SUSTAINABLE ENERGY TECHNOLOGIES AND LOCAL AUTHORITIES: ENERGY SERVICE COMPANY, ENERGY PERFORMANCE CONTRACT, FORFEITING

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Abstract - The large majority of Local Authorities (LA) are facing budgetary restrictions despite a municipal agenda overcharged with needs for intervention. Increasing public body energy bills is one of them. In such circumstances, Energy Services COmpanies (ESCO) and LA might enter collaboration through an Energy Performance Contract (EPC) in order to promote the rational use of energy to local level. To extend such type of action in the frame of a limited ESCO's creditworthiness, resulting EPC receivables are to be sold through forfeiting. A specialised financial institution is to be involved. This paper proposes detailed concepts' presentations, an overview on the used methodology, a relevant case of sustainable energy technology investment implying several actors and related further developments.

Keywords: sustainable energy technology, Local Authority (LA), Energy Performance Contract (EPC), Energy Services Company (ESCO), receivables, forfeiting.

1. INTRODUCTION

The ongoing process of deregulation within the Romanian electricity market induces public body energy bills increase, Local Authorities (LA) seeming more and more financially over exceeded. Consequently the need for intervention is immediate and LA are presumably aware enough.

The moderate economic activities relaunching determines budgetary restrictions, both at central and local level and deepens financial difficulties.

The promotion of sustainable energy technologies at local level is listed as one of EU priorities [1]. In this respect, the present paper proposes definitions, methodologies, calculations for a study case and recommendations, bearing in mind that:

- LA financial stability is affected by the conjugate effects of both energy bills increase and still modest revenues from economic activities taxation;
- due to a simultaneous priorities local agenda, LA indebtedness is close to the maximum in the context of a rather modest creditworthiness;
- as regards the promotion of adequate sustainable energy technology, LA seem to need assistance;
- relevant successful international experience renders possible the specialised private operators intervention aiming at the contractual-based promotion of sustainable energy technologies to local level;
- availability of financial operators for third-party financing.

2. DEFINITIONS

Energy service means the physical benefit, utility or good derived from a combination of energy with energy-efficient technology [1]. Energy service is provided on contractual basis; verifiable, measurable or estimable energy efficiency improvement or primary energy savings is to result [2].

Energy Performance Contract (EPC) designates a contractual arrangement between the beneficiary (i.e. LA) and the energy service provider, where concerned investments are paid for in relation to a contractually agreed level of energy efficiency improvement and/or financial savings [1, 2].

Energy Services COmpanies (ESCO) delivers energy services and/or other energy efficiency improvement measures to a user's facility or premises, and accepts some degree of financial risk in so doing [2]. The provided services correspondent payment is an either wholly or partially related-performance one, consisting in the achievement of energy efficiency improvements or in meeting of other agreed performance criteria.

Third-party financing refers to a contractual arrangement involving a third party - in addition to the energy services supplier and the beneficiary of the energy efficiency improvement measure - which provides the capital for that measure and charges the beneficiary a fee equivalent to a part of the energy savings achieved as a result of the energy efficiency improvement measure.

Energy service companies (ESCO) and energy performance contracting (EPC) are internationally recognised common tools to enhance the sustainable end-use of energy through promoting energy efficiency and renewable energy sources [2].

ESCO and EPC help to overcome financial constraints to investments and pay off initial costs through the energy cost savings coming from the reduced energy demand. ESCO provide an opportunity to curb increasing energy demand and control CO_2 emissions while exploiting market benefits for customers by decreasing the energy costs of their clients and making profit for themselves [2].

3. METHODOLOGY

3.1. Subsequent Methods

The relatively complex approach used for the elaboration of this paper requires a step-by-step overview. The following subsequent methods were considered:

- determination of sustainable energy technology performance indicators using the cash-flow based net present value method [3, 4];
- business origination by ESCO;
- establishment of EPC terms and conditions for both LA and ESCO;
- forfeiting origination by LA and ESCO with a specialised financial institution.

3.2.Sustainable Energy Technology Performance Indicators

The notations are a - discount rate, h - year of expenditure or earning; d - duration of erection works; D - lifespan of investment; V_h - annual revenue in year h; C_h - annual expenditure within year h, I_h - annual investment in year h [3, 4].

The first relevant indicator is the discounted cash flow CF_h which depicts the annual situation of revenues and expenditures for every year from the interval 1, d+D:

$$CF_h = \frac{[V_h - (I_h + C_h)]}{(1+a)^h},\ h = \overline{1, D+d}\,. \qquad (1)$$

The quicker this indicator becomes positive the more interesting is the implementation of sustainable energy technology for the present paper purpose.

The net present value NPV designates the net discounted revenues over the entire period of time 1, d+D [3, 4]. The relation is:

$$NPV = \sum CF_h > 0,\ h = \overline{1, D+d}\,. \qquad (2)$$

As this indicator is positive and gets greater values as the investment is of high priority.

The internal rate of return IRR indicates the economic strength of the further implementation of sustainable energy technology and designates that value of the discount rate for which the net present value NPV becomes null (NPV=0). As indicated in [3, 4], the value of IRR can be analytically obtained using the relation (3):

$$IRR = a_{min} + (a_{max} - a_{min})\frac{NPV_+}{NPV_+ + |NPV_-|}\,, \qquad (3)$$

or graphically [3, 4], as suggested in fig. 1.

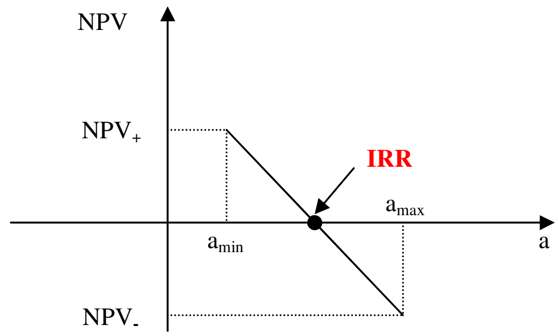

Fig. 1. Graphic determination of the internal rate of return

(source: Malamatenios, Ch., Vezirigianni, G., Grepmeier, K., Renewable Energies & Energy Efficiency: training guidebook, NicVox Publishing House, ISNB (13) 978-973-8489-37-0, Bucureşti, 2007).

The gross payback time GPT:

$$\sum_{h=1}^{GPT} [V_h - (I_h + C_h)] = 0, \qquad (4)$$

designates the period after which, through the cash flow released by after investment commissioning, the total size of investment was entirely paid back [3, 4]. If the annual cash flows have uniform values, the gross payback time is to be determined with the relation:

$$GPT = \frac{I}{V - C}\,. \qquad (5)$$

The discounted payback time DPT [3,4], designates the period after which through the discounted cash flow released by investment operation, the total size of investment was entirely paid back. Additionally, a discounted cash flow determined based on the value of the discount rate can be obtained, too. The relation for the calculation of the discounted payback time is:

$$\sum_{h=1}^{DPT} \frac{V_h - (I_h + C_h)}{(1+a)^h} = 0. \qquad (6)$$

If the annual cash flows have uniform values, the discounted payback time depends on GPT within the relation:

$$DPT = -\frac{\ln(1 - GPT * a)}{\ln(1+a)}\,. \qquad (7)$$

The determination of the discounted payback time is also based on the exact definition of the zero time moment, which is normally associated to the investment commissioning.

3.3. Business Origination by ESCO

In principle, ESCO might be a small or medium sized enterprise, capable to deliver energy services or other energy efficiency improvements measures. In line with the provisions of the Directive 2012/27/EU [1], when entering negotiations with LA as energy service provider, ESCO should have the following professional profile to rely on:

– expertise to obtain accurate information about LA existing energy consumption profile,
– capabilities to identify and quantify cost-effective energy savings opportunities;
– detailed knowledge on the promotion and implementation to LA of most favourable sustainable energy technology;
– appropriate capacity for installation or equipment operation, maintenance and control;
– adequacy for monitoring, verification, evaluation and reporting.

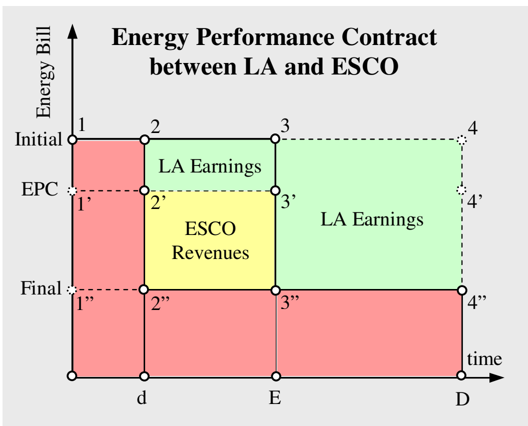

Fig. 2. Energy Performance Contract between LA and ESCO
(source: M.-M. Voronca-Coordinator, T. Constantinescu, M. Cruceru, A.M. Fodi, A. Marin and S.-L. Voronca, FINANŢAREA INVESTIŢIILOR ÎN EFICIENŢĂ ENERGETICĂ, Editura AGIR, Bucureşti, ISBN 973 - 720 - 200 - 0, 2008).

3.4. Establishment of EPC terms and conditions for both LA and ESCO

As previously indicated, EPC connects LA and ESCO, the former as beneficiary of an energy service and the latter as service provider. Through EPC, concerned investments are paid for in relation to a contractually agreed level of financial savings coming from energy efficiency improvement [1, 2]. In fig. 2, basic information on how is constructed an EPC is emphasised.

To enter such contractual arrangement, ESCO is firstly required to determine the LA's initial amount of energy annually consumed (line 1-2). After choosing the most promising energy saving opportunity, ESCO assess the further amount of energy consumption (line 1"-2") and enter negotiations with LA in order to mutually establish the EPC virtual one (line 1'-2').

EPC stated that, for a commonly agreed period of time (between the investment commissioning d and by parties' negotiated EPC completion noted E in fig. 2), LA pays bills ESCO in accordance with EPC virtual energy consumption level (line 2'-3') and not with the further one (line 2"-3"). In such conditions, ESCO commits to provide performance guaranteed energy services against regular LA payments necessary to cover all required investment costs.

3.5. Forfeiting origination by LA and ESCO with a specialised financial institution.

ESCO capacity to perform EPC is often limited by the availability of long term capital to finance investments under such contractual arrangements.

The reason might be a moderate creditworthiness of ESCO just entering EPC business, and consequently, a modest appetite for borrowing, too. Such situations are usually encountered on an emerging ESCO EPC market, as it is the case of Romania.

To overcome such limitations, ESCO could explore various options, forfeiting being one of them.

Forfeiting is the term generally used to denote the purchase of obligations falling due at some future date, arising from goods and services, without recourse to any previous holder of the obligation [5].

Forfeiting is a financial transaction involving the purchase of EPC receivables. More precisely, within a period jointly agreed with LA after implementation noted F (fig. 3), ESCO could financially exit the contractual arrangement before EPC completion E, by selling EPC receivables to a specialised financial institution called Forfeiter.

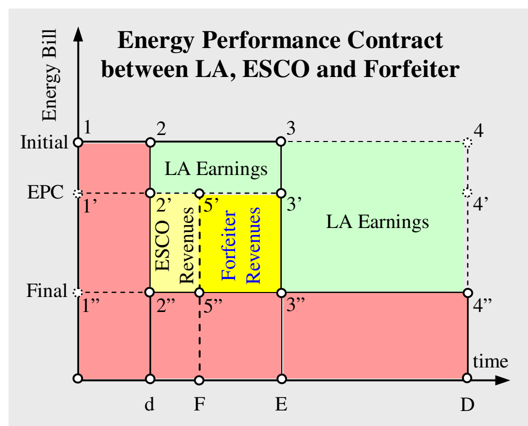

Fig. 3. Energy Performance Contract between LA, ESCO and Forfeiter

In such financial transaction, ESCO commits to be paid within, for instance, a year from commissioning with a price covering all investment costs and a part of "up to the EPC end" profit (fig. 3), against the Forfeiter and LA who commit to perform and finish EPC with regular LA payments in the benefit of the Forfeiter.

After forfeiting, the same energy service is provided by ESCO to LA, which continues to pay accordingly, this time to the Forfeiter. ESCO obtains quicker than foreseen, against a smaller profit, the capital to enter new EPC business. The Forfeiter collects a margin as long as the price paid to ESCO is a discounted one.

Using for the forfeiting transaction the discount-to-yield annually compounded method [5] to determine the payment amount due by the Forfeiter to ESCO for EPC receivables purchase, the following indicators' values are to be obtained:

- n representing the total number of days between disbursement F and the EPC contract completion E; value adjustment for non-working days and value addition for grace days;
- a_n representing the number of whole year periods calculated from N;
- o_d representing the number of odd days within the remaining partial year period;
- r_h representing the Forfeiter's annual yield rate (Forfeiter's interest rate in % p.a.);
- f_h representing the Forfeiting Base Fee (% p.a.) obtained with formula (8):

$$f_h = (\frac{360}{n} + r_h) * [1 - \frac{(1+\frac{r_h * o_d}{360}) - 1}{(1+\frac{r_h * 365}{360})^{a_n}}]; \quad (8)$$

- t_h representing the Forfeiting Tax (% p.a.) obtained with formula (9):

$$t_h = f_h + m_h , \quad (9)$$

where m_h is the Forfeiting Margin (% p.a.); compared to FBF which is correlated to the Forfeiter's interest rate, FM has a negotiable value which indispensably quantifies the Forfeiter risk exposure [6, 7];
- L_O representing the value obtained by summing ESCO investment costs and "up to the EPC end" ESCO profit (fig. 3);
- F_D which designates the Forfeiting Discount, determined with formula (10):

$$F_D = L_O * \frac{n}{360} * t_h ; \quad (10)$$

- P_A which designates the payment amount due by Forfeiter to ESCO, determined with formula (12):

$$P_A = L_O - F_D . \quad (12)$$

Within the origination of forfeiting, a detailed identification and assessment of risk exposure is to be performed. Against LA and ESCO which shares a common exposure to technical risk, the Forfeiter is alone facing all other kind of risks.

As long as EPC terms and conditions foreseen ESCO obligations for technical risk treatment, the Forfeiter is on his own assuming the rest. And FM is taken it into consideration.

4. PROJECT HIGHLIGHTS

4.1. Presentation of business opportunity

Among different interventions that LA may perform, the refurbishment of outdoor public lighting is one of them.

For the purpose of this paper, a real case of a small municipality operating a public outdoor system of 335 lighting sources is taken into consideration. The related inventory shows that from the total, 82 units are Norris lamps with rated power 400 W, 56 units are high-pressure nitrate vapours lamps with rated power 250 W, 67 units are high-pressure nitrate vapours lamps with rated power 150 W, 19 units are high-pressure nitrate vapours lamps with rated power 70 W, 95 units are incandescent lamps with rated power 100 W and 15 units are fluorescent lamps with rated power 36 W.

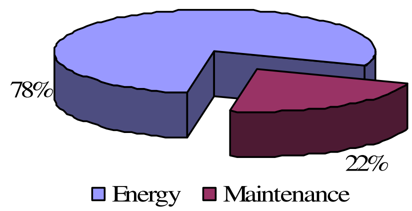

Fig. 4. Structure of annual LA expenditures for outdoor public lighting system operation in year 2009 (source: http://free.org.ro)

The total installed capacity of the lighting system amounts to 80.1 $kW_{e.}$ The total annual energy consumption of the system was 292.4 MW_eh/year, i.e. the equivalent of 31,136 €/year (V.A.T. included). An annul lump sum of 8,918 €/year (V.A.T. included), due to maintenance interventions is to be added. Fig. 4 shows the related shares from the total of annual expenditures for the system operation.

Fig. 5. LED-technology outdoor public lighting system in Mociu, Cluj County (source: EnergoBit Schreder Lighting S.R.L.)

A simple observation of the situation is enough to get the conviction of an interesting business opportunity dealing with the public lighting system refurbishment. The investment is technically simple and financially acceptable, the implementation is rapid and the improvement of cash-flow comes immediately after.

4.2. Sustainable energy technology performance indicators

ESCO might easily face the previously mentioned business opportunity. Being aware of the best available technology in the field of lighting, ESCO would probably propose to LA the refurbishment of outdoor public lighting using LED-technology as it was the case of the first municipality in Romania, Mociu Local Council (fig. 5).

Assuming that ESCO has opted to invest in LED-technology, it is reasonable enough to consider that the public outdoor system of 335 lighting sources will be equipped with 175 units LED-lamps with rated power 50 W and 160 units LED-lamps with rated power 30 W.

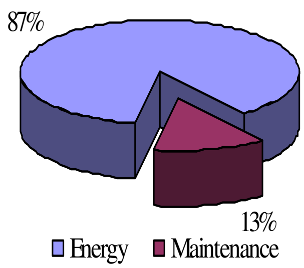

Fig. 6. Structure of annual LA expenditures for refurbished outdoor public lighting system operation (source: http://free.org.ro)

The total installed capacity of the lighting system will amount to 14.2 $kW_{e.}$ The total annual energy consumption of the system will be 51.9 MW_eh/year, i.e. the equivalent of 5,306 €/year (V.A.T. included). An annual lump sum of 797 €/year (V.A.T. included), due to maintenance interventions will be added.

The considered total investment size for the lighting system refurbishment is 159,408 € (V.A.T. included). After project implementation, the financial benefits will amount to 33,951 €/year (V.A.T. included), without taking in consideration the favourable effect of electricity price increase. In order to determine the sustainable energy technology performance indicators values, the following simplified input data were considered as relevant [8]:

- the discount rate is a = 12%;
- the duration of erection works is d = 2 months;
- the lifetime of investment is D = 20 years;
- the amount of net revenues is V_h = 33.951 thousands € a year; the amount of annual revenues is constant;
- the amount of annual expenditure is C_h = 0;
- the total investment size is I_h = 159.408 thousands €; for any other year h from the interval d, D + d is null.

Under such premises, a worksheet in MS Excel has been created. Output data are showed in Table 1.

Table 1

Investment Performance Indicators	Year h = 1, D + d					
	d = 0	h = 1	h = 2	h = 3	h = 4	h = 5
	k€	k€	k€	k€	k€	k€
I_h	-159.41	0	0	0	0	0
V_h	0	33.951	33.951	33.951	33.951	33.951
C_h	0	0	0	0	0	0
$V_h - (I_h + C_h)$	-159.41	-125.46	-91.51	-57.55	-23.60	10.35
$1/(1 + a)^h$	1.00	0.89	0.80	0.71	0.64	0.57
CF_h	-159.41	-129.09	-102.03	-77.86	-56.29	-37.02
a	12	%				
I_h	-159.41	0	0	0	0	0
V_h	0	33.951	33.951	33.951	33.951	33.951
C_h	0	0	0	0	0	0
$V_h - (I_h + C_h)$	-159.41	383.81	417.76	451.71	485.66	519.61
$1/(1 + a)^h$	1.00	0.16	0.15	0.13	0.12	0.10
CF_h	-159.41	77.37	82.31	86.73	90.67	94.19
a	12	%				
GPT	4.7	years				
DPT	7.3	years				
NPV	94.19	k€				
IRR	21	%				

4.3. Business Origination by ESCO

After examining the LA existing energy consumption profile, ESCO has observed that for the operation and maintenance of the outdoor lighting system, an annual energy bill of 40,054 €/year is to be allotted from the LA budget (fig. 7). Having identified the energy saving opportunity represented by the outdoor lighting system refurbishment (a gross payback of 4.7 years and an internal rate of return of 21%), ESCO will enter discussions with LA in order to propose the overall conditions for a further mutual collaboration:

- the already identified energy saving potential;
- further financial benefits from a 10% reduction with of LA annual energy bill (28,038 € over 7 years) by promotion of LED-technology lighting;
- no financial pressure on LA budget as long as an off balance sheet investment is envisaged;
- no responsibilities in lighting system installation, operation, maintenance and control;
- a determined contractual arrangement time (ESCO exits after 7 years);
- collection of entire financial benefits amounting to 441,363 € (over 13 years) and free of charge installation property right transfer when ESCO exits.

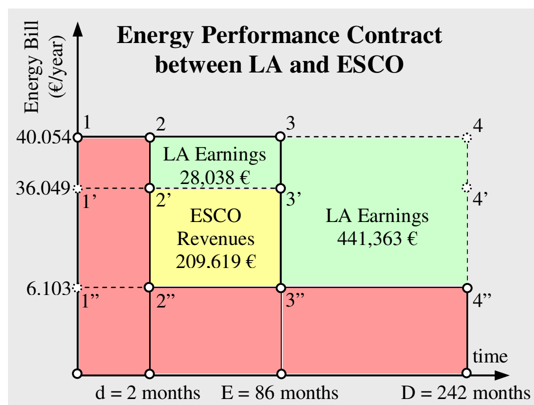

Fig. 7. Investment Financial Benefits shared between LA and ESCO through Energy Performance Contract

4.4. Establishment of EPC terms and conditions for both LA and ESCO

After both LA and ESCO committed to enter a contractual arrangement, all terms and conditions of collaboration under an Energy Performance Contract are to be established. The following provisions are relevant:

- LA is the beneficiary of energy services;
- LA is contracting from ESCO energy services for a period of 7 years long from investment commissioning;
- ESCO guarantees a 10% discount from the annual energy bill corresponding to the existing LA public outdoor lighting system operation and maintenance;
- based on the energy savings potential of investment, LA agrees to be awarded with 10% discount i.e. the equivalent of 4,005 €/year, from the annual energy bill of 40,054 €/year corresponding to the existing LA

public outdoor lighting system operation and maintenance;
- ESCO is responsible for the refurbishment of the LA public outdoor lighting system; the considered total investment size amounting to 159,408 €;
- ESCO is responsible for investment financing;
- ESCO is responsible for "all-inclusive" operation and maintenance during entire investment lifespan;
- LA agrees that ESCO sell and a third-party purchases the EPC receivables in case of an earlier ESCO exit from EPC contract;
- in this last case, the third-party is responsible for covering "all-inclusive" maintenance and operation costs up to the EPC end.

4.5. Forfeiting origination by LA and ESCO with a specialised financial institution

Considering ESCO option to sell EPC receivables after 12 months from commissioning, it is worth nothing that only 29,946 € from the total of 209,619 € in 84 months are ESCO's revenues (fig. 8). In conclusion, the remaining amount of 179,673 € will represent the Forfeiter's revenues in 72 months.

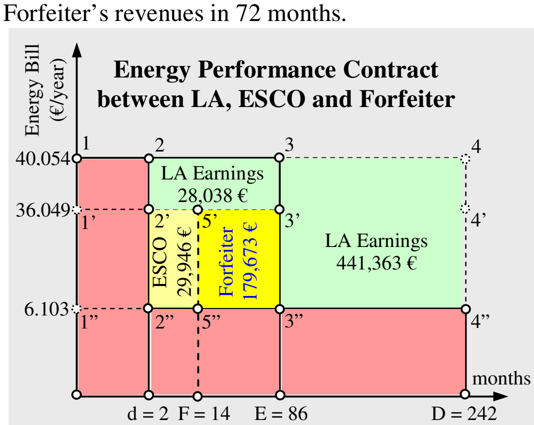

Fig. 8. Energy Performance Contract between LA, ESCO and Forfeiter

As mentioned in chapter 3.5, the Forfeiter's payment should cover all investment costs and a part of "up to the EPC end" profit (fig. 3). Investments costs are referring to the total investment size and the debt service (principal and interest) of ESCO up to F.

In chapter 4.2 the total investment size for the lighting system refurbishment was indicated to be 159,408 € (V.A.T. included). As ESCO's own financial participation is 20% (normally required by any lender), it might be assumed that the difference of 127,526 € would be a bank loan.

4.5.1. Determination of ESCO's "up to the EPC end" profit

The "up to the EPC end" profit is obtained for EPC complete execution. An overview of annual revenues and expenditures is presented in Table 2.

To complete the financing scheme, it might be presumed ESCO will borrow the amount of 127,526 € under the following conditions:
- interest rate of 4.5% p.a.;
- loan reimbursement in 7 years; no grace period;
- quarterly based payments of principal and interest.

Table 2

ESCO Revenues and Expenditures	Year h = d, E			
	h = 1	h = 2	h = 3	h = 4
	k€	k€	k€	k€
LA Annual Payments	36.049	36.049	36.049	36.049
Debt Service	-18.218	-18.218	-18.218	-18.218
Lending Cost	-5.460	-4.622	-3.812	-2.978
Energy Bill	-5.306	-5.306	-5.306	-5.306
Maintenance	-797	-797	-797	-797
20% Own Contribution	-31.882	0	0	0
EBIT	-25.614	7.105	7.916	8.750
LA Annual Payments	36.049	36.049	36.049	**252.340**
Debt Service	-18.218	-18.218	-18.218	**-127.526**
Lending Cost	-2.156	-1.334	-514	**-20.876**
Energy Bill	-5.306	-5.306	-5.306	**-37.142**
Maintenance	-797	-797	-797	**-5.579**
20% Own Contribution	0	0	0	**-31.882**
EBIT	9.572	10.394	11.213	**29.335**

ESCO will reimburse the 7-year loan of 127,526 € in 28 equal quarterly payments of 4,555 € each, and will pay a lending cost over 7 years of 20,876 €. The EPC revenues would amount to 252,340 € (annual energy bills of 36,049 € paid by LA to ESCO over 7 years). Apart debt service and lending cost, other expenditures that might occur after the investment implementation are the LA annual energy bills, the maintenance costs and the ESCO own contribution of 20% to close the financing scheme.

In conclusion, in the case of EPC complete execution, the ESCO's "up to the EPC end" profit that would be obtained amounts to 29,335 €.

4.5.2. Determination of the payment amount due by the Forfeiter to ESCO for EPC receivables purchase

Taking into account that forfeiting will occur at the time F=14 months (fig. 8), the amount of 127,526 € is to be borrowed by ESCO under the new conditions:
- interest rate of 4.5% p.a.;
- loan reimbursement in one year; no grace period;
- quarterly based payments of principal and interest.

ESCO will reimburse the one-year loan in 4 equal quarterly payments of 4,555 € and the final payment of 109,308 € to time F and will pay a lending cost over one year of 5,460 €.

To determine the payment amount due by the Forfeiter to ESCO for EPC receivables purchase, the discount-to-yield annually compounded method [5], is used for. The determination of values associated to the indicators n, a_n and o_d from chapter 3.5. is below presented:

$$n = E - F = 2{,}590 - 362 = 2{,}168 \text{ days} \quad ; \quad (13)$$

$$a_n = \mathrm{Int}\left(\frac{n}{365}\right) = \mathrm{Int}\left(\frac{2{,}168}{365}\right) = 5 \text{ years} \; ; \quad (14)$$

$$\begin{aligned} o_d &= \mathrm{Integer}\left(\frac{n - a_n * 365}{2} + 1\right) = \\ &= \mathrm{Integer}\left(\frac{2{,}168 - 5 * 365}{2} + 1\right) = 172 \end{aligned} \quad . \quad (15)$$

Forfeiting means one's own internal costs and r_h represents the Forfeiter's annual yield rate (Forfeiter's interest rate in % p.a.), accordingly. For this present paper the used value is:

$$r_h = 3.47\% \text{ p.a.} \tag{16}$$

Introducing the values of the indicators n, a_n, o_d and r_h in formula (8), f_h gets the value:

$$f_h = \left(\frac{360}{2{,}168} + \frac{3.47}{100}\right) * \left[1 - \frac{\left(1 + \frac{3.47}{100} * \frac{172}{360}\right) - 1}{\left(1 + \frac{3.47}{100} * \frac{365}{360}\right)^5}\right] =$$

$$= (0.200\,75) * \left[1 - \frac{1.01658}{(1.03518)^5}\right] = 3{,}46\%\,. \tag{17}$$

Considering the Forfeiter's risk exposure assessment [6, 7], materialised through a Forfeiting Margin (% p.a.) with the value:

$$m_h = 1.3\ \% \text{ p.a.}, \tag{18}$$

the resulting Forfeiting Tax (% p.a.) gets the value:

$$t_h = f_h + m_h = 3.46\% + 1.3\% \ = 4.76\%\,. \tag{19}$$

Bearing in mind that L_O represents the sum of ESCO investment costs (which includes the total investment size and the lending cost over one year) and "up to the EPC end" ESCO profit:

$$L_O = 159{,}408 \text{ €} + 5{,}460 \text{ €} + 29{,}335 \text{ €} = 194{,}203 \text{ €},$$

the Forfeiting Discount from formula (10) is:

$$F_D = 194{,}203 * \frac{2{,}168 * 4.77}{360 * 100} = 55{,}701 \text{€} \tag{20}$$

Finally, the payment amount the Forfeiter owes to ESCO from formula (12) is:

$$P_A = 194{,}203 \text{ €} - 55{,}701 \text{ €} = 138{,}502 \text{ €}\,. \tag{21}$$

Table 3 depicts the financial situation for forfeiting.

Table 3

ESCO Revenues and Expenditures	Year h = d, E			
	h = 1	h = 2	h = 3	h = 4
	k€	k€	k€	k€
LA Annual Payments	29.946	0	0	0
Forfeiting P_A	0	138.502	0	0
Maintenance	0	797	797	797
Debt Service	-18.218	-109.308	0	0
Lending Cost	-5.460	0	0	0
20% Own Contribution	-31.882	0	0	0
EBIT	-25.614	29.991	797	797
LA Annual Payments	0	0	0	**29.946**
Forfeiting P_A	0	0	0	**138.502**
Maintenance	797	797	797	**4.782**
Debt Service	0	0	0	**127.526**
Lending Cost	0	0	0	**-5.460**
20% Own Contribution	0	0	0	**-31.882**
EBIT	797	797	797	**8.362**

In conclusion, in the case of forfeiting, the ESCO's profit that would be obtained amounts to 8,362 €, of which 4,377 € within year 2 and 3,985 €, during the next 5 years.

5. RESULTS AND DISCUSSIONS

By comparing the results form Table 2 to those in Table 3 it is easy to notice that in the case of forfeiting, ESCO gets profit quicker than without forfeiting. But the price paid is the Forfeiting Discount.

The distribution of EPC revenues amounting to 252,340 € (annual energy bills of 36,049 € paid by LA over 7 years) is presented in fig. 9. As expected, the total investment size share is the largest one (63%). The 7-year energy bill balances the financing costs (15% each) and the earnings share is 7% (both for ESCO and Forfeiter profits).

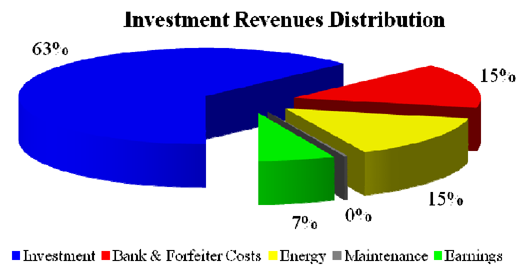

Fig. 9. Distribution of revenues for a 7-year Energy Performance Contract Cash - Flow Projection with Forfeiting

With regard to the amount of 8,362 € representing the ESCO profit, at the forfeiting moment, all revenues from maintenance could be collected, if the Forfeiter agrees so. Compared to the initial capital of 31,882 € invested by ESCO, the financial efficiency over one year gets a remarkable value of 26%.

The Forfeiter's profit amounts to 8,436 €. As its own initial capital put into business was 138,502 €, the financial efficiency over 6 years is 6%. But observing the Forfeiter's capital cost of 32,735 € which might be considered as revenues too, the financial efficiency over 6 years rises up to 30%.

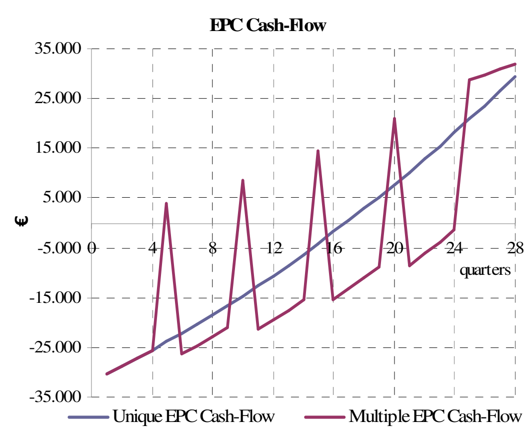

Fig. 10. 7-year Energy Performance Contract Cash - Flow Projection without and with Forfeiting

LA pay smaller energy bills by 28,038 € in 7 years and by 441,363 € over the lifespan of investment.

In fig. 10, the EPC cash-flow projection for two situations was considered: (i) a unique EPC without forfeiting and (ii) five EPCs with forfeiting, all presumptions form the present work being kept. The following observations are important:

– within 16 quarters the unique EPC cash remains negative as long as three EPCs with forfeiting were concluded;
– within 28 quarters, other two EPCs with forfeiting are possible;
– to the end of 28 quarters, multiple ECPs with forfeiting seems to be more profitable;
– in the multiple EPCs case, the revenues collection is considerably greater than 28 quarters.

In this paper, no reference to additional lending conditions (borrower creditworthiness) has been made, either no reference to additional costs for risk exposure treatment [6, 7]. But working with moderate values for interest rates and margins, it could be assumed that ESCO is creditworthy well enough.

6. CONCLUSIONS

Sustainable energy technology promotion at local level is a national energy policy priority. The context is represented by the gradual increase convened between Romania and the International Monetary Fund (IMF) for electricity and natural gas prices. The related pressure on the municipal budgetary execution has induced arrears. Now, the same IMF confirms that for a new prolongation of the Stand-by Agreement the arrears reduction up to their total removal is required.

Sustainable energy technology implies existing and certain energy consumption [3]. Savings obtained through the entire cut of energy consumption (i.e. the case of public outdoor lighting systems) should be considered quite similar with a black-out, which is an unusual situation [3].

Sustainable energy technology deals with energy savings. Its promotion might be a “win - win - win” situation as described in the present paper. Investments in sustainable energy technology are highly replicable.

Sustainable energy technology could help local authorities to regain their financial stability. Initiation and a continued preoccupation for an appropriate financial resources management deals with the promotion of such technologies. As sustainable energy technology performance indicators get higher values as the financial benefits are more significant.

As already mentioned in [3], sustainable energy technology implementation requirements are (i) a well defined demand for energy use to cover, (ii) an appropriate connection with that part of energy demand which is almost time – invariant.

Sustainable energy technology promotion at local level needs (i) appropriate legal framework for energy performance contract based energy services, (ii) public procurement rules for local authorities in contracting such services, (iii) helpful assistance of energy services companies provided to local authorities, in order to overcome their chronic lack of financing, (iv) possible implication of specialized financial institutions to assist energy services companies in overcoming their limited creditworthiness (v) appropriate risk management and (vi) rigorous financial discipline.

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