

Promotion of Sustainable Consumption in the Energy Sector

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ABSTRACT

Sustainable development as it is currently framed aims to reduce the consumption of available resources while minimizing negative impacts on the environment. Sustainability encompasses ecological, economic and social concerns. A main purpose of this term is the maintenance and development of human well-being on a local and global scale. So that this term can be approached by the population, all its attributions must be appropriated and understood. The existence of ecological conditions is necessary to lead an economically sustainable lifestyle. A control over nature and ideas of balance between human effort and nature, fostered by sustainable desolation can benefit future generations. The relevance of such an ecological balance is assessed by comparing how consumption typically occurs in modern human societies as opposed to nature. Sustainable consumption emphasizes the term "green consumption" and reducing the carbon footprint

Key words: consumption, development, energy, sustainability

1. Introduction

The topic of the article was chosen with the goals and awareness of the negative effects that the energy sector has on the environment. To combat these effects, the population is forced to associate the term sustainability with the entire energy industry. After the term has been appropriated and associated, the search for optimal energy consumption alternatives that will continue to satisfy the energy demand will begin. The study wants to investigate what are the solutions to reduce energy consumption and whether consumers can contribute to this by using other systems that generate much cleaner and "green" energy.

The content of the paper presents the current state of the energy sector and the negative effects obtained from the excessive use of energy, be it electrical or thermal. To stimulate the economic situation and environmental well-being, a sustainable consumption will be associated with the energy sector. Developing the society in which we live and educating the population to capitalize on the resources available to our planet will ultimately lead to the efficient use of resources without depleting them.

Calling for an alternative framing of the relationship between human society and nature, the only adaptation towards a biological understanding of such a relationship is influenced by the characteristics of today's consumption, including its connection with human needs, the role of work but also the responsible use of resources. Alternative approaches seek to change not just the patterns but also the levels of consumption specific to rich economies

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(Diaz-Maurin, 2017). Sustainability focuses on changing lifestyles, collective and local forms of production or consumption, but above all, transformations that can have an impact on supply infrastructures (Bran et al., 2018).

Companies have been held accountable for their negative impact on the environment, so they have engaged in efforts to integrate sustainability into their operations and meet the needs of today's societies without compromising the quality of production and services (Burlacu et al., 2019). Sustainability in a company can intervene by including efficient technologies or conserving resources and recycling waste obtained from the manufacturing process (Profiroiu, Radulescu & Burlacu, 2020). Today most companies are abandoning traditional business models and focusing on "sustainable" business models (Schöniger & Morawetz, 2022).

In the future, the ability of the population to reform patterns of consumption behavior can be maximized, through a series of small changes but with ecological potential, instead of trying to radically revise the global system of production and consumption. Sustainable energy for development and energy technologies are the main means to make a difference in lifestyle (Angheluta et al., 2019).

2. Efficient use of resources in the energy sector

Understanding energy demand and how efficiently energy is used is of interest to policy makers because both aspects influence economic development, the environment and sustainability (Bodislav, Radulescu et al., 2020). Throughout history and around the globe, energy use has followed a highly uneven process and has demonstrated dramatic variations in energy sources, use, and growth rates. The energy path of the future world is uncertain (Mogos et al., 2021). At the beginning of the 20th century, nuclear power was unheard of, but today, more than 400 nuclear power plants are in operation around the world.

All users must ensure their energy needs without destroying the ecological balance (Radulescu et al., 2020). Once the energy is efficiently consumed, the goal is not the abuse of renewable energy but the value of the consumer and human development (Profiroiu et al., 2020). The focus should be on energy services, not just energy consumption or provision as an end in itself, energy services that improve the human development index directly, such as cooking, are put forward; warming up; lighting and transport .

In general, being energy efficient is defined in a technical sense and relates a certain level of service to a certain level of input (Burlacu, Popescu et al., 2021). To put it another way, an increase in green energy occurs when energy inputs are reduced for a given level of service (Burlacu et al., 2021). Being energy efficient in itself means providing services with an energy input that is small compared to a fixed standard or normal input. The costs of an effective measure vary, depending on who is evaluating the investment and what costs and benefits are being considered (Bodislav et al., 2021).

3. The evolution of annual carbon dioxide emissions in Romania

In Romania fossil fuels are most often used for the energy sector. By burning them there are emissions of up to 30% of the total share of primary energy. The rest of the emissions come from other sectors such as agriculture or industry.

According to Figure 1, it can be observed that between 2000-2006 there were the largest carbon dioxide emissions, starting from 92.45 million and reaching 103.21 million tons in 2006. Romania has put on a question mark and tried to seek measures to reduce these emissions.

A first measure was the decrease of the import for gases and oil, Romania being dependent on these imports and a second measure was the introduction of renewable energy sources aiming to occupy 24% of the total energy used. If between 2006-2008 there were slight decreases that did not exceed 98.6 million tonnes, in 2010, according to the new energy regulations and policies, 75 million suddenly reached.

Between 2016-2018 the projects of renewable energy were not carried out until the end due to lack of funds, and Romania registered a minor increase among emissions following that by 2022 they will be considerably reduced, reaching 71.7 million tons.

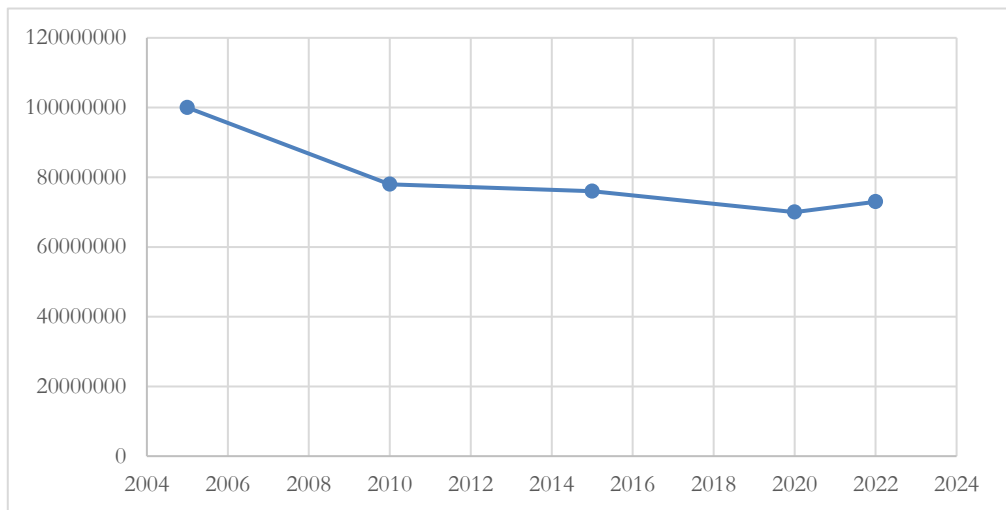


Figure 1. The annual situation of carbon dioxide emissions in Romania. Source : <https://ourworldindata.org/>, 2022

4. Renewable energy sources in the world

From year to year, new technologies appear, more efficient and with a high energy consumption that exhaust the primary sources. Globally, renewable energies have become known and popular. Each country tries to set a target to reach gradually, with the introduction of consumption reduction schemes or the integration of renewable energy projects. In the current context of the global energy crisis, most countries favor the increased use of renewable energy at the expense of fossil fuels (Gielen & Boshell *et al.*, 2019).

This reason includes the need to meet the growing energy demand of the population. Environmental authorities in every country are forced to rise to overcome the challenge of low renewable energy production (Loos & Abson, 2014). There should also be a higher proportion of renewable energy in the energy mix and the use of renewable energy should

be directed directly to activities or sectors that have a direct impact on human well-being, such as the health and education sectors.

Figure 2 shows the consumption of terawatt/hour of renewable energies at global level. In the first place, the most consumed type of energy is hydropower due to the waters and rivers that our planet has. An average of about 4297 terawatt/hours is consumed from this resource alone. Wind power with 1800 terawatt/hour and solar power with 1000 terawatt/hour are located on the other sites (Thonig, 2014).

These 2 sources are not used so intensively, a first reason would be the fact that a climate and a geographical position is necessary and a second reason would be that not every country calls for funds to invest in renewable sources. With lower consumption, other renewable sources such as bioenergy are also found. These renewable sources are divided as follows: hydropower and solar energy in Asia, Australia and Oceania; geothermal and biomass resources in North America; hydropower and wind resources in Europe (Sanchez, 2022).

The internal energy market refers to the price and quality of services offered by large electricity or natural gas companies. A measure that must be supported by this hypothesis is: the right of each consumer to be able to choose the supplier and the contract regarding the price of energy distribution (Zipp, A., 2017).

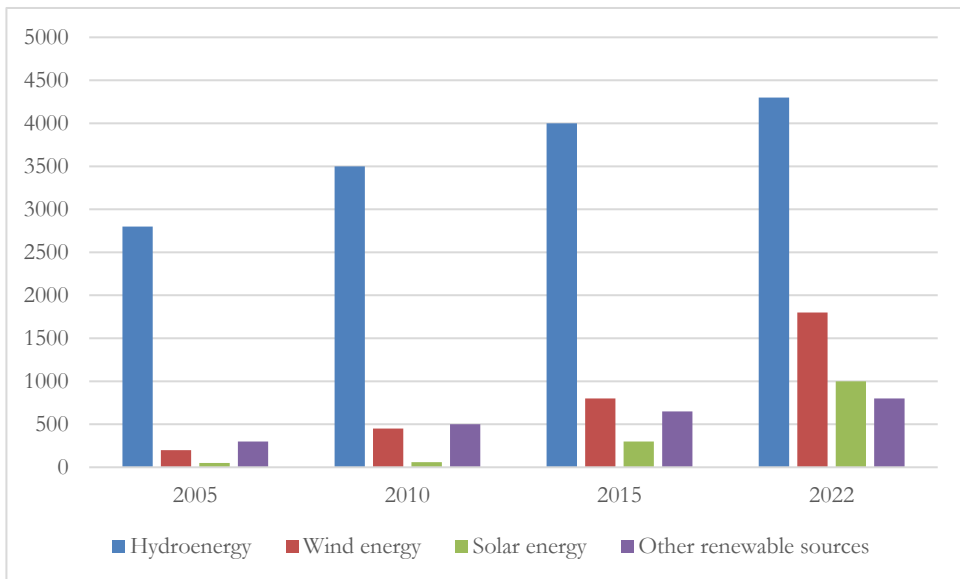


Figure 3. Renewable energy sources globally (TW/h). Source: <https://ourworldindata.org/>, 2022

The implications of a renewable energy project in Romania

Romania can enjoy benefits in terms of quality of life if it decides to increase the volume of renewable resources. These benefits are: if we use other alternatives, fossil fuels will no longer be used intensively and thus will not be exhausted and Romania can get rid of its dependence on energy imports from other member states; the natural resources available to Romania will be valued and conserved; not only will all consumers be satisfied and

satisfied with the new energy offer, but they will consume less CO₂ emissions and will be able to live in a much greener environment (Evangelos&Kober, 2019).

Once these systems are integrated into Romania's energy mix, energy security can benefit from support from regional and rural development policies.

There are also operating cost benefits even if they are in competition with non-renewable energy sources because with the proliferation of such systems, the prices for renewable sources have also increased. An investment in a more expensive but much better performing system cannot be recovered in the future, while for renewable energy sources the investment can be recovered as follows: for hydroelectric power in 4-7 years; for solar energy in 5-9 years; for wind energy, respectively wind parks, in 8-11 years and for geothermal energy in 5-8 years. According to a study, the most preferred sources of energy and the most chosen by consumers or industries are: wind and solar energy.

The price set for renewable energy depends on the technological methods used for the immediate market distribution of wind or photovoltaic energy. Romania supports the use and development of renewable energy sources based on solar and wind systems. These development projects have always been supported by fiscal units in terms of providing help to reduce taxes and fees and financing investments in new technological processes for the conservation and efficiency of renewable energy (Hasselmann, 2009).

With the implementation of the new economic regulations, strict measures were taken from an administrative point of view as well as legal means to encourage economic factors and the population to reduce energy consumption by at least 15%.

Local public administrations can influence the population to move towards ecological systems by being responsible for having knowledge in the field of sustainability, thus supporting the local economy (Hagbert&Femenias, 2016). It plays an important role and must issue approvals and authorizations of location or constructions regarding the development of projects of this kind (Tryggvi *et al.*, 2016). On the market impact of wind energy forecasts/*Energy Economics/* pp. 313-320

Any action that involves the well-being of the environment directly interests them as they are concerned with climate change and the pollution that exists at the present time (Wozabal *et al.*, 2016).

5. Investments made in Romania for renewable energy systems

As increased energy consumption has long been considered a factor that could affect the country's sustainability, environmental organizations have proposed investments in sustainable systems (Ashok *et al.*, 2018).

To make investments in renewable energy, it is natural for organizations to analyze the long-term profitability of these investments. Consequently, the European Union focuses on renewable energy to achieve sustainable development and mitigate the negative consequences of climate change. The increase in investments for renewable sources is not only limited to the medium-term climate objective, but investments in renewable energy sources that increase energy security.

A country with a stable and strong economy has a significant impact on these investments because it tends to invest much more (Evangelos& Kober, 2019). Renewable energy, a

high-risk industry that requires several types of investment, capital required for ongoing activities. For example, investments for photovoltaic panels producing solar energy that are large require bank financing or the use of certain funds. Without the assistance of an improved financial system this is impossible.

Another decisive factor influencing investments in renewable energy is energy efficiency. Some of the fastest and most cost-effective methods that would save revenue, reduce carbon emissions, generate jobs and meet the energy requirements of Romanian consumers or industries. Utility prices can be reduced by increasing energy efficiency. Energy efficiency can also be beneficial in diversifying resource portfolios and therefore act as a hedge against fuel cost volatility (Anido et al., 2016)

Table 1. Investments for renewable energy systems.

The energy source	The total budget (thousands)	Part of the budget (thousands)	Number of projects
Bioenergy	131.153 €	12.75	12
Wind power	290.266 €	28.2	10
Geothermal energy	18.557 €	1.85	3
Hydropower	227.532 €	22.12	17
Solar energy	70.489 €	6.85	9
Photovoltaic panels	292.202 €	28.36	40

Source: <https://insse.ro/cms/>

Romania has prioritized the renewable energy sector to address environmental issues. It has seen a remarkable improvement in investments to introduce green projects into the energy mix. The table below shows the investments made in Romania on renewable sources but also for non-renewable energy sources.

According to the data obtained below, most projects based on renewable energy were financed from development funds. They had as their objective the installation of medium-sized hydropower plants, the development of energy from biomass and the location of some wind stations (Moriarty& Honnery, 2020).

Hydropower and wind power have long been preferred renewable energy sources by investors because the cost of installation and operation is lower and it has low risk (Pryor et al., 2022). Green marketing has awarded green certificates for such projects (Del Río&, Kiefer, 2021). Bioenergy is not so widespread in Romania, although attempts have been made to introduce it to the market, as it has no competitors in the energy sector (Tishler, 2011).

In table 2, the investments for renewable energy are detailed, by types of energy, their budget, part of the total budget and the number of completed projects. It can be seen that wind and hydropower have been allocated the largest amounts, thus increasing the number of projects.

Regarding non-renewable energy, it was allocated the largest amounts from the total budget, thus it benefited from a large number of projects, namely 40. In the future, it is aimed to eliminate or gradually replace it with other alternative sources, because fuels are intensively used fossils and the operation and installation cost scheme does not cover the energy needs for Romania. The profitability of such projects as well as their efficiency is short-term.

Unfortunately, Romania has chosen to invest considerable sums in non-renewable energy, solutions have been implemented to reduce consumption, but it has been proven that no matter how much consumption is reduced, the natural resources available to this state are exhausted. These projects consist in the rehabilitation of old energy systems. Currently, Romania is moving towards a renewable future, noting that the already existing systems have too high a consumption and the number of megawatts/hour consumed cannot fit into a moderate and optimal consumption (Amrouche, 2016).

Although this country has been considered, according to studies, very beneficial for setting up such parks, there have not been many loans or financing to help promote them. Unfortunately, Romania has chosen to invest considerable sums in non-renewable energy, solutions have been implemented to reduce consumption, but it has been proven that no matter how much consumption is reduced, the natural resources available to this state are exhausted (Loos, Abson *et al.*, 2014).

These projects consist in the rehabilitation of old energy systems. Currently, Romania is moving towards a renewable future, noting that the already existing systems have too high a consumption and the number of megawatts/hour consumed cannot fit into a moderate and optimal consumption (Da Rosa, Ordóñez, 2021). These solar parks have reduced the carbon footprint by 15% through the electricity generated compared to the energy that comes from fossil fuels, and they can also be recycled in case it is desired to stop them for technical reasons (Sanchez *et al.*, 2022).

Table 2. Investments for solar parks in Romania.

Location area	Braşov	Arad	Satu-Mare	Giurgiu
Installed capacity (Mw)	82.00	65.00	56.00	49.98
Storage capacity (Mw)	69.00	55.00	47.00	42.50
Photovoltaic units	335	318	232	218
Area covered (ha)	200	200	330	310
Investment costs (euro)	100 million €	100 million €	65 million €	77 million €

Source: <https://insse.ro/cms/>

Considering the situation presented above, the prosumer obtains an annual income from the production of this solar energy, which will lead to the amortization of the investment

in a maximum of 10 years. In the future, it is expected that the number of prosumers and projects of this type will increase because with the evolution of technology, today's society has learned about the benefits of renewable energy.

Conclusion

Currently, humanity cannot live without energy, being dependent on the energy sector. This dependence is a negative factor for the climate and the environment due to the increasing demands of energy in modern society.

Within the European Union, it is required to reduce the emissions of greenhouse gases or carbon dioxide emitted in the technological process for the production of electricity from the old traditional combustion sources.

Sustainability represents a process through which natural resources will be conserved and the risk of depletion will decrease considerably. This term related to the energy sector represents the increase in the share of the use of renewable sources in the total energy production. Along with the use of other alternatives, namely wind, solar or hydropower, the optimal and efficient use of energy resources or market penetration with the marketing of energy storage and infrastructure technologies is pursued. Each member state of the European Union undertakes to capitalize on the available resources and introduce the most favorable alternatives into the energy mix.

Industries also have a large contribution of CO₂ emissions and are trying to set an indicator for reducing these emissions. According to the study, today's industries replace energy obtained from basic sources with renewable sources, thus obtaining green certificates.

Decisions can be made by each state taking into account the regulations of this sector that can only take place with the help of research and innovation. To this day, the society we live in is presented with all the opportunities available to it. This depends on the economic development of each country, namely: if a country does not have renewable resources they can access long-term investments for a sustainable energy system.

It has been proven globally that every country has its own contribution to carbon dioxide emissions due to the fact that fossil fuels are used at a high level. Dependence on fossil fuels can be reduced through investment and support schemes for energy infrastructure. Current situations regarding emissions and fossil fuel consumption do not benefit the climate change facing the planet, with environmental pollution being the main risk factor. The conservation of resources will bring major changes for Romania, ultimately reaching the proposed objectives that want to be achieved in the year 2030. Before getting involved in a project aimed at renewable energy, a series of measures and policies must be taken.

In the case of Romania, for example, first the favorable areas from the climatic point of view are chosen and then the profitability of the project will be checked and whether the energy sector will benefit from the support of the Financing Guide. Romania is trying to access funds to invest in renewable energy, namely wind or solar energy. Thus it demonstrates its involvement in achieving the objectives proposed by the European Union until 2030.

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