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Collection of existing financing mechanisms – case: Czech Republic

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1. INTRODUCTION

As any activity, energy renovation has its related costs, which vary according to the depth of the refurbishment, i.e. number and complexity of implemented energy efficiency (EE) measures. Therefore, any decision on energy renovation of a building must carefully evaluate these costs and ensure financing, in order to reap the benefits after the implementation.

The aim of this document is to present the possibilities for financing EE projects in the public sector and more specifically in schools. For that purpose, the most common financing models will be briefly presented in chapter 2, while in chapter 3, available financing models in a particular country will be presented and, based on the Project partners' feedback, a comparative analysis of availability, current usage and planned usage of different financing models will be provided.

2. ANALYSIS OF FINANCING MODELS FOR EE PROJECTS IN THE PUBLIC SECTOR

In this chapter, a very brief general (not country related) overview of possible financing models for EE in public buildings is given. The chapter ends with comparative analysis of models according to the following criteria: legal aspects, statistical treatment on public debt, complexity of implementation and other identified influencing factors. Pros. and cons. of each model are clearly marked.

2.1. Own funding

Traditional financing of projects in cities and municipalities relies dominantly on the use of own budget. One of the financing challenges facing municipalities, more often for smaller municipalities rather than larger ones is the insufficient revenue base with which to fund projects (not only EE projects, but also other development projects as well). An insufficient revenue base, which may be the result of a small number of tax-paying commercial businesses and/or high-income residents, can reduce the availability of adequate funds for capital investments. Municipalities depending on revenue transfers from regional or national governments often have limited revenue-raising powers. Such limitations imply that any decision to invest in an EE project either requires the municipality to reallocate funds or convince higher levels of government that the EE project is economically viable. This may often not be a simple task. Reliance on transfers from other levels of government also exposes municipalities to the risk that permitted levels and uses of funds may be affected by

changes in national budgetary or political priorities. This introduces further uncertainties and makes commitment to multi-year programs of capital expenditures more difficult.[1]

2.2. Loan financing

When it comes to loans, i.e. borrowing, national governments often impose limits on borrowing by municipalities to prevent them getting into financial difficulties. These restrictions may take the form of limits on the use of loan funds and/or on the total amount that municipalities may borrow. In both cases, EE projects are likely to lose out, because they are not typical capital expenditure projects that can be readily assessed and approved by higher authorities. In addition, when debt ceilings are in place, EE projects, with relatively low public profiles, are likely to have a lower priority than other pressing or mandated needs. [2]

Soft loans are dedicated credit lines for EE measures extended to end users at preferential terms in terms of maturity and/or interest rates. Such credit lines are often provided by national or international development banks (such as European Investment Bank (EIB) and European Bank for Reconstruction and Development (EBRD) and are further distributed to designated markets through regional partner retail banks.

2.3. ESCO model

The terms "energy services"[3] and "energy service companies (ESCO)"[4] are already well known and established in the energy efficiency field. They were defined already in the Energy Services Directive (2006/32/EC). There are many initiatives to promote ESCO model in the EU, due to its potential to remove several important barriers to energy efficiency in public sector – availability of up-front capital needed for EE investments and lack of technical knowledge and capacities to develop, implement and monitor EE projects. ESCOs are companies that work on a basis of energy performance contracts (EPC). In an energy EPC arrangement, the ESCO is responsible for optimizing building services systems and system operations in existing buildings across all branches of construction and maintenance. The main service provided by the ESCO is a guaranteed level of savings over a defined period.

Basic concept of EPC is shown in Figure Błąd! **W dokumencie nie ma tekstu o podanym stylu.**-1.

Before a tender is made, an energy cost baseline is determined for the building (or building pool) or facility. This is usually based on the energy consumption of the calendar year prior

[1] Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH: "CF4EE - Crowdfunding for Energy Efficiency", October 2016, available at: http://www.ieadsm.org/wp/files/2016-10-28-CF4EE-Feasibility-Study-final.pdf

[2] *Ibid.*

[3] 'Energy service': the physical benefit, utility or good derived from a combination of energy with energy efficient technology and/or with action, which may include the operations, maintenance and control necessary to deliver the service, which is delivered on the basis of a contract and in normal circumstances has proven to lead to verifiable and measurable or estimable energy efficiency improvement and/or primary energy savings

[4] 'Energy service company' (ESCo): a natural person or legal entity that delivers energy services and/or other energy efficiency improvement measures in a user's facility or premises, and accepts some degree of financial risk in so doing. The payment for the services delivered is based (either wholly or in part) on the achievement of energy efficiency improvements and on the meeting of the other agreed performance criteria

to commencement of the EPC, which is often also compared to the two preceding years in order to eliminate extreme climatic influences, usage fluctuations, etc. The evaluated baseline data is climate adjusted on the basis of mild or hot days (annual degree days). Proceeding from the energy cost baseline, the ESCO guarantees an annual energy cost savings (in EUR, calculated on a fixed price basis with the energy prices of the reference year) to the customer over the entire contract period. A fixed proportion of these guaranteed savings is set as the contracting fee, which the ESCO receives from the client to finance the investment, maintain the installations and attain a profit margin. Usually, the fee is set lower that the guaranteed saving in order for client to immediately benefit from savings.

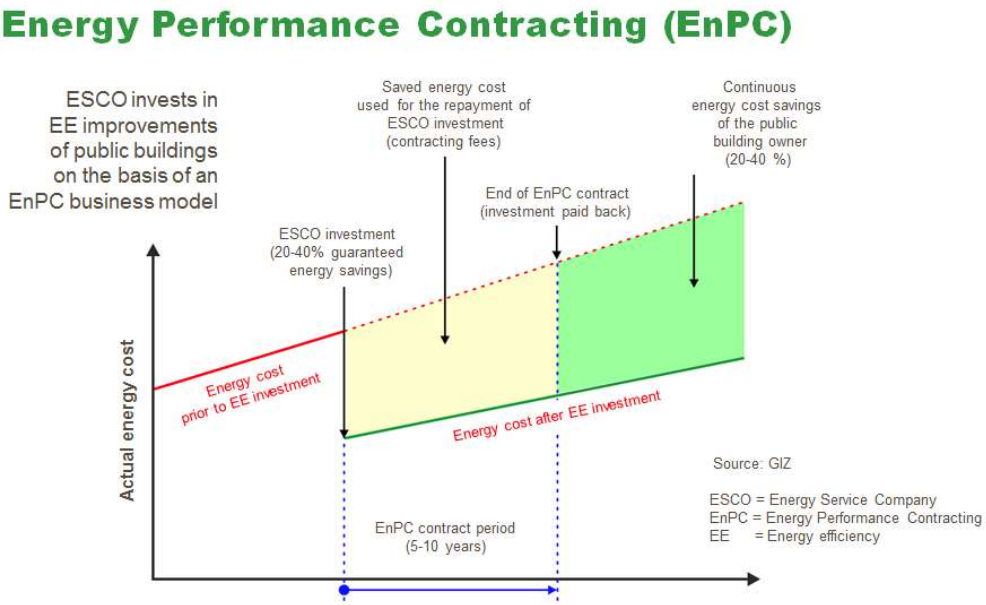

Figure Błąd! W dokumencie nie ma tekstu o podanym stylu.**-1 - Basic concept of EPC and ESCO operation**

In order to verify the annual energy savings, incurred energy consumption costs are converted into the reference year basis and then compared to the baseline during EPC bill audits. For the sake of ensuring this comparability, energy supply bills received by the client need to be adjusted for the following factors:

- deviations from the reference year in climatic conditions (annual degree days);
- changes in energy prices compared to the reference year (energy bills received by the customer must always be converted into the energy prices of the reference year);
- changes in building/facility usage compared to the reference year (insofar as these may cause energy consumption changes).

If the difference between the adjusted energy cost savings and the guaranteed cost savings is zero, the ESCO is exactly within the performance parameters of its contract. If the difference is greater than zero, contract over-performance sets in (savings are greater than guaranteed); in this case, the extra savings can be shared among the ESCO and the client. If

the difference is negative, the ESCO has not achieved its savings goal and must reimburse the customer with the resulting difference (because, according to EPC, ESCO guarantees savings).

If energy prices rise, the energy cost savings of the customer increase (energy saved multiplied by energy Price increases). This delivers additional budgetary benefit for the customer.

Contractually agreed one-off payments at the beginning (e.g. investment or building cost contributions) or at the end of the contract term (redemption sum) are also possible. With this solution, higher investment costs do not necessarily lead to higher contracting fees or longer contract durations.

Financing of EE project may or may not be ensured by ESCO[5]. There are two basic cases:

1. Customer financings – this model is usually referred to as "guaranteed savings". Here, an ESCO guarantees the outcome of investment in EE measures, but the customer (client) covers the whole investment and is responsible for accounting. This model is suitable if the customer has access to capital and if ESCO is a rather small company with limited balance sheet total.
2. ESCO financing - this model is usually referred to as "shared savings". Here, ESCO provides the financing, and is thus also responsible for the accounting, for all necessary investment, normally by borrowing from a bank. The customer pays a fee to the ESCO for the services rendered and for investment payback. Under a shared savings EPC arrangement, the client participates in the energy cost savings from the start of the main performance obligation period. The level of a client's share in cost savings must be stipulated in the contract. Typically, a client's profit share is between 10% and 20% of the savings achieved. Profit-sharing from the start results in shared savings EPC contracts having longer periods than a fixed-term arrangement, being that the annual contracting fee available to the ESCo for refinancing investment costs is lower. The benefit is that the customer's budgeted costs are directly reduced during the main performance obligation period of the savings guarantee agreement.

2.4. PPP model

A Public-Private Partnership (PPP) arrangement differs from conventional public procurement in several respects. In a PPP arrangement the public and private sectors collaborate to deliver public infrastructure projects (e.g. roads, railways, hospitals) which typically share the following features:

[5] Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH: "Assessing Framework Conditions for Energy Service Companies", September 2012, available at: https://www.giz.de/fachexpertise/downloads/giz2013-en-esco-guide.pdf

- a long-term contract between a public procuring authority (the "Authority") and a private sector company (the "PPP Company") based on the procurement of services, not assets;
- the transfer of certain project risks to the private sector, notably with regard to designing, building, operating and/or financing the project;
- a focus on the specification of project outputs rather than project inputs, taking account of the whole life cycle implications for the project;
- the application of private financing (often "project finance") to underpin the risks transferred to the private sector; and
- payments to the private sector which reflect the services delivered. The PPP Company may be paid either by users through user charges (e.g. motorway tolls), by the Authority (e.g. availability payments, shadow tolls) or by a combination of both (e.g. low user charges together with public operating subsidies).

The rationale for using a PPP arrangement instead of conventional public procurement rests on the proposition that optimal risk sharing with the private partner delivers better "value for money" for the public sector and ultimately the end user.

PPP arrangements are more complex than conventional public procurement. They require detailed project preparation and planning, proper management of the procurement phase to incentivise competition among bidders. They also require careful contract design to set service standards, allocate risks and reach an acceptable balance between commercial risks and returns. These features require skills in the public sector which are not typically called for in conventional procurement. [6]

2.5. Grant schemes

Most of available grant schemes are based on the use of European Unison structural and investment funds (ESI). EE projects in buildings belong to projects that generate net income after completion, i.e. the energy cost savings of the project are treated as net income.

Under the preamble (paragraph 13) of the Delegated Regulation 480/2014, as well as under recital (paragraph 58) of Regulation 1303/2013 of the EU, it is necessary to accurately calculate net income to ensure the efficient use of Union funds and to avoid over-financing of projects. Determining the share of co-financing by the Union should reflect the rule of non-profit - grants must not result in earning a profit. If they are profitable, it is necessary to conduct a financial analysis to determine the financing gap, the assessment of the need for grant and the amount of potential grants.[7] Therefore, the purpose of co-financing through grants is to close the financing gap that is generated in energy efficiency projects when the investment in energy efficiency cannot be paid off from savings on energy costs.

[6] EIB European PPP Expertise Centre: http://www.eib.org/epec/g2g/intro2-ppp.htm

[7] GUIDANCE FOR BENEFICIARIES of European Structural and Investment Funds and related EU instruments, EC, 2014 (http://ec.europa.eu/regional_policy/sources/docgener/guides/synergy/synergies_beneficiaries.pdf)

The formula for calculating the financing gap is:

$$NPV(i,N) = \sum_{t=0}^{N} \frac{R_t}{(1+i)^t} = R_0 + \sum_{t=1}^{N} \frac{R_t}{(1+i)^t}$$

where:

$NPV(i,N)$	net present value of the project
$i -$	discount rate
$N -$	period of project evaluation
$R_0 -$	initial investment
$R_t = R_1 \dots \dots R_N -$	net income = annual energy cost savings and maintenance costs

The net present value is the difference between the sum of discounted net income over the entire project implementation period and the amount of investment costs. The net present value represents measure of added value today that results from the undertaken investment. In case the project has a negative net present value, it corresponds to the amount of the financing gap. The financing gap represents a part of the investment that needs to be co-financed by grants so that the net present value of the project corresponds to the amount of zero.

After calculating the financing gap in an absolute amount, it is necessary to determine the project co-financing rate. The co-financing rate is obtained as the ratio of the financing gap amount and the amount of initial investment in the energy efficiency project.

The formula for calculating the required co-financing rate is as follows:

$$co - financing\ rate = \frac{NPV\ (i,N)}{R_0}$$

If the project is co-financed by grants with the co-financing rate calculated according to the aforementioned model, the energy efficiency project in buildings will achieve net present zero value and will be economically justified.

2.6. Combination of different financing models

Usually, energy efficiency projects in public buildings combine two financing models. Rarely, more than two financing models are used. Research of usual practices in the Project Partner countries showed that dominantly grants (if available) are combined with own financing.

Recently, with the availability of EU structural and investment funds for energy efficiency across the MS, the blending of such funds with other financing models becomes increasingly interesting. The blending refers to combination of grants with other financing mechanism such as loans or ESCO/PPP model.

2.7. Comparative analysis of financing models

The financing models described above may be compared based on several important criteria as demonstrated in the Table blow. There is no universally best solution, but for each particular situation (country, region, building) an optimal solution should be tailor-made.

Table Błąd! W dokumencie nie ma tekstu o podanym stylu.**-1 Comparative analysis of considered models**

Criteria/ Model	Own financing	Loan financing	Grants	ESCO model	PPP model
Neutral impact on government debt	☺	☹	☺	😐	☺
Administrative procedure complexity	☺	😐	😐	😐	☹
Guarantee of savings / service standard	☹	☹	😐	☺	☺
Capacities and capabilities of the public bodies to implement the model	☺	😐	😐	☹	☹
Estimated multiplier effect	☹	☹	😐	☺	☺
Projects for which the model is appropriate	Simple EE measures with short pay-back periods	Simpler EE measures with shorter pay-back periods	More complex projects, with longer pay-back periods	Highly complex projects, with moderate pay-back periods (up to 10 years)	Highly complex projects, usually with new buildings, long-term

3. EXISITING FINANCING MECHANISMS IN CZECH REPUBLIC

3.1. Summary of available financing mechanisms

Czech Republic has well developed financing mechanisms for EE projects in schools. Schools are owned by cities and there are well established budget items for planning capital expenditures of investments in schools. Debt financing is also common and very attractive due to interest rates below 2.5%. There are also many grant schemes using either EU funds from Operational Programme Environemnt or using national funds through "State programme on support of energy savings and use of RES". Grant rates range from 35 to 50% for reconstruction projects (up tp 70% for project preparation) and there is a trend of decreasing grant rates, due to which this mechanism is becoming less and less utilised. ESCO market is well developed and EPCs are usually concluded for several public buildings of the same owner, so called "packages" as smaller projects are usually not economically feasible. PPP market is developed, but this type of financing is not used for EE projects but rather for big infrastructural projects.

An oveview of available financing mechanisms for EE projects in schools in Czech Republic is given in Table below, while details are given in the Section 3.2.

Table Błąd! W dokumencie nie ma tekstu o podanym stylu.**-2 Overview of financing mechanisms for EE projects in schools**

Criteria/ Model	Own financing	Loan financing	Grants	ESCO model	PPP model
Availability	√	√	√	√	-
Previous and current usage	√	√	√	√	-
Planned usage	√	√	√	-	-

3.2. Detailed feedback on financing mechanisms

1. General information			
Name of partner	ENVIROS		
Type and number of schools chosen for pilots	Primary	Elementary	College
	0	9	0
Who is the legal owner of schools	The schools are owned by cities. In our case in particular: the city of Louny (1 school), the city of Jablonec and Nisou (1), and the city of Ostrava (7).		
Who pays utility bills and regular maintenance for schools	The same as above		
What is the source for those costs	Local authority budget (+ external sources if a school renovation project is partly financed externally)		
Who is responsible for making decisions on implementation of energy renovation projects	Usually school directors are rather aware and try to initiate energy efficiency activities in their schools. For them, the main counterpart is a city energy manager (if the city has him/her) and the city's department of education. They then communicate with the department of investment, which is responsible for budget preparation. The city budget must be approved by the council. In cities, where the energy manager is appointed, the top-down approach		

	works as well. I.e. the initiative starts from the energy manager.			
What is the source for the cost of energy renovation	The city budget is divided into "current expenditure" and "capital expenditure". Under capital expenditure, a further division is based on the city's department structure; one of the main budget chapters is "department of investment". Then it includes sub-chapters "kindergartens", "primary schools", "after-school centres", "health-care facilities", etc. Under each sub-chapter, specific activities/projects are listed, which may include both energy-related investment (e.g. insulation of the school ABC) and energy not-related investment (e.g. construction of a new playground in school XYZ).			
Which department (sector, institution) is responsible for implementation of energy renovation (in public buildings)	The main responsibility is on energy manager (if exists) or the department of education. However of course, the implementation is strongly supervised by the department of investment.			
2. Financing EE projects using own funds				
Do you have funds in your budget allocated for EE projects in public buildings	**Yes**			No
	When reading specific budget items of the city's investment budget for 2018, the energy-related investments are about 680 000 €, of which 400 thousand is amount for a big energy project in Ostrava zoo.			
Do you have funds in your budget allocated for EE projects specifically in schools	**Yes**			No
	The investment budget for "elementary schools" is 100 000 €, from which 20 000 € is for energy-related projects. It is an increase compared to 2016 and 2017. Budget item = Department of Investment → Elementary schools → Heating and regulation after insulation			
Have you already implemented EE projects in schools using own funds	**Yes**			No
	No concrete numbers, but a large amount of schools was renovated (energy) in last 10 years. They were funded from subsidy programmes sometimes with the city co-financing of 10-15 %.			
3. Financing EE projects using credit or loan funds (debt)				
Is this kind of financing available for you?	**Yes**			No
	Source (commercial bank, development bank, other)	Interest rate	Repayment period	
	commercial banks national development bank	up to 2.5 %	5 – 15 years	
Do you have plans to invest in EE projects in schools using this model	**Yes**			No
	Thanks to favourable interest conditions (see previous question), cities often use commercial loans to co-finance projects funded from operational programmes. However, with new conditions – funding only 35-50 % (instead of 85-90 %), the scheme has become less attractive.			
Have you conducted EE project in schools financed by credit or loan funds (debt)	**Yes**			No
	It is supposed that this type of financing will still be used (to some extent) with new operational programme calls.			
4. Financing EE projects using grants, subsidies or other incentives				
Is this kind of financing available for you?	**Yes**			No
	Source (national, EU	Grant rate %	Max. amount of	

	funds, other)		grant per project	
	see separate table below			
Do you have plans to invest in EE projects in schools using this model	**Yes**			No
	The subsidy schemes are still used but less often compared to previous programming period due to less attractive conditions (funding rate). The scheme nr. 2 is almost not used.			
Have you conducted EE project in schools co-financed by grants, subsidies or other incentives	**Yes**			No
	No concrete numbers, but a large amount of schools was renovated (energy) in last 10 years using subsidy programmes.			
5. Financing EE projects using ESCO model				
Is this kind of financing available for you?	**Yes**			No
	EPC market is well developed in the Czech Republic. It is used mainly in a public sector; schools are very popular buildings for ESCOs. (The reason is that many of them have already been insulated and windows changed, so EPC projects can focus on measures with lower payback period, which makes the projects economically attractive.) EPC projects are always implemented in a way that each project covers several public buildings of the same owner, so called "packages". Implementing a project for a small number (or even one) buildings is not economically feasible.			
Do you have plans to invest in EE projects in schools using this model	Yes			**No**
				One EPC project is currently running in the city of Jablonec. However, there are no other plans for near future in participating cities.
Have you conducted energy efficiency project in schools financed through ESCO model	**Yes**			No
	In cities participating in FEEDSCHOOLS project, EPC projects in schools were carried out in the city of Ostrava (2012) and the city of Jablonec nad Nisou (1998, 2016).			
6. Financing EE projects using PPP model				
Is this kind of financing available for you?	Yes	**No**		
		PPP market is developed in the Czech Republic, but this type of financing is not used for EE projects. It is used rather for big infrastructural projects.		
Do you have plans to invest in EE projects in schools using this model	Yes	**No**		
		see above		
Have you conducted energy efficiency project in schools financed by credit or loan funds (debt)	Yes	**No**		
		see above		

Additional information on grant schemes

	Source (national, EU funds, other)	Grant rate %	Max. amount of grant per project
	OP Environment (EU funding)		
1.	PA 5 Energy Savings, SC 5.1 Decrease energy intensity of public buildings and increase use of RES	35-50 % (depending on % of savings achieved); 70 % for installation of systems of forced ventilation with waste heat recuperation	No limitation at project level Limits are set for specific types of measures (e.g. limit for envelop insulation in €/m2)
2.	PA 5 Energy Savings, SC 5.2 Reach high energy standard of new public buildings	30 %	2 million €
	Programme EFEKT **"State programme on support of energy savings and use of RES"** (national fund – state budget)		
3.	Sub-programme 1B Reconstruction of heating system and heating source	50 %	80 thousand €
4.	Sub-programme 1C Energy efficiency measures in buildings implemented by using EPC method	50 %	80 thousand €
5.	Sub-programme 2D Implementation of energy management systems	70 %	20 thousand €
6.	Sub-programme 2E EPC feasibility studies (analysis whether/which buildings are suitable for EPC)	70 %	8 thousand €
7.	Sub-programme 2F Preparation of energy efficiency projects	70 %	4 thousand €