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An Inclusive Model for an Effective Development of the Renewable Energies Public Sector

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Abstract: *In general, in the recent decades, the renewable energy's contributions in terms of economic and social development are remarkable. Moreover, it should be emphasize how fast the world's countries have come to realize the need to support the renewable energy's development and how quickly they approved and implemented their national legislative framework in order to facilitate the sustainable development. Furthermore, it should be taken into account that, ten years ago, only a quarter of the world's countries had programs dedicated to the renewable policies, as well as objectives of integration in the national energy mix. Nowadays, however, over 90% of the countries (the majority of the countries) have established policies and objectives, as well as results, obtained in only a decade, through the close and successful collaboration between the industry's associations together with the governments of all the countries. In only ten years, almost all the countries in the world have adopted legislative measures and have set targets to reduce the pollution. Additionally, it can be stated that Romania is in this group of states. In this paper, as an element of novelty, the author proposes an inclusive model of sustainable economic development, based and focused on the renewable energy sources available in Romania.*

Keywords: economic growth; renewable energies; sustainable development; inclusive model

JEL : Q47 ; Q48 ; Q55.

Introduction

The dynamics of the changes in the renewable energy policies and their diversification are a clear sign that the world understands the dangers of pollution, resulting primarily from the production of energy in various forms, without which today's society could not exist. Due to the fact that energy itself represents the basis of economic development, the link between sustainable economic growth and the growing need for the resources that produce energy becomes natural and logical (Bayar, 2016). Overall, the investment in the renewable industry (for producing energy and fuel) increased six times over the past ten years, totalling more than 2 trillion dollars worldwide. It is true that in this matter it should also be considered

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here, additionally, the government's subsidy and support programs, which play a decisive role (Popescu, G. H. & Bitoiu, 2016). Contrary to the general conception, many developing countries have begun to invest heavily in the renewable industry. China and India are the most important examples, trying to counteract excessive pollution in recent years due to rampant economic growth (Androniceanu & Dragulanescu, 2016). A related effect, regarded as very important in terms of social elements, refers to the renewable industry process of jobs' creating. According to The International Renewable Energy Agency (IRENA) in 2014 it was recorded a total of almost 7.7 jobs in the renewable field ((International Renewable Energy Agency, 2016). Most of these positions (3.2 million) are in the solar sector, followed by the biomass and bio fuels sector (nearly 3 million) and the wind energy (just over 1 million).

Statistics show that the small hydropower only provides about 210,000 jobs and geothermal power just over 150,000. To which are added around 10,000 employees involved in the research and development fields, plus thousands more in other sectors of renewable (Nica, 2016).In the recent years, the wind and solar sectors encountered a growing trend, which is expected to be continue at a sustained pace at least until 2020. Basically, the solar and wind facilities represent 55% of the investments done in the renewable in the year 2014, without taking into consideration the large hydro capacity. The investments done in the wind power exceeded 36%, while a quarter of the total investments were directed towards small-scale projects, particularly for the photovoltaic panels (Pacesila, et al., 2016).

1. An overview about the major changes within the renewable energy sector with a direct positive impact on the sustainable economic growth

A careful analysis of the energy field, in general, help us find out that, worldwide, the states prefer to further invest huge amounts of money in the exploitation of the fossil fuels in order to support this sector. So, at present, the direct investment have reached amounts of over half a trillion dollars (Sedláková, 2016).That is over two times more than the subsidies for the renewable, while the related costs have risen to an incredible amount of over 5 trillion dollars annually.

In our view, if these subsidies would be eliminated and the pollution would be charged accordingly, the competitiveness of the renewable would be highly visible and probably their generalization would become more accelerated (Popescu, G. H., 2016). However, in 2004, renewable provided 23% of the total capacity for the electricity production worldwide. In this case, 800 GW came from large hydro and the remaining 85 GW from wind, solar, small hydro, biomass plants, and so on and so forth. After a decade, renewable reached an estimated 1.7 TW (double that of the existing one 10 years ago), and the percentage in the overall capacity of electricity generation increased to almost 23% (Peters & Besley, 2016).

Practically, 2014 can be considered the "new renewable year" – because the pollution's standstill values are primarily due to renewable energy sources in

which it has been heavily invested especially after the crisis in 2008. In addition, the development in the "new" renewable is seen as noteworthy. In a decade, the capacity of the non-hydro renewable has increased from about 85 GW to about 650 GW (Andrei, et al., 2016). In the same period, large capacity hydro plant capacity has increased with more than 50% (from 715 GW in 2000, to 1055 GW). This situation demonstrates quite clearly the effectiveness of the investments done in the new renewable sources, especially if we look at the developments over the last ten years (see Figure 1).

Table 1. The development of the non-hydro's renewable capacity

The development of the non-hydro's renewable capacity				
	2004	**2013**	**2014**	**var. 2004/2014**
Wind energy	48	319	370	+ 670%
Photovoltaic energy	26,4	141,4	181,4	+ 580%
Biomass energy	36	88	93	+ 158%
Geothermal energy	8,9	12,1	12,8	+ 44%

(Source: International Renewable Energy Agency, November, 2016).

The sustainable economic growth was supported by the investments in the photovoltaic and wind power plants, which were preferred by investors. The wind turbines in the world entered a steeper slope shortly after the economic crisis. The costs reduction had also increased: in the USA, for example, the cost per KWh decreased 3 times in 5 years, from 7 cents / KWh in 2009, to 2.3 cents/KWh in 2014. The wind "farms" are already more profitable than the thermal power plants and almost at the same level with the gas stations. The solar sector is divided into three subdomains. The first field is that of the photovoltaic systems used for producing electricity. The investments in this direction have accelerated in the last 5 years, during which 90% of the investments have been concentrating in the last decade. In a decade, the photovoltaic installations reached a total capacity of about 600 GW. The second subdomain is represented by the solar panels for the hot water, which is a variant of the more suitable solutions using gas. Like photovoltaic installations, the solar panels went on a steeper slope after the time of the crisis, but so far their market was sufficiently developed (Andronicеanu, 2017). The field of solar panels for the water heating totals, after 10 years, about 2.5 TW-thermal. The solar panels concentrators' field is the least developed, but promises great potential due to the much better efficiency of conversion of light into electricity. Currently, as proven by the "explosion" of the investments recorded between the years 2011 and 2012, Spain is a leader in this area. Taking into consideration the evolution of the technology and the taxes required by the local governments, it is expected that the projects belonging to this subdomain to multiply exponentially until the end of

this decade. After a relatively timid beginning, the solar concentrators reached a total capacity of almost 15 GW from 2004 to 2014.

The biomass is used in two main directions: as a fuel for the production of electricity or as bio fuels in the transport sector. Mainly, the biomass for the heat or the electricity is the rate of about 75-80% pellets. Their production has increased steadily in the last decade, the major manufacturers being in Europe, followed by the Americans and the Canadians. In 2014, the pellets ensured the generation of over 433 TWh of energy, almost double compared to 2004, especially in the residential applications. From 2004 to 2014, about 150 million tons of pellets from wood waste were consumed (Autoritatea Nationala de Reglementare în Domeniul Energiei – Buletin Informativ Lunar no. 12, 2016).

Regarding the bio fuels, the data shows that they came to a point of stagnation. On the one hand, the costs of obtaining the raw materials rose; on the other hand, the law was changed, the authorities putting the issue whether crops for the production of bio fuels could undermine the food sector, leading to a food crisis. In total, in these 10 years, the fuels sector has produced an amount of 900 billion litters. Almost 80% of this quantity was made up of ethanol, a very common component in South America.

As it can be seen, the renewable sector is continuously booming and there is only a matter of time until it will become more competitive than the fossil fuels one. This is a picture that should convince the world leaders that the renewable are both a viable and a sustainable solution for a sustainable economic development worldwide (Popescu, C. R. et al., 2015)

2. Sustainable economic growth based on renewable energies in the international environment

In the current economic thinking different points of view are expressed in relation to the sustainable economic growth and development. The economic growth represents the increasing size of the economic outcomes determined by the combination and use of factors of production and is highlighted by the following macroeconomic indicators, such as: **the gross domestic product (GDP), the gross national product (GNP) and the national income in real terms, both total and per capita.** As a form of the macroeconomic dynamics, the economic development requires a set of quantitative, structural and qualitative transformations, both in the economy and in the scientific research and manufacturing technologies, in the mechanisms and organizational structures of the economic functioning, in terms of thinking and while considering the people's behaviour (Lazaroiu, 2016). In this context, the concept of **"sustainable economic development"** arises, which represents that form of economic development which aims to present the consumer's satisfaction under the assumption that this should not jeopardize or prejudice, in any manner, whatsoever, the well-being of the future generations.

Thus, by the concept "development" (or "increase"), the idea of sustainable ethical-economic rationality is understood, which targets to ensure the existential

conditions and the preservation of the human society in an indefinite time horizon, taking into account the whole natural and social economic space accessed in the future (Kaplanova, 2016). In general, sustainability is: "A quality of the human activities that takes place without exhausting the available resources and without destroying the environment, so without compromising the ability to meet the needs of the future generations". The World Conference on the Environment in Rio de Janeiro, in 1992, paid particular attention to this concept, which involves establishing a sustainable balance between the economic growth and the environmental protection, as well as finding alternative resources (Popescu N. Gh. et al., 2016). When referring to the economic development of a whole country or region, the synonym "sustainable development" is usually preferred. In our opinion, the concept of "sustainability" emphasise especially the ideas of conservation and efficient use of the economic resources in order to facilitate and guarantee the access to a natural environment for the future generations and that can be economically exploited (Pacesila, 2017). Specifically, insofar as it ensures meeting the needs of the present generations, without compromising the ability of future generations to meet their own needs as well. John Hartwick identified a direct link between *the resources* and *the economic sustainability* in *the case of some finite resources*. Hartwick's rule shows that a nation will invest the annuity paid from the present use of the exhaustible resources, in the event of the applications that maximize the benefit of the owner. John Hartwick develops the concept of resource rent based on the concept of the *user's cost*. This cost is, in fact, an opportunity cost. The exhaustible resources' character reveals that if a natural resource unit is extract now, that means that the unit will not be available at a later date.

The *user's marginal cost* is known as the cost related to the waiver of the marginal resources extraction units in the future. This cost measures the using of the *inter-temporal scarcity of the natural resources*. In these circumstances, the situation will be represented by the consumer's awareness in regard to the marginal utility – marginal cost for a unit of the natural resource consumption, which is taken into consideration at certain level of the prices paid per unit of the natural resource consumption.

The efficiency of a unit of the natural resource consumption is represented by the manner in which the consumer's utility could be increased (which involves lowering the price) due to the better use and also decrease of the opportunity cost if rational use of resources is encountered. The transition to *a sustainable society* requires not only a change in the way in which it manages the resources, but also a change in people's attitudes, in general, and business representatives' attitudes, in particular. The factors that intervene in the functioning of the national economy and which are manifested by the macroeconomic results are directly or indirectly involved in the growth process.

The direct-acting factors that determine the economic growth are: the human factors (such as, the labour resources), the material factors (such as, the natural resources and the production equipment accumulated), the technical or

technological factors, the informational factors, and educational too (Belás et al., 2016). There are also the indirect-acting factors, such as the aggregate demand, represented by the absorption capacity of the internal market, the rate investments, the research and development, the financial, monetary, budgetary and fiscal policies of the state, the international trade, the environmental policy, the labour migration and the capital, and so on and so forth.

Essentially, the **concept of sustainability** denotes the indissoluble link between the natural environment and the rational use of the natural resources capable to increase the economic efficiency in the medium and long term.

The sustainable economic growth encompasses the characteristics of the sustainable development, and, in the same time, sustainability involves more than economic growth. It requires a change in the content of the economic growth, which implicates that it should mean less consumption of the natural resources with a significant impact on the result produced, with ripple effects in the economy. These changes are needed globally, as part of a package of measures to preserve the stock of ecological capital, able to improve the income distribution process and to reduce the vulnerability of the economy to economic crises and pollution.

The **World Report on Human Development**. developed under the age is of the United Nations Development Programme (UNDP), summarizes **four essential components of the paradigm of the sustainable economic development and the sustainability: a) Productivity:** the population must increase its productivity and should participate fully in the process income generation, in this case the sustainable economic growth patterns representing a subsystem of the human development **b) Equity:** the population must have equal access to options; **c) Sustainability:** the access to options must be provided not only for the present generations but for the future generations as well. All forms of capital - physical, human and environmental - must be reunited; **d) Participation:** the human beings must participate fully in the decisions and the processes affecting their lives.

The overall objective of the sustainable economic development is to find an optimal interaction and compatibility of four systems: *economic, human, environmental and technological*, in a dynamic and flexible process. The optimal level corresponds to the long-term development that can be sustained by the four systems. The recognition of the existing dependence between the sustainable economic development and the natural resources, in general, and the renewable resources, in particular, and their physical condition show the fact that the concept of "development" occurs due to a long "confrontation" between different conceptions, regarding the protection of the natural environment, in which: the geo-concentric conception, the bio-centric conception and the anthropocentric conception. By retaining the common elements, rational and useful of these three concepts on the protection of the natural environment, one generalizing conclusion can be reached: the reconciliation conception of the human nature and its renewable resources for the sustainable economic development.

For the first time in history, in the year 2016 the plants that produce the energy from renewable sources accounted for over 50% of the total installed generation capacity worldwide last year, it was stated in a report from the International Energy Agency. IEA experts argue that "this milestone" is a clear evidence of the rapid change in the global energy system and additionally believe that the renewable energy will register a growth over the oil, gas, coal and nuclear power in the next five years. The UN member states have agreed on a new agenda for sustainable urban development for the next 20 years. It is called the New Urban Agenda and complements the Agenda 2030 adopted in September 2015. Among the recommendations of this Agenda are those relating to **reducing pollution in the cities.** The authorities are encouraged to make the transition to renewable energies, improving public transport and manage their natural resources sustainably. In addition, incentives are offered to create the conditions for **the sustainable growth and inclusive**, social and cultural development and environmental protection.

The main objectives of the sustainable economic growth, as they are formulated in the New Urban Agenda are: to create equal opportunities for all citizens, the elimination of discrimination, the improved cleanliness in cities, the implementing of the measures to reduce the gas emissions and to better manage the impact of the climate change, guaranteeing the rights of migrants and refugees, facilitating the collaboration and the access to green spaces, encouraging green initiatives, and so on and so forth. Another important point on the Agenda is related to the development of the infrastructure for bicycles, by encouraging cycling due to its utility and recreational purposes and to ensure safe conditions for cyclists.

At the European Union (EU) level, the energy sector consumes 44% of the total amount of the water used. If wind power production would double by 2030, IRENA estimates that the UK would save 52% of the water consumed; the United States - 37%; Australia - 32%; Germany - 28%; and India - 12%. Together with the doubling of the production of the wind power the energy production from traditional sources would be replaced. Thus, it would decrease the ammonia emissions, the particulate matter, the volatile organic compounds and the sulphur dioxide by 82%, 33%, 27% and 12% respectively. Thus,4 million lives a year could be saved by 2030.

In May 2016, Portugal has operated entirely by the aid of the renewable electricity for four days in a row: the photovoltaic energy, the wind and hydroelectric energy provided 100% of the energy needs for 107 hours. In 2015, the wind power provided 22% of the energy and the renewable resources have secured 48% of the total energy needed. These records were achieved despite the reduction in 2012 of support schemes for the new wind capacity - a decision similar to that taken by the Romanian authorities in the same period. Denmark is another champion of the wind energy: this source has provided the equivalent of 42% of the country's energy consumption for 2015, up from 39% in 2014 and 33% in 2013. Lower consumption of energy means lower pollution.

Although energy consumption has decreased (by a small amount at first, but very important in relation to the energy consumption), the nation's gross domestic product grew by almost 40%. So here is an example that can evolve, given that consumption is reduced sufficiently. On July the 10th2015 at 3 o'clock, the wind energy production has exceeded 140% of the demand at that time. The Danes plan is to increase the share of energy produced by the wind farms to 50% by 2020 and to 85% by 2035 (Comisia Nationala de Prognoza – Proiectía Principalilor Indicatori Macroeconomici 2016-2020, 2016). In a sunny and windy weekend in May 2016 87% of Germany's energy needs were covered by the photovoltaic plants and the wind turbines. Since nuclear power plants and the coal could not interrupt the production, into their energy there was suddenly too much energy, which led the prices to negative values, and some industrial consumers could earn money using electricity.

In 2015, according to the German think tank Agora Energy wend, the average share of renewable energy was 33%. Germany seeks to rely exclusively on renewable energy sources by 2050. Through action focusing on human development and on entrepreneurship, the company will provide a potential for generating a rational economic behaviour, based on the efficient use of the renewable resources depletion and the implicit awareness of the danger represented by the possibility of extension of the market.

The sustainable economic development should be based on the reproduction of pre-existing economic factors, with a limited use duration, which requires the consideration of a limited stock of the environmental capital. The problem is how the economy would enhance the ecological capital stock. In this respect, the production and distribution of income is envisaged in order to support the actions of the producing economic welfare.

Therefore, a significant and radical mutation that should take place in the world's economy and the economies of the world consists *in the gradual replacement, but at a rapid pace of the traditional energy sources with natural sources of energy generating a variety of resources for producing the renewable energy*. In our view, the renewable energy can and must become the power source of the process of the economic development and the sustainable development. From this perspective the views of a wide range of researchers are expressed.

These researchers have estimated that, depending on the decisions of the governments and the market's developments, three possible scenarios for this transformation process could be outline: (1) the scenario called "Hard Rock"; (2) the scenario named "Unfinished Symphony" and (3) the scenario entitled "Modern Jazz". According to the scenario "Hard Rock", the energy's demand would increase by 46% by 2060, while the fossil fuel's consumption would drop from 81% to 70%. In a more optimistic scenario, called the "Unfinished Symphony", more sustainable models of economic growth could develop. The energy consumption would increase by 22% by 2060 and the fossil fuel consumption would drop to just 50% of the total product. Finally, in the scenario "Modern Jazz",

the demand growth would be 38% and the use of the fossil fuels would reach 63% of the total.

The World Energy Council experts believe that the technological innovations that allow the more efficient energy storage, the government policies and the diminishing expectations of growth will have a significant impact on the energy sector. Accordingly, per capita energy demand is expected to fall later than 2030, reversing the current trend. From 1970 until now, the demand has doubled. However, according to the specialists' studies, the demands for electricity will double itself by the year 2060. Coping will require consistent investment in the infrastructure and the production technologies of "clean" energy. The production of solar and wind energy will continue to grow, rising from 4% to a value between 20 and 39% of the total. At the same time, the demand for the fossil fuels will begin to decline, even up to 50% of the total generation. In all the three scenarios, the energy demand per capita will reach a peak before 2030. All the fuel oil will be predominant, but the electric cars will take advance surely.

3. Inclusive approach applied to the renewable energies for a sustainable economic development

Based on these considerations and the general outlook for the sustainable economic development, we have developed a **model presenting an inclusive approach to the sustainable economic development based on the renewable energy sources**. This is shown in figure 1. The inclusive model elements, as they are presented in the figure above, are further analysed for Romania. Romania has successfully fulfilled the European commitment for 2020 to increase the share of renewable energy sources (RES) to 24% of the gross final energy consumption, reaching for the indicator level of 26.3% in 2015, at a considerable cost for the final consumer, according to the data published in Romania's Energy Strategy 2016-2020.

Three factors will determine the share of RES in Romania 2030: the cost of the capital for RES consumption financing trends of biomass for heating and achieving the target for bio fuels in transport by 2020 and the development of electro-mobility and the electric heating. Between 2017 and 2030, the quality of life for the rural dwellers and the improving of the forests' management can be found among the national priorities.

The effect will consist in a slower growth in the share of RES by reducing the consumption of biomass for the rural warming. Therefore, Romania should carefully consider the level of ambition of RES targets for 2030. An important source of revenue for providing the investment objectives could be represented by auctioning the emission permits related to ETS.

Referring to the European Union's long term objective represented by de-carbonation, which is reducing by 2050 at least 80% of total emissions of greenhouse gases compared to 1990, the governmental policies and strategies mentioned that assuming this target at the national level would mean involving

major investment effort that would implicate the transformation of dwellings, accelerating the electrification of transportation, as well as creating energy independence. The strategy takes into account a reduction of the greenhouse gas emissions by 75% in 2050, a percentage that depends on technology cost reduction compared to the current projections. The decrease greenhouse gas emissions will continue at slower pace than in the last 25 years, given the investments already made in the industrial sector.

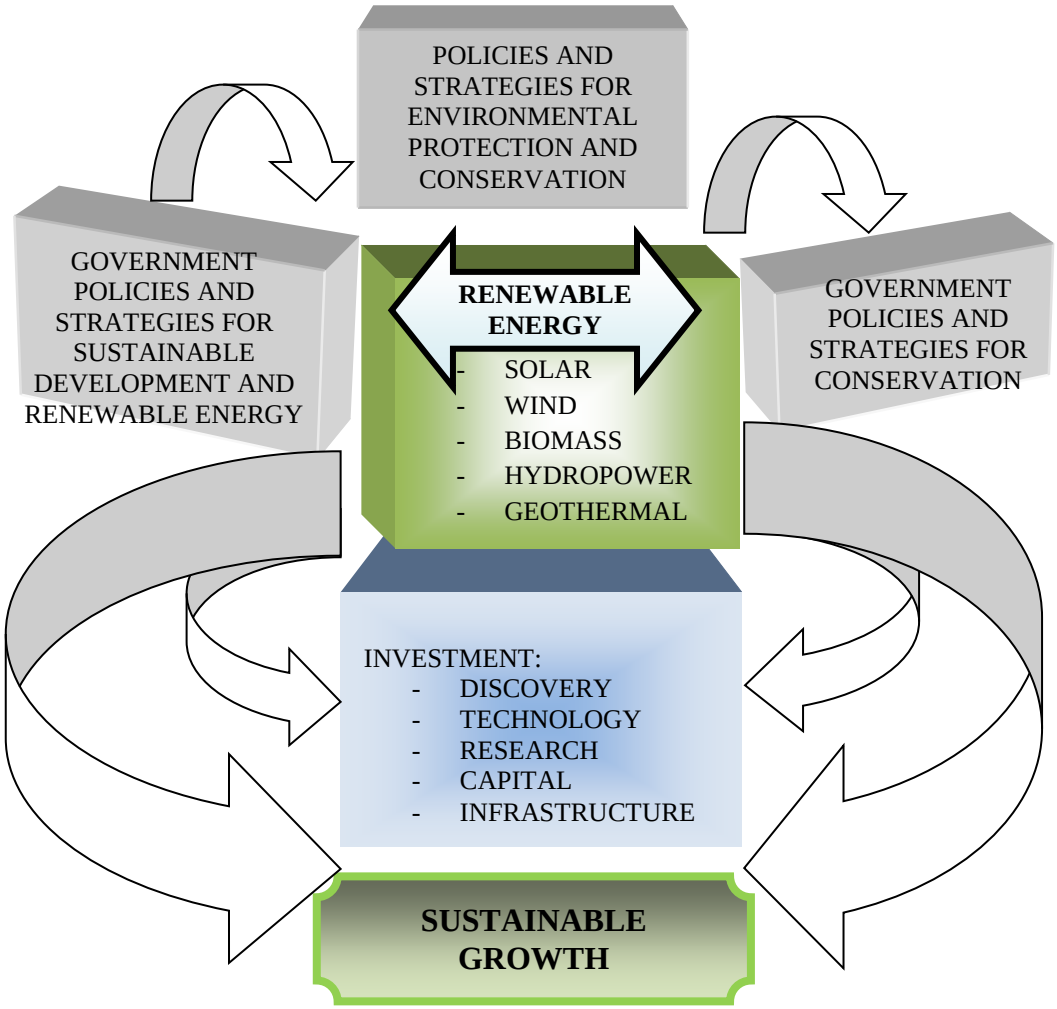

Figure 1. Sustainable economic development based on an inclusive approach applied to the renewable energies
(Source: Authors)

The investments in research for the sustainable economic development are indispensable. According to the inclusive model, the research should be conducted at least in the following areas: discovering renewable energy sources; the discovery of new techniques and technologies for the exploitation, processing, transportation, storage and distribution of renewable energy by economic and population, but also in human resources training, employment and population. Investments in research will result in significant improvements in all sectors, with a focus on energy efficiency and increase the share of clean energy in the energy mix.

In the recent years, the governmental policies and strategies in Romania have provided a sharp correction of the support scheme for the electricity produced from renewable sources and the uncertainty regarding the prospects of the scheme on short, medium and long term. They declined significantly Romania's attractiveness for the new investments in the field.

Many owners of wind and solar power farms, threatened by bankruptcy, wanted to sell their businesses, but potential buyers are offering unacceptable prices. In addition, the wind turbine towers are regarded as construction which concluded that they are taxable, which implicated that the potential investors did not find this sector as attractive for them. Although Romania has met already the specific target for 2020, it is unclear whether they will survive in terms of a sufficient generation capacity by 2020, when the verification of the fulfilment of the specific target is due. There are no clear prospects for the new support schemes for the electricity production in the photovoltaic roof panels or the promotion of biomass as an energy resource. Beside them, the latest proposal for legislative change is perceived by investors as being without short-term solution for the financing of the implemented projects. Given today's conditions, according to the specialists' calculations, the return of an investment in a wind project developed in Romania is greater than 30 years, so it seems that these entrepreneurs' investments should be supported by the state through appropriate policies and a new adaptation of the legislation.

Romania could afford a 31% target for the renewable energy by 2030 [66]. The target for the share of renewable energy in the final consumption proposed for Romania for 2030 could be 31%, but this will be established following the negotiations between the representatives of Romania and the European Commission. At present, renewable energy is set at European level a target average of 27%. This is the time to see what Romania can afford and what is bearable for consumers. By 2015, the consumption level registered in Romania was 26.12%. The manner in which the renewable sector will evolve will be discovered in the next time period. For Romania, the experts state that reaching a target of 31% is a feasible target for 2030. However, the scenarios used to develop the Strategy for Energy 2016 – 2030 do not exclude the reintroduction of new schemes for the renewable energy.

However, according to the International Energy Agency, the demand for electricity will double by 2060. To cope, an investment in the infrastructure and in the production technologies of "clean" energy will be required. The production of

the solar and wind energy will continue to grow, rising from 4% to between 20 and 39% of the total. At the same time, the demand for fossil fuels will begin to decline, even up to 50% of the total generation.

In Romania, the National Forecast Commission (NFC) left unchanged the growth forecasts for the years 2016 and 2017, at 4.8% and 4.3%, compared with its preliminary autumn forecast on the medium term, published in September (Energii Regenerabile, 2016). According to the projection of the main macroeconomic indicators for 2016-2020, NFC estimates for this year a real growth of 4.8% at a nominal GDP of 758.5 billion lei, and for 2017 by 4.3%, with a GDP amounting to 807.4 billion lei.

The contribution to the real GDP growth in services grows from 3.1 percentage points (p.p.) as a preliminary version, to 3.3 p.p., and, in turn, the real GDP growth in agriculture decreases at 0.2 p.p., while the real GDP growth in construction gets to 0.3 p.p. and the real GDP growth in industry stagnates at 0.6 p.p. Regarding the structure of the GDP by industry, compared to the previous version provided by the NFC, the agriculture's contribution decreased from 4.3% to 4.1% and the construction's contribution decreased from 7.7% to 7.6%. The industry is stagnating at 22.6%, having the same as the net taxes on products (11.1%). However, the contribution in the services' sector is enhanced from 54.4% to 54.6%.

The final consumption was revised from 7.3% in the previous version of the document, to7.6% in the current version of the document. The GDP per capita remains at the same level of 38.487 lei in 2016 and 41.199 lei in 2017. Also, the investments remain unchanged, which means the same level of growth of 6.3% for 2016 and 6.9% in 2017.

The World Bank has improved significantly the estimates concerning the advance of the Romanian economy in 2016, at up to 5.1%, from 4% as estimated in June, according to the Economic Report for Region Europe and Central Asia (ECA), published on the 22nd November 2016 by the international financial institution (World Energy Council, 2017). The World Bank states the fact that the leap of 5.1% for the Romanian economy in 2016, after an increase of 3.8% last year, will be followed, in 2017, by a slowdown to 3.8%, and the predictions for 2018 show that the Romanian economy's advance will reduce to 3.4% (World Bank Group, 2016). The International Monetary Fund (IMF) estimated that this year Romania will register the highest economic growth in Europe, 5%, followed by Ireland (4.9%). In early November, the European Commission revised the upwards by one percentage point, to 5.2% in terms of the projected growth of the Romanian economy this year. These projections are based on the calculations and the scenarios that integrate various factors and variables, but there is no shortage of these renewable energies as a feasible option for a sustainable economic and social development of Romania.

The statistics show that the installed capacity of the renewable energy producers in Romania in September 2016 totalled 4,701 MW, according to data centralized by Transelectrica. Thus, in the system could be encountered wind farms

with an output of 2961 MW, photovoltaic panels with a total capacity of 1,319 MW, small hydro powers of 318 MW and biomass projects with an aggregate power of 103 MW. On the 10th of March 2016 at 15.16, the production of the wind energy in Romania registered, according to Transelectrica, the value of 2.709 MW - the highest amount registered with us. Following this result, Romania has become an energy exporter, after more than a month of energy imports. The wind power accounted for 33% of the entire energy production of that day, followed by the hydropower (24.5%), the nuclear and the coal power. In total, about 18% of Romania's energy consumption comes from renewable, non-polluting sources of energy (Ministerul Energiei, 2017).

According to the data provided by the National Energy Regulatory Authority (ANRE) and Transelectrica, the wind power represents 11% of the energy delivered by the producers with portable units' networks. With over 85 wind farms in operation in Romania, the wind energy sector has a major impact on the economy and the investments in the wind power energy sector are currently exceeding 4.5 billion Euros. At the end of 2015, a renewable energy production capacity of 5.142 MW was included in the system. The renewable energy producers receive free green certificates, which they sell on a specialized market to gain extra energy. These green certificates are paid by all consumers in Romania, including the population, in the final bill to electricity.

In the fall of the year 2016, the Romanian Ministry of Energy has launched for public debate a draft concerning an emergency ordinance amending the Law 220/2008 on the support scheme for energy from renewable sources. The specialists expect that after the relevant legislation will be amended, the households with an average consumption of electricity will pay 60 bani per month, extra money for these green certificates. The Romanian Ministry of Energy commissioned a study which came after these proposed changes. In this case, for a domestic consumer with an average consumption, the impact will be 60 bani per month for an average consumer, reaching 3.3 lei per month. The Ministry of Energy sought to strike a balance between the renewable energy and the subsidies received in the manner of contributions paid by the final consumers. The scheme closes on 31 December 2016, so it will no longer be accepting new renewable energy producers.

Thus, it could be estimated a number of green certificates issued during the scheme, which will take effect until 2031. The number of green certificates is divided by the number of years and hence a number of green certificates to be traded annually. Basically, a balance between supporting the renewable energy and the incorporating alternative sources in industry and population and acceptable cost can be found and has to be paid by the final consumer of electricity in Romania.

4. Conclusions

Obligations on reducing emissions of greenhouse gases established for Romania as a member state of the European Union according to the EU policy are

20/20/20. That means to reduce 20% of emissions of greenhouse gases by 2020, compared to 1990. Also to reduce energy consumption coming from hydrocarbons by 20% by improving energy efficiency and growth at the same time by up to 20% the share of renewable energy in overall energy consumption. Romania exceeded those quotas already, but the future is hard to predict. In Romania energy losses are on average 30-35% of the consumption of primary resources, according to a study on Romania's energy security, developed by the European Institute of Romania. Basically, for the production of 1000 euro gross domestic product, consume four times more energy than in other EU countries. These losses are made in conditions where resources are extremely limited. Oil and gas will be significantly reduced in the next 14 -15 years, and coal in 40-50 years. In Romania, the coal is the main fuel for electricity generation, with a contribution of almost 45%, the rest being provided from hydro, nuclear, wind, solar, biomass and geothermal. In Romania are required major investments in renewable energy sector. As we introduced and explained in integrative model there are a variety of factors influencing Romania's economic sustainable development based on renewable energies. A key role in this respect has Romanian Government, which must implement policies and strategies in the energy field. They require new manufacturing technologies, less polluting, and technologies for exploitation of renewable resources in Romania. These technologies also come to meet the sustainable development concept, concept related to environmental issues and natural resources crisis and assumed both by politicians and entrepreneurs.

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