

RENATA ŻABA-NIERODA\*

# Eco-innovativeness as source of competitive edge in companies in the example of selected power plants

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**Key words:** eco-innovativeness, eco-investments, competitive edge, competitiveness, company

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**S u m m a r y:** Eco-innovativeness as a process of providing activities in companies which produce electricity is one of the elements allowing gaining competitive edge. The expenditures incurred for ecological innovations and the created conditions are translated into the produced added value. The crucial significance of eco-innovativeness is more and more often appreciated by the management. Optimisation of the management process in the area of eco-innovativeness activities is becoming an element necessary to obtain competitive edge. For the companies which produce electricity, eco-innovative activities are necessary for further functioning of these companies.

The necessary condition for executing eco-investments is their cost-effectiveness, guaranteed by the appropriate prices. In a power plant, expenditures incurred for eco-innovative of the solution should affect prices of energy. The market price defined by the power plant should cover costs of production, environmental costs and administration costs, and should bring about specific unit margin on top of that, thus allowing multiplication of the capital invested in eco-investments.

## 1. Introduction

Eco-innovativeness is the response to the requirements of the market surroundings in the combination of innovative solutions with the care about natural environment. Supporting eco-innovative solutions forms the execution of the assumptions of the Lisbon Strategy and the Plan of Action for Environmental Technologies. Eco-innovations within the Framework Programme for Entrepreneurship and Innovations is the priority issue. In the years 2007–2013, EUR 200 m is planned for financing projects

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\* Renata Żaba-Nieroda, PhD—assistant professor at the Chair of Management, Małopolska School of Economics in Tarnów.

related to eco-innovations. The objective of this paper is to find out whether and how the activities in the scope of eco-innovativeness contribute to enhancing competitive edge of companies. It is planned that the necessary adjustments in the scope of protection of the environment will affect eco-innovative activities of companies, thus, in the long range, enhancing their competitiveness.

## 2. Ecological innovations

Eco-innovativeness means new production processes, technologies, services and products, which premise is reduction of the negative impact on the natural environment. Ecological innovations offer a chance for implementation of sustained solutions which will allow more effective use of the natural resources and reduction of harmful effect on the environment, with simultaneous maintenance of high level of innovativeness. Eco-innovations include building pro-ecological consumer attitudes, supporting environment-friendly products and expanding markets for them. Eco-development in the economy assumes optimisation of production processes so as the products manufactured with the lowest possible consumption of energy and raw materials and low pressure on the environment were really necessary, durable and of high quality (1, p. 44).

Ecological effectiveness of the company may enhance its competitive potential. Taking into account ecological conditions of functioning of a company and implementing pro-environmental activities in each stage of its functioning (from planning and preparation of the production process to acquiring economic resources, the production process, to sale and management of consumer waste) may bring about specific results. These effects may be regarded as a prospective source of economic benefits which enable gaining competitive edge. Enhanced competitive strength of a company may be the result of exceeding the competition in the scope of meeting the requirements set forth for the protection of the environment.

Due to changes in social awareness which consist in common acceptance of clean environment as an element of social and individual welfare, a company may build its competitive edge by differentiating products and respecting ecological preferences of specific groups of consumers. This meeting of ecological tastes of consumers may be translated into competitiveness of the company's products and may lead to increased demand for the offered products, which is equivalent with increased proceeds and strengthening of the position in the market. Such products may be, for example, clean energy, renewable energy, meeting environmental standards, etc. Competitive edge achieved from implementation of pro-ecological actions and behaviours in a company is significant as an item of competitiveness only when (2, p. 56):

- Specific conditions and methods of external costs calculation and internalisation are created;
- Conditions for common and effective enforcement of obligations for using the environment are created;

- Ecological awareness of the society is increased combined with changes in consumer preferences and patterns.

The following may be included in prospective benefits from ecological activities (3, p. 203):

- Gaining cost advantage in the market, resulting from increased economical effectiveness of a company after reduction of environmental costs;
- Gaining product advantage which results from improving quality and attractiveness of products and increasing satisfaction and trust of the clients.

Eco-innovations constitute one of the basic capacities which may help the company stand apart from the competition and be a source of continuous advantage in the market. However, due to complexity and high costs of the implementation process of eco-innovations, only some companies manage to build competitive edge with this capacity. Making decisions in the scope of execution of eco-innovations, the managers take into consideration changes in the surroundings, the necessity of improving the condition of the company, increasing competitiveness, the need of diversification of activities or changes in the scope of technology and manufacturing methods, which are all translated into the generated costs.

These factors determine not only existence of and balance between business entities, but also ensure obtaining competitive edge, which refers to perceiving the company by its owners in the context of generation of future financial surplus which is translated into the value of the company.

In conclusion, companies which intend to maintain continuous competitive edge are forced to improve their activities and undertake actions aimed at its perfection. It may be achieved with eco-innovative activities which leads to achievement of development objectives of the company.

### 3. Competitive edge of companies

Competitive edge is the necessary item in long-term successes, that is survival and growth of the company (4, p. 57). The company is the more competitive, the higher its capacity to achieve objectives under competition existing in the markets where it operates or intends to operate (4, p. 57), has the possibility of achieving higher added value than other companies acting in the same market, creates and maintains better results than those of the competition (5, p. 67).

Competitive edge is the essence of activities of the company in a competitive market (6, p. 17). In all the theories and models concerning company competitiveness, competitive edge plays the key role. It is the soul of the results of companies in a competitive market. Researchers are unanimous about the scale of this phenomenon, but there are difficulties in its defining. Competitive edge is a set of advantages perceived by the market and appreciated by the clients, which positively and perma-

nently differentiate the company from its competition and bring about better measurable financial results (7). The term of competitive edge is not interpreted clearly. The views of various authors on the term of competitive edge are presented in Table 1.

Table 1

Definitions of competitive edge in the literature

Definition	Author
Using skills and competencies of a company as well as opportunities occurring in the market.	S. Bandopadhyay
Having a strategy which may not be used by the existing and prospective rivals.	J. Barney
Advantage resulting from perceiving the product of the company by the clients as better from competitive products in at least one category and gaps in the skills of the competition to the given company.	K. P. Coyne
Broadly understood benefits for the company originated as a result of competition.	G. D. Flint
Differences between two competitors in a cross-section of but one variable, which allows creation of value for the client better than when compared with the rival. It is the soul of results of the companies operating in competitive markets.	H. Ma
The value delivered to the clients which may refer to price or non-price components of the offer. This value exceeds the costs of its manufacture.	M. E. Porter
The skills of the company in the scope of creating key competencies, which will allow adaptation to fast-changing conditions of the surroundings.	C. K. Prahalad G. Hamel
A higher level of achievements against the competition, which meets the following conditions: the given achievement must be of significance for the client, must be perceived by him and must be durable.	H. Simon
The capacity for effective use of the competitive potential, allowing generation of an attractive market offer and effective instruments of competition, to ensure generation of added value.	M. J. Stankiewicz
More advantageous location of the company in the market against the competition, which allows enhancing of the results of its operation (without increasing expenditures) or reducing expenditures (without minimising effects).	W. Wrzosek
Strengths and weaknesses of the organisation and the author draws the conclusion that competitive advantages and shortcomings are the strengths and weaknesses of the organisation against the strengths and weaknesses of its current, probable and future competition.	J. A. F. Stoner
Whatever positively differentiates the products of the company or the company itself from among the competition in the eyes of the clients or end-users.	L. Fahey
Its visible sign is the superiority of the company over the competition, perceived as lower costs and the resulting lower prices, originality of the product, good customer service, improvement in organisation of sale, precise following of the requirements of the market segment, specialised offer, the offer of products or services of modern quality, etc.	J. Famielec
The capacity of the company to act so that the competition cannot or will not imitate its ways.	Ph. Kotler

S o u r c e: Prepared on the basis of (8; 6, p. 17; 9, p. 137; 10, p. 172; 7; 11, p. 156).

The definitions presented in Table 1 prove that a variety of views refer to the essence of competitive edge as well as its types, sources, conditions of achieving and maintaining. Achieving superiority by a company above other companies is the result of specific development and use of its resources and skills. Pursuing competitive edge must thus assume having better resources and/ or skills. However, these are only sources of competitive edge. In themselves, they do not turn automatically into competitive edge. To make it happen, resources and skills of a company must be developed and used in a distinct and efficient way leading to achievement of development objectives. It is significant for the sources of competition to be permanent and to feature advantages difficult to imitate by the competition, especially at the times when dynamics of economy development causes immediate spreading of all innovative, individualised solutions (12, p. 22).

Competitive edge of the company may be regarded as a market game between the client, the company and the competition, which refers to a specific place, time, and is present only in specific situations (7). Its basic dimensions may include: the type, the size in reference to the competition, durability (13, p. 2), and the reasons to win it may be: lower costs of manufacture or differentiation of products, resources owned, skills, capacities, creating new solutions in the product and organisational realms, compression of time of manufacturing and delivering the product to the recipients. Source of competitive edge are integrated inside the company, and its appearance is happening in the external relations. The size (scale) is related to the disproportion between the company and its competition in the cross-section of a specific feature (instrument of competition), partial competitive edge. It is determined by effort and external factors, related to the type of the achieved advantage, whose larger size determines better competition possibilities.

#### **4. Expenses, costs and proceeds related to implementing ecological requirements**

Ecological standards in selected power plants may be achieved by such groups of investment and organisational enterprises as liquidation of the existing sources, abandoning or reducing energy production, modernisation of the existing sources with various applicable technologies, building new sources of energy production with various technologies limiting emission of pollution into air (eco-innovative solutions in this respect), application of new types of raw materials for energy production, emission trading.

The identified methods and enterprises of implementation of ecological standards in the electrical power engineering sector have been grouped into 6 blocks and all of them result in financial consequences typical of operational, financial and investment activities. The consequences of protection activities are not directly isolated and apparent in the accounting and financial reporting of companies. Work is still in

progress on creating the so-called ecological accounting, initiated, among others, by the Ministry of Environment and the Ministry of Economy (14, p. 52). They allow naming and measuring financial consequences of protection activities, including implementation of ecological standards. Typical financial categories related to ecological enterprises include: investment expenditures (expenses) and the resulting assets, current costs (expenses), proceeds from sales, equity, obligations (as a source of financing).

Expenditures for eco-investments in power plants are the sum of expenditures for investments eliminating pollution (pipe end) and investments preventing pollution (integrated) (15, p. 109). Expenditures on integrated eco-investments include expenditures for introduction of new or adaptation of the existing technologies, processes, equipment (or its parts), aimed at prevention or reduction of pollution at the source, thus reducing the impact on the environment, related to emission of pollutants resulting from production of electricity.

The protection of the environment and restoring it to the required condition are related to incurring costs (16, p. 9). Environmental costs mean costs of activities undertaken or required, used for elimination of negative impact of the operation of the power plant on the natural environment and other costs resulting from the power plant—environment relationships. These costs may include prevention of air pollution. The costs of protection of the environment with eco-investment and current nature incurred by the power plant should contribute, over an extended period of time, to reduction in fees and penalties on account of using the environment (or eliminate payment of penalties and damages on this account). Moreover, along with increase in these costs and the number of represented pro-ecological actions, the image of the power plant will be improved as a company friendly to the environment.

The necessity of the power plant incurring the costs of functioning in the given environment results from the requirements of the law which executes (with legal acts) the premises of the ecological policy of the state, e.g. emission fees.

A specific source of own capitals, with ecological nature, comes in subsidies and subventions, as well as allowances, tax exemptions and deductions which (through proceeds and extraordinary profits or reduced tax charges) affect the net financial result and the withheld financial result enhancing the equity in the form of the supplementary and reserve capitals.

The obligations which constitute the value equivalent of these items of property which were made available to the power plant with the obligation of returning within a specific deadline are the supplementation of own sources of financing. The ecological obligations are the obligations resulting from past events which consist in providing benefits of reliably defined value, related to the negative impact of the operation of the power plant on the environment, which result in using the already owned or future assets of this unit.

In the context of the market, the decisions related to introducing eco-innovative solutions are made on economic grounds such as costs and prices. The participants

of the market are committed to continuous comparative assessment of prices, product quality, available supplies, prospective markets and option of services for the consumer, and what is often most important, that is whether at all to take part in the market (to produce or to consume, to buy or to sell). The accounting period for calculation of costs of producing electricity in power plants is calendar year. The main groups of costs may be defined in their functioning, i.e. fixed and variable costs, as well as the related costs of protection of the environment which affect the prices of energy.

There are two main types of prices: those based on costs of the produced goods and market prices, determined by the market, which the company has to accept. One can assume that the profit and loss account and the calculation of costs constitute the information used in managing the company, and the relationships between prices and costs may be regarded as a determinant of the financial situation of the company.

In Polish power plants, prices of energy should be also effected by the necessary expenditures incurred for eco-innovative solutions. The market price obtained by the power plant should cover the costs of production, the environmental costs and the administration costs, and should bring about specific unit margin on top of that, thus allowing multiplication of the capital invested in eco-investments.

The necessary condition for executing eco-investments is their cost-effectiveness, which is guaranteed by the appropriate prices. Obtaining new commercial credits from banks, not based on long-term contracts, is difficult. Power plants have few items of property which banks could recognise as attractive collateral.

Lack of funds for own contribution of the credit beneficiary (which may be from 30 to 60% of the eco-investment value) is another limiting factor. In obtaining investment credits, power plants cannot count on support of the state. Financing investments with debt in the form of emission of bonds or Euro-bonds requires the statutory defined emission procedure and subjecting to the assessment of credit capacity. It looks like financing based on a contract of leasing or lease with the use of assets is the possibility adjusted to the current structure and needs of power plants. The most important advantage comes in the form of the period of repayment which determines the realistic charge on the power plant, resulting from the costs of the entire investment process. Emission of debt securities allows its extending owing to the possibility of rolling specific series of issue of debt securities and adjusting maturity of individual series to the requirements of the buyers.

About one billion Polish Zlotys is to be allocated for the power engineering sector within the execution of the "Infrastructure and Environment" Operational Programme. The "Infrastructure and Environment" Programme also means obtaining funds for promotion of renewable sources of energy. 20% of the funds should be provided for cofinanced projects from public funds, which is about EUR 780 m. The Ministry of Regional Development, however, proposed to allocate for the power engineering sector EUR 397.2 m, including almost 60 m from national funds. Stimulation activities will be initiated for power engineering companies which are the prop-

erty of the State Treasury, to undertake new investments in the scope of increasing production capacity, as well as for construction of exhibition structures for the technology of CO<sub>2</sub> capture and storing, and, after 2015, for the possible adjustment of the new blocks to assembling such installations. New production units should make use of the modern, low-emission technologies of incineration.

The research conducted provided the grounds for the finding that the defined environmental standards and their rules of functioning in selected power plants have and will have in the future serious negative impact on the competitive position of power plants, and this results from the necessity of introducing eco-innovative solutions. It will be specifically reflected in the decreased share in the market, in the increase in costs of energy production and in the increase of electricity prices.

## 5. Conclusions

Companies commit to the eco-innovative activities for a number of reasons. Their objectives may refer to products, markets, effectiveness, quality, capacity to learn and implement changes. Determining motivation of companies for undertaking innovative activities and the role of these motifs facilitates examination of the factors stimulating innovative activities such as competition or chances of entering new markets.

Eco-innovativeness of companies is in part dependent also on external factors whose stimulation is the task of the bodies of government administration on both central and local levels. Due to the necessity of adjusting to the requirements of ecological standards, the companies functioning in the market of energy in Poland had to undertake a number of eco-innovative activities. A number of factors may make eco-innovative activities difficult. There may be reasons for not undertaking any innovative activities, as well as reasons for slowing down such activities or effecting negative impact on it. These include economic factors, such as high costs or lack of demand, factors related to the given company, for example lack of qualified personnel or lack of knowledge, as well as factors of legal nature, like legal or tax regulations. The eco-innovative company is one which has introduced eco-innovation within the given period.

The effect of eco-innovations on effectiveness of activities of companies may vary from affecting sale and share in the market to changes in effectiveness and performance. At the level of the type of operations and at the level of the country, important results include changes in international competitive position and increase in the total productivity of production factors, transferring know-how resulting from eco-innovations at the level of companies, as well as increase in the volume of know-how shared in the network of relations. Effects of product eco-innovations may be measured with the percentage of sale on account of new or improved products. A similar approach may be used in measuring effects of other types of innovations.



Viewing eco-innovativeness as a process of introducing activities in companies which produce electricity allows measuring the conversion of the expenditures incurred and conditions created into the created values, and allows its optimisation. The crucial significance of eco-innovativeness is more and more often appreciated by the management in companies. Effective management over the process of eco-innovativeness becomes the condition necessary to win and maintain competitive edge for a company and increase the value of the company over an extended period of time. For companies producing electricity, eco-innovative activities are necessary for their proper functioning in the market.

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## Ekoinnowacyjność źródłem przewagi konkurencyjnej przedsiębiorstw na przykładzie wybranych elektrowni

**Streszczenie:** Ekoinnowacyjność jako na proces wprowadzania działań w przedsiębiorstwach wytwarzających energię elektryczną jest jednym z elementów pozwalających na uzyskanie przewagi konkurencyjnej przedsiębiorstwa. Ponożone nakłady na innowacje ekologiczne i stworzone warunki przekładają się na tworzenie wartości dodanej. Kluczowe znaczenie ekoinnowacyjności jest coraz częściej dostrzegane przez zarządzających. Optymalizacja procesu zarządzania w obszarze działań ekoinnowacyjnych staje się elementem niezbędnym do uzyskania przewagi konkurencyjnej. Dla przedsiębiorstw wytwarzających energię elektryczną działania ekoinnowacyjne są niezbędne do dalszego funkcjonowania tych instytucji.

Niezbędnym warunkiem realizacji ekoinwestycji jest ich opłacalność, co gwarantują odpowiednie ceny. W elektrowni na ceny energii powinny mieć wpływ nakłady poniesione na ekoinnowacyjne rozwiązania. Cena rynkowa, którą uzyskuje elektrownia, powinna pokrywać koszty produkcji, koszty środowiskowe i koszty administracji, a ponadto przynosić określoną marżę jednostkową, umożliwiającą pomnożenie kapitału zainwestowanego w ekoinwestycje.

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**Słowa kluczowe:** ekoinnowacyjność, ekoinwestycje, przewaga konkurencyjna, konkurencyjność, przedsiębiorstwo

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