DEVELOPING ECOLOGIC SPIN-OFFS: STRATEGIC OPTION FOR ACHIEVING PERFORMANCE IN ENERGY INDUSTRIES

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Abstract

The paper aims to emphasize the usefulness of applying an emergent concept in the economic literature (the ecologic spin-off) as main instrument for restructuring the national energy industry, under the circumstances of the increasing pressures provided both by the national and international environment, focused either upon the greenhouse gas emissions reduction or upon the active promotion of energy efficiency principles. The article highlights the fact that the mere existence of an energy market, assumed to operate similar to capital markets, where are supposed to be traded green certificates, may prove inefficient unless rigorous mechanisms for guiding the transition from the classic organization structure of the energy industry towards a new, modern and competitive organization model are being developed. In this context, the ecologic spin-offs may prove to be a main strategic option for ensuring the development of a competitive and efficient energy industry, very similar to the energy industries operating within most of the European Union member countries.

KEYWORDS: *spin-off; ecologic spin-off; energy sector; strategy; performance; efficiency; competitiveness*

Introduction

The analysis of the dynamics regarding economic and industrial environment within developed European countries reveals the emergence of new structural forms of organizations, such as clusters, spin-offs or firm networks, aimed both to ensure the shift from the information economy to the knowledge-based economy and to facilitate the transition from a traditional organizational model to a flexible, modern and competitive energy operating system.

The intensifying of global efforts focused on ensuring a sustainable economic and social development, correlated with global, national and regional economic efficiency targets and with the international concerns on quality of life and environmental protection, generates the emergence of a new association form, regarded as ***ecologic (eco-efficient) spin-off***, which is being characterized both by a high degree of innovation and by specific elements, aimed to ensure the harmonization of European Community objectives with the national framework,

and to increase the economic efficiency of the operators within national strategic industries.

These issues are of high interest for leaders of different bodies and organizations who have to elaborate and implement different strategic options, in order to meet to a high level the expectations of their stakeholders (Năstase, 2010).

In order to establish a competitive parity between the emerging countries, such as Romania, and the more developed economies from the European Union, in the field of national strategic industrial sectors efficiency, considering also the new worldwide development strategic priorities (sustainable development, product quality improvement, natural environment protection and preservation, economic and social efficiency, rational consumption of natural resources, with high emphasize on renewable resources and green technologies, a.s.o.), is being developed the necessity for ensuring an adequate institutional and decisional framework aimed to apply the worldwide trends in the fields of economic and industrial development, and to provide the necessary support for enhancing the development of emergent associative structures, able to boost the restructuring of the counterproductive industries.

1. Ecologic Spin-Offs: From Theory to Practice

From classical point of view, **the spin-off** consists in setting up a company, in order to facilitate the knowledge, know-how and technology transfer which are generated as a result of R&D activities developed within universities and research institutes. Thus, universities provide the results of the research activities both to the corporate environment and the industries in which the new-founded companies operate, under the binding of developing prior activities of testing and prototypal validation *(Nicolescu, 2007; Chemmanur & Yan, 2003)*.

The ecologic (eco-efficient) spin-offs *consists in setting up companies, or reconverting already existing operators, in order to facilitate the transfer of technologies generated as a result of the research and development activities carried out by government institutions, through a National Regulatory Authority. The technologies should be focused on achieving European Union performance targets within the industries in which the new companies operate, and to be subject to the mandatory application of research results to enhance economic and social efficiency at national level.*

The ecologic spin-off represents an innovative approach in economic and ecologic literature, whose origins derive from the classic characteristics of a spin-off (association of universities/research institutes and businesses operators aimed to put on the market a set of models, prototypes and innovative products, resulted from research and development activities), because the State, through the National Regulatory Authority, is acting like a university or a research center *(Shane, 2004)*.

The main characteristics of ecologic spin-offs can be summarized as follows:

- *ecologic spin-offs are set-up within non-performing industries*, which either have a high environmental risk or are energy-intensive;
- *ecologic spin-offs involve the state from a double-perspective:* the regulatory authority for the interaction between the industry operators, and the research and development authority, within the new-founded entity;
- *ecologic spin-offs are being focused on developing new mechanisms, prototypes and models,* which aim either to promote non-polluting technologies, to promote renewable energy sources, to implement pro-active environmental strategies or to ensure the efficiency targets at microeconomic level, industry level or national level;
- *ecologic spin-offs research and development activities' are being developed by the State Regulatory Authority***,** and have national, regional or industrial applicability;
- *ecologic spin-offs are based on a tacit "conflict of interests" (Bovaird, 2004),* between the State role of Regulatory Authority, on one hand, whose main objective is to ensure the compliance with the Community objectives, and the State role of research institute, on the other hand, whose main objective is to ensure compliance with the national, regional and industrial efficiency targets.

2. Perspectives upon National Energy Sector

The aspects concerning both the energy efficiency and the renewable resources usage, in the context of the energy sector, has been increasingly considered in conjunction with the efforts which Member States are required to strive, in order to lead their conduct towards a complex mix of activities aimed to ensure a sustainable development.

Within still developing countries, such as Romania, the energy-intensive industries are the main vectors of maintaining greenhouse gas emissions to an upper level than the permissible upper limit *(Persson et. al., 2005)*. In this context, the intensification of the energy sector restructuring pressures imposed by assuming the European Community objectives, generates the necessity of developing several mechanisms in order to facilitate the transition from the current organizational energy system to a much modern, flexible system, focused on promoting renewable energy sources, which can be led after rigorous mechanisms of managing supply – demand relations which take place onto the market.

At present, at national level, according to *Law Number 220/2008, concerning the establishment of the system for promoting energy production from renewable energy sources (2008),* the energy sector is being defined by the existence of four main categories of operators: *electric energy production operators, electric energy transport operators, electric energy distribution operators, and electric energy supply operators.*

Both the interactions between the operators and the operators' efficiency depend on the interference of two main factors that describe the energy market: ***the presence of mechanisms for encouraging environmental protection measures*** and ***the presence of regulatory mechanisms of energy market dynamics***.

The main ***regulatory mechanisms*** for the demand – supply relations on the energy market are *(OPCOM, 2010)*:

- *DAM* – **The Day – Ahead Market***;*
- *CMBC* – **The Centralised Market for Bilateral Contracts***;*
- *CNCMBC* – **The Continuous Negotiation Centralised Market for Bilateral Contracts*;***
- *GCM* **– The Green Certificates Market.**

The harmonization between the ***mechanisms for encouraging environmental protection measures*** and ***the regulatory mechanisms of energy market dynamics*** may be achieved by setting up national, regional or local ecologic spin-offs, as entities susceptible to operate according both to the market economy principles and to the energy efficiency principles.

3. Conceptual model for achieving performance within National Energy Sector by developing ecologic spin-offs

The conceptual model presented in ***Figure 1***, which aims to emphasize the mechanism for achieving performance within National Energy Sector, involves a three – dimensional analysis upon the energy industry, focused on the content and structural changes within the sector as result of setting-up ecologic spin-offs.

3.1 Macroeconomic perspectives upon national efficiency

At national energy sector level, the described model illustrates the sequence of energy market transformation from a state defined by a series of dominant features, which are viable for a conventional energy market, to a final state of the energy market, characterized by resizing the share of renewable energy sources in overall national energy production, and by the emergence of new markets as a result of the restructuring process. The dynamics of the two components of the national energy market (conventional energy market and renewable energy market) as well as the new created markets are main consequences of both growing efficiency within the energy sector and promoting renewable energy sources, according to European Union energy objectives and targets.

Under these circumstances, as a consequence of the development of electric energy production from renewable sources, the national energy industry is being defined by the interconnectivity between four main markets: The Day – Ahead Market, The Centralised Market for Bilateral Contracts, The Continuous Negotiation Centralised Market for Bilateral Contracts and the Green Certificates Market *(OPCOM, 2010)*.

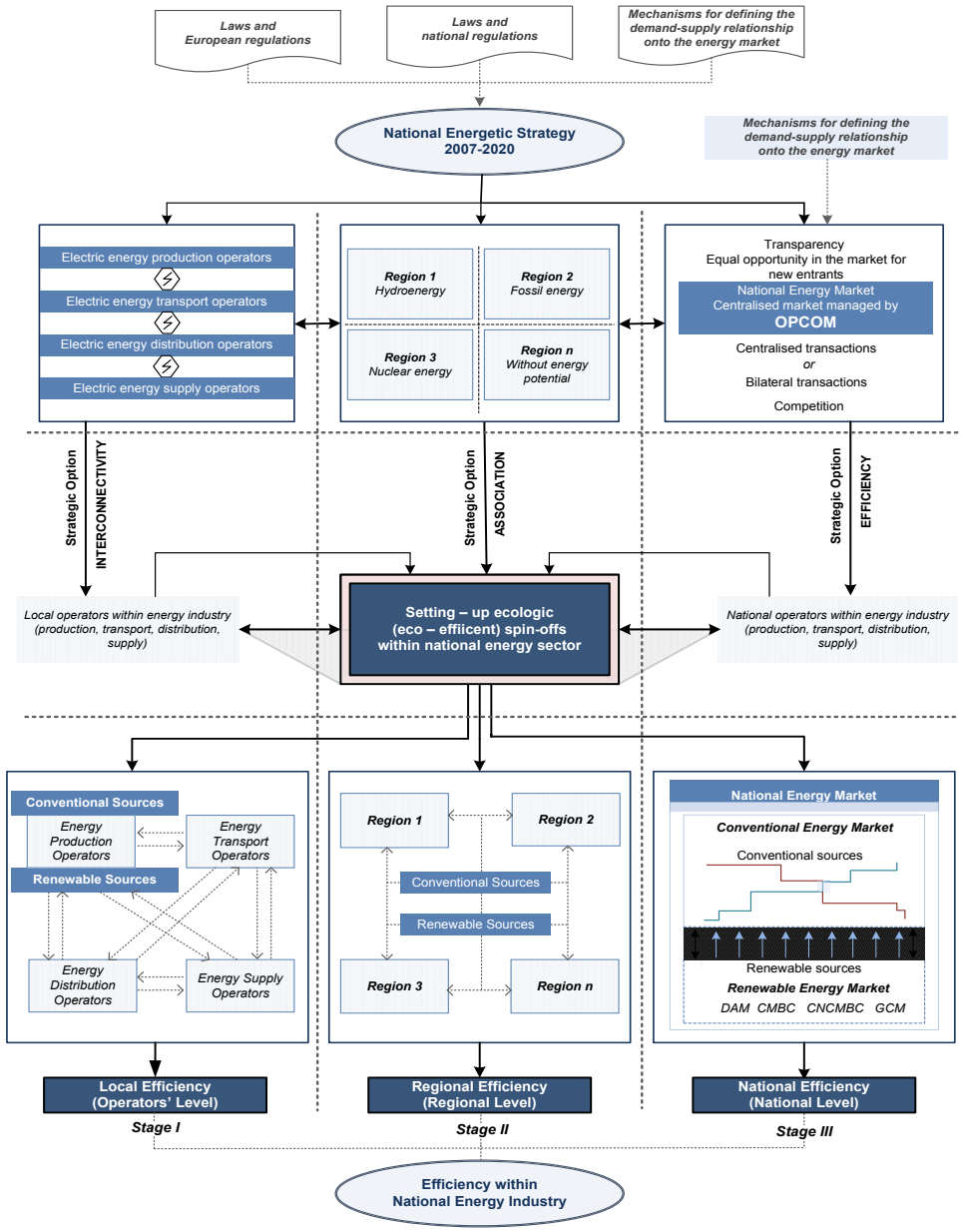

Figure 1 Strategic model for restructuring and increasing efficiency within the national energy sector by setting-up ecologic spin-offs

Thus, the role of ecologic spin-offs is to ensure the regulation and to keep under control the existing mechanisms within energy markets, by creating a set of simulation models aimed to reduce the level of uncertainty that characterize the energy sector. The simulation models should be repeatable, in order to estimate the most

adequate probabilities of extreme situations occurrence, that may affect the market (Kure & Ogushi, 2003). The simulations are being focused both on the quantities traded and the market price for energy (Jaehn & Letmathe, 2009), aiming to establish the limits of variables' variation which describe the normal market run (Lee, Lin & Lewis, 2008).

3.2 Economic perspectives upon regional efficiency

The simulations performed above, onto the national energy markets, may outline the fact that promoting renewable energy may prove to be as well an opportunity as a binder for the regional energy markets. The results of the simulations lead to different strategies adopted by the operators, in order to ensure the maximum efficiency from the energy transactions.

The regional efficiency goals refers to the measures taken in order to ensure at the same time a sustainable development for the population and an equilibrated growth for the energy industry companies which operates in a certain region. The regional efficiency outputs are being calculated, through specific algorithms, taking into consideration the renewable energy sources, which are susceptible to generate the highest added-value in the region. The algorithms would provide a decision support for investments in developing energy production capacities at regional level.

A concept related to the regional efficiency goals is the **regional energy potential,** which refers to the circumstances under which the renewable energy sources may be used for generating value. The regional energy potential represents an uncontrollable variable of the model, gathering a mix of factors, such as:

- *natural factors* (the climate, the relief, the altitude, the temperature, the wind flows, the shading coefficient, the location on the globe, a.s.o.)*;*
- *economic factors* (the energy demand, the number of energy operators, the market entry barriers, the type of competition on the market, a.s.o.);
- *social factors* (the average energy consumption rate, the number and the dimensions of the nearby urban centres, the intensity of the industrial and energy-intensive activities in the region, a.s.o.);
- *other factors* (the dimensions and the characteristics of the region, the government policies with regard to the renewable energy sources, the regulatory mechanisms for the Day – Ahead Market, The Green Certificate Market and the Centralised Markets for Bilateral Contracts, a.s.o.).

In the case of Romania, the regional efficiency should be analysed by setting-up an ecologic spin-off within each of the eight development regions, stated accordingly to the European Commission recommendations with regard to establishing a common system of statistic classification of territorial areas (NUTS, 2003), which was assumed by the national law system through Law Number 151/1998 and Law 315/2004, concerning the national regional development.

3.3 Microeconomic perspectives upon local efficiency

Applying the model to each of every operator in the energy sector is basically the most difficult and complex part of the whole model, in terms of anticipating the decisions of each operator for realizing a viable forecast for the market evolution. Analyzing local efficiency requires a depth microeconomic analysis, focused around the concepts of *opportunity cost* and *utility (Hofmann, 2007)*.

Developing a competitive advantage, based also on energy efficiency as well as the necessity of increasing competitiveness, involves a set of related tasks, which have a specific goal and could be assigned as projects *(Năstase, Ţăpurică, Tache, F., 2010)*.

Thus, every energy production operator, which generates energy from conventional sources (implicitly, generates a certain amount of greenhouse gas emissions in the atmosphere) is required by law to posses a certain **"Q"** amount of green certificates, either as a result of his own production of energy from renewable sources or as a result of an acquisition process form the market, at **"x_i"** market price. At the end of the year, if the operator cannot present de evidence of possessing the green certificates he will be required by OPCOM to buy the **"Q-A"** (where **"A"** is the amount already possessed by the operator) amount of green certificates at a default price **"y"**, which is higher than the initial "x_i" price on the market.

Under the circumstances of a competitive market, where the price **"x_i"** fluctuates depending on the green certificates demand and supply, and the price **"y"** is set by default, each energy production operator should anticipate the market evolution and identify the linear combination that generates the lowest expenditures, by minimising the function stated above:

$$\textbf{Min } [(A * x_i) + (Q - A) * y],$$
$$A > (Q-A)$$
$$x_i < y$$

where Q = the amount of green certificates which a certain energy production operator should posses at the end of the year;

A = the amount of green certificates which is being held by an energy production operator, at a certain moment (Q>A);

x_i = the market price of green certificates at a given moment i;

y = the default price for buying green certificates at the end of the year, unless the operators proves the possession of the "Q" amount of green certificates.

Taking into account the market dynamics, we may assume that the energy market operates as a dynamic system, which is susceptible to be described by using Forrester functions or chaos theory algorithms.

The spin-offs role in this context is to identify the most suitable linear combinations for green certificate transactions, in order to ensure a minimum expenditure for the operators.

Conclusions

Starting from the considerations stated above, there are two main categories of research directions for developing the conceptual model, in order to ensure a higher degree of applicability:

- **Identifying new methods for reducing and controlling the uncertainty degree which characterizes the national energy market**

The process of energy market dynamics simulation has many elements of uncertainty that affect the accuracy of forecasting. In this context, it is necessary to identify all the mechanisms aimed to control and monitor the uncertainty generated by changes in environmental legislation or in renewable resources promotion policies, by the share of renewable energy developments at regional level, by the changes in the national, regional or local energy potential, driven by climate change and last but not least, by the lack of linearity of the factors influencing the market developments.

- **Recording the energy market dynamics for a long period of time, in order to develop accurate forecasts**

OPCOM has already recorded some information about the energy market dynamics, which can be used for the development of statistic, microeconomic and econometric models, aimed to describe in a quantitative manner the market evolution. On the one hand, the data recorded by OPCOM is not enough for developing a viable quantitative model and on the other hand, there are many residual factors that influence the behaviour of the operators onto the market, for which OPCOM has no data recorded. Under these circumstances, a further direction for transposing the conceptual model into practice consists in identifying and recording the variables that influence the market dynamics and afterwards generating a model aimed to ensure the prediction of the market variables.

References

1. Bovaird, T. (2004). "Public - Private Partnerships: From Contested Concepts to Prevalent Practice". *International Review of Administrative Sciences*, 70(2), 199 – 215
2. Chemmanur, J. T. & Yan, A. (2003). "A theory of corporate spin-offs". *Journal of Financial Economics,* 72, pp. 259-290
3. Hoffmann, H. V. (2007). "EU ETS and investment decisions: The case of the German electricity industry". *European Management Journal,* 25(6), pp. 464 - 474
4. Jaehn, F. & Letmathe, P. (2009). "The emissions trading paradox". *European Journal of Operational Research,* 202, pp. 248 - 254

5. Lee, C. F., Lin, S. J. & Lewis, C. (2007). "Analysis of the impacts of combining carbon taxation and emission trading on different industry sectors". *Energy Policy,* 36, 722 – 729
6. Năstase, M., Ţăpurică, O., C., Tache, F., (2010), "Involving Project Leaders within Project Management Teams - Key Factor towards Competitiveness", *Review of International Comparative Management*, Vol. 11, No. 4, pp 582 - 590;
7. Năstase, M., (2010), "Developing a Strategic Leadership Approach within the Organisations", *Review of International Comparative Management*, Vol. 11, No. 3, pp 454 - 460;
8. Nicolescu, O. (2007). "Types of managerial and organization options for industry development". *Review of International Comparative Management,* 8(2), pp. 5-13
9. Ogushi, T. & Kure, S. (2003). *OECD global forum on sustainable development: Emissions trading. Concerted action on tradeable emissions permits country forum. Organisation for Economic Co-Operation and Development, http://www.oecd.org* http://www.oecd.org/document/38/0,3343,en_2649_34359_2507110_1_1_1_1,00.html;
10. Persson, T. A., Azar, C. & Lindgren, K. (2005). "Allocation of CO2 emission permits – Economic incentives for emission reductions in developing countries". *Energy Policy,* 34, pp. 1889 – 1899;
11. Romanian Government (2008). *Government Ordinance Number 220/2008 concerning the energy efficiency and the promotion of the energy generated from renewable energy sources within final consumers. Romanian Official Journal,* 628(2008), http://www.dreptonline.ro/legislatie/og_eficienta_energetica_consumatori_finali_surse_regenerabile_ energie_22_2008.php ;
12. Shane, S. (2004). *Academic entrepreneurship: University spinoffs and wealth creation. Edward Elgar Publishing,* pp. 15 – 236.