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THE SUSTAINABLE DEVELOPMENT INDICATORS FOR THE ENERGY SECTOR

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Abstract

In Romania are used all the sources of energy offered by the nature to sustain the energy sector. The increasing need of energy along with the growth of the population creates a difficulty in responding to the big quantity that is required. The proportions in which the energy sources compose the electricity production are different, the composition includes in majority fossil fuels used as prime matter for energy production and less, different on countries and growing in the recent period, the renewable sources. The evaluation of the sector is very important and relevant for choosing the future sources of energy. Hence comes the need of strengthen the indicators system. For Romania the energy sector is at the beginning of its reorientation but there is seen a possibility for sustainable energy production and consumption in the future of the Romanian sector because of the European restrictions and their guidance.

Keywords: indicators, sustainable development, energy sector, renewable energy

INTRODUCTION

Every country must give a great importance to providing the best life conditions for its population, the utilities being one of the main aspects of the society's requirements. Our country's energy sector is one that is well developed, from the point of view of its local resources and imports of energy resources used for the production of electricity and of its consumption by the production and industrial users.

Romania has developed power lines across the urban and rural localities and there are many large energy consumer companies, which have here the mother-company or subsidiaries of multinational companies. In the same time, must be mentioned the small consumers, their provision with electricity being mandatory in every area of the

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country. This construction of the energy sector is the one that must take the measures for the implementation of the renewable energy sources in order to improve it from every perspective.

TYPES OF ENERGY

Being given the need and importance of the use of energy, there must be taken into consideration very carefully the sources, types and effects of energy.

The energy sector can be analyzed from many points of view:

- Type of energy sources (conventional and renewable energy);
- Type of energy resources (fossil fuels, solar energy, wind energy, hydro-energy, geothermal energy, tidal energy, wave energy, biomass, nuclear energy);
- The indicators that show their evolution (quantitative and qualitative indicators, that present the resources along a period of time);
- The energy production and consumption (that refer to the population needs and the impact of using energy on the environment).

The energy sector classification is divided in terms of energy sources in two categories, according to their sustainable character:

- The conventional energy sources are those that have a limited character in time, their use being equal with their total consumption and having mainly a bad impact over the natural factors;

- The renewable energy sources are the ones that have the capacity to be used at all times, their provision being continuous and in the same time their use has no or just small negative effects on the environment.

The first category refers to energy production as it was done until now, using fossil fuels, with their advantages and disadvantages of their use that have led to technological progress and its support. The production of households served to enhancing the life conditions and support the research to increase this comfort home and at work, or in the movement of people, for tourism- sightseeing or relaxing.

This energy consumption in this highly developed process of energy production has led to the depletion of resources stocks, demanding in time a change for this sector.

The second type involves the activity of shifting the energy production to energy sources that have not a limited quantity or are not close to disappear in the next period and which support programs focused on the care for the natural components, which are being destroyed in some areas or are ongoing destruction as an impact of the use of energy. Using this energy sources offers the possibility for restoration the natural capital factors by intervening with environmental measures that are meant to bring balance in this sector.

Within these energy sources are included the non-renewable and renewable resources, taking into account the duration of the use of resources, through the consumption growth caused by the demand from this economic domain.

Regarding the resources for supplying energy the first category, the main

conventional sources are the following:

- The coals, of several types, also inferior and superior sorts, which are extracted from quarries and processed being used some established technologies;

- The oil and derived products, their operating being considered a touchy subject, taking into account the accidents that have happened with some oil stations by over-exploiting along their history;

- The natural gas and their derivatives, the operation has also been shown delicate sometimes, because it has generated some accidental explosions.

These resources are used for automotive engines and as fossil fuels for the energy consumption in households or the heating in thermal plants, their many roles putting them on the first position in the current energy production, at which can be added their accessibility and small prices.

The second category includes several energy resources, which are presented in the global energy strategies according to the below classification [1]:

- The solar energy that is based on the heat energy from sunlight, being dependent by the number of sunny days per year in every area.

This type of energy has a great potential, but is a little used resource. For this energy type can be used the photovoltaic panels for the capture of the sun rays and the photovoltaic cells, being a good practice for every building. But, in the same time, these items are expensive, and although this fact, the interest in its use is increasing;

- The wind energy is based on the movement of the air, the windy areas being the ones that will beneficiate from this type of energy.

To capture its energy are used the wind turbines, the most common example being the windmills. The big disadvantages about it are the variable wind intensity and that it needs another source of electricity;

- The hydro-power energy is the one of falling or flowing water, being the most used type of renewable energy in our country.

For its production are used the hydro plants, based on the natural waterfalls, that are already there or the construction of dams and reservoirs;

- The geothermal energy that is the energy from the interior of the Earth.

For providing this sort of energy can be used plants, but in only in little occasions despite of its advantages;

- The tidal energy is given by the continuous movement of the oceans: the advancement and withdrawal caused by the gravitational attraction of the moon.

To capture it there is used the hydro-electric power.

- The wave energy is generated by the wind impacting the surface of the water.

The global potential is very high, but is used only where the waves are regular.

- The biomass energy is generated by renewable organic materials such as plant and animal organisms, and their waste products.

In this case the potential is very high and its use is an organic process;

- The nuclear energy is the one based on the atom force.

To capture the nuclear power, the process asks that the fusion take place, after which the fissions occur. It is an expected high potential but there are high costs and

some risks at these plants, a nuclear accident being one of the worst things that could happen for the humanity.

The renewable types of energy can give us and to the future generations' sustainable and continuous energy and a secure life, as is presented in the sustainable development principles [2].

THE SUSTAINABLE DEVELOPMENT ENERGY INDICATORS

The indicators that describe the energy sector are part of many date bases and plus, there were established some new ones that can be monitored for this purpose (figure 1). Their importance is to observe the lacks in the good management process for this economic area and this methods used have proven to give results in time.

The sustainable energy sector development is based on the principles of this phenomenon that can be observed by studying the energy sector and indicators of the sustainable development [3].

The indicators that describe the energy sector are part of the statistical database, including the following:

- Fuel energy resources;
- Imports of energy and energy resources;
- Dependence on imports;
- Primary energy production;
- Electricity production;
- Energy consumption.

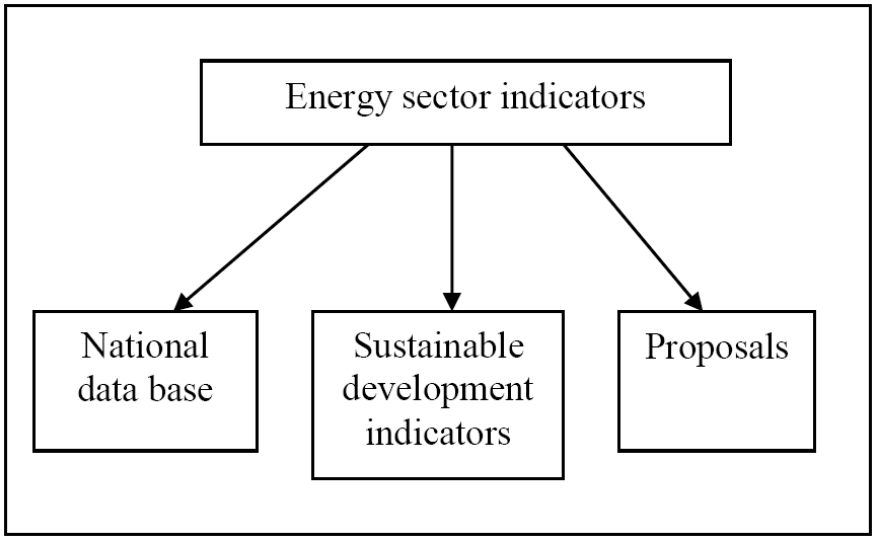
A part of them or some obtained through the aggregation of other indicators are monitored as indicators of the sustainable energy sector:

- Gross energy consumption;
- Final energy consumption;
- Energy intensity of economy;
- The share of renewable energy;
- Combination heat energy and electricity as a percentage of total Electricity;
- Income from fees for use of energy;
- Energy intensity of carbon dioxide in energy consumption.

The number of indicators also can be bigger to study the effects of their actions or of the lack of them in the energy sector. The conclusions are important and can influence the future actions, the future strategies and the plans and programs that are at the base of these documents.

Therefore, in the best scenario regarding the energy sector, there must be recorded high values of the energy resources and electricity production along with small dependence on imports and not exaggerated energy consumption, but in the same time the share of renewable energy should be bigger with every period of time taken into consideration. This way, the energy sector will be an independent and self-sufficient one, but also sustainable by not putting at risk the environment and the next generations.

Figure 1. Indicators of the energy sector



Source: processing of the author

These three categories are all of a great importance, the first two ones are already part of many studies and the third one is a category that is the subject of this research in terms of naming and can become of interest in studying them and use the statistical data in the future period.

PROPOSALS FOR INDICATORS OF THE SUSTAINABLE DEVELOPMENT OF THE ENERGY SECTOR

The proposals for sustainable energy indicators aim the environmental elements, the improvement of energy efficiency and the renewable energy through projects including the European Union funds [4]. The levels taken into consideration include the international, European and national ones (table 1).

In the same time, the proposal is treating the data sources, namely the statistics of different levels which already present these data and just need to be included in the sustainable indicators database or suggests other indicators that can be calculated and included in the named database.

The indicators refer to:

- financial allocation, at national level and at the level of the companies, in terms of:
  - funds, that are about the financial aid absorbed in every area;
  - profits, for showing the financial results that can be obtained through the sustainable approaches;
  - costs, that are about the expenses involved in reaching the goals for the sustainable development.

- the projects made by the local administration and by the companies for the implementation of the renewable energy.

Table 1. Proposed indicators of the sustainable energy sector

Indicators	Measure unit	Data source
Energy economy by using renewable energy sources	million tons oil equivalent	national or international statistics
The growth of rate of the share of the renewable energy in the total of the used energy	percent	national or international statistics
The value of funds for energy projects	euro	European or international statistics
The share of European funds in the funds for renewable energy projects	euro	European or international statistics
National funding for renewable energy projects	euro/ lei	European or national statistics
The share of renewable energy costs out of total	percent	European or national statistics
Number of renewable energy projects	number	national statistics on the private sector
Reinvested profit in renewable energy	euro/ lei	national statistics on the private sector

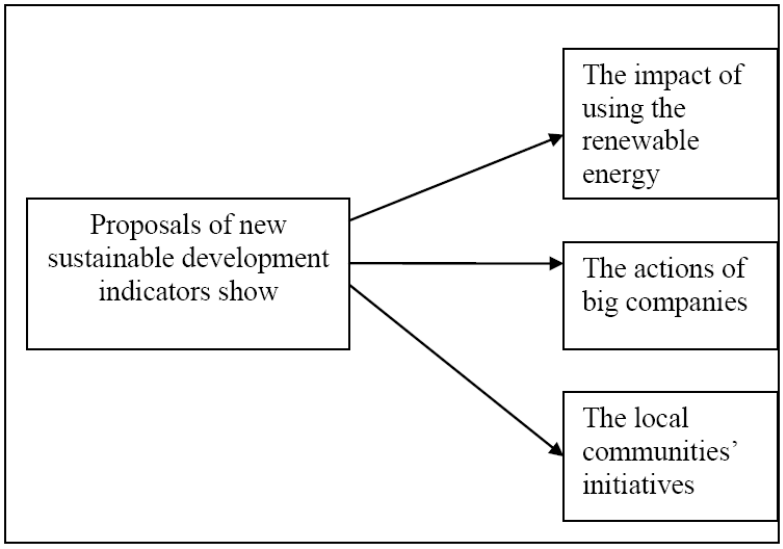
Source: Popa, I. (2011) *Dezvoltarea durabilã – suport decizional în politica energeticã,* Şcoala Doctorală, ASE, Bucharest

The indicators are intended to complement the existing ones and to detail the analysis at the sector level, which is very important for the general sustainability. Also, they are the basis for boosting the reorientation measures to the sector of the renewable energy by highlighting their advantages and their promotion.

The purpose of these indicators is to define some aspects (figure 2) in terms of:

- defining the impact of the renewable energy on consumption and production in this sector;
- the actions taken by the big consumers and polluters companies in all the economic sectors;
- the initiatives of all the small companies and of the population that are taken part of the reconsideration of the energy sector and of its reorientation to the renewable sources as a majority for the energy production.

Figure 2. The use of the proposed indicators



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Funding is a big problem and Romania must succeed in attracting structural funds in order to sustain these actions. Although there can be some administrative problems, assuming the sustainable desiderates is a great responsibility and can have the best results only if it has the best resources at its disposal.

The indicators of sustainable database are very important and we can see it in the actions of the European Union and so therefore in the case of our country this kind of efforts and proposals are well received and necessary.

Controlling the impact of using energy and of its production is important due to the decrease of the quantity of the energy resources and the pollution that are negative and strong effects of using fossil fuels.

CONCLUSIONS

The study of the indicators of the sustainable development in the energy sector is a task that has to lead to the sector assessment so it can be realized the improvement of its state and the economy in general.

The presence of a high number of indicators can ensure a detailed analysis that can generate solutions and appropriated measures. Those methods are applied using the resources that are very important and are always accessible, having the best results for the present but also for the future generations and for satisfying the needs of the consumers without having a bad impact on the environmental factors.

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