



ENERGY PERFORMANCE CONTRACTING (EPC)

The BEEP project activities will facilitate the road for using EPC models and specifically using the Building Information Modelling (BIM) technology, which would serve in achieving a more sustainable rehabilitation process for public administrations. It will also raise awareness for EPC possibilities as well as it will provide a contract template which will furthermore facilitate the opportunities for conducting such contracts.

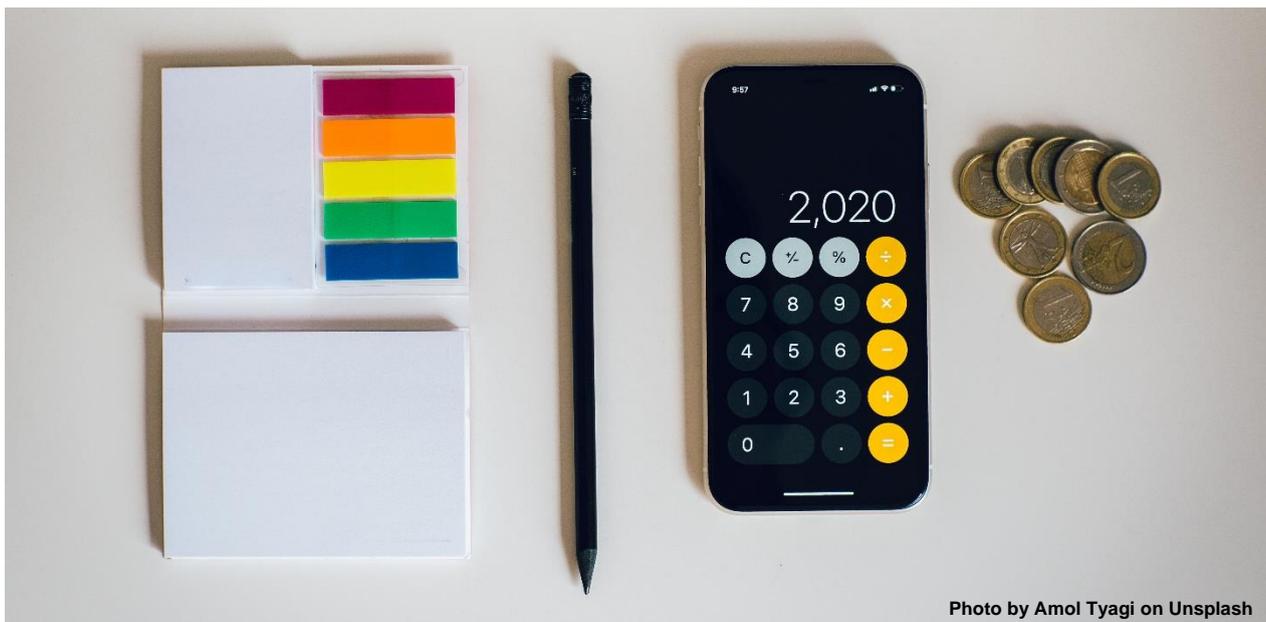


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WHAT IS EPC

Energy Performance Contracting is a financing mechanism used to support energy efficiency measures and renewable energy installations without worrying about the financial barriers. In an EPC contract, the energy service company (ESCO) is committed to provide guaranteed energy improvements to the customer's territory while the finances are covered from the achieved energy savings.

Main advantages of EPC

Some of the **main advantages** of such contracts are:



EPC Models

There are many models of EPC contracts. However, the **most famous models** are as follows:

Shared Savings Model	Guaranteed savings model
ESCO does not guarantee to reach a certain amount of savings.	ESCO guarantees a certain amount of energy savings each year of the contract.
Both the client and the ESCO share a predefined percentage of the savings as agreed in the contract.	If the agreed amount of savings is not reached, the ESCO shall pay the shortage to the client.
If no savings are achieved, the client pays the energy bill while the ESCO must pay for the financial obligations associated with equipment purchases.	If the savings exceed the agreed amount, the excess is divided between the customer and the ESCO according to the particular contract.
The Project will be implemented with its own means and resources by the ESCO, which undertakes its full financing, with its own and/or foreign funds.	The Customer undertakes the financing, with own and/or foreign funds, of the Equipment.



HOW BIM CAN FACILITATE EPC (1/2)

EPC essential tasks	Problems / Issues	Advantages of a BIM-based workflow
Involvement of owners/tenants	It is difficult to communicate technical solutions to non-technical final users.	BIM allows for simplified visualization of technical data (3D, render, etc.).
Energy refurbishment	The refurbishment project is done in successive phases and often architects, structural engineers, and HVAC engineers experience difficulties in interacting with each other, with subsequent interferences/ problems up to the implementation phase.	Design is done in a shared environment (Common Data Environment) where it is possible to coordinate the different models coming from the different professionals contributing to the refurbishment.
Construction phase	Construction is a complex phase that is hard to efficiently manage.	BIM can help manage the construction phase.
Expected budget	The construction sector has a chronic problem of price uncertainties.	BIM can help manage prices, quantity take-offs and reduce worksite uncertainties through clash detection activities during the design phase.
Evaluation of the refurbishment project(s)	It is difficult to evaluate different options.	BIM, especially with the support of an integration with dynamic Building Performance Simulation, can help simulate different design scenarios, also assisting decision support systems.



HOW BIM CAN FACILITATE EPC (2/2)

EPC essential tasks	Problems / Issues	Advantages of a BIM-based workflow
Facility management costs	Facility management (when present) often relied on traditional, not parametric technologies, leading to redundancies and inconsistencies.	BIM promotes facility management implementation and facilitates integrated control of information and operation.
Public tenders	Public tenders often lack complete, reliable documentation.	BIM can provide a robust data repository with all the tender information, constraints, and requirements.
Tenders' assignments	Tenders are usually assigned through the examination of paper-based documents.	BIM model must represent the entire building in all its parts, proving more susceptible to detailed assessment. Code checking and clash detection on BIM models can be successfully used to evaluate bidders.
Project life-cycle	The presence of several stakeholders is prone to inconsistencies during planning, design, implementation, and operation phases.	BIM can promote a life cycle approach in the construction sector.
Evaluation Of Return of Investment (RoI)	RoI is inherently uncertain.	BIM allows for a better evaluation of costs and time by making the construction workflow more reliable and robust.



EPC – ESSENTIAL PARAMETERS

An economic feasibility study is crucial before starting any project. Such study would determine whether an investment is profitable or not. Decisions of bankers and financial firms are mostly based on a feasibility study results. The payback time and the return of investment are the main identified drivers.

Payback time and simple payback time

The payback period determines the time needed for the investor to recoup the cost of the investment. Upon the calculation of the payback period, the investor can compare different scenarios to determine the shortest period to return his investment. The integration of the BIM technology allows better determination of the payback period giving more credibility to the calculated value. It also makes it easier to explore more options for retrofitting the building without consuming time and effort.

Payback time indicator is suited for the economic evaluation of the proposed energy retrofit scenarios, as it requires simple calculation, its use is widespread as it is easy to understand by non-experts. A simplified method for the economical assessment of the investment can be considered if the annual savings are constant. In this case, the **simple payback time** can be easily calculated as the ratio of the initial investment, to the annual net savings.

For example, if the energy bill was reduced by 3,500\$ per year after installing a solar PV on-grid system, then the simple payback period will be 2.85 years considering the initial investment to be 10,000\$.

$$\text{Simple payback period} = \frac{\text{Initial Investment}}{\text{Annual Savings}} = \frac{10,000}{3,500} = 2.85 \text{ years}$$

While the payback period shows the duration required for the return of investment, it does not show what the return of investment is. Thus, the profitability of the project will not be clear for the investor. To properly explore the profitability of the investment, the return of investment (RoI) can be integrated.

Return of investment

The Return of Investment is a financial ratio used to calculate the benefit an investor will receive in relation to their investment cost. It is a performance measure used to evaluate the efficiency or profitability of an investment or compare the efficiency of a number of different investments.

RoI is commonly measured as a ratio of the net income over the capital cost of the investment. The higher this ratio is, the higher the benefit. It acts as an indicator that can separate low-performing investments from high-performing ones.



EPC IMPLEMENTATION IN SEVEN MED COUNTRIES

Italy An EPC can be supported at most by a BIM-based process when it is able to streamline the organization with field data gathered during the analysis phase and work with it to support design solutions at best. Moreover, BIM can support the EPC during the operation and management phase making the EPC and its implementation after the realization of interventions as dynamic as possible.

The Italian EPC market is defined as “Sizeable and developing” with a positive trend that follows the growth of the market of ESCOs and is foreseen to continue its increase for the period 2020-2023.

Spain According to the latest report on the Spanish ESCO market presented at the end of 2021 by ANESE, the Spanish National Association of Energy Services Companies, the EPC model was the most widely used in 2020 because of the continued interest of financial entities in it. Nevertheless, due to a lack of knowledge on EPC especially on the contracting side (and even more so in public administration) the market is still not sufficiently mature.

The Spanish energy services market was still considered to be small and underperforming in 2018, despite having grown steadily over the last previous years, and maintaining the trend of a slow market increase since 2015 as in most EU Member States (JRC - Joint Research Centre study on the energy services market in the EU during 2018-2019).

Cyprus As the real-time data is key for achieving more precise and updated calculation of the energy performance of a building it is also key that this data is made available between all stakeholders and BIM can help in streamlining this process.

Both the sector of EPC and the adoption of BIM technology are in their initial stages in Cyprus. No cases of BIM for EPC are reported or implemented yet. The ESCO market penetration so far is considered to be at its initial stages.

The potential for the market development of energy services in Cyprus has been described as promising, given the poor energy performance levels of the Cypriot building stock.



Jordan_ A digitized workflow is appealing for the stakeholders involved in the process both during the design phase, when it can streamline the analysis phase and make the results more transparent and reliable, and during the operation and management phase of the implemented interventions.

Using EPC in Jordan is very limited due to its applying difficulty and the problems that resulted consequently between the building owners and the ESCOs regarding distribution the profits. In addition, Jordan still lacks the required legislation for supporting ESCOs and EPC based EE implementation.

Palestine_ Data management during the design phase can be greatly implemented by a BIM-based process that can also decrease project costs and allow a faster delivery of the results.

The take-on rate of EPC in Palestine remains low at present and there is a lack of understanding and professional skills about how to apply the technique effectively.

Until now, there is no implementation for BIM in Palestine.

Lebanon_ As a concept, EPC contracts could be an attractive solution for contractors, clients, and investors however such formats require a certain extent of economic and financial stability in Lebanon.

The lack of funds is the main barrier refraining from implementing energy performance contracts in Lebanon. However, there are several other items leading to not performing such contracts such as the lack of experience and knowledge in the Lebanese market, although there are a lot of Lebanese professionals having CMVP certificates (Certified Measurement and Verification Professionals) which is essential in understanding such contracts.

On the legal side, there are no sufficient laws and regulations that can govern such contracts. Power Purchase Agreement (PPA) can be performed in Lebanon, with limited production to the project's grid, for large scale projects only and under the direct supervision of the Ministry of Energy and Water. Technically, the grid is unstable with daily cut-offs.

Moreover, the opportunity of equipment leasing through EPC contracts can facilitate the installation of energy efficiency measures in residential and public buildings.

Egypt_ In Africa, Egypt with other countries is cooperating with global institutions in order to create fund, increase awareness and implement ESCO association. These are the recent followed strategies for the promotion of ESCO in their countries.



ABOUT EPC & THE BEEP PROJECT

The Mediterranean region has a great potential for EPC implementation. Most of the public buildings in this region are non-efficient with great potential for savings. In some countries, energy savings can reach 40% and even more.

The BEEP project aims at strengthening the use of BIM to enhance energy efficiency in buildings and particularly in heritage buildings. Digitising the entire process from the building analysis to the intervention development through the use of BIM and dynamic Building Performance Simulation (BPS) is an attractive work methodology that can reduce time and costs and offer more transparent and reliable results. A BIM-based workflow can also minimise the time needed to analyse different retrofitting scenarios as well as offer a 3D visualization for non-technical clients. Providing public administrations with such a powerful method for retrofitting public heritage buildings can be considered as an asset that facilitates the process for conducting EPC contracts.

The innovative methodology for energy renovation of heritage public buildings that the BEEP project is providing to public administrations is being tested on nine pilots located in Italy, Spain, Cyprus, Jordan, Palestine, Lebanon, and Egypt. Energy efficiency and renewable energy measures will be proposed to reduce these buildings consumption while preserving their cultural and heritage values.

The BEEP project, which started in September 2019, has a duration of three years, and counts with a total budget of € 1,934,184.51 of which 90% is funded by the EU under the ENI CBC Med Programme.

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