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RESEARCH AND CONCEPTS IN ENGINEERING AND MANAGEMENT, REGARDING RENEWABLE ENERGY

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Abstract: *The objective of the paper is to create a methodological format regarding energy management within SMEs and to support the implementation of the best proposals in the renewable energy sector. During a major energy crisis, we found that there are very few small and medium-sized enterprises (SMEs) in the private sector that have so far undertaken energy management reviews to have a timetable by which they can act for implementation. of energy saving criteria. Lack of funding programs as well as expertise in the green sector is an extremely low priority for energy management within SMEs. The methodological format that I want to develop removes barriers and could encourage SMEs to implement energy management analyzes and the implementation of energy efficiency measures recommended following the analysis. This review of energy management first presents an overview of all systems and technologies tested in the green sector and suggests technical recommendations that contribute to stimulating the adoption of energy management plans in SMEs.*

Key words: *engineering design, renewable energy, optimization, energy management small and medium size enterprises (SMESs).*

1. INTRODUCTION

This paper presents multiple benefits that seek to expand interest in energy efficiency beyond traditional financial and technical concerns to measures to reduce energy consumption or reduce greenhouse gas emissions and relate them to strategic priorities and internal managerial objectives. Energy management has an important role in the development of energy efficiency in industry.

Energy management establishes the reduction of the energy supply gap in the energy transition process [1].

The methodological framework underlying energy efficiency serves the requirements of SMEs for the development of sustainable business models, as it links energy management decisions with the advancement of business objectives. The business model serves as a diagnostic tool for describing and understanding the energy management mechanism [5].

Through the energy management mechanism, we aim to reduce the amount of energy consumed.

In practice, parity is made between the energy consumption of the previous year without the implementation of energy efficiency solutions and the estimated proposal of the new energy consumption after one year of application of the energy mechanism. The goals of energy management include resource conservation, environmental protection and cost savings without compromising access to the energy needed to continue business operations. The source of energy consumption varies from industry to industry [9].

For manufacturing companies, energy management can involve identifying machinery that uses excess amounts of energy. It could also include monitoring excess waste in production, which leads to more energy being consumed creating a single product than necessary. The management process is also essential for reducing greenhouse gas emissions, and major innovation efforts are vital to deploy the right

technologies. As companies advance and technologies must improve energy innovation [3].

2. LITERATURE REVIEW

One of the main pillars of private generation or service provider companies is the uninterrupted supply of energy at a reasonable price. Energy production is based mostly on fossil fuels, which are becoming more and more expensive [4]. This increase in the cost of energy leads to the inability of companies to be stable in the market. Thus, we can see that energy efficiency is very important for the sustainable development of companies in synergy with the implicit protection of the environment.

This paper presents the opportunity to analyze several private companies regarding the current energy situation and the implementation of an internal energy management system.

We will select several 20 companies to interview on how to apply energy management and from the 20 we will select 3 whose energy parity we will analyze and apply the energy management mechanism. This paper also presents a methodology that can be applied by other private companies to frequently implement an energy management process to target their carbon consumption and emission rate under control [5].

The paper provides an applied scheme by which energy management is applied in the company. Even if we talk about the ease at first sight of applying the energy management scheme, we still encounter certain pitfalls such as employees' awareness of energy consumption, know-how in the field of renewable sources and financial possibilities that somehow block companies from implementing an energy management system energy with energy efficiency measures. In addition to energy management, there is also a need for an entrepreneurial management of the company that includes the specific use and application of the energy mechanism.

For a sustainable improvement, a complex approach is needed, including effective management of the company, as well as the application of technical schemes in the field of energy [6]. Although there are generally some guidelines for energy management, they do not provide the method of implementing them in companies. Well, through the submitted research we can also offer a business model for companies that includes all the elements mentioned above.

The preliminary energy analysis (found in the specialized literature under the names of summary analysis, on-the-fly analysis, first glance analysis) uses only available data and information related to the energy consumption of the analyzed contour and provides the possibility of a quick assessment of how energy is managed within the analyzed draft. The duration of the preliminary analysis depends on the size and complexity of the analyzed draft (one-two days for small industrial units, one-two weeks for high-complexity industrial units) [9].

3. METHODOLOGY

We will analyze three companies for which we will develop internal energy management. In the first stage, the perimeter of the location is established, which refers to the point of consumption and the consumption over the last 12 months is calculated. The results of the analysis quantify primary energy consumption and greenhouse gas emissions. The mapping of the existing situation refers to the energy consumption of the defined perimeter over a determined and representative period, thus resulting in the quantification of energy consumption, and the quantification of the resulting greenhouse gas emissions.

The energy consumption and the number of emissions will be reported to the activity level in the established perimeter and the parity between the energy consumption and the activity level will be analyzed. Also, the method used to determine energy consumption and greenhouse gas emissions will be presented [7]. The Tepr value will be established, which means the energy consumption, expressed in Tep, for the reference year usually being the previous one, as well as the RCE energy consumption reduction. The quantification of these values will be accompanied by a simple description of how consumption is determined.

The GHG value representing greenhouse gas emissions, expressed in tCO2 (total carbon

dioxide) for the previous reference year and the reduction of greenhouse gas emissions, will be determined. The quantification of these values will be accompanied by a detailed description of the method for determining greenhouse gas emissions. After establishing the result, the possibilities to reduce energy consumption by introducing the use of renewable energy sources will be identified [1].

The method of calculation regarding the reduction of energy consumption [8]:

$$RCE = \frac{Tepr - Tep1}{Tepr}[\%] \qquad (1)$$

where RCE represents the reduction of energy consumption because of the implementation of the investment project, based on the energy analysis;

$-Tepr$ represents the energy consumption, expressed in TEP, for the previous reference year, without project implementation;

$-Tep1$ represents the energy consumption, expressed in TEP, for the first calendar year after the completion of the project [8].

The method of calculation regarding the reduction of greenhouse gas emissions:

$$RGES = \frac{GESr - GES1}{GESr}[\%][t_{CO2}] \qquad (2)$$

where $RGES$ represents the reduction of greenhouse gas emissions, because of the implementation of the investment project, based on the energy analysis [7];

$-\ GESr$ represents greenhouse gas emissions, expressed in for the previous reference year, without project implementation;

$-\ GES1$ represents greenhouse gas emissions, expressed in, for the first calendar year after the completion of the project.

Energy management is a document that defines concrete actions, responsibilities and deadlines to improve energy efficiency and reduce energy consumption in the short, medium and long term of the company. Through the analysis of energy management, private companies demonstrate how they will contribute to the achievement of national targets in the field of energy efficiency in the context of the energy crisis and the share of energy from renewable sources in the final energy consumption [2].

The process of developing the plan energy management includes four stages: preparation, planning, implementation, monitoring and reporting. By energy efficiency at the level of the building, we mean the reduction of the need and the rational use of energy, at the same time as ensuring an adapted thermal comfort, indoor air quality and indoor lighting in compliance with the lighting standards in force.

The amount of energy saved determined by estimating consumption before and after the implementation of a measure to improve energy efficiency, while ensuring the normalization of external conditions affecting energy consumption [4]. The analysis is completed with an action plan that includes concrete measures and actions to contribute to the reduction of energy consumption [12].

The life cycle with which the methodology begins ends with the analysis of the business model as a strategic tool.

Energy parity must be proportionate and representative, so that it provides a reliable overview of energy efficiency and reliably achieves the most important ones possible.

Finally, this cycle highlights the different energy benefits with business management objectives and sensitizes managers about energy efficiency decisions, demonstrating their relationship with the priorities and overall business objective. [10].

4. CONCLUSIONS

Energy management applies directly to companies, but also to society, being of increasing importance. The main objectives of energy management are the main sources of energy supply, efficient energy consumption, economic efficiency, reduction of greenhouse gas emissions and environmental protection [4]. For private companies, there are real reasons to apply energy management and implement concrete energy consumption and saving measures.

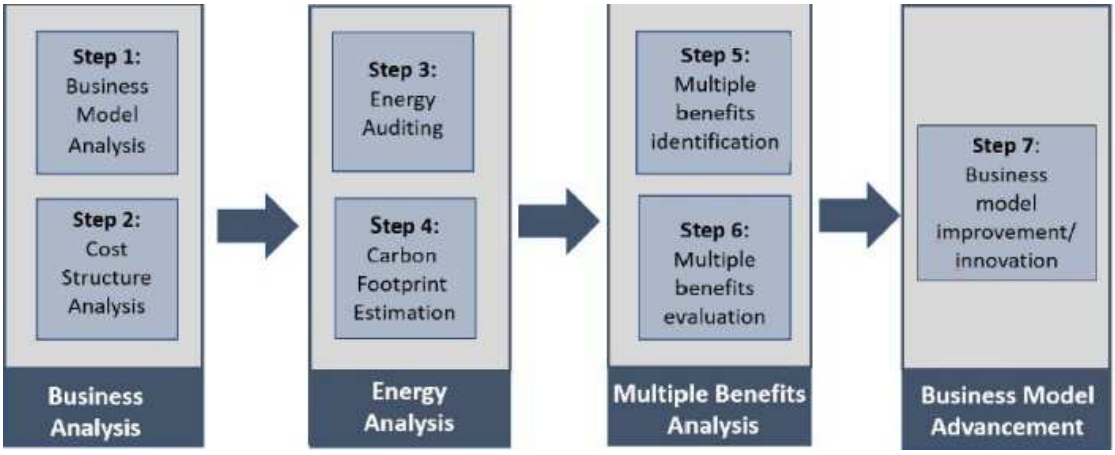

Fig. 1. The methodological approach

Private sector companies are still reluctant to implement energy efficiency measures because they cannot realize the concrete business benefit, they can get from implementation.

The energy transition represents a profound change in the energy system and includes major changes in energy supply. It has become increasingly clear around the world that the exploitation of fossil fuels and the use of energy resulting from them are causing serious problems, especially climate and ecological change and environmental damage [6]. At the same time, global innovation in energy science and technology is accelerating, making it possible to imagine and create a new energy transition based on energy efficiency and renewable energy sources [9].

The effects of implementing solutions to increase energy efficiency are felt primarily at the level of the organization that implements them, where they consist of increasing profitability and competitiveness on the market, in reducing the impact on the environment, they are felt at the level of the entire human society, in the context of promoting sustainable development and other general concern for the efficient use of all exhaustible material resources [8].

Future research will be focused on providing educational support for stakeholders and users, as shown by [14, 15]. In addition, knowledge and innovation transfer should be supported through contractual framework in the context of university-industry collaboration [16] and thus, having a positive impact on the companies' quality and performance management [17-19]. Furthermore, some studies of ours in the field of climate change [20-22] have pointed the idea on investigating the dynamics of ready-to-use solutions of renewable energy by local communities to manage the climate change negative effects. This idea is of great interest in the actual conditions imposes by the energetic crisis generated by the Ukrainian war.

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Cercetări și concepte în inginerie și management, privind energia regenerabilă

Obiectivul lucrării este de a crea un format metodologic privind managementul energiei în cadrul IMM-urilor și de a sprijini implementarea celor mai bune propuneri în sectorul energiei regenerabile.

În mijlocul unei crize energetice majore, am constatat că există foarte puține întreprinderi mici și mijlocii (IMM-uri) din sectorul privat care au întreprins până acum revizuiri ale managementului energetic pentru a avea un calendar prin care să poată lua măsuri pentru implementare. a criteriilor de economisire a energiei. Lipsa programelor de finanțare, precum și a expertizei în sectorul verde, reprezintă o prioritate extrem de scăzută în ceea ce privește managementul energiei în cadrul IMM-urilor. Formatul metodologic pe care vreau să-l dezvolt înlătură barierele și ar putea încuraja IMM-urile să implementeze analize de management energetic și implementarea măsurilor de eficiență energetică recomandate în urma analizei. Această revizuire a managementului energetic prezintă mai întâi o privire de ansamblu asupra tuturor sistemelor și tehnologiilor testate în sectorul verde și sugerează recomandări tehnice care contribuie la stimularea adoptării planurilor de management energetic în IMM-uri.

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