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NEW TECHNOLOGIES - BETWEEN BUSINESS AND ENVIRONMENTAL PROTECTION IN ROMANIA

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Abstract

The paper analyses some of the controversial aspects of the environmental protection policy in Romania: the high level of concern for environmental protection manifested as an over financing of green energy, on the one hand, and the disregard for the environment by encouraging the exploitation of shale gas by hydraulic fracturing, on the other.
Romanian authorities offer generous support for renewable energy. Romania has become the most attractive country in the region, especially in the wind energy sector, as far as such investments are concerned because the investment can be redeemed in only a few years. While some countries reconsidered their green energy support programs and drastically reduced or temporary suspended financing for such programs, Romania continued to support the development of excessively generous wind energy programs. Due to the fact that overcompensation is present in all energy markets, the costs will artificially rise and will lead to the increase of prices for products.
As far as green energy is concerned, decision makers offer environmental protection a great importance. However, this is not the case when dealing with the exploitation of shale gas which it may pollute the water and would not only affect the environment and the population, but would also destroy the main economic activities of spa tourism in regions such as Felix, 1 Mai or Buzias.
The real situation reveals that economic interests are have a greater impact than the concerns for actual environmental protection and sustainable development. Unfortunately, environmental protection is only a theoretical, declarative objective.
Romania has implemented the most generous program of renewable energy development from the entire European Union; this work studies the implications of the accelerated development of renewable energy and especially wind energy. Because of the instability of this energy, the need to resort to more than what was recommended for the classic energy was inevitable. That is why the favorable impact on the environment was below expectations. Also, important unfavorable economic effects have emerged, effects materialized in the increase of costs for all the consumers of electric energy and in the emergence of some significant competitiveness loss for the economic environment. The new renewable energy production technologies have brought great and rapid earnings only for the ones that have invested in this domain in Romania. The excessive support of the renewable energy in Romania was generated by the political decisions that weren't very rigorously substantiated from an economical point of view.

Key words: business, costs, energy, fracturing, hydraulic, instability, renewable

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1. Introduction

The EU considered that the production of energy from renewable sources brings many environmental benefits. The energy production out of renewable sources means a series of advantages for the environment. This is why the interest for green energy is increasing. Nevertheless, the energies produced from such sources are often much more expensive than those obtained from fossil fuels.In order to enable more and more these sources at an European level, it is considered that promoting the production of renewable energy is necessary. UE has established its target for 2020: from the energy generated by member states, 20% shall be provided by renewable sources. Regarding this goal, Romania has set its own target level of 24% (EC Directive, 2009).

In this respect, certain support schemes were implemented and these schemes are economically sustained by final consumers. The study targets the comparative analysis of the main support mechanisms that have been implemented for the support of the renewable energy in the European Union. Given that the environmental protection was declared a major desideratum, in Romania, the programs of renewable energy development have been financed excessively. Overgrowth of green energy has been decided by politicians.

This paper starts from the assumption that this decision was well founded. The study aims to analyze both the impact on the environment, as well as the economic one of the excessive development of renewable energy in Romania. The analysis starts with the hypothesis that renewable energy will exert a beneficial effect on the environment by the reduction of CO_2 emissions, which would exist if the same amount of energy will be produced on the strength of fossil fuels. Also, it is presumed that supporting the development of renewable energy will generate positive effects from an economic point of view, both through the vivification of the investments in the domain of new energy generating technologies, but also through a positive effect of training the development of other related activities. The testing of this hypothesis will be made in the case of wind energy which has known the greatest development of all the methods of producing renewable energy.

2. Analysis of the context

The measures for encouraging the investments in renewable energy involve instruments based upon either price, or quantity. The field's main support mechanism is the Fix Prices System "Feed-in Tariffs". Implemented in Germany in 2000, the system was further on adopted by other countries (such as France, Denmark, Spain, Italy, Czech Republic) becoming the main support mechanism in the field. The purpose of this system is to assure that renewable energies can compete with those resulting from conventional sources (EC Directive, 2009).

At the same time, such a mechanism establishes a safety level for the long term and medium term investments in the energy field, encouraging long term contracts (10-20 years). This system does not impose a limit regarding the quantity of resulting energy. That is why it produced an increase of the renewable energies in Europe (much larger than that of the quota system) and at a low price for consumers and lower prices for consumers (compared to the alternative case). Another mechanism is the Green Certificates System and Compulsory Quotas; these two schemes are usually combined in some states (such as the United Kingdom, Romania, Sweden, Belgium, Italy and Poland). The Green Certificate is a document which certifies a quantity of 1MWh of electric energy produced by renewable energy sources. The Green Certificate theoretically has an unlimited validity and it can be transacted apart from its related electric energy on a bilateral contracts market or on the centralized market of green certificates. In fact, the price varies according to the limits established by the government and covers the difference between the production cost of the renewable energy and the market price.

The minimal price is imposed in order to protect the producers and the maximum price for the consumers' protection. The compulsory quotas system implies the provider's acquisition of compulsory electric energy quotas produced by renewable energy and selling them to the consumers. The acquisition price is established according to competitive basis. In this combination's case, the energy quantity is established by the government and the green certificates' price by the market. Besides these mechanism, some countries use tax incentives (such as tax exemptions or reductions and renewable energy investment tax) and specific auction systems by which governments issue offer requests for companies interested in providing such energy at a fix price (the most competitive offer receives by contract and additional costs for electricity production are paid by consumers).

Romania has great potential for producing energy out of renewable sources. Therefore, projects for producing electric energy or/and thermal energy out of renewable sources are founded: such examples are biomass, hydropower resources (in units with an installed capacity exceeding 10 MW), wind energy, solar photovoltaic, aeolian, biofuel, geothermal resources and other renewable energy resources. The operation for promoting energies obtained from renewable sources involves the following steps: the Romanian Energy Regulatory Authority (RERA) - sets a fixed quota of electricity produced from renewable energy that suppliers are obliged to buy (RERA, 2011d). Afterwards, this authority annually qualifies renewable electricity producers in order to obtain green certificates (EC Decision, 2011). Producers receive for each electricity unit delivered in network (1MWh), a green certificate, which can be sold separately from electric energy on the green certificates market (RERA, 2011a); before mid-2013 six 6 green certificates were awarded for solar photovoltaic, three 3 for micro hydro and two 2 for wind energy (RERA, 2011b). In order to fulfill their duty, providers must hold a number of green certificates equal to the required share of electricity from renewable energy sources (RPL, 2008).

A green certificate is issued by the Romanian company for electricity transmission-Translectrica-After the production and delivery of an MWh of renewable energy in the energy system, Romanian company for electricity transmission-Transelectrica-issue a green certificate; before mid-2013 six green certificates were awarded for solar photovoltaic, three for micro hydro and two for aeolian wind energy (RERA, 2011b). The scheme through which Romania grants certificates is completed by the requirement of electricity suppliers to purchase an

annual percentage of certificates proportional to the delivered energy (RPL, 2008). For example, the electricity produced by a coal-fired power plant (such as the Oltenia Energy Complex) has a cost of 190 lei/MWh, but the same amount of aeolian wind energy equals about may even reach 640-670 lei/ MWh (when added to the price of energy and 2 green certificates of roundabout which may be as high as 50-55 euros/certificate).

The problem is that while producing less, this energy is often left out of the market because green energy has to be taken in precedence. In turn, electricity suppliers recover their money from consumers through the electric bill, so the entire population of Romania supports green energy production. In the case of domestic consumers, the certificate represents 12% of the invoice, and in the case of industrial consumers, 40% is reached (https://statistici.insse.ro/shop/?page=ipc1&lang=ro). It is worth mentioning that green certificates can be sold separately from electricity.

On the green certificates market, their value represents a perquisite received by producers for "clean energy" they deliver in the network (RERA, 2011c). This value of sold green certificates is determined by Romanian Gas and Electricity Market Operator OPCOM- a parallel market where the environmental benefits are traded. During 2008-2014, the trading value of green certificates is in the range 27-55 euros / certificate (RPL, 2008).

Romania's option of green certificates and mandatory quotas system was not the wisest choice. The alternative for fixed price system would have allowed investors to know exactly on what money they can rely and to lay down their business plans. Consumers would have enjoyed lower prices. For example, in Germany the special rates of injecting network, the so-called "feed-in tariff" for wind energy on land are between 48.7 - 89.3 euros / MWh; Romania offers more than that: 2 green certificates and the producer will still get about 40 euros from the sale of energy on OPCOM.

Furthermore, in Germany, the rates are applied on the entire payment period (20 years) and in order to stimulate the cost decrease with innovation, these rates annually decrease with 1.5%. In addition, Germany has tried to preserve the competitiveness of large industrial consumers by giving them some exceptions; thereby, the railroad and manufacturing industry operators are exempted of payment (http://www.eex.com/en/market-data#/market-data), and the energy-consuming industry (approximately 300 large industrial German groups) pays to cover the costs with the rates of renewable energy (only 0.05 cents/kWh). By comparison, in Romania, there is no differentiation of these rates. Therefore, large industrial consumers of electricity would be disadvantaged.

3. Case-studies presentation

Regarding energy provided by renewable sources, for 2020, Romania has set its own target: the level of 24% (EC Directive, 2009). Therefore, Romania approved for 2011-2020 a support scheme which grants subsidies of 10.5 billion euros for green energy producers. This is the most generous aid an European country offers to this area.

Facing the difficulties of economic and financial crisis, some European countries have severely reduced their support schemes for energy production out of renewable sources; for example, the so-called PIGS countries - Portugal, Ireland, Greece and Spain - which represent the group of European countries facing serious economic problems. Accidentally or not, these countries have had very ambitious programs for developing the aeolian wind energy and these were sustained by state supported schemes.

In recent years, the persistent economic crisis has determined most of these countries to restrict their programs. Thus, compared with 2011, in 2012, Portugal reduced its newly installed capacity at only 42%, Ireland at 60%, Greece at 37%. Only Spain continued its impetuous pace to increase aeolian wind energy generation capacity and scored a 106% increase as opposed to the previous year (EWEA, 2013). Although still affected by the economic crisis, Romania has not limited its support for green energy. In the second half of 2010, 25% of all public sector employees' revenues were cut; this resulted in a severe drop in consumption but the state continued to generously support green energy. Green energy maintenance costs have not decreased, on the contrary, they increased. If investments in green energy production from geothermal sources are symbolic, those in biomass are minor, and those for solar photovoltaic energy producing are relatively low, not the same can be said about the aeolian energy which registered a real boom. Thus, Romania has increased during the last year its aeolian capacity with 77.5% (from 520 MW in 2011, to 923 MW in 2012) which equals 8% of the total 11895 MW invested in the EU. This placed the state on the fifth place in the top of these investments (EWEA, 2013).

A major problem is that most of these projects gathered in Dobrogea region, which was identified as the second largest potential in Europe and the largest aeolian wind potential in the South-Eastern part of the continent. But Dobrogea's network is unsteady and there is only one transmission line to the rest of the country.

The electricity excess in Dobrogea region also creates strong imbalances and threatens the balance of the national energy system. Aeolian wind resource varies greatly depending on weather vagaries and it is practically impossible for rigorous production to be forecasted (Pramod, 2010).

Consequently, because until now aeolian wind energy had to, take priority there are imbalances in the power system and in the network. Therefore, if the wind suddenly stops, the existence of fast-start capabilities to compensate for wind energy production is required (Gipe, 2009).

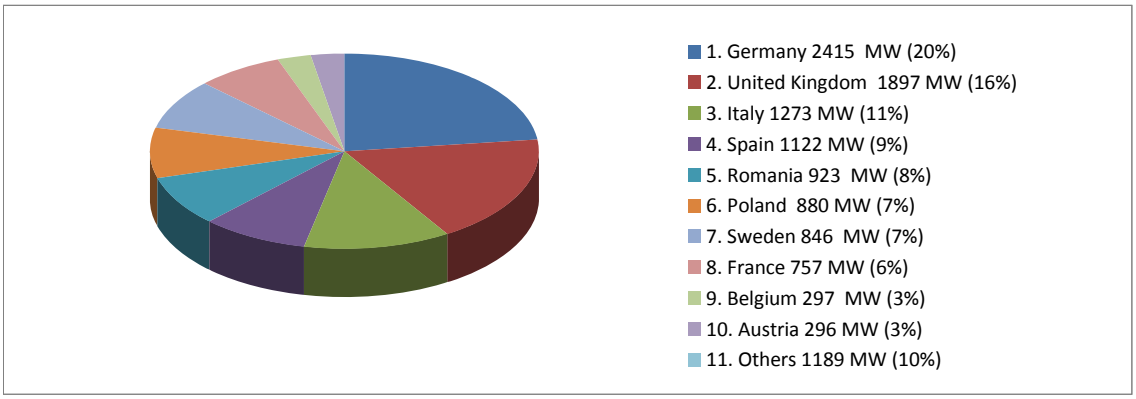

Fig. 1. Wind energy: new capacity installed in 2012 in EU

Hence another problem is that we do not have fast start-up units capable of balancing the system according to the variable nature of aeolian wind energy production. The lack of investment in small, fast units determines the balancing of the system to depend only on hydro and to the greatest measure on coal-fired power plants, which are the only ones that can start and quickly generate the necessary energy in the national energy system (Hemami, 2011). This means higher costs and more CO_2 emissions for plants.

After three years during which more than 3 billion euros have been invested to use until the first half of 2013 over 2,000 MW in wind farms, Romania polluted more than before the installation of anticipated those who took this decision. to install over 800 windmills. Thus, from day to day, depending on how the wind blows, the contribution of hydro power plants and power-stations, the electricity production is changing according to the proportion of aeolian wind energy power that has been taken over in precedence in the system. This situation means higher costs and a higher amount of CO_2 emissions (than in the situation where the same energy would have been produced by wind). Basically, despite all the investment in green energy, Romania has come to pollute more. There are costs unfairly registered by coal-fired power plants because the way they work now is a consequence of the system's operation. Therefore, it can be said that aeolian wind energy is expensive and did not have the desired efficiency to effective reducing CO_2 emissions.

A recent procedure (GEO, 2013) removes, from the 2nd half of 2013, aeolian wind industry's privilege to have the entire amount of energy produced in its own turbines taken over. Therefore, only quantities that ensure a balanced functioning of the national power system will be taken over. More specifically, on days when aeolian wind energy production is high and consumption low, only portions of up to 20% of the producer's additional production registered for notification will be taken over, in order to stop destabilization of other producers: thermal, hydro and nuclear.

This procedure will not lead to a rebuff of investment in new aeolian wind power generation capacity, but will only enable producers to generate exactly how much they noticed they will produce.

Eolian wind energy has led to an increase in electricity prices. The short term impact of the uncontrolled growth of electricity price by 60 - 100 lei/ MWh due to renewable sources promotion raises a question of affordability, both for industrial and domestic consumers (https://statistici.insse.ro/shop/?page=ipc1&lang=ro). About 75% of the net electricity consumption belongs to industrial consumers; this sector has been strongly affected by both economic crisis and disproportionate effect of increasing electricity prices. This increase was due to the liberalization timing, cogeneration contributions and contributions to support generation of electricity from renewable energy sources (http://colectaredate.insse.ro/metadata/viewStatistical Research.htm? researchId=3010).

Approximately one fifth of the electricity produced in Romania is delivered to the industrial sector (metallurgy, aluminum, petrochemicals, cement, construction materials, chemical fertilizers) characterized by low rates of profit (less then 10%). The prices are settled according to foreign markets and global competitiveness (there is only regional exception) and do not allow the transfer of price increases from producers to clients, regarding raw materials and energy. In such situations, if energy represents only 30% of the product's price, a price increase of 25% in electricity costs will generate a cost increase of 7.5%. Such increase should be absorbed at the expense of profit, as these industries become either unprofitable or uncompetitive (http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/).

About 25-30% of the electricity produced in Romania is provided to domestic consumers. With a share of more than 5 percent in consumption and a 10-20% annual increase of the price paid by consumers, electricity bill will generate an increase in the annual Consumer Price Index by 0.5 - 1% (meaning 20% of total annual index increase that can be considered bearable).

In 2013 an approximate increase of 8% of the electricity prices for domestic consumers is estimated (https:// statistici. insse.ro/shop/?page =ipc1 &la Hence another problem: we do not have fast start-up units capable of balancing the system according to the variable nature of aeolian wind energy production.ng=ro).

Unfortunately, the economical multiplying effect of investments in green energy economy is almost zero. Approximately three quarters of the value of these investments are purchased within the community's borders or imported. Also, most of the goods and services for the wind energy came from outside Romania (http://colectaredate.insse.ro/metadata/public.htm?locale=ro). In terms of creating new jobs, only those in security companies are predominantly and gains from taxes are insignificant (Aceleanu, 2011).

Aeolian Wind energy subsidies are twice higher in Romania than the EU average (RERA, 2012). Due to this benefit for producers and the priority to takeover energy produced in the system (GEO, 2011), the investment in a wind farm pays off in about 2-4 years. Therefore, there is a special interest for investment in this area and a real boom was registered. Dozens of wind farm projects are announced for the next years and this adds to dozens of already installed wind farms or those which are being installed. At the end of last year, 1,905 aeolian wind MW were operating. The majority was in Dobrogea region. This year, another 2,000 MW will be installed. The Romanian company for electricity transmission has applications for 30,000 aeolian wind MW, but the system does not currently support more than the sixth part of this amount, meaning approximately 5,000 MW. Enhancing power takeover is not possible without massive investment of over half a billion euros, money which does not exist. Therefore, there are profound implications for potential investors in aeolian wind energy. Those who already have connection agreements are the most advanced stage.

Theoretically, they should complete the project in no more than two years, otherwise the contract expires. Consequently, on the short term there will be a tough competition, because only the first who enable these plants will be taken over by the system without restrictions (GEO, 2013). Therefore, an overcapacity of green energy production is expected and this will lead to higher prices. After the boom in aeolian wind energy, it looks like one in solar photovoltaic energy will come. The subsidy for this type of energy was 6 times more than the European average until the first half of 2013.

In response to current discrepancy in the energy sector, a series of measures designed to strike a balance between development and sustainability was imposed (GEO, 2013). In the second half of 2013 the granting of a number of green certificates was suspended: two 2 for solar photovoltaic and one 1 for micro hydro and aeolian wind energy. Their recovery will be possible only starting from 1st January, 2017 for hydroelectric and solar power-plants, in the case of aeolian plants starting from 2018. Basically, the support scheme was not cancelled, but echeloned; in addition for great industrial consumers, an exemption mechanism was introduced. Even if investors in aeolian wind energy will continue to gain (though not as much as before), they are not willing to decrease previously huge profits. For example, one of the biggest investors in Romanian aeolian wind plants, the Czech group CEZ - appealed to this decision in the European courts.

Unfortunately, there is no study related to the impact of aeolian wind investments on the environment and the economy. The connection notice and subsidies were granted on lobby. and not according to rigorous economic basis.

All happened without taking into consideration rigorous studies regarding environmental impact. Romania allowed shale drilling. The shale gas drilling by the hydraulic fracturing method means that the probe is stretched vertically, then horizontally at a depth of 3-6 km, under very high pressure (about 1000 atm) an average of ten (about 60) million gallons of water are injected with each shot in soil, sand, additives to break the layer of rock and then shale gas is released (Brash, 2012; Spelmann, 2013). This method of extraction is very dangerous and has already been banned in France, Ireland and Bulgaria. Ignoring the position of European states regarding shale gas, Romania recently granted exploration-exploitation licenses. Currently, more shale gas exploitations are prepared nationwide; including those from Barlad, Felix, 1 Mai, Buzias, Eforie, Costinesti and VamaVeche. If exploration works firmly identify the existence of expected resources, the exploitation notice will be assigned (RPL, 2012).

A first problem raised by the hydraulic fracturing is the huge water consumption. For each probe 10-40 tons of clean water will be used. The water would be taken from the area's surface water or water table. For example, the hydraulic fracturing of Barlad's entire perimeter (a water scarce area) at full capacity would require an amount of water equal to Barlad's consumption for several hundred years.

Another problem is related to the chemical additives that water used in hydraulic fracturing will contain. Even if it were only about 0.5% chemical additives (as some companies that practice this process declare), this means, for example, 30 million liters of water for 150 tons of chemical additives per fracturing and an average of 18 times is required for a well to be fractured (Spellman, 2013). Out of 760 identified substances in the substance mixture used with the water required for the process, 70 are considered toxic and 29 cancerous (methanol, glycol, naphthalene, formaldehyde, benzyl chloride and others).

Once it reaches the depth, at the level of shale gas, the toxic mixture will affect the rock and shale gas mixture and the gases will be released and come out at surface. However, the toxic mixture does not

remain at the original depth, but migrates with water and heavy metals found naturally in soil, through the cracks in rocks and the lining wells, reaching in time the groundwater which is irreversibly contaminated. Therefore, this process will poison subsoil, groundwater and soil. Such problems have emerged in other countries, where shale gas exploitation was allowed. When operating in mentioned perimeters, the water supply of towns in proximity is threatened, such as densely populated metropolitan areas like Oradea and Constanta.

Moreover, the mixture of water with chemical substances, heavy metals, radioactive substances is brought to the surface and must be stored in tailing ponds. There is a series of suspicion regarding water supply to those deposits, safe storage, and water's treatment before reintroduction in the environment (Spellman, 2013).

We should not overlook that in rural or urban areas, digging deep wells causes noise and environmental disturbance. For spas placed in the drilling area of (Felix, 1 Mai, Buzias, Eforie, Costinesti and VamaVeche) this would mean compromising a decent tourism.

In addition, at thousands of feet depth, earthquakes can be caused because of shale gas rocks detonation. When performing the fracturing, gas recovery and shale gas liquefaction, an amount of approximately 9% is excreted in the atmosphere. The negative effect on global warming is over 105 times larger than that produced by CO_2.

Last, but not the least, shale gas exploitation will take out large areas of land from the agricultural system, cause massive industrialization of agricultural or wildlife areas and ruin the landscape.

4. Results and discussion

Romania's option of green certificates and mandatory quotas system was not the wisest choice. The excessive development of renewable energy in Romania is a direct result of the political decision. It has been made without the existence of an environment substantiation and especially, without a rigorous economy; it has been a consequence of the pressure of the advocacy groups of entrepreneurs from this domain; they have identified, in the Romanian political environment, an extremely permissive structure that was willing to adopt and implement the most generous policy of renewable energy development from the entire European Union and that succeeded doing so.

Unaware or only rapacious Romanian political deciders have imposed an irresponsible manner of renewable energy development, which has proven to be in detriment of the domestic and industrial consumers, and even in detriment of the classic manufacturers of electric energy.

The support of renewable energy was experienced as a burden in Romania. Furthermore, there is no incentive mechanism for lowering the renewable energy generation costs, and the manufacturers of this type of energy wait for the state (exclusively) to invest in the necessary infrastructure to transport and to the takeover of this energy, and especially to resolve the problems generated in the national energetic system by the instability of renewable energy.

In Romania, support schemes for green energy production are way too generous and imply overcompensation for these investments (EC Decision, 2011). Therefore, it is possible to have a green energy bubble. Practically, very attractive support schemes for investors will lead to overcapacity in green energy production, which will cause further price increases. This implies more expensive products, increased bills, and the situation will become unsustainable. The case will would be similar to that recorded during the real estate market boom and it is possible to have a green energy bubble: Is it possible that when the excessively generous financial support is withdrawn, green energy market suddenly will crash.

Uncontrolled growth of prices for electricity's final consumers required the suspension of the current green energy support system. A part of the support provided by the Romanian state for investors in green energy should be redirected towards investments in transport networks and flexible units, capable of rapidly balancing the system. The reduction of the support scheme could take place along with the introduction of a fee for the development this capacity reserve. The impact on the bill would be the same, but the system would benefit.

Without paying attention to the environment, in Romania, extremely controversial activities were allowed, such as exploitation of shale gas. While in other countries, shale gas is extracted usually in desert areas, in Romania these fields are located in highly populated areas and even in spa areas. Felix and 1 Mai are located on geothermal water that is unique in Europe. Placing machineries near Felix and 1 Mai, would dramatically affect the area's economic activities. In this perimeter, all the activities relate to spa and medical tourism, and an impairment of geothermal ground water would compromise most of the economic activities.

A similar situation is that of Buzias which has valuable resources of carbonated water. If all sorts of chemical substances were injected into the soil, groundwater would be infested and this carbonated water resource would be destroyed forever. Thus, activities based on mineral water exploitation and spas would also finish. Located on the Black Sea shore, Eforie, Costineşti, Vama Veche, are favorite holiday destinations for tourists worldwide. Shale gas exploitation would have an adverse effect, propagated to all economic activities in the region.

Most of these activities are related to the sea and spa tourism and shale gas exploitation in this region would undermine all important activities. Shale gas exploitation, which would have an average lifespan of 10 years, would irremediably destroy unique touristic areas.

5. Conclusions

In Romania, green energy has proved to be expensive, unbalanced, and economically inefficient. It lasted on the market only imposed by law force. While encouraging the production of wind energy and shale gas exploitation are completely different things, there are similarities between them: both are new technologies that have been developed in Romania without environmental impact studies and permissions were given because of the lobby.

The environment protection is a notable purpose, a noble goal upon which greedy or bereft of reason deciders build an inconsistent environmental politics. What prevails is the shyster business interest, to the detriment of the environment.

In Romania, the renewable energy developed without previous impact studies on the environment being conducted and has proven to be expensive, unstable, and economically ineffective; it has only kept its ground on the market because of the law imposition. The positive effects on the environment were less significant than expected. The new technologies of renewable energy manufacturing have constituted an extremely profitable deal for the investors of this domain, but it has been done to the detriment of the other economic agents.

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