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Development and Application of ESCO Models in Serbia – The Financial Aspect and Examples of Good Practice

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Summary: *The work presents the financial aspect of applying elements of the ESCO (Energy Service Company) concept through a contractual relation in a private-private partnership. Results of applied measures for increasing energy efficiency in the industry, based on different methods and models with the goal of decreasing electric energy consumption. The diagrams display the change of number of users through a three year period, on the territory of Petrovac on the Mlava, as well as the financial flow and the effect of achieved savings. The mutual relationship between the following elements has been described: the investment-revenue-profit element and the model's profitability from the standpoint of the ESCO.*

Key words: *Energy efficiency, savings, profit, partnership.*

1. INTRODUCTION

ESCO is a generic name for the concept which is a novelty on the service market in the field of energetics. Namely, ESCOs, aside from innovative projects for increasing energy efficiency and decreasing energy consumption, also offer users financial solutions.

The basic definition of an ESCO model is: an ESCO (energy service company) is a company/legal entity/entrepreneur, registered for rendering energy services (ESCO), which increase energy efficiency of objects and technological processes, through rendering energy services, and, to a degree, accept financial risk for rendered services by collecting payment, completely or partially, through achieved savings caused by implemented measures and fulfilling other criteria of performance [1].

The basic characteristics of the ESCO concept are:

- providing integrated all-in-one solutions
- connecting payment to achieved savings and project execution.

The most attractive aspect of ESCO models from the standpoint of the user is the fact that, through all project phases, business is done with only one enterprise, instead of many different subjects (project bureaus, energy distributors, equipment manufacturers, state and financial institutions, etc.) Aside from this, this "all-in-one" characteristic reduces energy efficiency project costs. The approach and business model of ESCO companies represents an innovative form of management in energetics which, as part of energy efficiency project completion, offers clients energy services.

ESCO companies profits off of achieved savings by the client, thereby taking on the payment risk of waiting for the moment of the first achieved and documented results – savings. The profit size is directly linked to achieved savings, in the ratio and percentage defined in the predetermined client contract. The base motive for carrying out energy efficiency projects and using renewable energy resources is the financial profitability of the project. Decreasing energy consumption or using cheaper energy sources achieves substantial financial savings, which should in an acceptable timeframe, if the project is profitable, surpass project investment as well as operation and system maintenance costs.

Benefits of energy efficiency in the public sector:

- ESCOs have experience in planning and carrying out measures for increasing energy efficiency which allow reducing sizeable budget spending. The expected increase in energy cost imposes a need for urgent energy saving measures in order to consolidate budget spending and increasing competitiveness in local and national economy;
- ESCOs take the risk of achieving results throughout planning, carrying out and using projects;
- ESCOs finance planning and carrying out projects, which does not increase the debt of the public body;
- ESCOs contribute to increasing the value of public objects, quality and energy efficiency of a public object and/or service;
- ESCOs contribute to increasing results of using available donations and budget resources through co-financing with private sector funds, which allows increasing the investment scope and a more extensive reconstruction, resulting in an increased object life span and an increase in energy efficiency. Joint activities enable achieving ambitious goals in increasing energy efficiency, which are necessary in the process of joining the EU;
- ESCOs help in introducing new technologies and services which are connected to the efficient use of natural resources. Participation in this economic trend increases chances of participation in future markets;
- The ESCO market decreases the drain of qualified workforces into foreign countries [2,6].

2. BASIC BARRIERS IN APPLYINGTHE ESCO MODEL IN SERBIA

The major barriers for the development of projects based on the ESCO model are:

- Insufficient capacity of the public sector to identify and prepare ESCO project;
- Not clear ownership over the facilities and not clear defined user/users of the facilities owned by public sector;
- Lack of pilot projects carried out by ESCOs in the public sector;
- Lack of market based financial solutions (direct or through commercial banks).Commercial banks are aware of the ESCO concept, but they do not have specific financial products, probably due to the lack experience in assessing these risks;

- Price of electricity, gas and heat are lower than market prices, although they have been increased in the last two years. Full market liberalization for electricity prices is expected by 2015;
- General lack of trust and unduly resistance towards ESCOs and other concepts because of fear of corruption;
- Lack of experienced ESCO companies and project developers;
- The energy efficiency is perceived as an technical issue only and its financial aspect is not;
- Lack of reliable energy consumption data that could be used for the establishment of baseline consumption because of: Measurement for heat energy has been performed for several facilities together and not on regular basis in public buildings. The measurement devices are inaccurate and not calibrated. Simultaneous procurement of fuels for several facilities managed by a single public entity/owner. Individual metering is not in place in apartment blocks;
- Lack of system for monitoring and verification of energy savings [3].

3. EXAMPLES OF GOOD PRACTICE AND CONTRACT MODELS

Research and development center Alfatec Ltd. Nis, based on the ESCO model, offers its users integrated solutions for electric energy consumption decrease. R&D center Alfatec also offers its users data collection services about the amount and value of consumed electric energy, analyses and designing, choosing the optimal method, implementing, applying surveillance control, and financing energy efficiency projects from own sources. Services are rendered based on the contractual obligation.

Different contract models exist which entrust ESCOs with carrying out energy efficiency projects. Each is adjusted to definite circumstances and need of the energy users, and offers certain advantages, which must be rated according to the demands of a specific project. Three basic contract models for public-private partnerships exist:

- Duration model – between an energy user and the ESCO until the end of the contract. –These contracts entitle ESCOs to compensation based on applied energy efficiency measures which totals 100% of energy savings until investment costs, services rendered and company risk has been covered. The contract had a relatively short duration, since the ESCO receives all energy cost savings after applying the measures. A maximum time duration is defined, but the exact duration of the contract is based on the level of achieved savings. The user knows which amount has to be paid to the ESCO from the beginning, and starts achieving energy savings after the end of the contract;
- Participation model – this contract model entitles the ESCO to compensation based on applied energy efficiency measures for a percentage of achieved energy savings. The compensation for the ESCO can vary for each individual contract and depends on contract duration. Compensation is paid to the ESCO usually once a month. The ESCO continuously follows equipment and object performance to achieve the agreed upon savings and acquire revenue;
- Guaranteed savings model – this model is used when energy consumption models are fixed and an appropriate energy savings nature exists, thus being able to guarantee a level of energy savings for the duration of the contract. According to these contracts, the ESCO guarantees energy savings reaching a defined minimum. If the agreed upon minimal savings are not achieved, the ESCO pays the difference to the energy user. If savings larger than the minimum agreement are achieved, the energy user can allow the ESCO participation in these larger savings. For the application of aforementioned models, the area of the Petrovac on the Mlava municipality has been selected. Figure 1 shows how the amount of the agreed upon savings has changed throughout a three-year period.

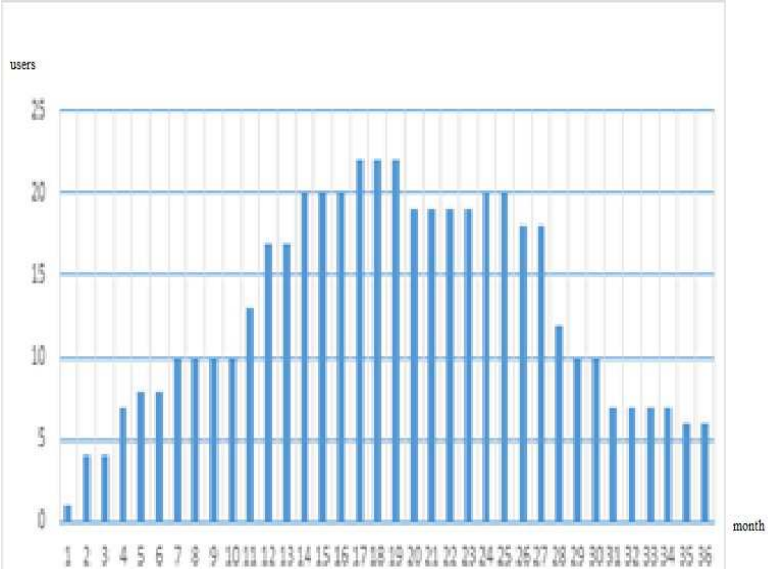

Figure 1. User Number Changes in a Three-Year Period

Small and medium-sized privately-owned enterprises have been selected as users.

In the first months of carrying out a marketing action, a small number of users had accepted the contractual obligation of increasing energy efficiency through achieving savings. Their number grew to a maximum of 22 users in the middle of the three-year period.

4. METODOLOGY

The energy users must carefully investigate all key elements in reaching a decision to carry out energy efficiency projects in their business objects. These include choosing the optimal project option and the way to finance it, including own resources or private partner financing. Many factors must be considered in preparing the financing of the project by the ESCO, which should be systematically done to avoid problems that can occur in the later stages of carrying it out.

4.1 Research and Preparatory Work

The first step should be investigating if the public object is appropriate for carrying out measures of energy efficiency, meaning:

- the user should have large annual consumption of electric energy or power sources,
- significant potential for energy savings should exist,
- investment spending should be refunded in an acceptable timeframe for using private capital.

ESCO companies need information about existing energy use of the user. This makes it necessary to prepare information about the history of the technological, or the manufacturing process, which includes:

- descriptions of the technological/manufacturing process and energy using equipment,
- data and records of energy consumption and cost (precise data is necessary, since the profitability of applied upgrades is calculated based on comparison to previous energy consumption),
- Factors which must be considered for the correction of previous (base, referential) consumption, so that the following can be discussed: the way to use the object, weather conditions, service standards, production rates, product mix, hours of work, etc.

It is very important to determine future needs and changes in the way the object is used (the number of people who use the object, work dynamic, changes in the technological process, etc.) and the future comfort or service standard level.

The information about the history allows the ESCO to estimate the possibility of achieving savings. The more precise the information is, the more reliable the analysis of the before and after the project's completion situation will be [2,5].

Information about energy consumption in objects is gathered through installing the appropriate equipment with which, in a defined time period (usually 30 days), data about energy consumption parameters is saved.

4.2 Carrying Out the Energy Efficiency Project

After collecting data, an analysis is done to estimate profitability, and an offer is made with the choice of appropriate equipment as well as the contract model. After a mutual signing of one of the contract models, acceptable for both the user and the ESCO, the ESCO which carries out the project, takes on full responsibility for starting the project in question: it defines the stipulations and terms, as well as the work dynamic, and accepts offers from various equipment suppliers. It takes control over all jobs, like delivery, installation organization and putting equipment into effect. The ESCO undertakes monitoring and rating achieved savings and is responsible for all incurred costs.

4.3 Basic Contract Elements

The main contract text about guaranteed savings should regulate rights and obligations of the contractual parties for the duration of the contract. Necessary elements of the contract's main text are:

- the subject of the contract is applying energy efficiency measures on objects in the contract in order to decrease corporate costs, with accepting the risk of achieving agreed upon savings by the private partner,
- the savings measures which are to be applied in terms of planning, technical procedural and other actions are carried out by the ESCO on the agreed objects,
- the primary obligation of the ESCO company is to decrease operational costs from the base/referential period through savings measures,
- calculating achieved savings for the accounting period of the energy efficiency project is done based on cost comparison relative to the base/referential period,
- the size of compensation for the private partner is paid, provided the agreed upon savings, based on the calculations, have been achieved,
- ownership of property (technical installations, devices and components) goes to the ESCO up until the expiration of the contract, when it is transferred to the user,
- other legal stipulations regulate: damage liability, the process of receiving preparatory work and savings measures, the beginning and end of the contractual relationship, the start of execution for the main obligation, resolving issues, contract termination, court jurisdiction, applicable law, project information.

5. RESULTS

As shown on Figure 2 and Table 1, the ESCO had a negative profit, at a maximum of 160.527 RSD, in the first 8 months. In just the ninth month a positive financial balance was recorded, i.e. profits had begun. Table 1 shows a growth in user number up to the 18th month, reaching its maximum of 22 users.

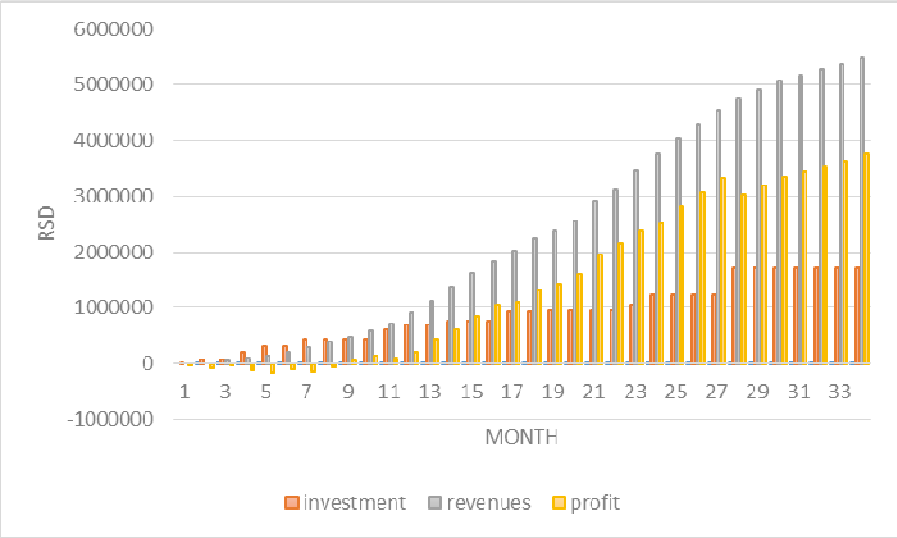

Figure 2. Financial Results of Achieved Savings

The total profit after 19 months came in at 1.417.727 RSD. After the second year, the profits grew to 2.520.978 RSD. The number of contracts entered a drastic decline after 27 months. The reason behind this was that a larger number of contracts was signed for a duration of 24 months. After 34 months, 6 active contracts remained, and profits reached 3.754.726 RSD. By the expiration of all contracts, an additional 800.000 RSD profit is expected. Investments total is 1.728.915 RSD.

6. CONCLUSION

The work represents a practice application of ESCO models for increasing energy efficiency. On examples of completed contracts of the ESCO and private sector users, the positive financial aspect of ESCOS has been presented. The model is applicable for public sector users, and one of the ways for overcoming the barrier which pertains to increased risk of achieving profits for the ESCOs themselves is shown through application results.

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Table 1. A Growth in User Number up to the 18th Month, Reaching its Maximum of 22 users

Month	Number of users	Investment [RSD]	Revenues [RSD]	Profit [RSD]
1	1	22.425		-22.425
2	4	82.225		-82.225
3	4	82.225	47.469	-34.756
4	7	207.575	88.485	-119.090
5	8	309.925	149.398	-160.527
6	8	309.925	213.714	-96.211
7	10	436.425	289.697	-146.728
8	10	436.425	387.627	-48.798
9	10	436.425	485.617	49.192
10	10	436.425	578.874	142.449
11	13	620.105	727.722	107.617
12	17	701.755	916.311	214.556
13	17	701.755	1.133.056	431.301
14	20	767.275	1.372.651	605.376
15	20	767.625	1.616.039	848.764
16	20	767.625	1.819.001	1.051.726
17	22	921.950	2.024.884	1.102.934
18	22	921.950	2.229.723	1.307.773
19	22	959.625	2.377.052	1.417.727
20	19	959.325	2.563.633	1.604.308
21	19	959.625	2.911.011	1.951.676
22	19	959.625	3.115.108	2.155.783
23	19	1.050.000	3.445.296	2.395.296
24	20	1.224.915	3.745.893	2.520.978
25	20	1.224.915	4.038.480	2.813.565
26	18	1.224.915	4.284.101	3.059.186
27	18	1.224.915	4.553.515	3.328.600
28	12	1.728.915	4.760.940	3.032.025
29	10	1.728.915	4.918.854	3.189.939
30	10	1.728.915	5.072.356	3.343.441
31	7	1.728.915	5.161.553	3.423.638
32	7	1.728.915	5.262.721	3.533.806
33	7	1.728.915	5.356.242	3.627.627
34	7	1.728.915	5.483.641	3.754.726

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