

INVESTMENT OPPORTUNITIES FOR FAMILY BUSINESSES IN THE FIELD OF USE OF BIOGAS PLANTS

Darina Myšáková, Ivan Jáč, Michal Petrů

Introduction

In recent years, the importance of renewable energy has been steadily growing. This mainly reflects rising energy prices and increasing dependence on fossil fuels whose reserves gradually decline. In the conditions of the Czech Republic, renewable energy sources are non-fossil natural energy sources, i.e. energy of water, wind, solar energy, biogas and solid biomass, energy of surrounding environment, geothermal energy and liquid biofuels energy (Ministry of Industry and Trade of the Czech Republic, 2009). The law on the environment indicates that these are renewable natural resources that have the ability, when gradually consumed, to be partially or completely restored either by themselves or with the aid of a human (Ley.cz, 2005). They reduce greenhouse gas emissions and the level of pollution, increase security of supplies, and strengthen economic growth, competitiveness and regional development.

This development can focus more on strengthening family businesses in municipalities of a rural type where many owners of forests or larger plots can take advantage of investment opportunities and stabilize the economy of their businesses. However, even more side effects such as new jobs and partial subcontracts from other family businesses or other companies can be noted.

The strengths of family businesses are in agreement between the parties, involvement of family members, knowledge of technology and know-how, flexibility in labor, time and money, long-term planning, stable corporate culture, speed in decision-making, proximity to local markets, pride and credibility, efficiency, productivity, focus on quality (Koráb et al., 2008). In recent decades, corporate social responsibility has been at the forefront of marketing tools of businesses and is often

associated only with the ethical standards that, among other things, seek to minimize negative impacts on the environment. Social responsibility, however, includes all activities that go far beyond the maximum legal requirements, as well as activities through which organizations strive to understand and satisfy the expectations of all interested parties, stakeholders, in the company. Therefore, they focus on the area of health care of human resources and relationship with the local community. Other advantages of family businesses are creation of working positions (mostly show a greater capacity to create new jobs) and socially responsible behavior – they invest in the development of a local community, sponsor local civic activities, have a tendency to greener behavior, take a good care of employees and others (Koráb et al., 2008)

Thanks to the involvement of family businesses, these are mostly indigenous resources which do not rely on the availability of conventional energy sources in the future, and their predominantly decentralized nature contribute to reducing energy dependence on energy supplies from abroad. They, therefore, constitute a key element of a future sustainable power industry (the Ministry of Environment, 2012). This article focuses on biogas plants producing biogas, which is one of the most important renewable energy sources. Biogas plants have a firm place within modern power industry of the 21st century. They ensure a stable supply of electricity and heat, without environmental pollution by emissions. These projects contribute to the environmental protection, not only in reducing greenhouse gas emissions, but also in the disposal of waste from agricultural production or biodegradable municipal waste. The article also draws attention to the economics of these investment projects. After characterization of biogas plants,

there are defined possibilities of funding these projects which have long been supported by the European Union policy. Further, their economic evaluation is discussed.

The text presents the results of a survey in which 313 businesses in the Czech Republic investing in agricultural biogas plants were addressed. The overall success of the investigation which was carried out in May 2014 was 44%, which can be considered a very meaningful questionnaire survey. First, research questions and scientific hypotheses were formulated and then, either confirmed or rejected through the selected research methodology. The set scientific hypotheses were tested using statistical Statgraphics program. The given null statistical hypothesis was verified at a 5% significance level α .

1. Biogas Plants

Biogas plants are technological facilities that use anaerobic digestion process for processing organic waste or any other biodegradable material. Anaerobic digestion or anaerobic fermentation is a process in which microorganisms degrade the organic material without air. It may occur either spontaneously in nature or by a controlled method in biogas plants (EnviWeb, 2009). Biogas, which is produced in biogas plants, is made up of methane and carbon dioxide. Flammable methane is represented by 50-75%, calorific value, therefore, ranges from 19.6 to 25.1 MJ / m³, which is about one third lower calorific value compared to natural gas (Ministry of Environment of the Czech Republic, 2012). Carbon dioxide is represented by 25-45%. Additional components include water vapor, oxygen, nitrogen, ammonia, water and hydrogen sulphide (Quaschnig, 2010, p. 296). Biogas is mostly burned in boilers. Produced heat is used for heating buildings or water heating. Another possibility is a combined production of heat and electricity in a cogeneration unit (EnviWeb, 2009). Electricity produced by a biogas plant can be sold to the network. Power companies are legally obliged to sign a contract for the purchase of this electricity for 15 years at a predetermined price. Nowadays, thanks to favorable purchase prices of electricity from biogas, economic aspect as a reason for the construction of biogas plants prevails. High purchase prices of electricity from biogas has led to the fact that some projects do not count with selling the heat from biogas

plants at all and concentrate just on electric energy (Ministry of Environment of the Czech Republic, 2012). Other products of anaerobic digestion include digestate and fugate. Digestate is a solid residue after digesting with lower content of biodegradable matter. If it meets all the parameters that are given by the Decree of the Ministry of the Environment of the Czech Republic, digestate may be used as a fertilizer, an additive to a compost or ground surface treatments. Fugate is a fluid product of a digestion process, which has the nature of waste water. This process water that is highly turbid and contains products of the anaerobic decomposition of organic substances is usually discharged into the wastewater treatment plant (EnviWeb, 2009).

Thus, the biogas plant produces ecologically and environmentally friendly (with low greenhouse gas emissions and local pollution) heat and electricity. The benefit of this alternative energy source can be shown at a specific example: medium-sized biogas plant produces up to 4,000 MWh of electricity per year, equivalent to theoretical annual consumption of 1,100 households. In addition, this plant can supply the heat to 300 households and reduce emissions of greenhouse carbon dioxide into the atmosphere each year by up to 3,500 tons compared to energy production from fossil sources (Kašpar, 2008). At present, in the Czech Republic, there are about 500 biogas plants in operation. The most widely spread agricultural biogas plants process inputs from primary agricultural production (energy crops and manure). Their construction mostly takes place at the premises of farms. Other types of biogas plants are quite sporadic. These are industrial and municipal biogas plants (Nazeleno.cz, 2010).

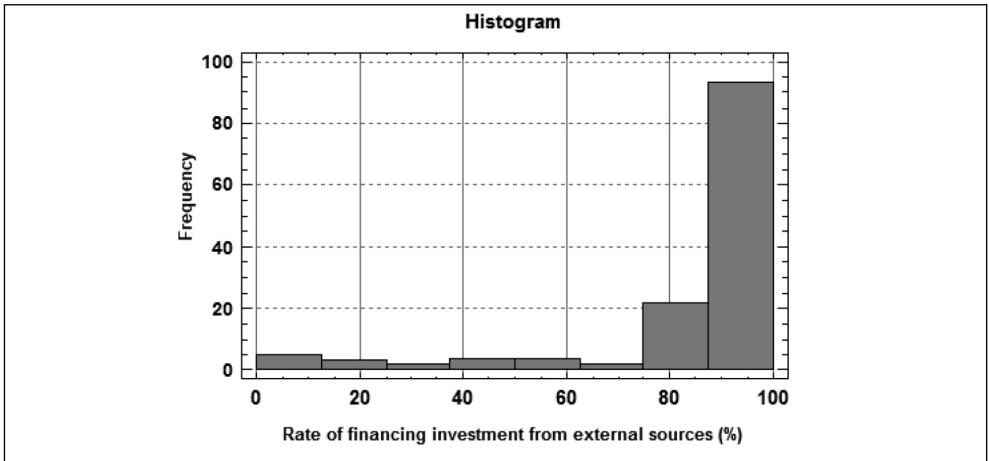
2. Economic Evaluation of Investment Projects of Biogas Plants

Chapter 2 defines the "ideal" approach to investing in biogas plants in terms of capital expenditure and financing of the investment (the ratio of foreign and own resources, the use of the subsidy, bank loan). The attention is also paid to economic indicator of return on investment. It is also necessary to take notice of the development phase of the national economy, where the attenuation stages (signs of recession) generally limit the investment activity in the economy and it is therefore

necessary to consider alternative scenarios of the success of these investments (Jáč, 2012, p. 38). The survey showed that **the investment costs for the construction of biogas plants in the Czech Republic, most often range within CZK 60-70 million**. The survey also pointed to the fact that in the Czech Republic, it is unlikely to build a biogas plant for less than CZK 30 million. On the contrary, the highest financial range, i.e. investment costs exceeding

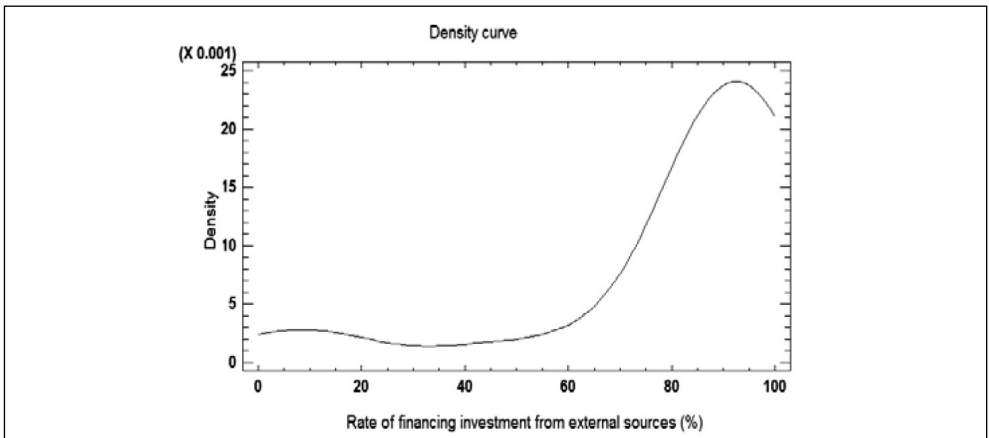
CZK 100 million, is highly probable. Another part of the research concerned the percentage ratio of use of external and company's own sources for financing biogas plants. The results obtained in the form of external versus company's own sources of funding were expressed by a percentage ratio of utilization of external resources. The results are presented using a histogram (Fig. 1) and the density of the appearance curve (Fig. 2).

Fig. 1: Rate of financing investment from external sources – histogram



Source: own

Fig. 2: Rate of financing investment from external sources – density curve



Source: own

Tab. 1: Frequency table – rate of financing investment from external sources

Class	Lower limit	Upper limit	Middle value	Frequency	Relative frequency	Cumulative frequency	Cumulative relative frequency
	on or lower	0	–	5	0.0357	5	0.0357
1	0	12.5	6.25	5	0.0357	10	0.0714
2	12.5	25.0	18.75	3	0.0214	13	0.0929
3	25.0	37.5	31.25	2	0.0143	15	0.1071
4	37.5	50.0	43.75	4	0.0286	19	0.1357
5	50.0	62.5	56.25	4	0.0286	23	0.1643
6	62.5	75.0	68.75	2	0.0143	25	0.1786
7	75.0	87.5	81.25	22	0.1571	47	0.3357
8	87.5	100.0	93.75	92	0.6643	139	1.0000
	above	100.0		0	0.0000	139	1.0000

Source: own

From the above results, it is evident that to a large extent a significant part of investors used an external capital to finance their investment. From the frequency table (Tab. 1), it is obvious that 82% of investors used more than 75% of external sources of financing for their investment. This can be explained by the fact that external capital is financially more advantageous for investors.

The survey of investors also showed that in financing most biogas plants external sources prevail over their own resources. The possibilities for financing investment projects of biogas plants from external sources include bank loans and subsidies. Subsidies are a very important source of financing biogas plants. Businesses in the Czech Republic could apply for a subsidy for the construction of biogas plants from the Operational Programme Enterprise and Innovation 2007-2013, the Rural Development Programme 2007-2013 and the Operational Programme Environment 2007-2013. Currently, the Czech government has approved Operational Programmes for the period of 2014-2020. Therefore, the concern that the biogas plants would not be subsidized after 2013 was not confirmed. The subsidies for the construction of a biogas plant in the monitoring period of 2014-2020 can be applied from the following programs: the Operational Programme Enterprise and Innovation for Competitiveness 2014-2020,

the Rural Development Programme 2014-2020 and the Operational Programme Environment 2014-2020. These programmes follow up on the same programmes of the period of 2007-2013. **The Operational Programme Enterprise and Innovation for Competitiveness 2014-2020** is intended for businesses (especially SMEs), universities, scientific research institutions and individuals. The OP Enterprise and Innovation for Competitiveness 2014-2020 aims to support key elements that have an impact on the performance of economy. The programme supports projects aimed at business development which is based on research and innovation, as well as reduction of energy intensity in the business sector and the introduction of high-speed broadband Internet. The managing authority of the OP Enterprise and Innovation for Competitiveness 2014-2020 is the Ministry of Industry and Trade. The programme is divided into four priority axes. In each priority axis, there are defined the main areas of support (subsidies EUROPROJECT, 2014a). **The Rural Development Programme 2014-2020** is designed especially for agricultural operators and forest owners, and to a limited extent, for municipalities. The main objective of the programme is restoring, preserving and enhancing ecosystems dependent on agriculture especially through agri-environmental measures, as well as investments for the competitiveness of agricultural enterprises,

landscape infrastructure and promoting young people to join farming. The managing authority of the Rural Development Programme 2014-2020 is the Ministry of Agriculture. A financial contribution from the European Union's Rural Development Programme 2014-2020 is intended to be EUR 1.9 billion. The program is divided into six priority axes. In each priority axis, there are defined the main areas of support (subsidies EUROPROJECT, 2014c). These initiatives are particularly significant for the so called regional disparities that are currently most found in rural regions. These investments can boost the municipality development dynamics (Jáč et al., 2010, p. 115).

The applicant in the Operational Programme Environment 2014-2020 may be a municipality, the organization of state and local government, research and scientific institute, legal entity, individual and non-profit organizations. The programme is divided into five priority axes. In each priority axis, there are defined the main areas of support (subsidies EUROPROJECT, 2014b).

In the survey, businesses were asked whether they applied for a subsidy for the construction of biogas plants. Figure 3 shows that 82% of the surveyed businesses applied for such subsidy. On the basis of statistical

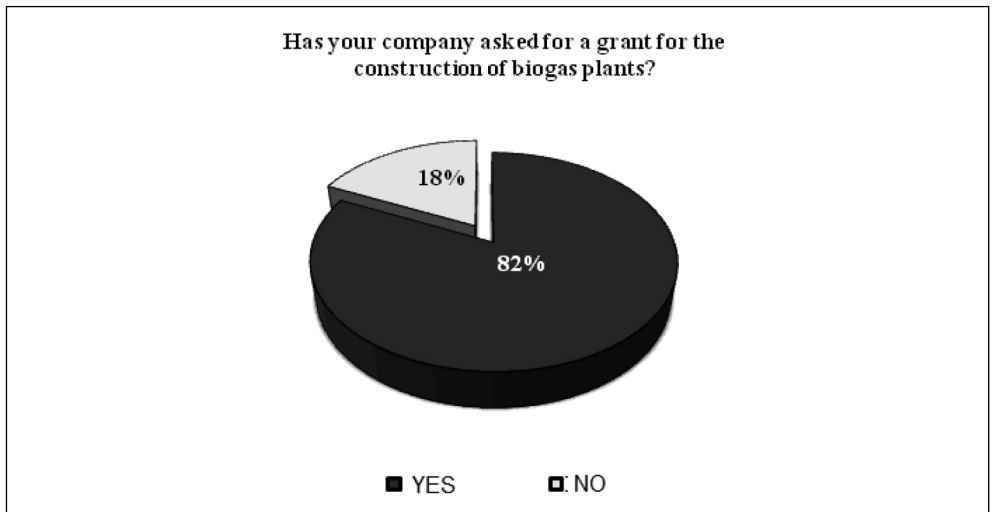
testing of set hypothesis, it can be said that the majority of businesses in the Czech Republic ask for a subsidy for the construction of a biogas plant. Further, the survey found that, as shown in Figure 4, almost 60% of businesses that applied for the subsidy also gained it. It can be stated that a success rate of obtaining financial means from the subsidy for the construction of biogas plants is high.

Furthermore, the survey dealt with the question of what percentage of the investment costs covered the subsidy, if the investment was financed from it. To illustrate the results, a histogram was used (Fig. 5), as well as a box and a scatter plot (Fig. 6) and a density of the appearance curve (Fig. 7).

From the above illustrated results, it is apparent that the level of financing investment from a subsidy ranged mainly (73% of cases) between 20-32%. This can be explained by setting subsidy programmes in such a way that it usually requires at least 50% of the investment costs coverage from the investor.

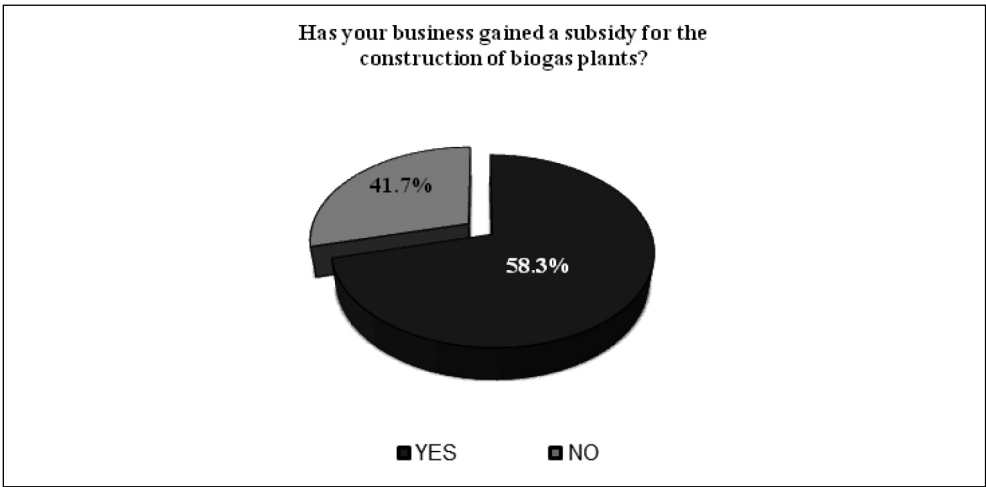
Another significant external source of funding investment projects such as biogas plants is a bank loan. Banks on the Czech market found out that it is an interesting investment project, therefore, it can be stated that there is a wide offer of loans to

Fig. 3: Subsidies for biogas plants



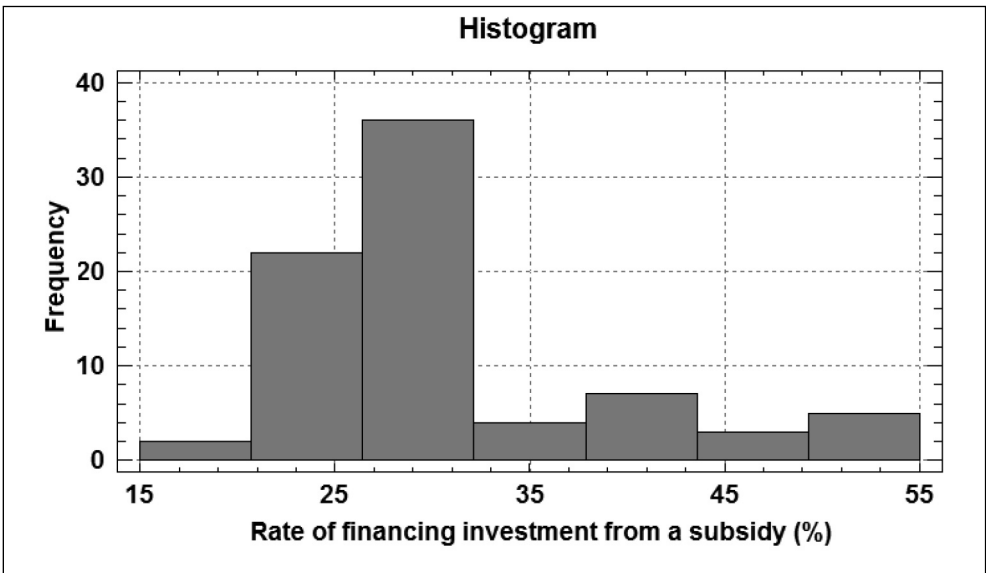
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Fig. 4: The success rate of obtaining the grant



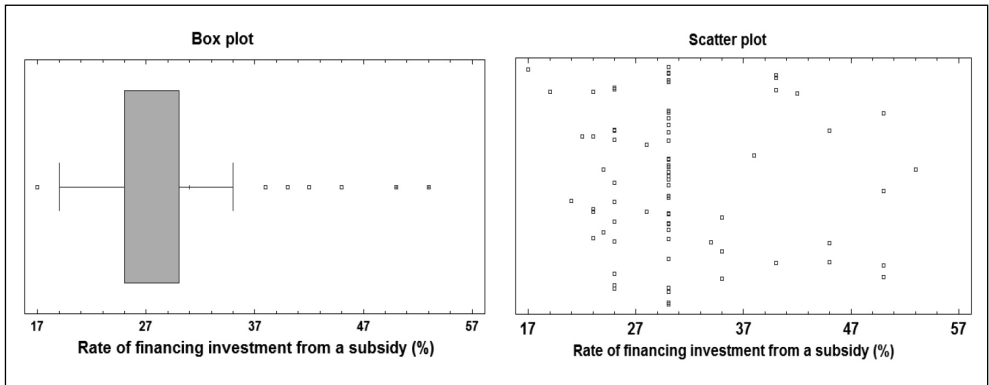
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Fig. 5: Histogram – rate of financing investment from a subsidy



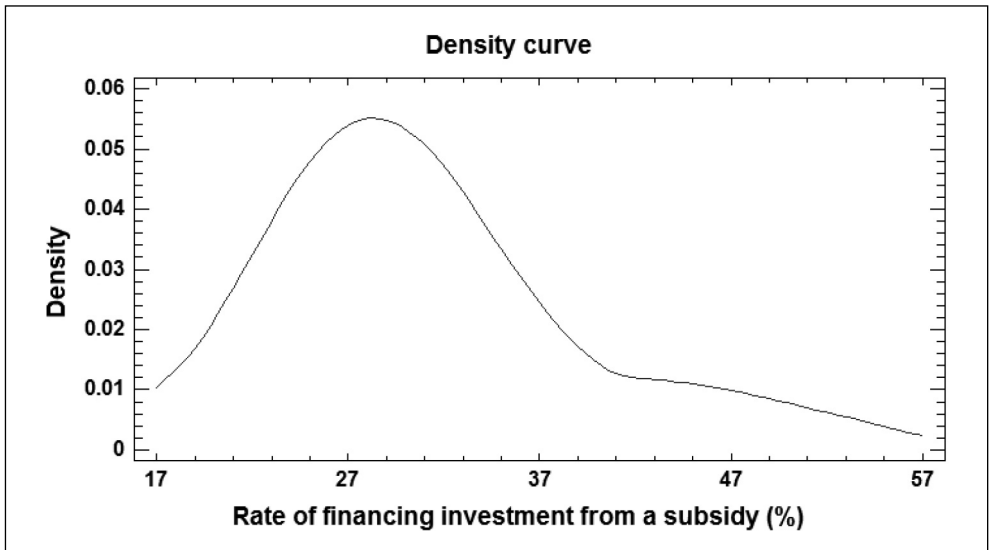
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Fig. 6: Rate of financing investment from a subsidy



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Fig. 7: Density of the appearance curve – rate of financing investment from a subsidy



Source: own

finance projects of biogas plants in the Czech Republic. Below, there are listed possibilities of financing biogas plants projects offered by the Commercial Bank, Czech Savings Bank, GE Money Bank and UniCredit Bank. **Commercial Bank**, which is one of the three strongest banks in the Czech Republic, offers a special program for financing biogas plants. The bank regards

investing in biogas plant as a new business opportunity for farmers and at the same time it represents a real alternative for the meaningful use of agricultural production.

Commercial Bank provides the following types of loans to co-finance projects of biogas plants as an alternative energy source:

- a short-term bridging loan to cover VAT,

- medium-term loan to pre-finance subsidies,
- long-term investment loan for the construction of a biogas plant,
- merger of medium-term loan for pre-financing a subsidy and a long-term investment loan for the construction of biogas plants into one loan with a special installment after receiving a subsidy,
- postponement of principal payment during construction and commissioning,
- regular repayment from revenues generated by the project, i.e. from sales of electricity or heat.

A company should have a clear idea of the project, mainly a technical, economic, and operational part before entering into negotiations with a bank. Everything should be summarized in a brief business plan. The information a business plan should include is the following: basic information about the company, the reasons for the project, the investment costs of the project, the amount of investors' own financial resources, placement of a biogas plant, a way of providing input, their quantity and structure, output to a network, the use of waste heat and supplier of construction works (Commercial Bank, 2010).

Czech Savings Bank has been financing biogas plants on the Czech market since 2007. Biogas plants are perceived as an appropriate form of diversification of the bank's agricultural customers, as they contribute to its stabilization, which also has a positive impact on the employment in rural areas. The bank also ensures its clients additional revenues from the sale of electricity after a maturity of a loan. As part of its Agroteam, Czech Savings Bank has been dealing with financing agriculture for more than 15 years. Czech Savings Bank became the market leader in financing renewable energy projects in the Czech Republic through specialized advice and experience of project financing. An evidence of its strong position is an established partnership with many professional organizations that operate in agriculture. These partners include Agricultural Association, Czech Biomass Association CZ BIOM, E.ON Energie, the Agrarian Chamber of the Czech Republic or the Czech Biogas Association (Czech Savings Bank, 2012).

GE Money Bank also pays close attention to the financing of energy projects that are among its priority areas. GE Money

Bank specializes in financing projects using renewable energy sources. As one of the first Czech banks, it started to finance biogas plants and has provided loans to more than 40 agricultural biogas projects so far.

In the area of biogas plants, GE Money Bank offers:

- financing up to 100% of the investment costs (depending on the type of project and the economy investor),
- maturity of the loan up to 15 years (depending on the type of project and the economy investor),
- deferral of principal repayments of the loan during the construction of biogas plant (up to 18 months),
- an offer of complete investment insurance under very favorable conditions,
- cooperation with a leading provider of technology,
- assistance when negotiating favorable purchase prices for electricity,
- Assistance in dealing with business partners.

The main assumptions that GE Money Bank assesses in its credit analysis and that precede the approval of financing projects of biogas plants are:

- providing their own input of raw material into a biogas plant,
- history of agricultural company,
- stable economy of an investor,
- size of cultivated land,
- general contractor with references (GE Money, 2015).

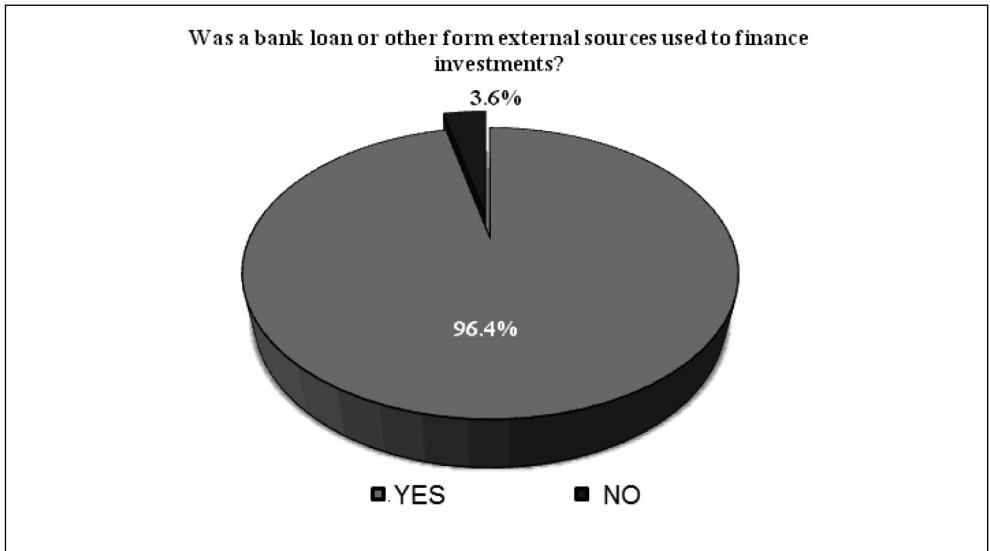
UniCredit Bank also provides investment loans for financing the construction and operation of biogas plants. The basic evaluated conditions are:

- size of a biogas plant is adequate to a crop area of an agricultural company,
- a project has a valid building permit and a future distribution network connection,
- a biogas plant will be owned by or by the project company where the agricultural company is a shareholder,
- general contractor has verifiable references.

Financing which UniCredit Bank offers:

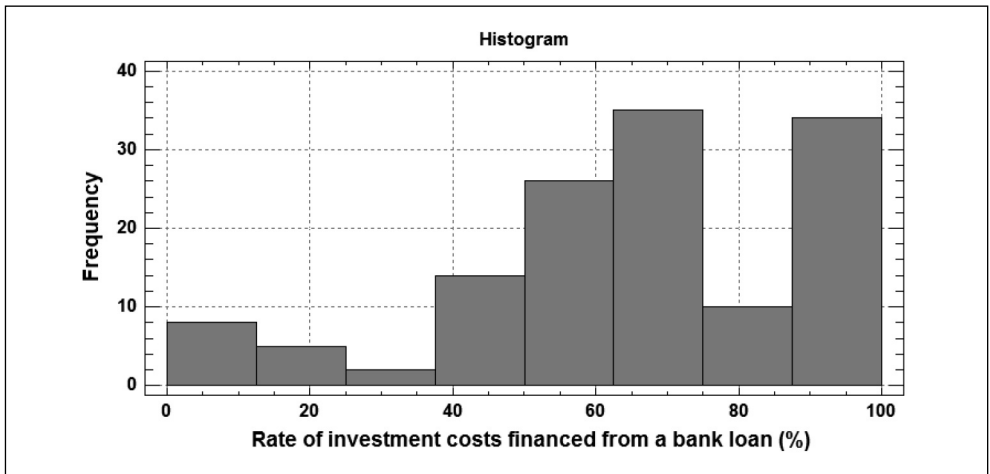
- long-term investment loans with maturities of up to 12 years,
- short-term loan for pre-financing of VAT,
- the possibility of loan installments after the completion of plant construction,

Fig. 8: Financing biogas plants with a bank loan



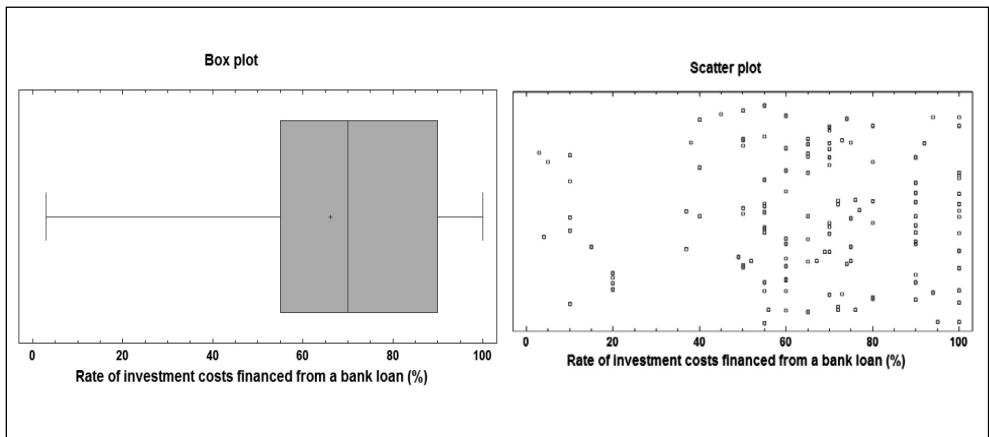
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Fig. 9: Histogram – rate of investment costs financed from a bank loan (%)



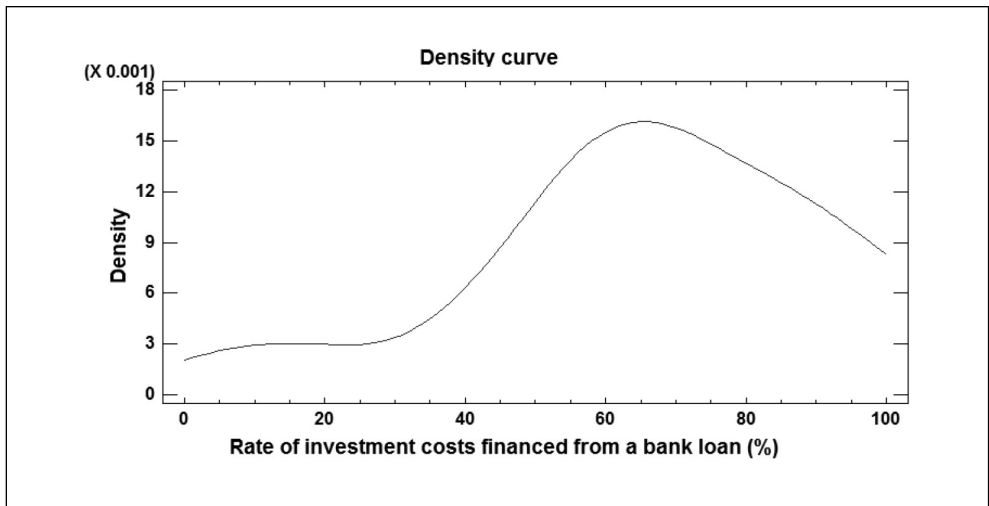
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Fig. 10: Rate of investment costs financed from a bank loan (%)



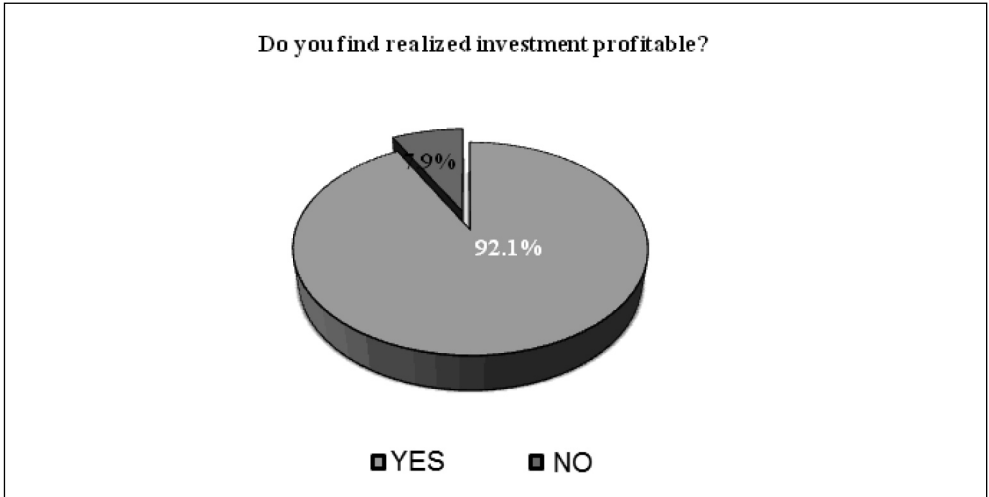
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Fig. 11: Density appearance curve - rate of investment costs financed from a bank loan (%)



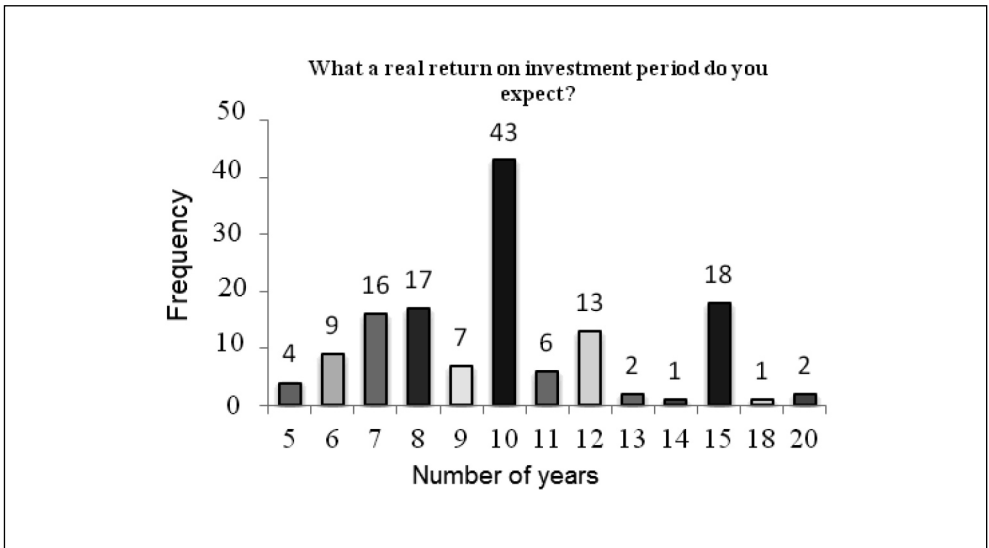
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Fig. 12: Investment profitability (yield)



Source: own

Fig. 13: Return on Investment



Source: own

- interest rate hedges during the entire loan repayment period,
- in the case of quality projects, financed by UniCredit Bank up to 100% of contract for work (UniCredit Bank, 2015).

Over 95% of respondents replied they used a bank loan or other form of external sources to finance an investment (Fig. 8).

To illustrate the results, a histogram (Fig. 9), a box and a scatter plot (Fig. 10) and a density of the response appearance curve (Fig. 11) were used.

From the results shown, inter alia, it is clear that almost 90% of investors used bank loans to finance their investments from 40 to 100%. This can be explained by the relatively easy availability of bank loans. Based on statistical analysis using Statgraphics, we can conclude that over 90% of biogas plants were built using a bank loan or other external sources.

When realizing the investment project, the issue of **profitability (yield) and return on investment** plays an important role for businesses. The survey showed that over 90% of respondents considered realized investments in biogas plants to be profitable (Fig. 12). The businesses in the survey mostly anticipated a 10-year return on investment period (Fig. 13). Figure 13 suggests that more than half of respondents expect a return on investment within 10 years. Statistical testing confirmed that the expected return on investment period in biogas plants is a maximum of 10 years.

Conclusions

Businesses in the Czech Republic responded flexibly to new challenges in the form of investments in biogas plants. It can be stated that the project to build a biogas plant is profitable for them. The fact that the construction of biogas plants in the Czech Republic has a significant support also contributes to this situation. The company that chooses this investment project may contact the Ministry of Agriculture, the Ministry of Industry and Trade and the Ministry of Environment to apply for a subsidy. It may be granted from the Rural Development Programme, the OP Enterprise and Innovation and the Environmental Operational Programme. Banks on the Czech market also responded flexibly to the growing demand for loans suitable for financing investments in renewable energy and came with special programs for

financing biogas plants. Therefore, it can be assumed that, due to favorable conditions, the number of biogas plants in the Czech Republic will be constantly growing. In this way, the Czech Republic will be closer to Western countries contributing to the fulfilment of the EU agreement to increase the share of renewable energy in overall energy consumption and will make the next step to more considerate behavior towards nature. Moreover, it will also significantly help to preserve agricultural sector in the Czech Republic and to greater prosperity of Czech agriculture businesses.

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Ing. Darina Myšáková, Ph.D.

Technical University of Liberec

Faculty of Economics

darina.mysakova@tul.cz

prof. Ing. Ivan Jáč, CSc.

Technical University of Liberec

Faculty of Economics

ivan.jac@tul.cz

Ing. Michal Petru, Ph.D.

Technical University of Liberec

The Institute for Nanomaterials

Advanced Technology and Innovation

michal.petru@tul.cz

INVESTMENT OPPORTUNITIES FOR FAMILY BUSINESSES IN THE FIELD OF USE OF BIOGAS PLANTS**Darina Myšáková, Ivan Jáč, Michal Petrů**

This article deals with the economic evaluation of biogas plants which are one of the most important renewable energy sources in the Czech Republic. They provide a stable supply of electricity and heat without polluting the environment by emissions. They significantly contribute to the environmental protection. For businesses, this renewable source of energy means financially a very profitable, safe and a fast repayable investment. These investments are a big opportunity mainly for a family type of business which especially in municipalities in rural areas performs a variety of other economic and non-economic objectives including the use of biomass. Opportunities of family businesses are in agreement between the parties, involvement of family members, knowledge of technology and know-how, flexibility in labor, time and money, long-term planning, stable corporate culture, speed in decision-making, proximity to local markets, pride and credibility, efficiency, productivity, focus on quality. In recent decades, corporate social responsibility has been at the forefront of marketing tools of businesses and is often associated only with the ethical standards that, among other things, seek to minimize negative impacts on the environment This article focuses on their basic characteristics, maps specific ways which the company can use for their financing and analyzes the profitability (yield) and return on these investment projects.

This development can focus more on strengthening family businesses in municipalities of a rural type where many owners of forests or larger plots can take advantage of investment opportunities and stabilize the economy of their businesses. However, even more side effects such as new jobs and partial subcontracts from other family businesses or other companies can be noted.

Key Words: Family business, renewable source of energy, biogas plant, biogas, investment, subsidies, bank credit, investment yield, investment returns.

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