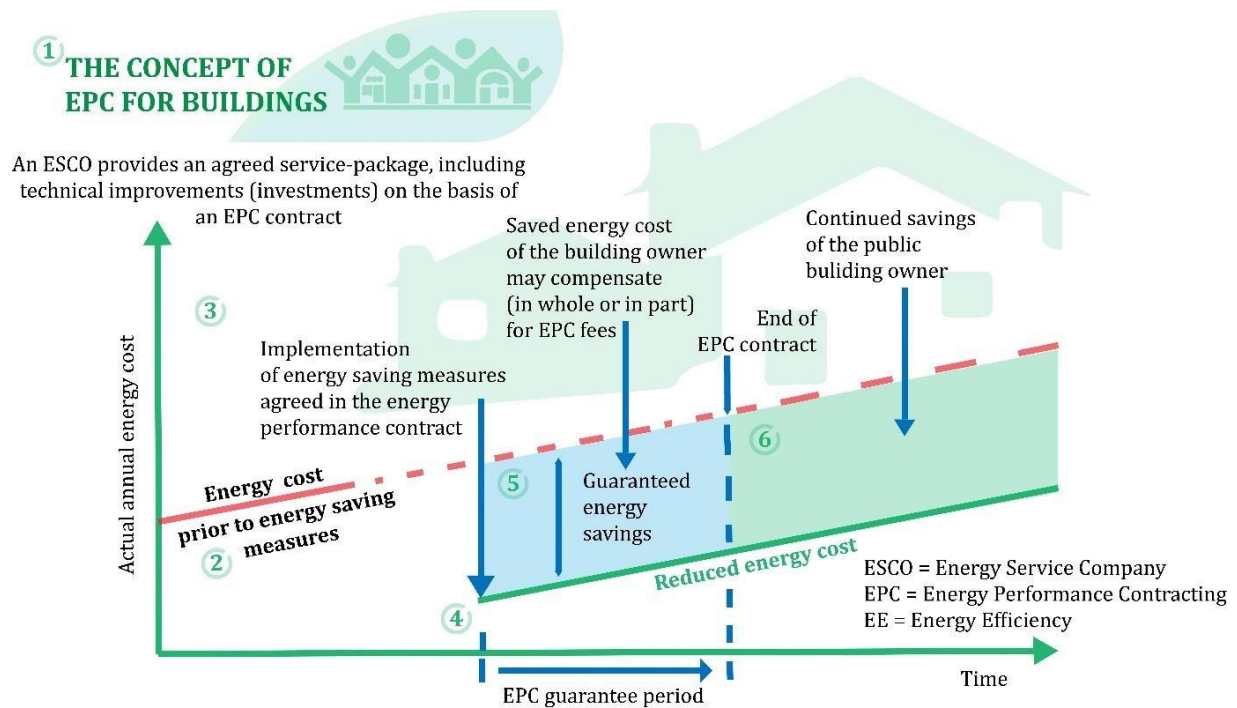
The ESCO provides energy reports and energy savings records. The ESCO should also be transparent in the adjustments of technical parameters, such as in the use and conditions of the building or in the installation and removal of energy devices. Usually, the ESCO conducts periodic metering of consumption using automated systems or by remote access and control.

## How is the EPC service fee calculated?

A fixed proportion of the guaranteed savings will be the EPC service fee which the ESCO gets from the public building owner to attain a profit margin and maintain the installations. The remaining proportion can be kept by the public building owner, or shared among the two parties, depending on the mutual agreement. In EPC, the yearly EPC service fee remains constant throughout the duration of the contract. The EPC contract is not affected by rising energy prices although this can be reflected in the energy bills.

The service fees for EPC are calculated to ensure repayment of all costs of the ESCO as well as the expected return of investment. However, the fees should not go beyond the value of the guaranteed savings in the baseline year. The payment can be received either partially or in whole, depending on the agreement. Likewise, the payment scheme can be arranged.

1. EPC is a contractual agreement between an ESCO and a public building owner
2. The Baseline energy consumption of the public building is set during the reference year
3. Energy-saving measures, including installations of technical facilities, are implemented
4. Once the energy-saving measures are completed, the EPC guarantee period starts
5. Saved energy costs of the building owner may be used in whole or in part for EPC service fees
6. When the EPC contract ends, the continued savings are retained by the public building owner



Source: GIZ in EnPC – INTRANS (2015)

**Figure 2:** EPC: In Summary

## What are the advantages of EPC?

- The investment risks are transferred from the public building owner to the ESCO
- Usually no investment or up-front capital required from the business owner
- ESCO provides the required energy services which the public building owner benefits from
- ESCO guarantees EE improvements which serve as the basis for their payments
- Maintenance costs are transferred from the building owner to ESCO during the contract duration
- The value and productivity of public buildings are optimized through ESCO's professional services

## What are the common incentives for EPC?

The development of EPC is facilitated by the following:

- EPC guidelines, tools, and sample contracts available in the country (or under preparation)
- National or regional databases of ESCOs and facilitators
- National and regional competence centres promoting EPC
- Promotion of inter-municipal cooperation and/or pooling of public buildings in EPC projects
- Trade associations of ESCOs promoting EPC as a business model

- Regional and local energy agencies and/or associations of local authorities promoting and facilitating EPC

#### *Political and legal incentives*

- High political commitment to EE and economic energy savings at the national level
- National EE law and supporting laws promoting EE in public buildings
- EE objectives and standards for public buildings stipulated in national policies and programmes
- Promotion of EPC as an innovative EE service in regional and national programmes and policies

#### *Economic*

- The expectation of increasing energy prices
- Energy-saving insurances for new ESCO
- Higher market value and increasing comfort level of renovated buildings
- Feed in tariffs for renewable energies

#### *Financial*

- Limited municipal budgets increase the interest in EPC as a financing model
- Subsidies for municipal EE programmes and projects (planning and implementation)
- Tax incentives

## What are the common barriers to EPC?

#### *Political and legal*

- Procurement rules and procedures for public authorities (complex tendering procedures)
- Restrictive regulations concerning financing cooperation of public authorities with the private sector
- Little interest in EPC as a financing tool among municipal decision-makers
- Requirements concerning the comparison of EPC and building owners' investment

#### *Administrative*

- Lack of understanding of the EPC concept among municipal decision-makers and initiatives
- Lack of qualified and motivated personnel in some public administrations or public services
- Non-transparent, lengthy, or complex decision-making processes in municipalities
- Competition between investments in EE and investments in other public services
- Distributed responsibility for buildings, energy bills, maintenance, and operation of facilities in municipal administrations
- Lack of finance and/or personal capacities for project preparation, tendering, contract negotiation

#### *Economic*

- Risk of incorrect calculation of baseline consumption
- Decreasing energy prices for fossil fuels
- Feasibility of EPC only for bigger buildings
- Long payback time

### *Financial*

- High cost of loans
- High planning and bidding cost
- Limited access of ESCOs to bank loans

### *Technical*

- Lack of experience in the calculation of baseline consumption
- Lack of attractive best-practice examples in the country
- Lack of know-how and experience among local public utilities
- Lack of calculation tools and sample contracts
- Lack of qualified local facilitators promoting EPC projects
- Lack of local ESCOs offering EPC services

### *Other barriers*

- The bad reputation of EPC among public administrations and decision-makers
- High barriers to the market entrance of new ESCOs
- Poor image of ESCOs among public administrations and decision-makers
- Lack of information on EPC in public buildings

Would you want to know more incentives and barriers – and whether these apply to your country or not? Take a look at a summary of these incentives and barriers across nine (9) European countries from [EnPC – INTRANS](http://www.enpc-intrans.eu/language/en/project/), <http://www.enpc-intrans.eu/language/en/project/>.

## Are there guidelines for managing EPC projects?

The EPC Code of Conduct promotes a professional and transparent approach to managing EPC projects. There are nine (9) guiding principles:

1. The EPC provider delivers economically efficient savings
2. The EPC provider takes over the performance risks
3. Savings are guaranteed by the EPC provider and determined by M&V
4. The EPC provider supports long term use of energy management
5. The relationship between the EPC provider and the client is long-term, fair, and transparent
6. All steps in the process of the EPC project are conducted lawfully and with integrity
7. The EPC provider supports the client in the financing of the EPC project
8. The EPC provider ensures qualified staff for EPC project implementation
9. The EPC provider focuses on high quality and care in all phases of project implementation

Learn more about the EPC Code of Conduct from [TRANSPARENSE](#).

## What are the business models for EPC?

There are three business models for EPC. The major differences lie in the scope of planned investment, targets for guaranteed energy savings, and contract duration. These business models may have overlaps as projects may mix different features. Below we bring an overview of EPC models of different scopes, straightforwardly named “basic”, “light” and “plus” as in the EnPC – INTRANS project.

## EPC Basic

EPC Basic is the most common EPC business model that aims to facilitate investments in fast-paying EE improvements or those that can generate a high energy savings effect.

**Table 5:** Features of EPC Basic Business Model

Features	Description
<b>State of building and planned investment:</b>	The building still serves its purpose and there are plans for the building to be used for a prolonged future period (at least as long as the EPC contract is in force), but the energy systems installed and used in the building are outdated and inefficient. Energy rehabilitation of the building is planned.
<b>Energy savings guaranteed:</b>	Typically, 20-60% compared to the baseline
<b>Investor:</b>	ESCO or building owner (making use of subsidies, if available)
<b>Financing:</b>	ESCOs own equity, loans, subsidies, financial contributions from the building owner
<b>Contract duration accepted in the market:</b>	5-15 years

**Box 1:** Case Study Example for EPC Basic Business Model

Case study: Oberndorf, Germany

EPC business mode: EPC Basic

Basic description: A pool of seven municipal buildings

Total bid price: 2.521 Million Euro

Guaranteed savings: 0.216 Million Euro (i.e. ~ 64%) less energy cost per year

Contracting period: 11 years and 8 months

What were the contracted measures?

- Establishment of a building management system
- Different renovation measures per building, including e.g.:
- Replacement/renovation of HVAC units (central heating / cogeneration / biomass)
- Rehabilitation of lighting systems in a sports hall
- Replacement of thermostats in a conference building
- Insulation of the upper ceiling in a school

Source: Kea in EnPC – INTRANS

## EPC Light

In this business model, the ESCO is contracted to optimize technical facilities to facilitate EE. However, EE improvements are realized with little to no investment in technical facilities.

**Table 6:** Features of the EPC Light Business Model

Features	Description
<b>State of building and planned investment:</b>	All public buildings with energy savings potential
<b>Energy savings guaranteed:</b>	Typically 10-20% compared to the baseline
<b>Investor:</b>	ESCO (usually only minor equipment)
<b>Financing:</b>	ESCO bears only the staff cost
<b>Contract duration accepted in the market:</b>	2-3 years

## EPC Plus

Under EPC Plus, the ESCO's services extend to comprehensive structural measures. Here, the investment costs may be shared between the ESCO and the public building owner. Other financing sources can be explored.

**Table 7:** Features of EPC Plus Business Model

Features	Description
<b>State of building and planned investment:</b>	A building does no longer serve its (current or future) purpose. Building and installed energy systems are outdated and/or dysfunctional. Deep renovation/rehabilitation is more economic than constructing a new building. Deep renovation is planned.
<b>Energy savings guaranteed:</b>	Ideally >70% compared to baseline
<b>Investor:</b>	ESCO or building owner share the investment cost (both making use of subsidies, if available)
<b>Financing:</b>	ESCOs own equity, loans, subsidies, financial contributions from the building owner
<b>Contract duration accepted in the market:</b>	10-20 years

## Box 2: Case Study Example for EPC Plus Business Model

Case study: Hanzehal Zutphen

EPC business model: EPC Plus

Basic description: large sports and events facility buildings

Contract duration: ~11 years

Total bid price: Approx. 500,000 EUR of which 210,000 EUR for energy saving measures (paid back from energy savings).

Initial energy costs (baseline): 65,000 EUR/y

Guaranteed savings: 19,000 EUR/y (i.e. 30% (gas) and 7% (electricity))

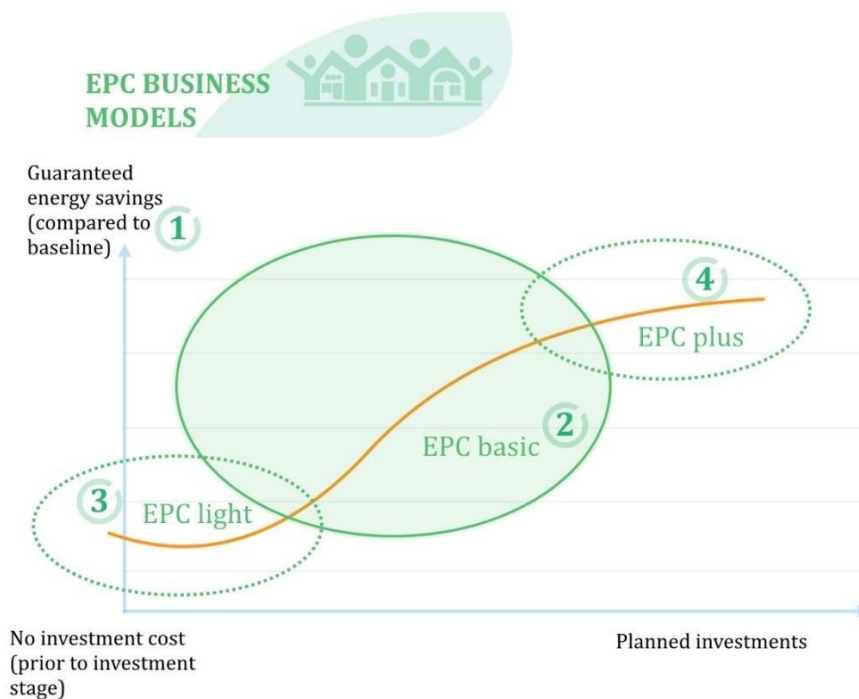
Reduction of CO2 emissions: 40 t/y (guaranteed)

Contracted measures:

- Roof renovation and insulation
- Wall insulation
- Solar PV / solar water heating
- Sensor lighting
- Building management system
- Contract-related figures:

Source: Transparence in EnPC – INTRANS

EPC plus projects are the most beneficial in terms of a high energy savings guarantee. However, for most public building owners, a starting point can be EPC basic or EPC light business models. Find out more about the business models and their corresponding features by looking at the Comparative Overview of EPC business models at EnPC - INTRANS.

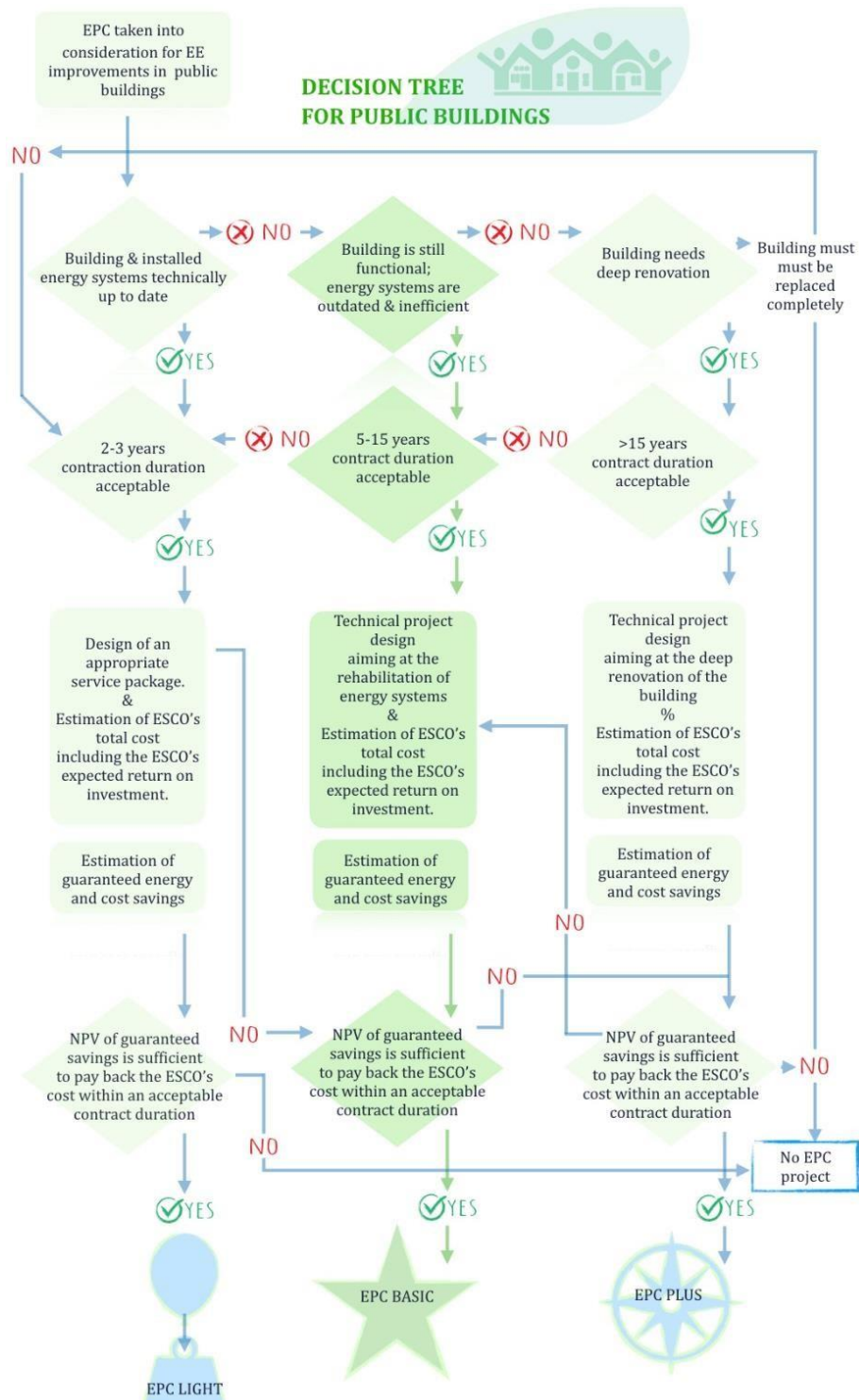


Source: EnPC – INTRANS (2015)

Figure 3: EPC Business Models

# How can building owners decide which business model to use?

Use this decision tree to select the appropriate business model for public buildings in your city. Find out which EPC business model you can use based on your context.



Source: EnPC – INTRANS (2015)

Figure 4: Decision tree



Note: The net present value (NPV) of guaranteed savings is very important to identify the complete cost that may be financed by the ESCO. The investment volume and services depend on the guaranteed energy savings and the contract duration. Learn more about the variations on EPC business models that have been applied in Europe and its framework conditions in the toolbox.

## What are the key lessons learnt from EPC projects?

### *Contract and finance*

- Available subsidies and grants should be used and included in the financial concept for an EPC project
- Bundling of buildings in one EPC helps in decreasing transaction costs and creating economies of scale
- EPC may also include solutions to non-energy problems in the buildings (e.g. fire protection) in the same contract
- Besides the energy and maintenance savings, EPC plus can integrate non-energy related savings (health and safety requirements, comfort improvements, increased building value, and others)
- A neutral and qualified third party acting as an arbitrator should be nominated in the contract and its decisions acknowledged in advances as binding by both parties
- Financing options for EPC projects
  - Very good experience exists with financing by EE Funds
  - Additional financing by the building owner can be helpful for the financing of the EPC
  - Insurances for the calculation of savings are an appropriate instrument to mitigate the risks for ESCOs, in particular for new un-experienced ESCOs

### *Facilitator*

- Most public building owners rely on proficient facilitators in
  - Project planning and preparation
  - Investigation and activation of potential grants and subsidies from local, regional, national, and EU sources
  - Compilation of tender documents and assistance with the tendering process
  - Tender evaluation and contract negotiations
  - Quality control of provided installations and services
  - Measurement and verification of achieved savings
  - Checks and approvals of EPC's bills
  - Verification of possible financing instruments (soft loans, instruments, and grants)
- The capacity development of local facilitators is, therefore, a priority for the development of local capacities for EPC in public buildings

### *ESCOs*

- For new ESCOs access to the EPC, the market relates to high economic and administrative barriers
  - Economic and technical risks are rated high by most of the interested companies

- New ESCOs usually must provide additional bank guarantees or insurance which increases the cost

### *Process*

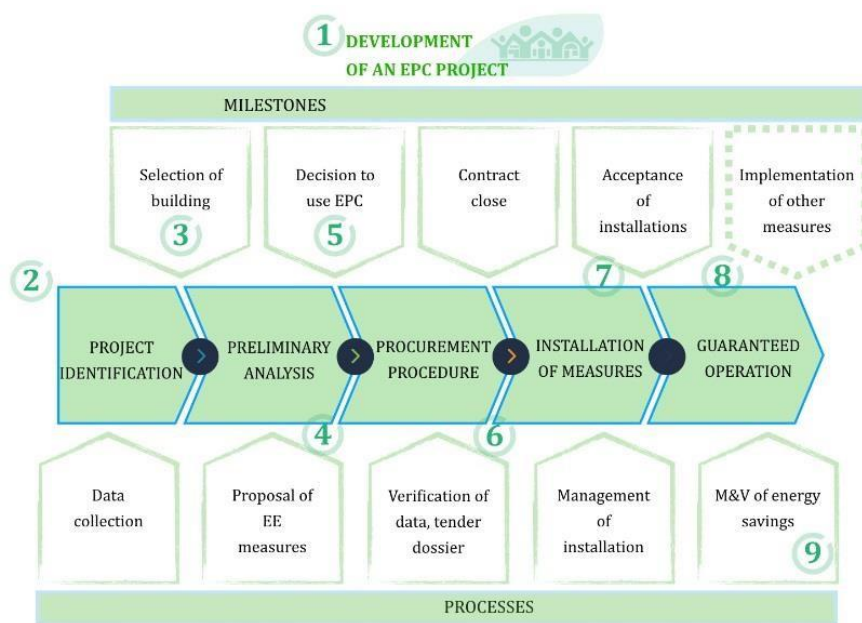
- Monitoring and verification of guaranteed savings are often complex and may lead to debates between the ESCO and the building owner
- Adjustments may be required regularly, depending on, for example:
  - Weather conditions
  - Changes in consumer behaviour
  - Type, intensity, and frequency of building use
  - Installation of additional, or removal of old consumer device
  - Replacement of old consumer devices with new, more energy-efficient devices
  - Changes in building structure (additional renovations) and installed facilities
- Simplified measurement and verification methods as well as key performance indicators, if agreed upon by both parties in advance, may help to reduce both complexity of calculations and reasons for debate

Source: EnPC – INTRANS (2015)

# How to develop energy performance contracting for public buildings

## Project Development Phase

In developing an EPC project, there are five subsequent phases, namely (1) project identification, (2) preliminary analysis, (3) procurement procedure, (4) installation of measures, and (5) guaranteed operation. Each phase has a corresponding process and milestone.



Source: EnPC – INTRANS (2015)

Figure 5: Development of an EPC project

## Project Identification

A public owner's building stock can be screened and identified for its energy savings potential once there is political commitment to improve energy efficiency in public buildings. The buildings that are most suitable for EPC projects can be further selected.

### How can data be collected for project identification?

For project identification, the first process is **data collection**. This can be done depending on the availability of energy audits. The data collection process can then be done in two ways, depending on:

- With up to date energy audit
- With no existing energy audits

Data collection will be followed by an analysis of savings potentials depending on the targeted EPC business model, followed by a calculation of energy performance indicators.

### **How can building(s) be selected?**

The milestone for the project identification phase is the **selection of the building**.

Different data sources can be examined to select EPC projects. These data sources include energy audits or energy performance certificates, data on energy consumption, contracts on energy delivery and energy management, and results of on-site inspections.

### **Which criteria can be used to select EPC projects?**

The following three (3) criteria matter in selecting EPC projects.

1. Current high energy cost. Low energy cost means the insufficient monetary value of savings, while high energy cost provides opportunities for repayment of the EPC project investment cost from guaranteed savings.
2. Obsolete or non-functioning energy facilities and need for new standards to be achieved. If the energy facilities are up-to-date, there is the likelihood that EE improvements may not pay off during the EPC guarantee period.
3. Future use of building or if the planned purpose is ensured. Measuring and verifying the energy savings will be difficult if the building will not be used or if the intensity significantly changes during the EPC guarantee period.

## **Preliminary Analysis**

After project identification, the next phase is a preliminary analysis. *“For each building taken into consideration, a rough analysis of building conditions and saving potentials has to be performed to provide a sound basis for the development of tendering documents.”* (EnPC-INTRANS, 2016a)

The process entails the **proposal of EE measures**, while the milestone for preliminary analysis is the **decision to use EPC**. The decision to use EPC instead of implementing a project in the traditional owner-directed way should be taken based on the comparative economic assessment of options. Limitations, if any, of the public building owner’s technical and financial capacities should be taken into consideration.

### **Which points of view matter in EPC projects?**

There are two views that matter for an EPC project: the public building owner’s and the ESCO’s.

For a public building owner, EPC is very appealing if the annual EPC service fees are less than or equivalent to the monetary value of the annual guaranteed savings. The monetary value of the guaranteed savings is calculated based on the energy price paid during the baseline year (fixed price basis).

Among ESCOs, two assessments matter: 1) an assessment of the net present value (NPV) of cash flows during contract duration and 2) an assessment of the internal rate of return (IRR). EPC is very attractive for ESCO the higher the total net present value (NPV) of all cash flows in the project is and the higher the IRR of the project will be.

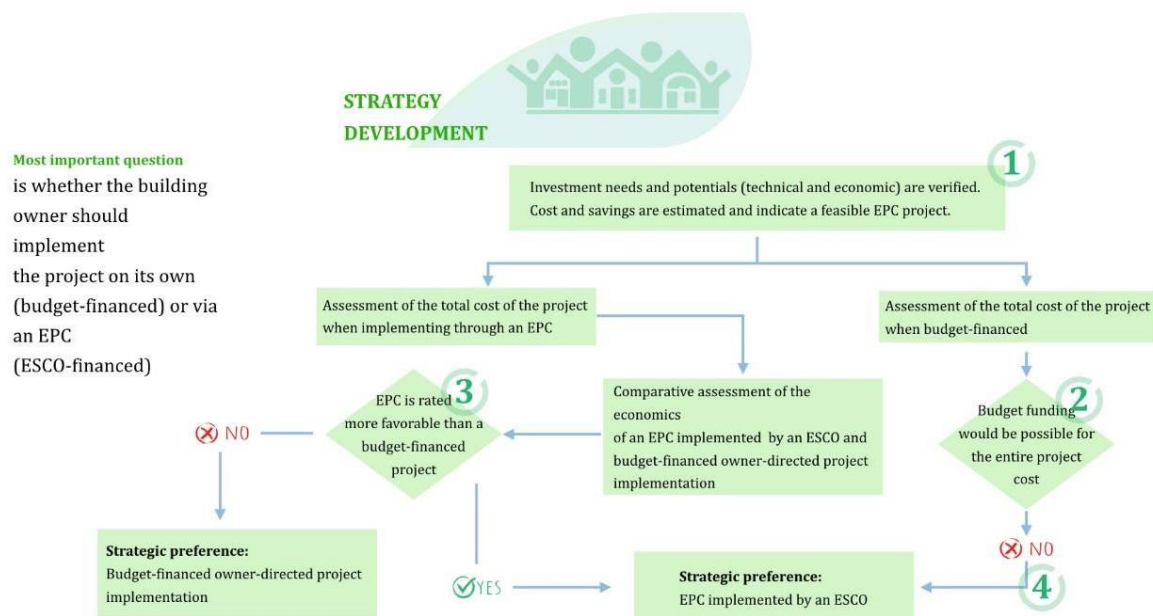
To attract qualified bids, EPC projects must be economically feasible from a commercial point of view.

### How can economic pre-feasibility be assessed?

An interested party can examine the economic pre-feasibility assessment of an EPC project from a commercial point of view using a tool from EnPC – INTRANS.

**Note:** Results created with this tool cannot replace a detailed economic assessment or a feasibility study in any case.

### How can a building owner decide whether to fund the project via EPC?



Source: EnPC-Intrans (2015)

**Figure 6:** Strategy Development for EPC Project

1. *Investment needs and potentials (technical and economic) are verified.* This basic information was gained during a rough analysis performed at the pre-tendering stage.
2. *Budget funding would be possible for the entire project cost.* If budget funding is possible for the entire project cost, there are still important potential benefits of EPC to be taken into consideration (e.g. transfer of risk, mobilization of ESCO's technical know-how and service capacities).
3. *EPC is rated more favourable than a budget financed project.* Public building owners are always obliged to go for the most economical option. Therefore, permitting of EPC projects in public buildings is often depending on the proof of economic advantages of projects compared to traditional (owner-directed) public investment projects for the building owner (additional benefits are often not taken into consideration by permitting

authorities. Although this has been proven already in many completed EPC projects in

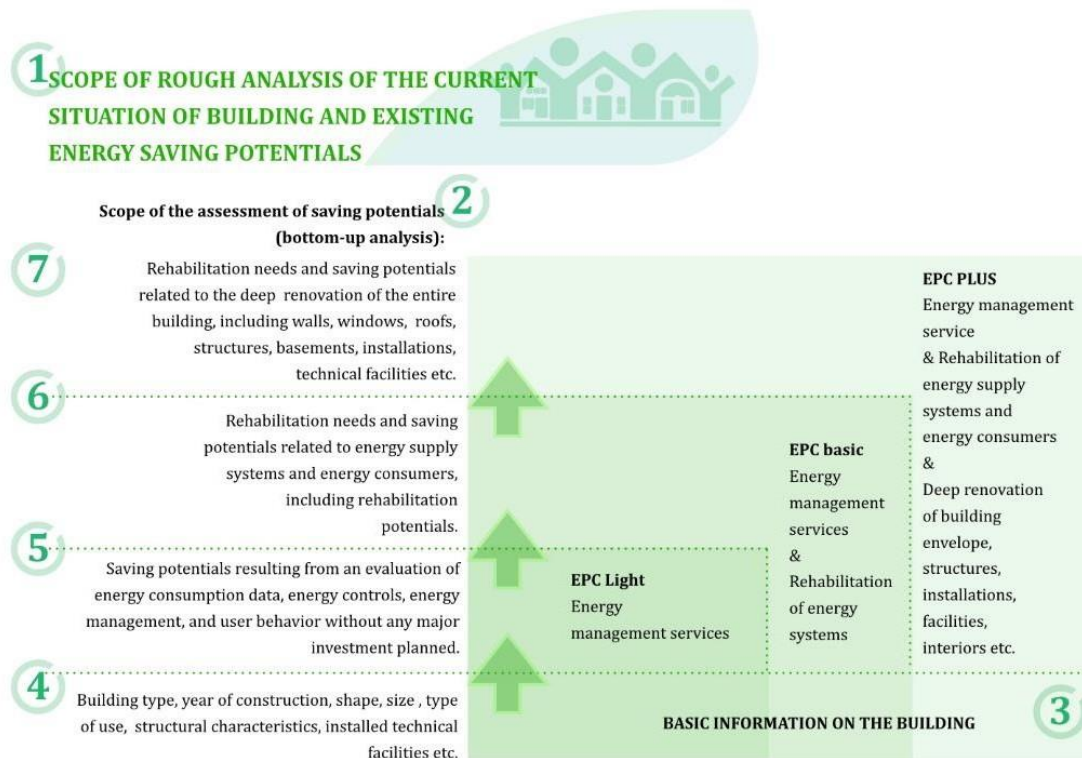
Europe in ex-post evaluations, major barriers to the permitting of EPC projects may still occur from:

- a lack of permitting authorities' trust in EPC business models,
- a lack of experience in the comparative assessment of EPC projects,
- a lack of life-cycle-cost perspective in public investment planning,
- and a lack of accepted methods for such a comparative assessment when performed ex-ante during permitting procedures.

It is therefore recommended to study the national budget laws and regulations carefully in advance to make sure that the results of the comparative assessment of EPC project economics are finally accepted by relevant permitting authorities.

4. *The lack of own budget for the financing of investments in EE improvements is still the major incentive* for many building owners in emerging ESCO markets to make use of EPC business models.

**How can the current situation of the building and existing energy-saving potentials be analysed?**



Source: EnPC-Intrans (2015)

**Figure 7: Current situation for energy saving potentials**

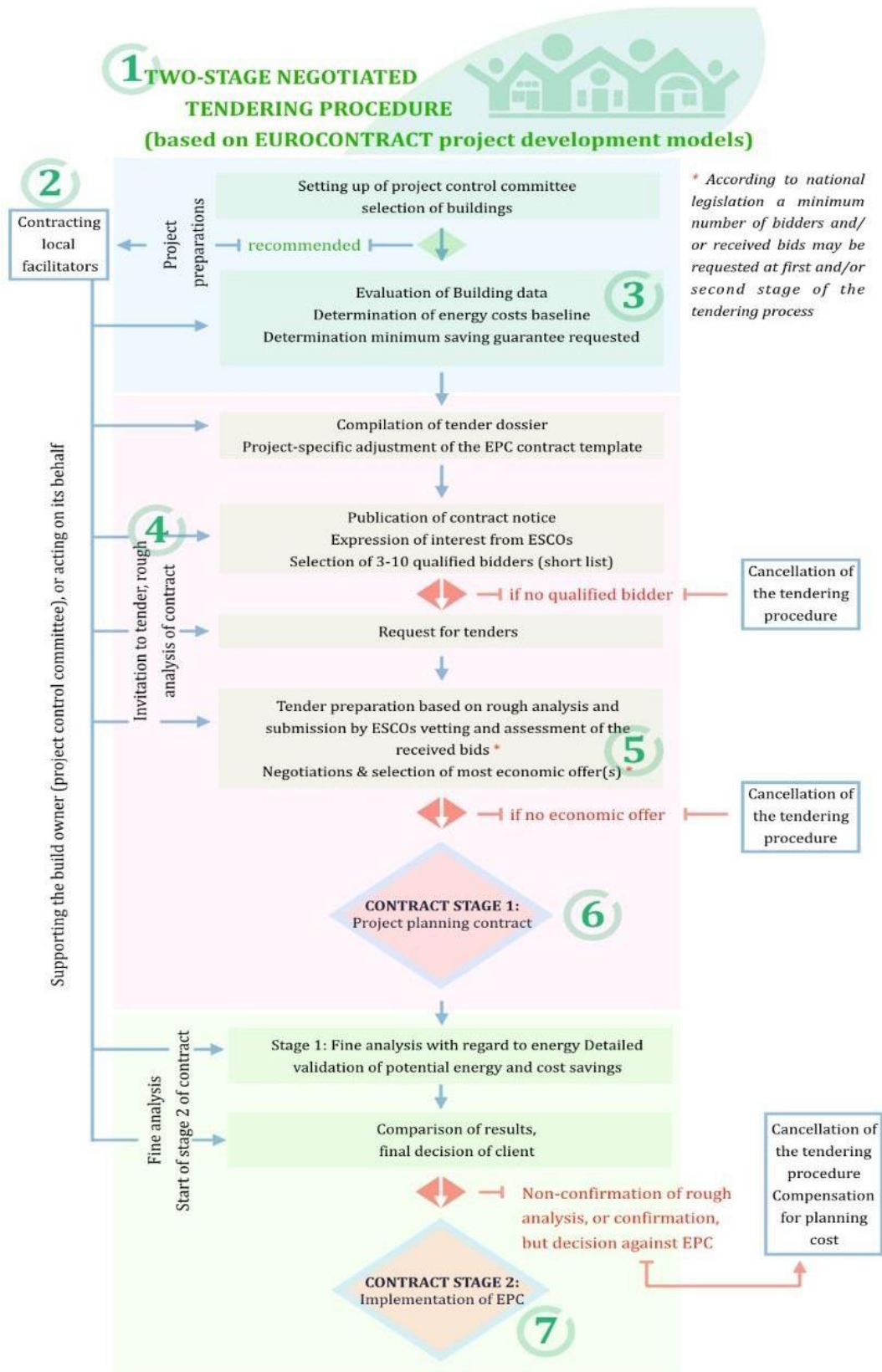
1. Basic information about the building: A checklist for onsite inspections (rough analysis) performed during the preparatory phase of an EPC project is available.
2. The basic information on the building is required as the basis for the planning of any kind of EPC project
3. Rough analysis for the preparation of an EPC light project may focus on the assessment of energy saving potentials related to improved energy controls, facility management, management of building use, and use behaviour without any major investment.
4. In most EPC projects (usually developed on the basis of EPC basic business model), the analysis is focusing on the identification and assessment of fast-paying energy-saving measures creating a relatively high energy-saving effect per invested amount. This may include the improvement, rehabilitation, or replacement of outdated and inefficient energy supply and distribution infrastructure in a building. Many projects include a fuel switch e.g. from decentralized heating to district heating, a switch from heating only to combined heat and power generation units, or a fuel switch from fossil to renewable energies. Additional measures e.g. thermal insulation of hot spots may also be of interest.
5. Deep renovation of a building (EPC plus) requires a comprehensive analysis of all building components to allow for developing an outline of a comprehensive refurbishment programme for a building which may be discussed e.g. in competition to concepts for the construction of a completely new building instead.

## Procurement Procedure

The phase of the procurement procedure entails a process of **verification of data, tender dossier**, while the milestone for this phase is the **closing of the contract**.

Procedures must follow rules for EU and national public procurement. There are two options: a two-stage negotiated tendering procedure and a single-stage negotiated procedure.

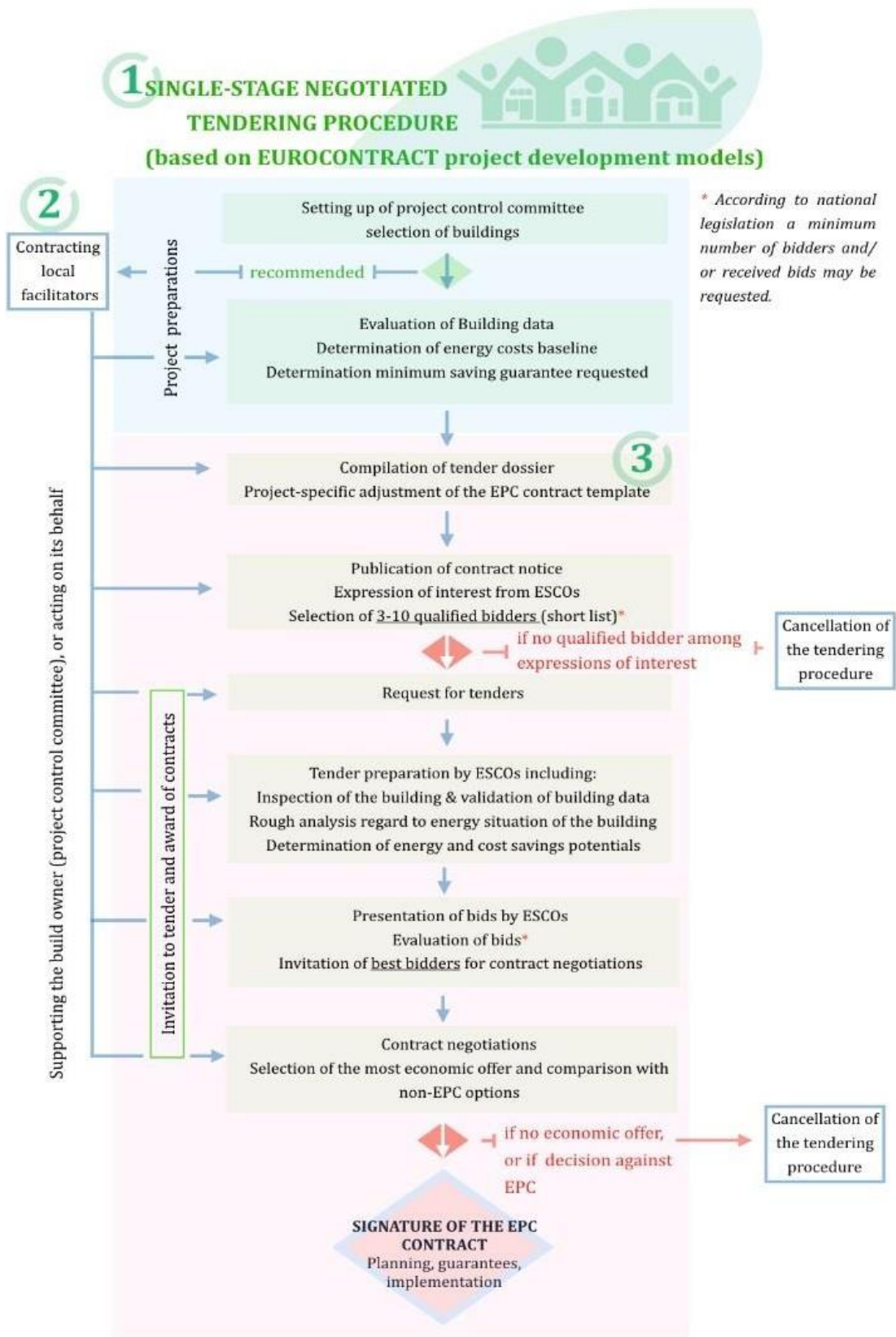




Source: EnPC-Intrans (2015)

**Figure 8:** Two-stage negotiated tendering procedure

1. Practitioners recommend using the two-stages approach for the tendering of EPC projects because
  - a. Project preparation effort is relatively little prior to entering into the tendering stage
  - b. A major share of the project planning cost is transferred into the contract scheme and may be included in the services covered by EPC fees
  - c. Detailed planning is performed by the ESCO during the first contract phase
  - d. Little upfront costs are to be paid by the building owner
2. The first step in the preparation of tendering procedures should always be the contracting of a local facilitator supporting the public building owner during the tendering process and beyond
3. A rough analysis of the building conditions and existing energy saving potentials provides the basic input for the tender dossier
4. At least 3-5 ESCOs (if no other stipulations are made in national law) should be invited to submit their tenders. If more than 5 ESCOs submit their applications, transparent selection criteria must be applied. Qualification criteria can include the economic capacity of the ESCO measured in turnover in energy services and in particular in EPC and the number and relevance of (up to 5) own reference projects based on ESCO/EPC business models. Eligibility criteria, for example, can include professional or trade register extract; proof of liability insurance (with minimum coverage level); legally required licenses and certificates; corporate structure (legal status, statuses, shareholders); declaration concerning payment of legal taxes and duties; a number of employees (e.g. during the past 3 years); economic, technical and financial capabilities. Additional criteria, for example, can include a commitment to the European Code of Conduct. Clear information on the selection criteria and ratings must be included in the tender dossier, especially in the Call for Expressions of Interest.
5. Proposed selection criteria for the identification of best initial tenders can include, for example:
  - a. Project concept (weight 50%)
  - b. Net present value (NPV) of guaranteed savings (weight 20%)
  - c. Net present value of net income of building owner (weight 20%)
  - d. CO2 emission reduction in tons/year (weight 10%)
6. The subject of negotiations with ESCOs may be, for example, the extent and quality of the designed measures, preserving requested the parameters of internal environment, observing the existing standards and laws, compatibility with the existing equipment, schedule of activities; calculation of guaranteed savings in referential and real prices; determining the reward for the applicant, and the share of the contracting entity on extra savings; and contracting entity requirements, call to adjust the tender.
7. Stage 2 of the contract starts only if the fine analysis confirms the assumptions made during tender preparation based on previous rough analysis.



Source: EnPC-Intrans (2015)

**Figure 9:** Single-stage negotiated tendering procedure

1. Single-stage negotiated tendering procedure is possible if required by national law.
2. Services of local facilitators during tendering preparation have to be more comprehensive.
3. The tender dossier must be very detailed and specific in technical and economic terms. The rough analysis is not sufficient as the basis for a tender dossier in a single-stage tendering of EPC projects. Therefore, the tender preparation cost for a single-stage tendering is usually higher than for a two-stage tendering process. The tendering procedure may however come to an earlier end (contract close).

## Installation of measures

In this phase, agreed measures are implemented during the preparatory phase of an EPC contract implementation – and before the commencement of the guarantee period. The process in this phase involves the **management of installation**, while the milestone is the **acceptance of installations**.

## Guaranteed operation

The phase of guaranteed operation starts when the agreed measures are accomplished by the ESCO and the public building owner have completed the provisions in the EPC contract. The process entails **monitoring and verification of energy savings**, while the milestone for this phase will be the **implementation of other measures**.

# What are the sources of finance for EPC?

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## Box 3: Own local budget

Location: Flemish Region (BE)

Project: Regional Energy Services Company Vlaams Energiebedrijf - VEB

### Results

This two fold model, which encompasses both energy supply and energy efficiency for public buildings has been qualified as having high scalability by CITYinvest.

By May 2015 its supply arm had already generated savings of EUR 12 million, 20% of the region's total energy bill, EUR 9.8 million directly in energy savings and EUR 2.2 million in admin and billing expenses, while only delivering to 8% of the total market.

In terms of energy efficiency, the VEB has one project with OPZC Rekem (Psychiatric centre) successfully tendered based on the EMPC model, and is currently in the process of tendering two other projects: De Vlaamse Opera (Flemish Opera) and BLOSO Gent (Regional Sports administration of Flemish authorities).

References:

<http://www.cityinvest.eu/content/vlaams-energiebedrijf>

## Box 4: Own local budget and private sector institutions and investors

Location: Umea, Sweden

Project: Creative financing for energy renovation

### Results

This is Sweden's largest energy performance contract (EPC) project, combining private investment from Siemens with public funds.

130 properties were retrofitted (425,000 m2 floor area, 50%+ of total area of municipally owned buildings) over 8 years from 2008-2016. Consistently exceeding its targets, the total investment of EUR 15.2 million has resulted in an annual saving of EUR 1 million from an energy reduction of 20%, along with a decrease in CO2 emissions by 5,800 tons/year and a number of other, smaller benefits.

This project has been chosen due to its ambitious scale, its recent completion and the highly beneficial ratio of investment/return for the municipality.

References:

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<http://www.umea.se/download/18.65c1214d14f38ac155364e34/1446109851846/01.+Climate+change+Mitigation+and+Adaptation.pdf>

### Box 5: Own local budget and European Funding Programmes

Location: Rotterdam, the Netherlands

Project: Rotterdam Green Buildings

#### Results

This project combines European Structural Investment Funds (ESIF), municipal investment, and energy service company (ESCO) funding. It has already achieved scale-up from its pilot phase.

The pilot, focused on public swimming pools, raised an investment of EUR 2.6 million, 10% from equity provided by the ESCO, 90% from bank loans to the ESCO. It resulted in improved energy efficiency of 34%, and savings on gas, electricity, heating and water of 43%, 56%, 35%, 9% respectively, representing a CO2 emissions decrease of nearly 2,000 tons. Additionally, there was a saving of 15% in maintenance costs, and in seven of the nine pools the water quality actually improved too.

#### References:

<http://www.cityinvest.eu/content/rotterdam-green-buildings-0>

Find out more about the best practices in EPC for public buildings through the compilation of best practices from the [EnPC INTRANS Project](#).

## References

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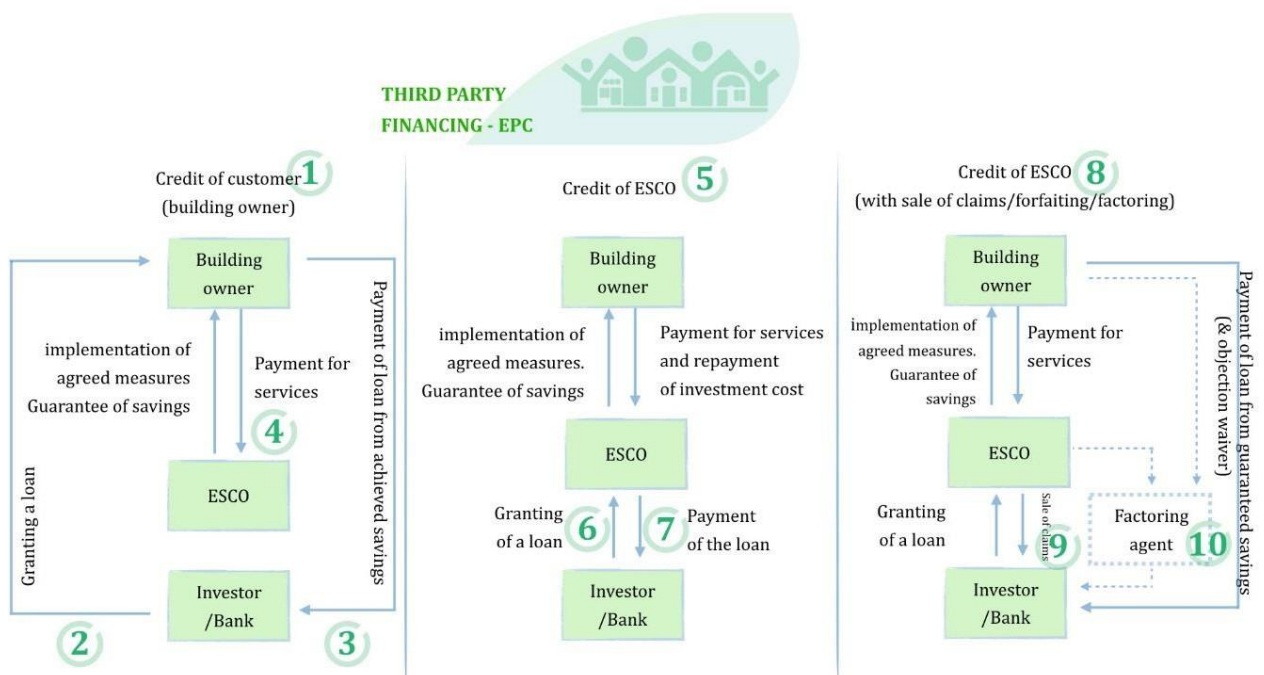
## Related Projects

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- **CombineS:** Combing energy services with subsidy schemes to finance EE in Central Europe
- **EFFI:** Efficient implementation of energy services in SME
- **EnPC Intrans:** Capacity building on energy performance contracting
- **ENTRANZES:** Policies to enforce the transition to nearly zero energy buildings in the EU-27
- **EUROCONTRACT:** European platform for the promotion of energy performance contracting
- **EPC\_PLUS:** Energy performance contracting plus
- **TRANSPARENSE:** Increasing transparency of energy services markets

# Third Party Financing - EPC

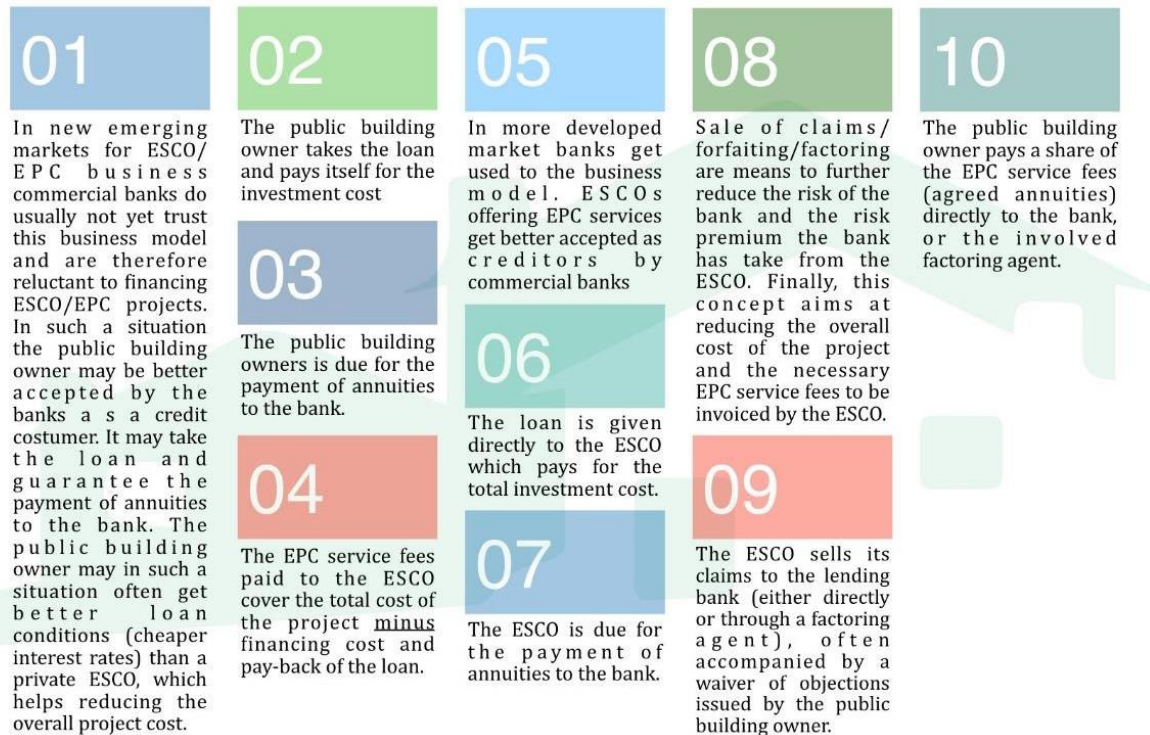
In developed EPC markets, the most common financing model for EPC is third-party financing. Third-party financing can be described as debt financing – wherein the building owner acquires financing resources from a third party, usually investors or banks, instead of getting these from the internal funds or the ESCOs. The ESCOs offer guaranteed savings to accommodate the repayment of the debt during the duration of the contract. These guaranteed energy savings offer positive project cash flow and minimize the risk of repayment to the bank. In this arrangement, the interest costs during the period of construction and installation are included in the project financing agreement.



Source: ENPC-Intrins (2016)

Figure 10: Third-Party Financing





**Figure 11: EPC Process**

**Box 6: EPC in Ljubljana**

Scheme: Third party financing – EPC

Location: Ljubljana, Slovenia

Project: Energetska Obnova

Ljubljane (EOL)

Sources of funds: Project Development Assistance (ELENA) + Own Local budget

+Private Investments (bank consortium)

Results

With a total cost of EUR 1,498,400, 90% supplied by ELENA, this project mobilized investment of EUR 50,700,000. The replication potential is considered high, notably the use of ESCOs for energy efficiency and renewable energy products. The largest project of its kind in Slovenia, it may become the model for similar projects in the country. To achieve economies of scale, several tenders have been organised for groups of similar buildings, or buildings looking to implement the same green technologies. It has resulted in total energy savings of 79 GWh per year, achieving a 24,593 tons annual reduction of CO<sub>2</sub>.

References:

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[http://www.transparens.eu/tmce/Gradiva/7-the\\_energy\\_retrofit\\_programme\\_by\\_loose.pdf](http://www.transparens.eu/tmce/Gradiva/7-the_energy_retrofit_programme_by_loose.pdf)

# Revolving funds

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## What you need to know about revolving funds



## What are revolving funds?

A revolving fund is a pool of capital replenished by the **cost-savings** from energy efficiency and renewable energy projects or by the **interest** paid by the sustainability measures financed by the fund. These cost-savings or interest revenues continuously finance new investments in similar projects, resulting in a sustainable funding cycle.

## What are the types of revolving funds?

There are two types of revolving funds:

1. **External revolving fund:** it is often developed and managed by a selected fund manager (with its compensation tied to the fund's performance), or by a utility or specially created organisation. This type of revolving fund lends to multiple municipalities, which must repay the loan on an agreed date. It can *"contract EE service providers, or ESCOs, to implement the projects for the borrowing municipalities, possibly with incentive payments linked to the achievement of expected savings"*. (ESMAP, 2014)
2. **Internal revolving fund:** it is a revolving fund developed by a single municipality, *"which provides the initial capital and may also manage the fund itself."* (ESMAP, 2014). The structure of an internal revolving fund varies depending on the city's needs as well as local

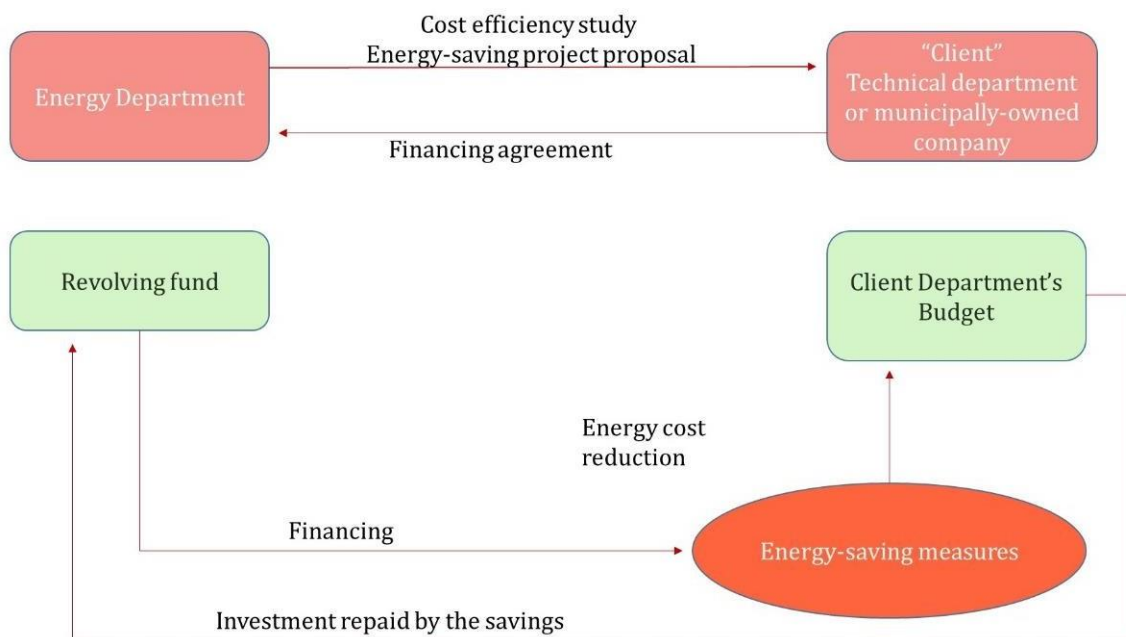
conditions. *“The strategy employed to leverage finance for low carbon projects depends on a variety of factors such as mayoral powers, regulatory and legislative context, type and scale of infrastructure project, and the risk/reward profile of stakeholders.”* (C40, 2016) The internal revolving funds need an initial capital contribution, which can come from the municipality’s own budget, grants or loans from external sources and donors.

## How are revolving funds used for implementing energy efficiency projects in public buildings?

When used in the public buildings sector, revolving funds are commonly developed by municipalities (an internal revolving fund). The revolving fund typically provides loans to public agencies in order to cover the initial investment costs of energy efficiency projects (World Bank, 2014). Similar to EPC, the savings resulting from the projects are used to repay the revolving fund until the original investment is recovered, plus interest and service charges. This scheme is called internal contracting (or intracting) that includes a revolving fund (Energy Cities, 2017).

## What is the idea behind an internal contracting that includes a revolving fund?

Internal contracting, or intracting, is a municipal internal performance scheme that enables the municipality *“to finance multiple investments for energy savings without being tied to an external contractor. This requires that a revolving fund be setup”* (Energy Cities, 2017). The public administration operates the scheme, which supports cooperation between two separate organisational units of the same public administration. *“For example, the municipal department for the environment may serve as the contract or (ESCO) for the ‘customer department’ without own investment funds. The money saved through energy efficiency measures flow back to a dedicated budget line – a revolving fund (energy saving trust) – until the investments have been paid off”* (Energy Cities, 2016).



Source: Energy Cities, 2017

**Figure 12:** Internal contracting financing scheme including a revolving fund

## Does internal contracting always include a revolving fund?

The internal contracting scheme does not necessarily include a revolving fund. Creating an initial revolving fund is a political decision, and a financial department responsible for budget issues is strongly involved in its development (Energy Cities, 2017). Although it is not compulsory, including a revolving fund in an internal contracting scheme can result in several advantages, which are further described.

## What are the differences between internal and external contracting?

**Table 8:** Internal & External Contracting

Aspects	Internal Contracting	External Contracting
<b>Administrative</b>	Within the limit of the fund size	No administrative limit from the local authorities' perspective
	Fast implementation: measures can be selected, financed and implemented quickly.	Long delay (in particular because of auditing and contract negotiations)
	No need to undertake a public tendering process or get legal advice when drawing up the contract.	
	Reduced need for exact quantification of the energy savings and the monitoring	Risk of litigation related to the quantification and qualification of the realized savings

	All savings realized flow back to the municipality	Savings realized thanks to the users behaviour changing are not taken into account
	Part-financing to enhance the energy-related quality of standard retrofits	
	Supplementary financing to trigger investments through combined funding	
<b>Legal</b>		Third-party investor (ESCO) takes the risks and guarantees the energy savings
	A simple agreement, the possibility of integrating an environmental bonus	Complex contracts to be agreed upon and signed
		Difficult to evaluate those measures for which no dedicated meter has been installed
		Renegotiation of the contract in case of changes in the building use patterns and times
<b>Financial</b>	No mark-up for business risk and profit or for interest on capital deployed	Additional external costs for the energy audit and planning
	Not subjected to interest rates	Interest rate follows the market
	Financing of small-scale projects (e.g. replacement of pumps, thermostats or control devices) is of considerable interest because of their short payback-period	Often a constrained focus on highly profitable measures thus small-scale projects are unlikely to be of interest though they might be highly sustainable
<b>Technical</b>	The city selects the measures to be implemented	Selection of most profitable measures, no integrated approach
	Know-how remains in the city departments	Expertise is recommended to oversee the actions of the ESCO partner
	Small effort is required to monitor projects across their entire lifetime	

Adapted from: Energy Cities, 2017

## What are the advantages of setting up an internal contracting with a revolving fund?

The World Bank (2014) lists a few advantages of setting up this scheme, such as:

- Since both the borrower and lender are publicly owned, such funds may often offer **lower-cost financing with longer tenors** (repayment periods) and **less-stringent security requirements** than typical commercial loans.
- Because EE projects have positive financial rates of return, capturing these cost savings and reusing them for new investments creates **more efficient use of public funds** than typical budget or grant-funded approaches.
- It can help demonstrate the commercial viability of EE investments and provide **credit histories for public agencies**, paving the way for future commercial financing.

Besides these aspects, Energy Cities (2013) includes other advantages when implementing an internal contracting (intracting) with revolving funds, such as:

- With intracting, the **municipality has the expertise** contrary to contracting where expertise is outsourced. The economic vision of qualified municipal staff also tends to be more favourable to the municipality. Contracting also involves the risk of financing only those measures that are the most profitable for the contractor, thus disregarding the municipality's social and financial needs.
- Intracting enables the municipality to **keep control** over its freedom of decision-making in relation to equipment and building use, with no need to consult an external partner.
- **Low risk** of disputes arising from the quantification or characterization of energy savings or from the estimation of savings not recorded by dedicated meters.
- **Savings are instantly achieved.** Compared to contracting, intracting requires minimal administrative efforts and implementation is facilitated. A change in building use, for example, does not require renegotiating the agreement.

## What are the common barriers to setting up an internal contracting with a revolving fund?

According to Energy Cities (2013), the drawbacks are similar to the ones from EPC:

- **Limited budget** to finance the measures.
- **The payback period is limited to 15 years.**
- **Comprehensive retrofitting is excluded**, and new buildings cannot benefit from this financing scheme.

C40 (2016) also highlights barriers to setting up a revolving fund:

- The set-up and operation of a revolving fund can be **administratively difficult**, for example, it may be needed to apply significant effort in educating financial administrators on how to recognise savings.
- The **costs** related to the operation of a revolving fund can be high, especially in cases in which an external fund manager is contracted.
- Revolving funds generally require **cross-department collaboration** and can be administratively difficult to establish.
- A city will need to find the **initial capital** to create the fund, with some cities using national or international transfers or the sale of property within the city to capitalize on the fund.

## How can internal contracting with a revolving fund help municipalities to overcome structural barriers?

Based on the experience of at least five cities that developed internal contracting including a revolving fund, the Energy Cities (2017) lists a few common administrative and budgetary

constraints that prevent the implementation of energy-savings investments. The table below shows these constraints and the solutions offered by internal contracting.

**Table 9:** Solutions provided by internal contracting to common structural barriers

Common structural barriers	Solutions provided by internal contracting
<p><b>No holistic view of costs for energy consumption and investment budgets for improvements</b></p> <p><i>Funds available for paying the operating costs such as the annual energy purchase and maintenance are strictly separated from the budget for investments. This can result in a lock-in situation: on the one hand, administrative services have to pay enormous energy bills due to the poor condition of public buildings; on the other hand, the departments are not able to re-finance the urgently needed energy-saving measures by paying back the energy costs are saved in the investment budget.</i></p>	<p>Internal Contracting is a holistic scheme that is used to implement procedures that link all aspects of energy management such as maintenance, energy consumption, energy efficiency improvements, new equipment (including its installation) and energy costs.</p>
<p><b>Limited investment budgets</b></p> <p><i>Installing modern technology usually requires modern onsite supporting infrastructure. Thus, instead of a simple replacement, a specific refurbishment is necessary. If such a situation has not been “foreseen” and a special budget has not been prepared, the financing needed for the refurbishment can overburden the regular budgets, thereby not allowing the most efficient alternative to be selected as regards both profitability and resource savings.</i></p>	<p>Internal Contracting can be used to finance the additional cost of buying the most suitable technology at the lowest total cost. Moreover, financing through this scheme may increase the number of retrofits. This can help to keep the average age of the installed equipment low and may reduce maintenance costs.</p>
<p><b>Limited maintenance budget</b></p> <p><i>Often maintenance is optimized in order to minimize the costs of one single maintenance activity or to keep within a yearly budget for technical equipment. This approach often goes hand in hand with cheap, non-durable, low-tech equipment, causing high energy demands and frequent replacements, both ultimately resulting in expensive operating costs. Energy-efficient, durable technology with a low life-cycle cost would require a higher initial budget.</i></p>	<p>Internal Contracting offers a way out of this dilemma by financing the additional costs for the optimal solution exclusively during the transition phase.</p>
<p><b>Fixed schedules of budget negotiations</b></p> <p><i>When budget lines are negotiated within a fixed schedule, financial demands not considered during the previous budget negotiations have to be placed on hold until the next round. In addition, small investments are often considered not worth fighting for in budget negotiations.</i></p>	<p>Internal Contracting can respond quickly to the financial demand and can ensure that these energy-saving measures will be considered.</p>
<p><b>Conflicts of interest</b></p> <p><i>In a complex municipal organisation, every unit has its designated tasks and will always and rightfully spend its budget to fulfil them. Thus, when it comes down to a final budget decision, there is no specific support for energy efficiency measures, even though the technical knowledge and awareness of the profitability of sustainable</i></p>	<p>Internal Contracting helps to overcome this barrier by demonstrating that energy efficiency measures can pay off. Moreover, Internal Contracting with its revolving fund can be the single recipient for all financial contributions if the city council has the political objectives of improving energy efficiency and the use of renewable energy, as well as combatting climate change. Both the unit managing the Internal Contracting and councillors can highlight the purpose of the fund and its</p>

*technology exists, as well as the desire to combat climate change.*

activities in (political) discussions. Over time, the city council will become familiar with “its” Internal Contracting and confident in the efficiency and effectiveness of the donations it receives. Consequently, the revolving fund is likely to receive further funding without requiring too much effort to convince the city council of its benefits.

## What are the prerequisites for the introduction of internal contracting?

The prerequisites to the introduction of internal contracting are (Energy Cities, 2017):

- Ability to assess energy consumption and investigate saving measures and potentials.
- Initial funding is needed to start investing in energy-saving projects and create returns.

## How much initial fund is required to set up the revolving fund?

In order to start the operation of the internal contracting scheme, the revolving fund will need sufficient initial fund. The amount varies according to what the city is able to provide and/or acquire, and the types of measures available for implementation. For example, small initial funds will only be able to invest in low-cost measures, with short payback time and easy to start with. For example, Koprivnica’s revolving fund was created with an initial fund size of € 20.000,00, but there were no low-cost measures available. Therefore, the fund had to be larger and external financing sources were used. In the case of Águeda, the revolving fund was fully financed by the municipal budget, with € 300,000 as a seed.



# How can internal contracting with a revolving fund be set up?

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## How to develop a business case for an internal contracting scheme?

Even though internal contracting presents several advantages, it implies a significant change in business-as-usual procedures and the involvement of different units within the same organisation. Furthermore, the energy management issues and/or financial procedures related to the scheme might not be familiar to decision-makers or relevant staff (Energy Cities, 2017). Therefore, political support is essential for the implementation of the scheme.

In order to get this support, you can prepare a **business case** for the scheme and communicate its main ideas to colleagues through an internal communication campaign. For example, the case can be presented to a variety of city departments, including the City Manager, the Chief Financial Officer, the Budget Director, the Finance Department and Building and Equipment Services Department. The main goal is to raise awareness of and interest in internal contracting.

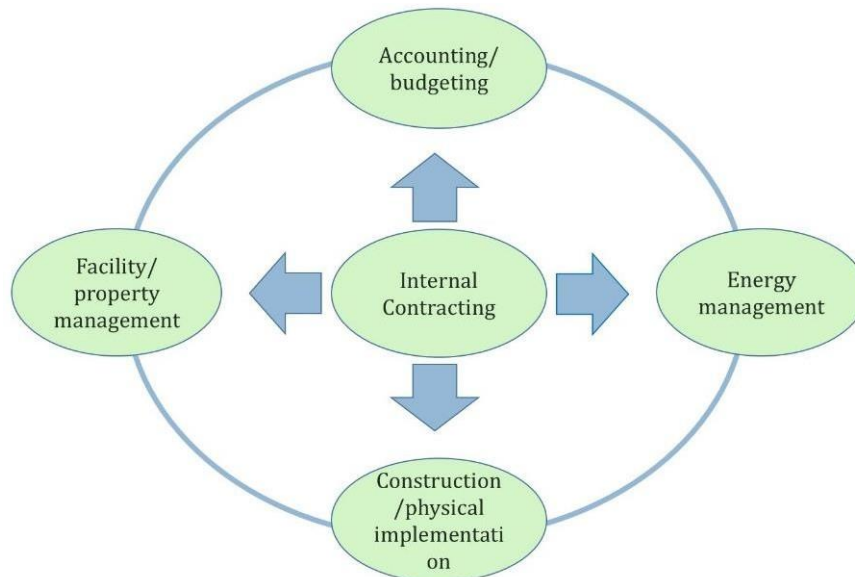
This section compiles suggestions from Energy Cities (2017), World Bank (2014), and C40 (2016). Mainly, the steps to be taken and components to be covered in the business plan are the following:

- **Convene key stakeholders** (such as staff interested in innovative financing approaches and energy efficiency) to discover market gaps, create innovative projects and to ensure continuous collaboration.
- **Describe the projects** that could be implemented through the scheme and create a clear investment strategy.
  - Identify uncontroversial investments that have resulted in energy efficiency improvements (e.g. replacing damaged windows).
  - Illustrate how internal contracting could work on these easy to grasp examples.
  - Outline how internal contracting can enable further investments in (advanced) energy savings or the use of renewable energy.
- **Define the scheme objectives and target markets.**
  - Focus on the initial activities and on a few targeted markets, such as schools and hospitals, which could offer high energy efficiency potential while having limited capacity to implement EE projects.
- **Demonstrate how other municipalities have been able to accomplish big energy projects** using an internal contracting with a revolving fund.
  - Show how those efforts apply to your city.
- **Demonstrate the value of the scheme** by quantifying potential energy savings.
  - Consider including other benefits, such as relieving the general fund from personnel costs and helping to deal with deferred maintenance.

- **Put together a five year and 15-year project pro-forma.**
  - Demonstrate what the fund would look like over time, focusing on the magnitude of savings and the effect on the general fund budget.

## How to define the internal contracting team?

Setting up an internal contracting scheme with a revolving fund entails **varied organisational tasks** that will be undertaken by **professionals with different experiences and skills**. Depending on the size of the public administration, these tasks could be linked to individuals within one working unit or to several units, each in charge of one task (Energy Cities, 2017). The following illustration shows the tasks of an organisation that need to be connected to set up internal contracting.



Adapted from: Energy Cities, 2017

**Figure 13:** Tasks that need to be connected for internal contracting

In order to select the professionals or units that will be part of the internal contracting team, define a list of criteria, considering:

- Candidates' knowledge and understanding of energy efficiency technologies and options
- Candidates' capabilities in financial analysis and project appraisal
- Candidates' understanding of EE and energy services markets, among other aspects

### Examples of teams for intracting schemes:

Stuttgart's internal contracting team	Águeda's internal contracting team
<p><u>16 officers</u></p> <ul style="list-style-type: none"><li>• Mainly engineers and technicians</li><li>• Work part time for internal contracting (one full-time job equivalent)</li></ul> <p><u>Facility management department</u></p> <ul style="list-style-type: none"><li>• Responsible for running and maintaining the municipal buildings</li></ul> <p><u>Municipal construction department</u></p> <ul style="list-style-type: none"><li>• Plans and executes refurbishments or new constructions</li></ul>	<p><u>Operation team with three members</u></p> <ul style="list-style-type: none"><li>• Managing director of the REAN agency</li><li>• Head of administrative department of finance, the promotion of entrepreneurship and utility management</li><li>• Head of administrative department of social services and European affairs</li></ul> <p>The team has an obligation to meet at least once every three months.</p>

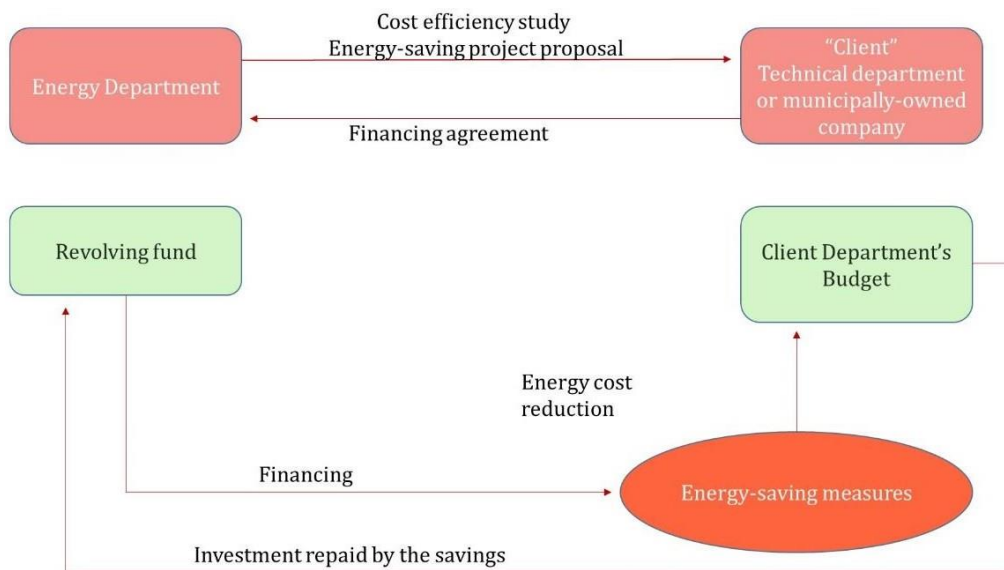
Adapted from Energy Cities (2017)

## Who manages the internal contracting scheme, and what are the managers' main responsibilities?

An internal unit has to be appointed to manage and operate the scheme. The tasks and responsibilities of this unit will be (but may not be limited to) the following:

- Assessing the energy consumption of the organisation
- Investigating and defining energy saving potentials and measures
- Managing the cooperation between different independent departments
- Functioning as a contact and reference point for the scheme team and other staff involved
- Dealing with technical, financial, and accounting issues

This role can be undertaken by the unit in charge of energy management, such as in the example illustrated in the figure below. In this case, the unit should be upgraded to a fully in-house competence centre for internal contracting.



Adapted from Energy Cities, 2017

**Figure 14:** Example of internal contracting financing scheme including a revolving fund

Figure 14 shows the Energy Department has access to the energy-saving (revolving) fund.

*“Due to its energy management abilities, the Energy department proposes cost-efficient energy saving projects to its ‘client’, a technical department or municipally-owned company. These measures are financed through the ‘Energy savings revolving fund’. Cost savings made by the client (by saving energy as soon as the proposed measure is implemented) over the following years are used to repay the capital invested to the Energy department. As soon as an energy saving project is accepted by the client and planned by the Energy department, it receives financing from the revolving fund. Implementation of the project immediately leads to reduced energy consumption and, therefore, declining energy costs, resulting in a smaller energy bill for the respective department. These savings are gradually paid back to the revolving fund.”*

(Energy Cities, 2017)

# How can internal contracting with a revolving fund be operated?

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## How to select the projects to be financed through the scheme?

In any type of revolving funds, it is crucial to have a clear idea of the types of projects that will be funded. Therefore, it is important to define the **selection criteria** based on two aspects:

- the purpose of the revolving fund
- the factors that can influence the successful implementation of the projects

Differently from other types of the revolving fund, when using revolving funds as part of internal contracting, the fund **“must be used solely for financing energy cost saving measures. If energy improvement is the sole reason for a retrofit, then energy cost saving measures can be entirely financed through Internal Contracting. Any additional renovation work has to be financed through conventional construction or maintenance budgets. However preparatory work may be necessary to implement the energy saving measures, e.g. strengthening the structure of a roof to support the weight of a photovoltaic installation. Thus, the cost of this work has to be included as part of the energy saving measure”** (Energy Cities, 2017).

### Examples of projects selection criteria used in Intracting schemes

Koprivnica's criteria	Águeda's criteria
<ul style="list-style-type: none"><li>• The cost-efficiency of the project</li><li>• The degree of urgency of the project</li><li>• Financial opportunities<ul style="list-style-type: none"><li>○ Financial savings from previous projects</li><li>○ City budget</li><li>○ Availability of external sources of (co)financing</li></ul></li></ul>	<ul style="list-style-type: none"><li>• The project is part of SEAP (Sustainable Energy Action Plan)</li><li>• Payback</li><li>• Energy savings</li><li>• CO2 emission reduction</li><li>• Contribution to Covenant of Mayors or Mayors Adapt objectives</li><li>• Innovation</li></ul>

Adapted from Energy Cities (2017)

## How to identify appropriate measures?

The following steps can be undertaken to check whether a measure is appropriate to be financed through the revolving fund (Energy Cities, 2017):

1. **Consult potential customers in charge of planning new construction, renovation, retrofits or maintenance about your scheme.** Ask about what is on their schedule. Try to steer their investment decisions towards energy efficiency beyond the current standard by offering additional Internal Contracting funding.
2. **Check whether the energy-saving measure will not be the subject of, or affected by, a more significant retrofit or new construction,** which could replace the whole installation before the investment of the measure is paid back.
3. **Examine the profitability of a project,** by determining:
  - a. The economic parameters: the investment cost and the resulting expected financial savings calculated by multiplying the energy savings and the cost per energy unit.
  - b. The payback time: the investment divided by the annual energy cost savings.
  - c. The operational lifetime of a measure: depends on the durability of its technical parts.

Only projects with feasible investment costs and payback times are suitable for funding via Internal Contracting. Therefore, consider the following:

**Payback time < operational life of the measure = economically viable**

**Payback time > operational life of the measure = not viable**

## How to manage the investments of the revolving fund?

As explained, the initial monetary value of the fund is set up at the start of the scheme. New investments are financed by energy cost savings gained and paid back by the implemented measures previously invested by the fund.

In order to be able to finance several energy-saving measures throughout the years using the initial monetary value of the revolving fund, a few aspects need to be considered:

1. **The fund cannot cope with investments of any size.** The cost of a single investment has to be lower than the fund's value.
2. **The total annual investment should be limited to only a share of the fund's value** since the fund is intended to pay for investments made in different years with paybacks also extending over several years.

*“To operate, the revolving fund constantly requires that investment cost and payback times of the financed measures are appropriate to the fund. Longer payback times not only prolong the refinancing of the investment, and hence of the fund, but lower the investment which is annually financeable. Increased investment costs can completely halt this business model. To ensure the revolving fund is not overloaded in the first years of Internal Contracting – which would cause suspension of investments – as a rule of thumb one can state:*

***The monetary value of the revolving fund should be at least 3 times as much as the investments planned for the first year when starting the Internal Contracting scheme, thus enabling investments with 5-year payback time.”***

Furthermore, the fund can be organised into different parts or amounts, in which the capital available in each part is dedicated to certain types of projects. This strategy was adopted by Stuttgart. The city divided the capital of the fund into three different parts:

- **Invested capital:** used to finance energy-saving measures implemented in previous years and yet to be paid back.
- **Earmarked capital:** used to finance already assigned energy-saving measures which are being prepared for implementation.
- **Free capital:** capital that can be contracted for new measures.

For more information on the financial development of the scheme, read chapter 3.2 Financial Aspects of the Infinite Solutions guidebook (Energy Cities, 2017).

## How to monitor and evaluate the operation of the scheme?

Monitoring and evaluation entail routinely gathering information on the implementation of the projects to measure the quality and effect of the internal contracting scheme. The table below summarizes the main aspects of monitoring and evaluation as identified by the World Bank (2014):

**Table 10:** Monitoring and evaluation of revolving funds

Step	Activities
<p><b>Monitoring:</b> tracking the technical and financial status of projects by employing a monitoring system that is appropriate for the type and scale of the projects and able to track both technical progress and financial status.</p>	<ul style="list-style-type: none"> <li>• Consider all project stages and components (planning, implementation, outcomes and impacts, replicability, visibility, and so forth)</li> <li>• Conduct field supervision and periodic audits as agreed</li> <li>• Conduct periodic progress reports</li> <li>• Perform electronic reporting techniques</li> </ul>
<p><b>Evaluation:</b> aims to determine whether project objectives set in terms of expected outputs, effects, and impact are being or will be met. Evaluation is needed to test planning assumptions, monitor overall results, compare programme performance, fine-tune implementation processes, and incorporate lessons learned into improving the fund's future operations. Often the evaluation of the fund's performance is conducted by an independent third party.</p>	<ul style="list-style-type: none"> <li>• Conduct evaluation by combining quantitative and qualitative data</li> <li>• Perform the evaluation at specific times (mid-term, interim special studies, completion, after completion)</li> <li>• Compare the fund's achievements relative to expected performance</li> </ul>
<p><b>Measurement and Verification:</b> M&amp;V is designed at the project level. It entails establishing the baseline as well as modifying it as needed if operating conditions change. There are many methodologies and protocols for M&amp;V, ranging from simple methods such as "deemed savings" where the savings are calculated using stipulated formulas, to detailed metering or simulation modelling. Because the accuracy and precision of the M&amp;V results are proportional to their cost, and it is desirable to use a pragmatic approach that balances the M&amp;V costs against the</p>	<ul style="list-style-type: none"> <li>• Develop baseline characteristics and typical operating conditions</li> <li>• Layout a clear methodology for measuring energy savings that is acceptable to all parties</li> <li>• Develop estimates of the actual energy savings, cost savings, and</li> </ul>

<p>required quality of the savings estimates. The most important aspect is that all parties agree to the level of detail of the M&amp;V plans. For public agency projects involving efficient lighting, deemed savings may be adequate. However, where a large portion of the energy use is for heating, simple commissioning tests may be used to determine the amount of energy needed to heat one square meter of floor space by one degree before and after the renovation</p>	<p>other performance characteristics of a project.</p>
<p><b>Reporting:</b> involves providing information to the appropriate organisations (in this case the funding sources) on implementation progress so that timely decisions can be made, if needed, to ensure progress is maintained according to schedule and performance goals. The collected data—both quantitative and qualitative—are provided in periodic reports to assess the status and quality of project activities.</p>	<p>Periodic reports can cover the following aspects:</p> <ul style="list-style-type: none"> <li>• Financial reporting — a periodic summary (usually monthly) of transactions, receipts, and disbursements by type, cash flows, outstanding balances, and so forth over the reporting period;</li> <li>• Technical reporting</li> <li>• Annual reports — annual reporting of technical, financial, and administrative results</li> </ul>

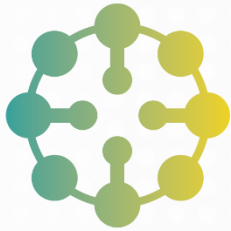
Adapted from World Bank (2014)



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# PROSPECT+



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