IEE Project ‘BiogasIN’

Options for financing biogas plants

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1. Introduction

The BiogasIN project is supported in the “Intelligent Energy for Europe Programme” by the European Commission and aims to create a sustainable biogas market in Central and Eastern Europe (CEE): Bulgaria, Croatia, Czech Republic, Greece, Latvia, Romania and Slovenia. Core of BiogasIN is to reduce framework barriers for biogas projects in CEE: high administrative barriers both in permitting and financing phases.

Biogas projects are characterised by high specific costs. In many cases a single farmer or even a consortium of investors is not capable of financing the whole project by equity capital. Therefore borrowed capital is essential for the implementation of a biogas plant.

The following paper describes a number of financing options for biogas projects. It highlights advantages and disadvantages of each particular financing option compared to the other options. The objective of this report is to explain different financing options to biogas investors. The advantages and disadvantages presented for each option makes the different financing options comparable. Furthermore different ways of gathering revenues from biogas plant operation are presented and compared.

For further information on financing options and revenues from biogas plants please also see the best practice report on “Examples for financing of biogas projects in Germany, Austria, The Netherlands, Denmark and Italy”\(^1\) as well as the report on “Criteria to assess biogas investments: Guidelines for financing institutes and investors”\(^2\) which were elaborated in the framework of the BiogasIN project.

Finally, the present report includes a glossary, explaining the most popular terms concerning biogas financing.

\(^1\) Hahn H., Rutz D., Ferber E., Kirchmayer F. (2010) Examples for financing of biogas projects in Germany, Austria, The Netherlands, Denmark and Italy. Report of the BiogasIN Project

2. Financing by banks

Common financing methods are credits from private banks. As indicated in Figure 1 below, there are two main types of typical financing for biogas projects: traditional financing by loans and project financing. Figure 3 illustrates the different financing schemata of traditional loan financing and project financing:

![Figure 1: Distinction between traditional loan financing and project financing concepts](image)

### 2.1. Traditional loan financing

Traditional loan financing is the most common way of receiving borrowed capital from banks. This form of financing is not just used for major investments, as they are regularly needed within biogas projects, but also covers many smaller private loans. The financier checks the financial background of the borrower in order to decide on the reliability and risk of the engagement. Of particular interest for financial institutes are securities in case the project fails. Such securities consist of estate, components of the biogas plant, private – and company asset, and all other assets that cover the loan sum. Furthermore the prospects of success of the project are analysed. The success is usually estimated by checking several criteria which influence the economy of the future biogas plant. For further information on these criteria for biogas loans, please also see the report “Criteria to assess biogas investments:
Guidelines for financing institutes and investors\textsuperscript{3}. The estimated economy and risk of the plant influence the amount of the interest rate.

Once the loan has been provided, the borrower has to pay back a pre-defined monthly amortisation rate which consists of principal and interest rates. Often banks offer also a grace period which is usually one or two years during which the borrower only has to pay back the interest rate, but not the borrowed money.

The duration of loans for biogas projects as well as the number of grace years is strongly dependent on the prerequisites of each particular biogas project. However, regular loan periods are about 12 - 15 years and typically one or two grace years are granted.

A special form of traditional loan financing is low interest loans provided by national authorities or financing bodies. These loans are granted for investments in the renewable energy sector, such as biogas projects, and work as a market support programme in order to stimulate the renewable energy sector. Low interest loans are characterised by considerably low interest rates. The investor’s house bank can help accessing these loans. In Germany for example the KfW Bank (Kreditanstalt für Wiederaufbau) and the LfA Förderbank are providing low interest loans.

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Advantages and disadvantages

+ Low administrative complexity.
+ Formation of a special legal company is not required.
+ Sufficient securities can be provided by estate and reduce the amount of the interest rate.
  - Financial capacity to act is constrained, as private estate is charged.
  - The investor is liable with private asset in case of project failure.

2.2. Project financing

Project financing is intended to finance a very particular investment which is repaid by its own cash flow. The financing bank makes its decision on the loan in the first place on the estimated cash flow of the project. In contrast to conventional loan financing, the financier usually has little or no access to private or company capital. In case of financing a biogas project, the financier’s investment is secured by the estimated cash flow of the plant selling electricity, the plant components and by the property of the plant site. Prerequisite to achieve project financing is the formation of a dedicated biogas project company.

Project financing provides considerably higher risks for financiers than conventional financing, since the loan can only be repaid when the project is operational. Therefore, banks are interested in minimizing potential risks. All aspects of the project are analyzed very carefully. This leads to increased administrative work for both parties. The investor has to prepare all project documentation in high detail. This procedure can be considerably time consuming.

Since biogas plants represent the main financial security for banks due to larger administrative efforts, usually only large scale biogas plants with an electrical equivalent of some megawatt (MW) are normally financed by project financing. Typical agricultural biogas plants (500 kWel or less) are rarely financed by this financing option.

Advantages and disadvantages

+ The investor is not liable with private asset in case of project failure.
+ The financial institute helps identifying and allocating potential week points of the project.
+ It does not matter, how many people join the project company. Thus, a consortium of farmers can jointly operate a biogas plant.
+ Capacity for further loans is not constrained, as private estate is not charged.
- High administrative complexity.
- A project company has to be founded.
- Not every bank provides the option of project financing.
- Interest rates might be higher.
- Usually applicable only for projects with an investment volume of some million Euros.

![Project financing scheme](image)

**Figure 3:** Project financing scheme

### 3. Leasing

Acquiring leasing partners is a frequently applied method for gathering equity capital for a biogas project. Leasing is characterised by the distinction of plant constructor (leasing company) and plant operator (lessee). The leasing company constructs and finances the plant by company capital or equity capital from leasing partners. Afterwards the company leaves the plant to the lessee who has to take the risks of operation. The lessee keeps all revenues from the operation of the biogas plant but has to pay leasing rates to the leasing company. After the contract expired, the
Lessee can either buy the plant corresponding to its residual value, or the leasing company has to remove it.

In most cases this option is only used for financing particular components of a biogas facility, e.g. for the combined heat and power (CHP) plant.

**Advantages and disadvantages**

+ Leasing partners provide expertise in biogas plant implementation and operation.

+ External investors have the opportunity to join the leasing company.

+ Farmers with low equity capital have the opportunity to operate a biogas plant.

– The leasing company does not have direct influence on the operation of the plant. Thus, success or failure of the project lies in “someone else’s hand” (lessee).

– After the contract expired, the biogas plant might have a considerable residual value, which makes removal uneconomic for the leasing company.

4. Biogas contracting

Contracting is a strongly emerging business model in some European countries, e.g. Germany and Austria. There exist different forms of contracting whereas the Energy Performance Contracting (EPC) is the original form. EPC is a contractual arrangement between the provider, normally a so called energy service company (ESCO), and the client. The ESCO implements and finances energy saving measures at the client’s property. Subsequently, the customer pays back contracting rates corresponding to the level of energy efficiency improvement. The ESCO
guarantees that savings meet or exceed annual payments to cover all project costs usually over 7 to 10 years. The advantage of an ESCO is the availability of financial resources, expertise, and the minimised risk for the customer.

Newer forms of contracting also include energy contracting not only for energy savings, but also for energy supply. This is interesting especially for larger clients (e.g. public institutions, hospitals, schools, companies) who need larger amounts of energy (usually heat), but want to reduce risks and do not have the capacity to invest in own expertise to operate the energy plant.

Contracting for biogas plants (Figure 5) is also a relatively new development. Some project designers, plant manufacturers and in particular ESCOs (Energy Service Companies) offer biogas contracting. These companies (contractors) usually finance, construct and operate the whole biogas facility. The farmer only provides the piece of land on which the plant is constructed and signs a feedstock delivery contract with the contractor. The risk of plant operation but also all revenues from selling energy are kept by the contractor. The farmer gets the payment from feedstock delivery and from the lease of the property. Depending on the contract between the contractor and the farmer, heat from the biogas CHP plant may be utilized by the farmer (e.g. to heat the animal sheds, to dry woodchips, etc. Also a participation of the farmer on the profit of the plant can be content of the contract. In many cases, the farmer also provides labour for the daily operation of the plant (e.g. feedstock feeding). The large advantage is that the farmer reduces its risk in case of system failure and thus does not loose capital. Also the expertise on most efficient system design and maintenance is provided by the contractor.

Another form of biogas contracting is a normal energy contracting between the contractor (ESCO) and an energy client (Figure 6), as it was described above (e.g. public institutions, hospitals, schools, companies). In this case, the ESCO is responsible for delivering heat and / or electricity to the energy client. Depending on the required feedstock for the plant, the farmer is the feedstock provider. In this case the contract between the farmer and the contractor is a normal business contract.

Different forms of contracting can be combined with each other in order to achieve the most economically and ecologically reasonable solution for the customer. Thereby the characteristics between the different contracting models, but also between contracting and leasing can be fluent. Figure 5 and Figure 6 represent only schematic examples, other relationships are also possible.
Figure 5: Contracting between contractor and farmer

Figure 6: Contracting between contractor and energy client
Advantages and disadvantages:

+ The farmer does not have to invest company or private capital.
+ The farmer has a lower financial risk.
+ A professional biogas expert (contractor) is responsible for the operation and maintenance of the plant.
  - The biogas plant remains property of the contractor for a pre-determined period, thus the farmer has no or only little influence on technical decisions.
  - The farmer’s earnings are diminished by the contracting rates.

5. Investment funds

Another financing tool for biogas projects is an investment fund. An investment fund is a firm that combines money from several small investors. All of them are investing in one or more biogas projects. By that means equity capital for the construction and operation of a biogas plant is gathered. Benefits from biogas utilisation and the risks are shared among the investors corresponding to the consortium or joint venture agreement. Farmers can form a cooperative where each farmer has a share in biogas revenues proportionally to the provided substrate and its biogas yield.

Advantages and disadvantages

+ The farmer or plant operator does not have to take out a loan and charge estate.
+ The revenue share of each partner exactly represents the money he invested in the fund.
+ The plant operator must nor necessarily provide securities.
+ The investors’ confidence in renewable energy funds is continuously rising due to the good performance of such funds within the last years.
  - Investors are regularly liable with all asset invested in the fund.
  - Investors have no influence on the operation of the biogas plant.
  - To participate in a renewable energy fund, a biogas plant operator has to undergo a complex application procedure in order to prove particular ecological criteria of the project.
6. Revenues from operating a biogas plant

The decision on granting a loan for biogas projects depends in the first place on the expected cash flow of the project. In order to secure an economically sustainable operation of a biogas plant, it is very important to calculate the revenues from its operation.

In most countries with a sound biogas market, feed-in tariffs for electricity produced from biogas plants are defined by law. These feed-in tariffs with their secured revenues over a long period of time represent a reliable security for financial institutions and the basis for economic calculations for the plant operator. Furthermore long term contracts covering heat utilization or biomethane injection in the natural gas grid increase the credibility of a biogas project.

Another way of refinancing a biogas plant investment is trading Green Certificates (also known as Renewable Energy Certificates, RECs). A green energy provider (e.g. biogas plant operator) is credited with one REC for every MWh of electricity produced from a renewable source. After the energy was fed into the grid, the certificate can be sold on the open market. Prices for the certificates depend on general electricity demand, the renewable energy resource from which the electricity was produced and
the location of the facility. Revenues from selling RES are less calculable than revenues from a fixed feed-in tariff as the prices for RES are subject to fluctuation.

Economically and ecologically it is most advisable to sell heat produced by the CHP (combined heat and power plant) facility of the biogas plant. Utilisation of heat improves the overall efficiency of the plant drastically. If the heat can be sold to consumers, e.g. via a local heating grid, the biogas plant operator generates additional income. In contrast to electricity production from biogas, there are usually no fixed feed-in tariffs for heat produced by biogas plants, as it is the case in Germany. The revenues from heat supply are usually subject to the contractual agreement between plant operator and heat consumer.

A minor part of the income from the operation of a biogas plant can be generated from the utilisation of digestate (residual material from the digestion process). Digestate can be sold as a fertiliser or used at the own farm as mineral fertilizer substitute. Digestate is rich in nitrogen, phosphorus, potassium and micronutrients and can be applied on soils just like liquid manure with lower odor emission after application. This makes it a demanded bio-fertiliser.

Finally, in case the biogas plant is designed for the digestion of bio-waste (e.g. catering waste, organic municipal waste, industry waste) the plant operator may get also a tipping fee. However, the use of waste materials in a biogas plant usually requires special plant design and experience with its (pre-)treatment. Furthermore, additional legal requirements regarding digestion conditions and the utilization of the produced digestate have to be considered.

7. Conclusion

Biogas projects can be financed by many different options. Each financing model has particular advantages and disadvantages for the investor and the financing bodies. However, each biogas project is implemented under different circumstances and may require a special form of financing. It is very important for a successful implementation and operation to select the correct financing option for the regarding project. Different financing options can be also combined in order to achieve the most sustainable financing structure. It has to be assessed very carefully, which revenues can be expected from the operation of the biogas plant previously to the implementation of the project.
Glossary: Financing of biogas projects

Amortisation rate: Monthly pay back rate, consisting of principal and interest.

Biogas contracting: This concept bases on the idea of financing the whole facility and its construction by the contractor. The farmer only provides the property and signs a feedstock delivery contract. All revenues from selling the energy are kept by the contractors. Depending on the contract, waste heat produced by the CHP plant can be utilized by the farmer. Profit participation can be content of the contract as well.

Cash flow: Cash flow refers to the movement of cash into or out of a business, a project, or a financial product. It is usually measured during a specified, finite period of time.

Contractor: A biogas contractor finances and operates a biogas plant on foreign property.

Credit: See loan.

Debt capital: Money acquired from external sources, distinguished from equity capital.

Equity (capital): The sum of capital from retained earnings.

Energy Performance Contract: An Energy Performance Contract is a financing or operating lease provided by an Energy Service Company (ESCO) or equipment manufacturer. They provide a guarantee on energy savings from the installed retrofit measures, and they usually also offer a range of associated design, installation, and maintenance services. Generally, the service provider will guarantee savings as a result of improvements in both energy and maintenance efficiencies.

Energy Performance Contracting: The application of an agreement with a private energy service company (ESCO). The ESCO identifies and evaluates energy-saving opportunities and then recommends energy saving solutions. The ESCO guarantees that savings meet or exceed annual payments to cover all project costs usually over 7 to 10 years. The advantage of an ESCO is the availability of financial resources, expertise, and the minimised risk for the customer.

ESCO: An Energy Service Company (ESCO) is a company that provides energy management services to an energy user. Services provided by an ESCO may be contracted through an Energy Services Agreement or through specific energy management solutions identified by the ESCO that provides the best return on investment for the customer.

Feed-in tariff: Tariff for guaranteed revenues usually in €/kWh from selling electricity by feeding it into the public grid. In many countries a fixed amount of the feed-in tariff
and the duration of the guaranteed payment are regulated by law.

**Financial institute:** Organisation providing borrowed capital to investors. A financial institute can for example be a bank, or a leasing company.

**Financial risk:** The financier’s risk of loan default. Financial institutions rate each loan request on the possibility of loan default.

**Financier:** The financier provides debt capital. Financiers can be banks, leasing organisations, or private persons.

**Grace period:** Period during the life of a loan in which borrowed money must not be paid back to the bank. However, interest rates have to be paid.

**Green Certificate:** Paper or electronic representations of electricity generated from renewable energy power plants. Each green certificate has a face value of one megawatt hour (MWh) of electricity.

**Interest rate:** Cost of using money, expressed as a rate per period of time (usually per year). The value of the interest rate depends on the financial risk of the investment, the loan duration and the amount of the loan.

**Investment fund:** A sum of money, owned by one or more investors, which is managed as one entity.

**Investor:** The investor spends money on a certain capital asset.

**Leasing financing:** Leasing financing is characterised by the separation of lessor and lessee. The lessor finances the leasing object and commits it to the lessee for operation. The lessee has to pay leasing rates to the lessor. Leasing object within biogas projects is often the CHP plant.

**Loan:** Money loaned at an agreed interest rate for a fixed term of years.

**Payback period:** Payback period refers to the period of time required to recapture an initial investment by its own cash flow.

**Principal:** The total amount of money being borrowed or lent.

**Project financing:** Project financing is intended to finance a very particular investment which is repaid by its own cash-flow. Prerequisite to excess project financing is the foundation of a project company. In case of financing a biogas project, the financier’s investment is secured by the estimated cash flow of the plant selling electricity, the plant components and by charging the plant site. Project financing provides considerably higher risks for financiers than conventional financing, since the loan can only be repaid when the project is operational.

**Rating:** Assessment of the financial risk of a loan for financial institutes by defined criteria.

**Renewable Energy Certificate:** See Green Certificate.
Securities: Property of the investor that covers the loan sum in case of loan default.

Subsidies: A subsidy is a form of financial assistance paid to a business or economic sector.

Traditional loan financing: Financing of an investment by private or business loan. Financier is a financial institute.