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## Commercial Viability of Strategic Choice on Green Energy Business: Hydro Power versus Wind Power (Latvian case)

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### Abstract

Development of green energy, especially such types as hydropower and wind power, presents great opportunities for companies' growth. The aim of the paper is to investigate commercial viability of green energy business to make an investment choice for Latvian privately owned small sized hydropower producer and seller LLC "Green Energy Solutions" ("GES"). Firstly the paper investigated theoretical and practical application of such concept of commercial viability of a strategy as a SFA: suitability, feasibility and acceptability. Then the latest trends of Green Energy Business in EU and in Latvia have been explored and strategic suitability has been defined. Secondly, to confirm or disprove investments in a hydropower station or wind turbine, Equivalent annual annuities of each alternative investment project have been calculated and financial feasibility has been discussed. Finally, recommendations for stakeholders regarding further growth of company "GES" and acceptability of given strategic choice have been reviewed in detail.

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**Keywords:** Green energy business, Suitability, Feasibility, Acceptability, Equivalent annual annuity

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## 1. Introduction

As it was stated by Craddock, 2008 renewable energy is the fastest growing source of energy on this planet and, therefore, the greatest source for profitable business. Although green energy considered being environmentally friendly and a socially viable type of energy, it at the same time was highly costly to produce and did not have an appropriate infrastructure. The aim of the paper is to investigate Green Energy as a type of business to make an investment choice for company “GES”. In this particular research, on the basis of calculated capital budgeting effectiveness ratio, it will be confirmed or disproved recommendation on investment in a hydropower station or in wind turbine.

## 2. Literature review

Child, 1972 was one of the major authors that begun to discuss the subject of strategic choice. He claimed that concept of strategic choice initially originated from the perception that the company's direction was defined by its operational strengths and opportunities. Johnson et al., 2011 have similar approach to strategic choice. They, in fact, were the major contributors on the strategy choice viability by applying clear model SFA by Johnson et al., 2011 of examining strategic opportunity through three assessment criteria: suitability, feasibility and acceptability. They stated that suitability, being the first criterion, is related with the company's strategic position and whether the company's strategic choice actually matches the external environment and company resources and capabilities. Feasibility is concerned with assessing the company's internal capabilities in terms of financial resources. Finally, as mentioned above, acceptability relates to evaluates whether the chosen strategies are able to meet stakeholders' expectations in aspects of level or risks and returns and whether the expected outcomes acceptable and to whom? Johnson et al, 2011 state that since suitability considers the company's strategic position with regard to the external environment is, therefore, the rationale behind the strategy. Quantitative Strategic Planning Matrix (QSPM) by David, 2011 is a strategic management tool that allows strategists to evaluate alternative strategies objectively, based on previous identified external and internal critical success factors. In order to test feasibility it is needed to examine whether the company has the financial resources to incorporate the strategic choice. Net Present value (NPV) is a financial tool that evaluates the feasibility of a project. The discount rate of the project can be calculated using the Cost of Capital of the company. Internal Rate of Return (IRR) is also known as the discounted rate of return and generates an NPV that equals zero in order generate the project's rate of return. Modified Internal Rate of Return (MIRR) is a more complicated version of IRR as it overcomes some of its weaknesses. Payback period refers to the time required to recover the initial investment or the initial cash outlay. One more technique using in capital budgeting is the Equivalent Annual Annuity (EAA), which is applied to assess the projects with different lengths period by Keown et al., 2005. The project's yearly annuity can be compared between projects, and the project with the higher one should be chosen. According to Johnson et al., 2008 an acceptability “is concerned with the expected performance outcomes of a strategy and the extent to which these meet the expectation of stakeholders.” When examining the final part of selecting a strategy it is necessary to consider the stakeholders' reaction to each strategic choice. The matrix developed by Mendelow in 1991 defines how the stakeholders can impact the company or be impacted by it, and also determines the attitude of the stakeholders towards the company as well as it objectives.

## 3. Theoretical Framework

The main goal of this paper is to investigate commercially viability of strategic choices that are available for company “GES” operating in the Green Energy. Therefore, commercially viable strategic choice may be used as a dependant variable in this study. The above stated factors influencing the strategic choice may be

grouped under three main independent variables, which influence strategic choice: suitability (environment, resources and direction); feasibility (financial advantages); acceptability (stakeholder). Once the theoretical framework has been established, it is now possible to consider the appropriate research questions that will serve as guidelines on how to achieve the aim of the research. Research Question 1: On the basis of strategic tools, what is the most suitable type of growth strategy for company “GES”? The first research question tackles the first set of independent variables that relate to the strategic position of the company and tries to identify what strategy is the most appropriate for the company to pursue. Research Question 2: What is a more feasible choice in terms of investments’ effectiveness: investing in HPS or in WPS? The second research question tries to address the second group of independent variables and intends to identify what strategic choice is financially feasible for the company. Research Question 3: Which strategic choice could satisfy the stakeholders’ expectations? Third research question tries to find out if the strategic option and recommendations that may be accepted by stakeholders.

#### **4. Description of Investigation**

In this particular research, on the basis of calculated financial estimates for company “GES”, it will be confirmed or disproved investment in a hydropower station or in wind turbine. The degree of the researcher is minimal, as the study will be conducted in the natural environment of the company without obstruction of the normal work flow of the company “GES”. It is called non-contrived as it is field study conducted in organization within the natural environment. The unit of analysis in this research is the company “GES”.

The data collection methods used in the research includes primary qualitative and secondary sources. Primary qualitative data is gathered from the semi-structured interviews with the company’s representatives. Moreover, interview with President of Latvian Association of Wind Energy and other industry experts were performed. Secondary sources include company annual reports, articles, databases, press releases and books on strategic management and financial management. Due to several reasons company’s real name is not mentioned in the paper, thus for the purpose of investigation the name Green Energy Solutions or “GES” was made-up. LLC “GES” is a privately held company engaged in the development and generation of green energy. The company mainly focuses on building, buying and operating hydropower projects with installed capacity between 100-500 KW. The company is committed to promote the growth of a clean and renewable energy sector in Latvia. The Company entered the hydropower industry in 2009. The company acquired three hydropower stations (HPS) in various regions of the country: in Zilupe, Vecogre and Mezroze. This experience encouraged the owners to continue their investment in the green energy sector. After two years exploring the available opportunities in the industry, company seeks to expand its presence in Latvia.

The investigation is divided into three interrelated parts according to the research questions of the study. The first step is to match strategic choices in terms of its suitability, and that will be done by using QSPM matrix. The second part is devoted to the financial analysis, where several strategic choices are measured by means of such financial ratios as NPV, IRR, MIRR, Payback Period and EAA. Finally, while exploring acceptability the Mendelow matrix is used to examine stakeholders’ reaction to the most suitable and feasible strategic choice.

#### **5. Analysis and Interpretation of Results**

To answer first research question, suitability analysis is used since it seems to provide the most detailed and comprehensive analysis for answering the question. Suitability analysis included exploration of company’s direction of development, market and environment. As it was discussed before, company “GES” is a young Latvian manufacturing company, producing electricity through Small Scale Hydropower Stations. At the moment shareholders are interested in further sales growth operating in the “Green Energy” industry. According to Siegel et al, 2008 Green Energy or as it is also called renewable energy is energy, which is

basically produced from sustainable resources that are constantly replenished. Schaeffer and Pratt, 2005 stated that “Big three” commonly available sources of renewable energy at a reasonable price are: sunlight, wind, and falling water. A great deal of the world enlarge in renewable electricity supply is stimulated by hydropower and wind power according to US Energy Information administration, 2010. World Bank, 2010 in its latest report stated that hydropower accounts for 16 percent of global power and considered to be the principal renewable source globally. Considering Latvia, according to Latvian Energy Policy, 2009 hydropower in Latvia is already the biggest supplier to electricity production and still has unexploited potential. In relations to wind power, it is power generated by wind turbines, which “consists of a pole of tower, blades, and a special box called a nacelle” and each of this turbines can produce electricity according to Fitzgerald and Voegelé, 2010. According to Boxwell, 2010 wind turbines are constantly increasing in their popularity for both: generating great amount of power for the value grid and generating small level of energy for a family.

Moreover, in the report produced by World Bank, 2010 it is stated that wind power has been constantly growing in EU at 25 percent each year during the past five years. Wind turbines were the most installed sources of electricity-generating power in the year 2008 in Europe. Aside from hydropower wind power is considered to meet future needs of renewable electricity generation according to Sorensen and Breeze, 2010. As it is stated by European Wind Energy Association, 2011 in 1995 year in EU, new installation of renewable power presented only 1.3 GW accounting only 14 % out of total EU power installations. Since that time the gradual increase can be clearly tracked, and already in the year 2008, renewable represented 13.3 GW- 57% of total EU power installations; moreover in the year 2010 22.7 GW was recorded. During this 15 years wind power installations considerably increased from 814 MW in 1995 to 9,259 in 2010 at an average growth rate of 17.6%. As it is stated by European Wind Energy Association (EWEA) report, 2011 the power sector is effectively transformed with the EU renewable energy policy by Renewable Electricity Directive, 2001 and Renewable Energy Directive, 2009. Thus, it is continuing to pursue successful approach and ambitious goals by setting promising goals for future green power development.

It is expected that the renewable sector will account for 34 % in 2020 and will grow to 100 % renewable by 2050. At the same time wind energy is expected to supply 497.7 TWh of electricity, supplying 14 % of Europe's total demand in 2020, showing considerable increase from 2.3 % in 2005, and 5.3 % in 2010. At the same time Latvia has a great potential for wind energy development due to a high voltage transmission line running along the Baltic Sea coastline according to Investment and Development Agency of Latvia, 2009. The potential growth of wind power industry in the future was also shown in the Renewable Energy Industry Roadmap for Latvia research by Rosende et al., 2010 where potential future development of the green energy sector in Latvia until 2020 have been examined based on two scenarios using the Green-X model (a detailed quantitative assessment of the future deployment of renewable energies on country-, sectoral- as well as technology level): the National Target Fulfillment (NAT) and Proactive Support (ACT) scenarios. According to the both scenarios the major enlargement is tracked in the wind energy industry, which starts at a minor level in 2005 and in the year 2020 will contribute 23%. Thus, Rosende et al., 2010 in the Renewable Energy Policy Action Paving (REPAP) paper claim that wind power sector will grow strongly. The existing EU protocol states that Latvia by the end of the year 2020 should boost its portion of renewable energy in the end consumption by 7.1% in order to achieve 42.0% according to U.S. Foreign Commercial Service, 2010.

Three strategies and its` suitability have been assessed by means of QSPM matrix: Invest in HPS modernization; Invest in WPS construction; Proceed with current strategy. QSPM matrix has shown that out of three alternative strategies, Investment in HPS modernization appears to be the most attractive strategy for the company to pursue as shown in table 1.

To answer the second research question, feasibility analysis has been used since it will assist in investment decision. Investment in HPS project here has been considered to be investment in both Zilupe and Vecogre HPS, while Mezroze HPS is disregarded since it has negative NPV and EAA value. Wind turbine project has negative NPV as well as negative EAA, while for investment in HPS both NPV and EAA are positive.

According to the calculation results it became obviously that investment in HPS is more profitable for the company than Wind-turbine (WPS) installation even after counting for that fact that these two investments have different life spans as shown in table 2. According to financial analysis the most acceptable strategic choice could be investing in HPS, particularly in Zilupe HPS and Vecogre HPS.

Table 1. Suitability of strategic choice

Result of external and internal environments scanning	Current strategy	Invest in HPS modernization	Invest in WPS
Internal critical success factors assessment	2.17	2.25	2.18
External critical success factors assessment	2.63	6.46	2.23
Quantitative Strategic Planning Matrix (QSPM) Scores	4.80	8.71	4.41

The third research question tries to find out if the strategic option developed before matches the stakeholders' expectations and what recommendations may be developed in case of accepting the strategy. The key stakeholders are shareholders and regulatory bodies who may influence on the strategy acceptance. It has been concluded that as the major players having an impact on the strategy selected are shareholders, who is interested in the greatest EAA, and governmental body, who encourage the growth of this sector of business. Thus, it might be stated that the choice made would be acceptable by both parties.

Table 2. Feasibility of strategic choice

Investment effectiveness ratio 1 Euro = 0.7208 LVL	Invest in Zilupe HPS Modernisation WACC 9.40%	Invest in Mezroze HPS Modernisation WACC 9.40%	Invest in Vecogre HPS Modernisation WACC 9.40%	Invest in Wind Power Station (WPS) RADR 10.00%
Initial Outlay ( in LVL)	-27128.00	-398664.00	-260592.00	-1105200.00
NPV (in LVL)	13747.20	-63926.40	33411.26	-215728.14
IRR (in %)	16	7	11	7
MIRR (in %)	12	8	10	9
Payback Period (years)	5.5	7.5	7.8	11.0
PVIFA = $[(1+k)^n - 1]/k$	3.85	3.85	3.85	6.73
EAA (in LVL)	3572.35	-16611.94	8682.26	-32067.67

## 6. Conclusion

According to the analysis conducted, the recommended strategy can be carried out through replacing outdated turbines in HPSs to increase capacity and manufacture more of the current product (power). As it was already stated the most suitable, feasible, and acceptable is to invest in two HPSs: Zilupe and Vecogre. The following recommendations may be drawn: for both projects Gugler HIROENERGY Company should be considered as supplier of turbine. Zilupe HPS with two existing hydro units: Francis turbine and siphon turbine TM-5 use only part of the Zilupe river hydro energetic potential. Thus, install one new horizontal up to-date hydro unit KT35 with flow regulation option in the chamber before the HPS building. Thus, the quantity of sold electric power will grow average from approximately 312 to 382.5 thousands kWh for

average hydrologic year. The growth will make average 70.5 thousands kWh per year. The project will be profitable under the condition that 40% of the total project costs will be covered from the EU foundation “For especially supported territories” and the owners will invest residual amount with cash. For Vecogre HPS should be installed: SSK-1000 hydro unit with fixed drive unit blades and adjusted turbine rotor wheel blades; SK-1000 hydro unit with Kaplan turbine double regulated; one siphon hydro unit of TM-5 type is considered to be installed in the special new-built chamber near deferential facility on the left bank of the Ogre river with regard to provide the required flow capacity  $0.5 \text{ m}^3/\text{s}$  (cubic meters per second) after the deferential facility till the deferential channel connection point.

Future work on the paper can be focused on accessing the constantly changing situation of the markets and industry. More options of savings costs could also be identified and analyzed, particularly those concerning technological advances as the technology is constantly being updated and new solutions are developed.

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