

ECSCO MODEL IN FUNCTION OF ENERGY EFFICIENCY (EE)

ECSCO MODEL U FUNKCIJI ENERGIJSKE EFIKASNOSTI (EE)

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ABSTRACT

BiH is utilizing energy in a manner that is both inefficient and illogical as a direct result of years of neglect and inadequate investment in urban infrastructure, public and residential buildings, energy and utility systems, and other similar areas. The most viable long-term answer to this issue is the careful management and conservation of available energy sources. The purpose of this study is to provide a comprehensive overview of the ESCo model, including its relevance and the necessity of its involvement in contributing to gains in EE in BiH. It also sheds insight on the challenges associated with execution, given that no initiatives have been carried out in BiH as of yet. This paper describes, introduces, and evaluates the role of such a model in attaining EE measures via a "top-down" or "bottom-up" approach.

Keywords: ESCo, energy service company, energy efficiency, energy performance contract.

REZIME

Usljed dugogodišnjeg zanemarivanja i nedovoljnog ulaganja u urbanu infrastrukturu, javne i stambene zgrade, energetske i komunalne sisteme i dr., BiH neracionalno i neefikasno troši energiju. Dugoročno rješenje problema se vidi u efikasnijoj upotrebi i štednji energije. Ovog rad ima za cilj detaljnije predstaviti ESCo model, njegov značaj i neophodnost u doprinosu poboljšanja EE u BiH, kao i ukazati na poteškoće u realizaciji, budući da do sada nema realiziranog projekta u BiH, opisati, približiti i ocijeniti funkciju takvog modela u ispunjenju mjera EE po "Top-down" ili "Bottom-up" pristupu.

Keywords: ESCo, društvo za energijske usluge, energijska efikasnost, ugovor o energijskom učinku

1. INTRODUCTION

Improved living standards and accelerated economic growth lead to an increase in energy consumption, necessitating improved and more effective energy management. The long-term solution to this issue resides in energy efficiency (EE) and conservation. Bosnia and Herzegovina (BiH) has a very high annual average specific energy consumption [1]. The indicator of energy intensity of the economy, which is calculated as GDP per unit of energy consumed, demonstrates the irrational and inefficient use of energy (Figure 1.) [2]. Long-term neglect and insufficient investment in urban infrastructure, public and residential structures,

energy and utility systems, transportation, etc. are responsible for this situation. Both the private and public sectors lack the significant financial resources necessary to improve the ratio of GDP to energy consumption.

Investments in increasing (EE) are hampered by private companies' incapacity to incur additional debt and their limited budgets. Improving EE through well-trained and motivated personnel is one approach, however, the current state of private enterprises and the public sector in BiH is far from the actual challenges they face. The Energy Service Company (ESCO) model entails entrusting specialized companies with the implementation of EE measures by strengthening public-private partnerships, thereby mobilizing "idle" private capital while enhancing socioeconomic living conditions.

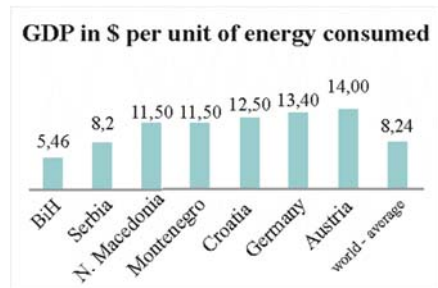


Figure 1. Energy intensity of the economy (Source: Reset)

ESCO is a legal entity that provides energy services based on an energy performance contract or other appropriate contracts during activities such as energy auditing, designing, construction, construction supervision, reconstruction, facility maintenance, energy consumption management, and monitoring while assuming financial risk [3]. Instead of providing energy, the ESCo model provides energy services, such as information provision, training, project identification, technical analysis, financing, contracting and installation services, commissioning, ongoing maintenance, overall system management, monitoring, and shared savings arrangements. The ESCo model enables the repayment of investments through reduced energy consumption and savings resulting from the reduction in energy consumption, thereby preventing an increase in budgetary expenses (Figure 2).

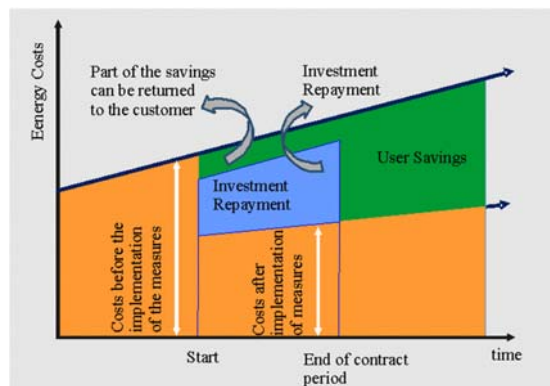


Figure 2. Investment repayment according to ESCo model

In BiH, the ESCo model has a great deal of potential and numerous advantages over other EE development models, with positive effects on the entire society. However, despite its many benefits, ESCo faces a range of limitations and challenges. The available literature on the ESCo market is limited, informative, and primarily consists of descriptive studies lacking the precise data necessary for a realistic evaluation of the model's benefits [4, 5, 6]. Furthermore, a limited number of analytical studies [7] are not applicable to BiH.

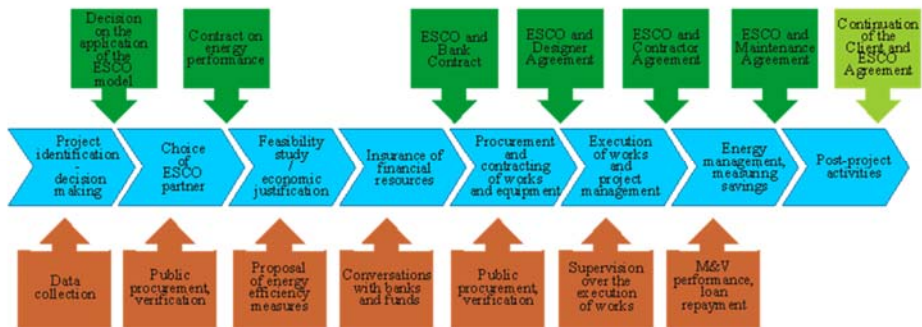
The purpose of this paper is to provide a comprehensive overview of the ESCo model, its significance, and its necessity in promoting EE development in BiH. Given the lack of

completed projects in BiH to date, the report also seeks to emphasize the implementation challenges. The purpose of this paper is to describe, explain, and assess the role of such a model in achieving EE goals via a "top-down" or "bottom-up" approach.

2. THE IMPLEMENTATION OF THE ESCO MODEL

2.1. Steps in the Execution of ESCo Projects

The initial step in implementing ESCo projects is for the user to evaluate the cost-effectiveness and benefits of investing in EE. The development of an ESCo project from conception to actualization is a multifaceted and intricate process that takes place over several distinct phases (Figure 3).



Slika 3. Tok ESCo projekta

Firstly, public procurement process is used to select an ESCo partner which conducts a detailed feasibility study and energy justification for an energy contract, including measures to enhance EE and a financial model [3]. Moreover, financing is guaranteed by the client or the ESCo collaborator. After securing funding, the ESCo partner procures design services, followed by the implementation of the project, the acquisition of apparatus, and the provision of oversight.

The ESCo model is not exempt from the application of public procurement laws, and market competition principles must be upheld. After the conclusion of the works and equipment procurement, energy costs are reduced and savings are realized in the user's budget compared to the previous condition; these savings finance the investment and ESCo partner's services. During the duration of the energy performance contract, the ESCo partner must maintain the implemented equipment and systems. The ESCo collaborator is required to monitor, optimize, and verify energy savings throughout the duration of the project. The ESCo partner transfers the apparatus and systems to the user for further management upon contract completion.

The user can enter into a new contract for energy management with the ESCo partner, thereby assuring a certain level of savings, increasing savings, and possibly preventing a "rebound effect."

2.2. ESCo Contract Models

The two most common ESCo contract models are:

1. Guaranteed Savings Model (EPC GS)
2. Shared Savings Model (EPC SS).

The guaranteed savings model of energy performance contracts is used in more developed markets with an established banking structure and the ESCo partner does not have the ability to finance the project. In this case, the user is responsible for financing the project, and the ESCo partner guarantees that the energy savings will be sufficient to cover the repayment of the debt [8].

In the case of project financing by the ESCo partner, the client is completely protected from financial risks related to the technical performance of the project, and the investment repayment is made from the guaranteed savings. This model is very favorable for companies with high debt because the investment does not increase the debt, and the company's borrowing capacity

remains the same and does not affect its operations. Given the high costs of long-term financing, the ESCo partner can sell its claims to another company or financial institution (forfeiting), which takes over the financial risk of collecting claims [8].

2.3. Possible Problems in ESCo Implementation

The energy performance contract must fully define all challenges that may arise during its term. Insufficiently defined contracts can lead to potential disagreements, which is neither in the ESCo partner's nor the user's best interests.

Complicated public procurement procedures do not support or hinder the implementation of ESCo projects. The value of the works must be stated in the public call, which prevents ESCo companies from employing "expensive" technologies that result in greater savings and, ultimately, superior outcomes. The selection and evaluation of criteria for determining the most advantageous offer frequently results in bidders filing complaints, which extends the allotted time for conducting public procurement.

2.4. ESCo Limitations

The return period for investments under the ESCo paradigm is between five and seven years. If this period is extended, ESCo partners will be disinclined to invest in such ventures due to the increased banking risk. ESCo partners will only select "profitable" EE initiatives, as very few projects have a brief investment payback period. Historically, ESCo partners have focused on the so-called "MUSH" market (e.g. municipal, university, schools, and hospitals).

The ESCo model is not suitable for the implementation of large projects where the compilation of project documentation can take months. Large initiatives are difficult to implement in ESCo companies, private companies, and the public sector due to a lack of qualified personnel. The solution is to expand the market and invite regional companies to participate, however it suffocates the domestic ESCo market.

3. ESCo MODEL IN BOSNIA AND HERZEGOVINA

3.1. Previous Efforts, Programs, and Projects

The Law on EE in Federation of Bosnia and Herzegovina (FBiH) and the Framework Energy Strategy of BiH by 2035 recognize the role of the ESCo model in implementing measures to improve EE. The Integrated National Energy and Climate Plan for BiH, which would define the financial framework for investment in EE improvement, has not been adopted, which certainly slows down the implementation of the ESCo model in BiH.

United Nations Development Programme (UNDP) is working on establishing an ESCo mechanism in BiH, within the project "Launching Environmental Financing for Sustainable Development Goals in BiH." Currently, the implementation of the first Energy Service Company (ESCO) project for the public lighting system in the City of Cazin is underway. Additionally, the groundwork is being laid for the implementation of 38 new ESCo projects, encompassing public lighting projects in 15 different cities, heating system improvements in 10 locations, and EE upgrades in 9 public buildings and 4 waste transport vehicles [9].

The successful implementation of these projects has yielded several positive outcomes, including the integration of the ESCo model into the Income Tax Regulation in FBiH, the establishment of accounting and bookkeeping standards for ESCo projects in the FBiH and the Republika Srpska (RS), the development of contractual and implementation arrangements for payment mechanisms, as well as the establishment of a monitoring, reporting, and verification system (MRV). (Monitoring, Reporting, and Verification) protocol for ESCo projects [10].

As of 2021, UNDP and the Ministry of Education, Science, Youth, Culture, and Sports of the Central Bosnia Canton (SBK) have collaborated on a nine-month project to prepare Energy Service Company (ESCO) public procurement in BiH for three schools and a police station [9].

Under the project titled "Development of Public-Private Partnership for EE Street Lighting Systems in BiH," which was financed by the Republic of Slovakia, feasibility studies have been conducted for 14 municipalities throughout the country [11].

In February 2023, with the aid of UNDP's "URBANLED" project, an ESCo association was established to assist ESCo partners in implementing EE projects. This initiative aims to promote sustainable development and foster a more energy-efficient and environmentally friendly approach to urban development in BiH.

3.2. Potentials of the ESCo Model in BiH

The long-standing neglect of public infrastructure and buildings, inefficient technologies, and energy waste create significant potential for the ESCo model to reduce energy costs and CO₂ emissions while increasing comfort, thereby resulting in the development of public-private partnerships, job creation, and GDP growth. Additionally, it enhances the competitiveness of businesses, contributes to environmental protection, and promotes sustainable development.

The European Commission has developed recommendations for two approaches to data collection and savings calculation. The “top-down” approach is based on national statistics, while the “bottom-up” approach relies on a set of equations used to calculate energy savings for each implemented project [12]. The “bottom-up” approach for BiH currently includes 22 predefined methods for calculating energy savings [12], primarily related to EE measures financed through the ESCo model and specific to individual projects.

The “top-down” approach is based on macro-coordinated mechanisms that involve climate-energy, regulatory, and financial instruments. The key to success, especially in the initial stage of establishing the ESCo market, lies in creating a regulatory framework and financial participation by state, federal, or cantonal institutions. The implementation of the ESCo model is conditioned by the democratization of the energy sector, which will enable active citizen participation at the local level.

3.3. Challenges of the ESCo Model in and Herzegovina

The structure of BiH and the distribution of responsibilities related to EE pose various challenges for the ESCo model (Table 1.).

Table 1. Challenges of the ESCo model in BiH

Legal and institutional barriers	Insufficiently developed legislative and institutional framework in BiH.
Bureaucratic barriers	Slow issuance of urban planning approvals and construction permits. Illegal construction. Property ownership issues.
ESCo market	The ESCo market in BiH is still in its early stages of development. Lack of experience with ESCo projects. Limited market for high-energy efficiency technologies.
Financing	BiH's credit rating and the absence of specific credit lines. High credit risk with "regular" credit lines. Lack of experience in financing ESCo projects. Lack of incentives and subsidies.
Technical challenges	Shortage of qualified workforce. Lack of skilled personnel for large and complex projects in the industry.
Social and societal challenges	Lack of project financing culture. Possibility of resistance to implementing EE measures by a small number of households. Instability in the industrial market. Low electricity prices.

4. CONCLUSION

BiH is a country with high average specific annual energy consumption, indicating that energy is being used inefficiently and irrationally.

The ESCo model provides a comprehensive energy management service and allows the user to implement EE measures without additional financial resources by having a single point of contact and transferring technical and financial risks to the ESCo partner.

The analysis of the ESCo model in BiH has shown the following:

- The institutional and regulatory framework hinders the implementation of the ESCo model in BiH.
- The ESCo market in BiH is developing, with visible positive progress.
- UNDP in cooperation with Bosnian institutions, is working on establishing the ESCo mechanism and creating a regulatory and market framework for the ESCo model.
- The ESCo market is limited, and the public sector is the most receptive to its implementation.
- Currently, ESCo projects, in terms of both approaches to the implementation of EE measures, are financially profitable only with co-financing by grants.

More efficient energy and fuel management in BiH have significant potential, leading to positive effects such as:

- Contributing to fulfilling BiH's obligations under EU directives and signed international agreements.
- Strengthening public-private partnerships by mobilizing "idle" private capital.
- Promoting economic development through job creation and increasing GDP.
- Ensuring better working and living conditions for people.

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