

# How to finance a bioenergy project?



## Guideline for farmers

**Deliverable 6.3: overview of bioenergy project**

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## **Imprint**

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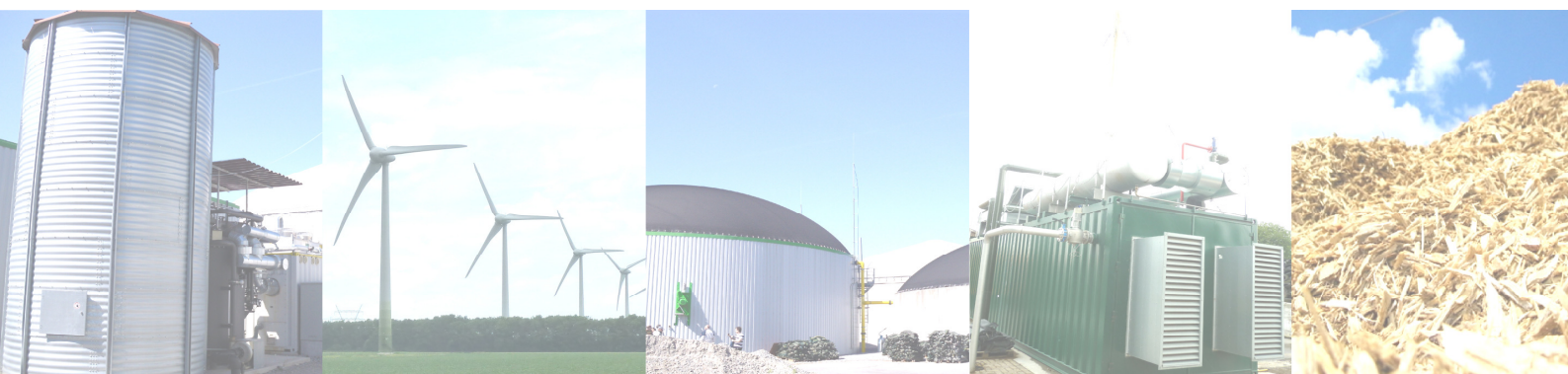
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The implementation guide is meant to give assistance in the realization of bio-energy projects. BioEnergy Farm and/or University of Stuttgart - Institute of Energy Economics and the Rational use of Energy (IER) - Dept. "System analysis and Renewable Energies - SEE" cannot be held responsible for the results of bio-energy project realization and do not accept any liability.

# 1 INTRODUCTION

This booklet is part of the BioEnergy Farm project (for more information see: [www.bioenergyfarm.eu](http://www.bioenergyfarm.eu)) funded by Intelligent Energy Europe (IEE). It has been written by the Institute for Energy Economics and the Rational Use of Energy (IER) of the University of Stuttgart, with support from other European partners within the BioEnergy Farm project.

## 1.1 Aim and content of the Bioenergy Project Financing booklet

This particular booklet is aimed at giving an overview on the different existing financing options for biogas plants and wood-combustion plants and should be used by farmers and forest owners and generally by people that are not specialized in financing concerns.

The focus of this booklet is set on financing options with exception made of funding options. An overview with some basic information on funding options will be given in this introductory chapter and some specific funding options will be mentioned in the country specific parts (chapter 4) aiming at a better comprehension of the whole financing process, but it is not part of this booklet to describe funding more precisely. To find more data on funding, please refer to the implementation guide booklet “Implementing a bioenergy plant – Guideline for farmers”, also delivered by IER (2012) within the BioEnergy Farm project.

In the second chapter, the basics of bioenergy project financing are explained. In the third chapter which is the main part of the booklet, a general description of each financing option is made. Data is given on the assets of each option, the pros and cons and a generic scheme representing the interactions between sub-parts involved. Most of the financing possibilities are similar for both biogas and wood-combustion options; if there are some differences additional data will be given. Finally, in the fourth chapter, country specific data completes the general information.

However, since accuracy matters, some complex words (marked with letter index) can be found among financing options description. In case of misunderstanding, please refer to the Glossary (see chapter 5) for a comprehensive explanation of these terms.

## 1.2 Overview on financing and funding options

The main options for bioenergy project related financing and funding comprise:

Financing options	Funding options
<ul style="list-style-type: none"> <li>❖ Equity</li> <li>❖ Bank financing:               <ul style="list-style-type: none"> <li>• Traditional Loan Financing<sup>dd</sup></li> <li>• Project financing<sup>y</sup></li> </ul> </li> <li>❖ Contracting (various sub-options)</li> <li>❖ Leasing<sup>t</sup></li> <li>❖ Renting</li> <li>❖ Investment funds<sup>r</sup></li> </ul>	<ul style="list-style-type: none"> <li>❖ National and local:               <ul style="list-style-type: none"> <li>• Technology (Investment) Subsidies</li> <li>• Low-interest loans</li> </ul> </li> <li>❖ Fixed Feed-In tariff (mid-long term) for electricity or upgraded biogas (biomethane)</li> <li>❖ Green Certificates<sup>p</sup></li> <li>❖ Tax credits/ allowance</li> </ul>
<p>There are a variety of financing options and it is important to be aware that it is possible to combine two or more when appropriate. In the following subparts, each of the financing options mentioned will be described in more detail.</p>	<p>There are a variety of funding options which are also country specific. For more detailed information on funding options see the implementation guide booklet “Implementing a bioenergy plant – Guideline for farmers”, also delivered by IER (2012) within the BioEnergy Farm project.</p>

Remark:

A regular contact with a financial institute is really important and should be seen as a must to assure the success of project financing.



## 2 BASICS OF PROJECT FINANCING

Biogas and wood based project assets may be very different on the aspect of substrates used and technical or legal bottlenecks. Still, as long as project financing is concerned they share a lot of common points.

In both cases investment costs are very high compared to fossil-fuelled solutions. In fact, the devices used are often of very high complexity and require in-depth maintenance.

### 2.1 Risks included in Bioenergy projects

Compared e.g. to hydroelectric or wind plants, bioenergy projects are characterized by high risks mainly related to the technology used, the market and regulations.

Overview on risks carried by different types of renewable energies:

Type of risks <sup>1</sup>	Type of projects		
	Hydroelectric power plant	Wind power plant	Bioenergy plant
<b>Technology</b>	Medium	Low	Medium/ high
<b>Market</b>	Low	Medium	Medium
<b>Regulation</b>	Low	Medium	High

In the context of a bioenergy project, the risks related to technology, market and regulation are described in detail the following table:

Type of risks <sup>1</sup>	Details
<b>Technology</b>	<ul style="list-style-type: none"> <li>• Construction (e.g. delays, extra costs, etc.).</li> <li>• Non-proved technology (e.g. performances, etc.).</li> <li>• Microbiological/ Chemical complexity of reactions.</li> </ul>
<b>Market</b>	<ul style="list-style-type: none"> <li>• Raw materials (e.g. access, fluctuating costs, quality, energy threshold, etc.).</li> <li>• Distance (e.g. high transportation costs, etc.).</li> <li>• Variable market price of delivered heat and/ or electricity.</li> </ul>
<b>Regulation</b>	<ul style="list-style-type: none"> <li>• Variable state incentives: <ul style="list-style-type: none"> <li>○ Subsidies<sup>aa</sup>.</li> <li>○ Low-interest credits.</li> <li>○ Regulation of use and operation of bioenergy plants (e.g. environmental criteria, origin of substrates, etc.).</li> </ul> </li> <li>• Insurance (e.g. who endorse the risks of operation? Costs known? etc.).</li> </ul>

<sup>1</sup> Source: *Financement de projets en bioénergie* (French), Tremblay (NOVACAP), Canada, 2011

In countries where the bioenergy market, i.e. either biogas or wood combustion market, is new, financing partners may have little confidence in bioenergy projects, making it difficult for investors to raise enough funds to meet the high costs of such projects.

This cautiousness of financial partners may lead to the creation of a market barrier. Therefore emphasis should be set on identifying risks and allocate them before any negotiation with a financial partner.

## 2.2 Main criteria assessed by financiers<sup>n</sup> with regard to bioenergy projects

Please be aware that this is an overview of the principal criteria assessed. In any financing case, the investors should communicate with their home banks to be sure to match all requirements to obtain financing.

In all partner countries, numerous criteria are assessed by financiers<sup>2</sup> in the case of bioenergy plant financing. These main criteria can be summarized in four main categories. These categories are developed and complementary information is given in the following subparts. The following table gives an overview on the main criteria and sub-criteria. The criteria are not listed in order of importance:

Categories of criteria	Overview on sub-criteria
<b>Applicant (e.g. farmer/ forest owner, etc.)</b>	<ul style="list-style-type: none"> <li>• Plant monitoring, expertise of the staff and additional project participants (e.g. for planning, construction, etc.)</li> <li>• Legal form of the company that applies for finance</li> <li>• Applicants financial security</li> </ul>
<b>Projected plant</b>	<ul style="list-style-type: none"> <li>• Technical assets of the plant</li> <li>• Location of the plant</li> <li>• Storage facilities</li> <li>• Substrates and residues</li> <li>• Insurance</li> </ul>
<b>Cost calculation &amp; Financing plan</b>	<ul style="list-style-type: none"> <li>• Detailed and realistic cost calculation</li> </ul>
<b>Documentation</b>	<ul style="list-style-type: none"> <li>• Personal/ Company documentation</li> <li>• Project Documentation</li> </ul>

<sup>2</sup> Source: [Criteria to assess biogas investments: Guidelines for financing institutes and investors](#) (English), Ferber and Rutz (WIP – Renewable Energies) et. al. with contribution of: EIHP (Croatia) and European Biogas Association, IEE Project BiogasIN, Munich, Germany, 2011



### 2.2.1 Criteria for assessment of the applicant

The applicant refers to the person, natural or legal entity (e.g. dedicated project company, investors pool, etc.), that wishes to invest in a bioenergy project. The financiers will take into account the following criteria:

Criteria for assessment of the applicant	Explanation/ parameters involved
<b>Composition and expertise of the project consortium</b>	<ul style="list-style-type: none"> <li>✓ Expertise in biogas plant or wood combustion plant realization and operation, with respect to:               <ul style="list-style-type: none"> <li>❖ Planning and construction.</li> <li>❖ Substrates.</li> <li>❖ Plant and production technology (e.g. biology/ chemistry of the reaction, anaerobic degradation, proved technology and know-how, etc.).</li> <li>❖ Reaction product retreatment (e.g. ash retreatment, digestate use, etc.).</li> </ul> </li> <li>✓ Motivations (e.g. environmental, etc.) for the implementation of a bioenergy project are strongly assessed in bank questionnaires.</li> <li>✓ Sufficient work-force capacity should be available for plant operation.</li> </ul>
<b>Plant monitoring, expertise of the staff and additional project participants</b>	<ul style="list-style-type: none"> <li>✓ Supervision of the reaction process has to be taken over by the plant operating staff.</li> <li>✓ The plant operating staff shall prove skills for maintenance work.</li> </ul>
<b>Legal form of the company that applies for finance</b>	<p>A comprehensive concept of the legal form of the company has to be provided to the banks. Therefor the following criteria could be important:</p> <ul style="list-style-type: none"> <li>✓ The number of persons (natural or legal) participating in the project and taking part into the investments of the plant.</li> <li>✓ The origin of the capital (e.g. does the investor also operates the plant? etc.).</li> <li>✓ The source of the equity capital<sup>g</sup> (e.g. single/ multiple investor (/s), etc.).</li> </ul>

#### Notes:

- A minimum of equity is expected by banks.
- The role of the plant operator(s) is crucial in the success of a bioenergy project.
- The microbiological (biogas) or chemical (wood combustion) processes in bioenergy production demand a continuous supervision and operation.
- Any bioenergy plant operator should be able to assess the quality of a reaction and to perform minor maintenance work in case of limited failure of the system.

### 2.2.2 Criteria for the projected plant

The projected plant criteria refer to the plant and its components (e.g. bioenergy production activities, etc.). An overview of important criteria to consider for banks among others is given:

Criteria for the projected plant	Explanation/ parameters involved
<b>Technical details</b>	<ul style="list-style-type: none"> <li>✓ It is an advantage that the plant describes the state of the art (e.g. tested technology, etc.).</li> <li>✓ A list of components and materials used has to be provided.</li> <li>✓ A detailed construction plan has to be handed to financial partners. The more details are given, the easier the assessment and thus approval by financial bioenergy experts.</li> </ul>
<b>Location of the plant</b>	<ul style="list-style-type: none"> <li>✓ The plant site has to be connected to a public street, suitable for heavy machinery (e.g. construction, substrates and digestate logistics, etc.).</li> <li>✓ The electricity and heat feed-in point have to be clearly defined.</li> <li>✓ Electricity and heat consumers have to be identified and/ or long-term contracts provided. Therefore long contract periods should be aimed to cover the loan payback period<sup>x</sup>.</li> </ul>
<b>Storage facilities</b>	<ul style="list-style-type: none"> <li>✓ A suitable design and capacity for storage facility has to be presented to the financing institute.</li> <li>✓ In the case of biogas plants, digestate storage facilities: <ul style="list-style-type: none"> <li>❖ Should be able to store the digestate at least 6 months.</li> <li>❖ Should be closed to raise biogas efficiency (additional emissions).</li> </ul> </li> <li>✓ The location should be presented on the global plan.</li> </ul>
<b>Substrates and residuals</b>	<ul style="list-style-type: none"> <li>✓ Depending on country specific regulations, it is generally asked: <ul style="list-style-type: none"> <li>❖ To have a minimum percentage of home-grown crops for plants working on energy crops.</li> <li>❖ To use energy crops, as well as manure, produced within a given radius of the plant. This depends on the energy threshold of each substrate.</li> <li>❖ To assure substrate delivery by contracting external entities.</li> </ul> </li> <li>✓ Enough biomass/substrates of a certain quality available at a suitable price.</li> </ul>
<b>Insurance</b>	<p>Insurances should be effected, for example:</p> <ul style="list-style-type: none"> <li>✓ In case of operation interruption, fire damages, floods, accidents, physical damages and machinery failure</li> <li>✓ For construction work and general liability.</li> </ul>

#### Notes:

- A great deal of risks directly depends on the reliability of the technology used.
- The exact location of the plant should be decided before starting to negotiate for a loan<sup>w</sup> or any other financing mode. It has influence on social (e.g. neighborhood acceptance, etc.), economic (e.g. cost of substrates, presence of clients in the surroundings, etc.) and environmental consequences.
- A great storage capacity has to be installed to palliate the possible supply variations.

### 2.2.3 Criteria for the cost calculation and financing plan

Generally spoken a detailed cost calculation and financing plan based on a realistic scenario has to be presented but the profitability and return on investment of the project have to be guaranteed even on the worst case scenario.

Also maintenance costs have to be included in the financing plan, for approval by financiers. Typical maintenance costs for CHP plants<sup>2</sup> reach 0.3 to 2.5 €/kWh<sub>el</sub> and the global yearly costs of maintenance for other components comprise between 1.5 and 4% of the total investment.

A general cost/ revenue table for bioenergy projects is given in section 2.3: “General costs and revenues in Bioenergy projects”.

### 2.2.4 Criteria for the documentation

This part lists the different general documents that an applicant should consider to complete his application file for a bank and to clarify legal details. Document types and their details can vary depending on the country and the bank:

Criteria for the Documentation	Explanation/ parameters involved
<b>Project documentation</b>	<ul style="list-style-type: none"> <li>✓ Business plan comprising information about the whole project (e.g. projected plant, cost calculation &amp; financing plan, contracts, plans of the project site)</li> <li>✓ Permits and compliance to laws in force.</li> <li>✓ Insurance.</li> </ul>
<b>Personal/ Company documentation</b>	<ul style="list-style-type: none"> <li>✓ Personal details of the applicant.</li> <li>✓ Short curriculum vitae.</li> <li>✓ Last three income tax returns, pay slips or annual balance sheets.</li> <li>✓ Legal documents.</li> <li>✓ The permission procedures for the bioenergy plant (e.g. is a special legal form required? etc.).</li> </ul>

## 2.3 General costs and revenues in Bioenergy projects

Biogas and wood combustion projects imply several costs (i.e. investment, operation and maintenance costs) and revenues. The following table gives an overview of them, dividing them into two main cost & revenues phases, the first phase before plant operation - Investment costs (Planning, building of plant, equipment) and the second phase with construction start and plant operation - plant costs (financing, operation and maintenance):

	Costs	Revenues
<b>Before plant operation:</b>  <b>Investment costs (Planning, building of plant, equipment)</b>	<ul style="list-style-type: none"> <li>▪ Engineering costs, certificates<sup>d</sup>, etc.</li> <li>▪ A reserve of 5 % of the total investment costs shall be considered for extra costs (e.g. delays in construction, etc.).</li> <li>▪ Technical equipment (e.g. CHP plant, fermenter, combustion oven, stirring technology, etc.) buildings, storage facilities, infrastructure, grid connection, machinery (e.g. electronic components, etc.).</li> </ul>	<ul style="list-style-type: none"> <li>▪ none</li> </ul>
<b>With construction start and plant operation:</b>  <b>Financing, operation and maintenance of plant</b>	<ul style="list-style-type: none"> <li>▪ Financing depending on the type/ amount of capital.</li> <li>▪ Digestate management, fossil fuel, etc.</li> <li>▪ Personnel, repairing, insurance, etc.</li> <li>▪ Substrates (depending on e.g. type, storage capacity, proximity, etc.).</li> </ul>	<ul style="list-style-type: none"> <li>▪ Electricity and heat savings and selling.</li> <li>▪ Tipping fees<sup>cc</sup> in biogas management for waste, sales of digestate as organic fertilizer, etc.</li> </ul>

## 2.4 General example of investment and financing in the case of a bioenergy plant<sup>3</sup>

The following example is valid for a wood combustion plant without heat grid:

Investment costs	Share of the total investment	
Net Investment costs	75 to 85 %	
✓ Engineering	20 to 30 %	
✓ Technical equipment	50 to 65 %	
Side costs (e.g. planning, certificates, construction supervision, inspection, etc.)	10 to 15 %	Percentage of the net investment costs
Interests during construction (no income)	Approx. 5 %	
Liquidity Reserve	5 to 10 %	
Total	100 %	

Financing & funding	Share of the total investment	
Financing by equity	20 to 30 %	
Financing by bank	30 to 50 %	70 to 80 %
Funding	20 to 30 %	
Total	100 %	

The following aspects can be highlighted:

- A possible investment scheme gathers financing in addition to funding.
- Banks always ask to have extra cash-reserve corresponding for example to 5 to 10 % of the **total investment costs** in addition to the equity invested in the project.

Additional information:

- In this example financing refers indistinctively to traditional loan financing, project financing or capital obtained through leasing or an investment fund.
- Though equity is needed in all projects, each bank/ financier might have specific requirements concerning the equity, securities, etc. that the investor(s) has to provide. It is thus important for investors to get acknowledged on the assets of each financing option to select the most appropriate.

<sup>3</sup> Source: Biomasse – Leitfaden für Kreditinstitute – Handbuch zur Prüfung und Finanzierung von Biomasseheizkraftwerken (German), Forseo, Germany, 2008.

### 3 FINANCING OPTIONS: GENERAL DESCRIPTION, PROS & CONS

Depending on the investor/ investors there are plenty of different financing options that could and should be considered to start and operate a bioenergy project. The following chapter is going to present and explain these options and their differences.

#### 3.1 Equity

The use of state funding assistance, or financing by banks, requires a minimum percentage of equity, i.e. own capital.

It is important for the investor to be aware that:

1. Most of his available equity is necessary and used during the first phase of the project.
2. It is also important to keep enough funds (generally about 30% of capital are recommended) for further steps of the project as it is a prerequisite to be eligible for financing by banks.

Whenever insufficient equity is available for the project investor, he is given the availability to be assisted by different institutions (e.g. banks, cooperative associations, etc.), through various options and wise and profitable investments, to raise sufficient funds.

Another way to increase the equity may be the inclusion of additional shareholders and partners in the project and the issuance of shares. For more information on this option, see section 3.6 “Investment funds”.

#### 3.2 Financing by banks

Getting finance through credits<sup>c</sup> from private banks is the most commonly used method. Two main financing options through private bank credits can be distinguished: (Traditional) Loan financing and project financing.

##### 3.2.1 (Traditional) Loan financing

The (traditional) loan financing is the financing of an investment by private or business money loaned at an agreed interest rate for a fixed term of years.

##### Before getting the loan

The financier checks the financial background of the applicant in order to assess his reliability and the risks taken along with an engagement. Securities<sup>z</sup> are given to bankers in case the project end up failing. These could be estate, components of the biogas or wood combustion plant, private-/ company assets or any other asset that covers the loan sum. Financiers will also require that the investor has a liquidity basis on top of the equity he brings into the total investment. This is aimed at covering extra costs that could happen, during the construction phase for example.

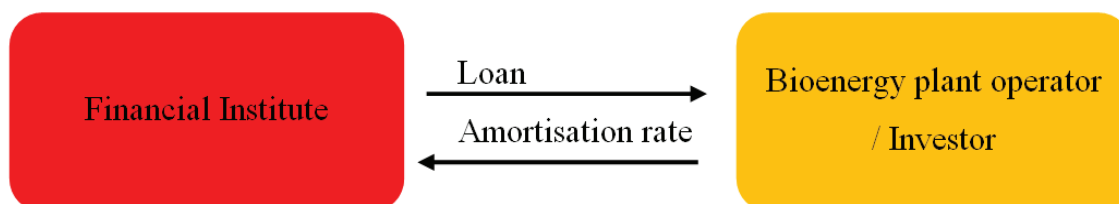
As mentioned before, the prospects of project profitability will be carefully looked through. Both, the risks taken by the bank and the estimated economy of the plant have severe impact on the interest rate agreed between the financier and the applicant.

## Repayment of the loan

Once the loan has been provided, the applicant has to pay it back to the financial institute/bank through pre-agreed monthly amortisation rates<sup>a</sup> which consist of loan-basis repayment and interest rates.

The duration of the loan payback period as well as the “grace period” depends on the prerequisites of each individual bioenergy project. Nonetheless, the repayment scheme is the following:

1. The investor is granted a “grace period” during which he only has to repay interest rates. This period usually lasts between one and two years.
2. Afterwards, there is a payback period in which the applicant has to repay both interest rates and the loan basis. The length of the payback period is selected so that it covers the life-expectancy of the main plant component i.e. the CHP unit. On average, this period lasts 10 to 15 years.



**Figure 1:** Relation between financier and farmer (bioenergy plant operator/ investor) in a traditional loan case.<sup>4</sup>

### 3.2.2 Project financing

In this case, a bioenergy project dedicated company is created. The financing is thus only intended for the specific bioenergy production activity of the company, so **the cash-flow created by the energy production activity repays the loan.**

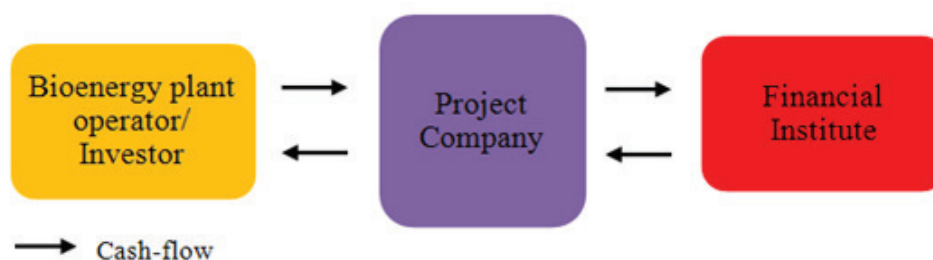
Thus, the bank makes its decision, in the first place, on the estimated cash-flow of the future plant. As opposed to traditional loan financing, the financial background of the applicant is not basis for the assessment of the solvency. The banker will not have access to the financial details of the applicant (farmer/forest owner) or its own farming- or foresting-company capital. In fact, the financier’s investment is secured by the estimated cash-flow of the bioenergy plant along with all assets related to the plant operation and property.

The fact that this kind of financing can only be repaid through cash flow, when the project is operational, results in considerably higher risks for bankers than with conventional loan financing. For this reason, banks strive to minimize risks as much as possible and they assess thoroughly each aspect of the project. The applicant should give exhaustive data on each project detail. This implies increased administrative work for both parts: Applicant and financier.

<sup>4</sup> Source: [Possibilities of financing a biogas investment](#) (English), Rutz and Ferber (WIP – Renewable Energies), IEE Project BiogasIN, Munich, Germany, 2011



Project financing is widely spreaded, although there are some administrative expenditures for the applicant. For bioenergy projects it offers the possibility to gather expertise whenever several partners are involved in the project company. Thus, financial institutes<sup>1</sup> may be more willing to provide additional or parallel loans for the applicant which they would be in the traditional loan case.



**Figure 2:** Exemplary relations and flows between stakeholders in a bioenergy project financing.<sup>5</sup>

### Example of project financing

The following example shows the significance of some parameters to achieve a successful cost calculation for project financing. Here is a brief, **simplified**, comparison between three different scenarios within the case of biogas production. Case 1: scenario only with bank financing, case 2: scenario with bank financing and funding and case 3: scenario with a mix of bank financing, funding and equity. The percentages of financing mixes used in each scenario are listed below:

Share of Scenarios	Funding	Bank financing	Equity	Total
1) Extreme	0 %	100 %	0 %	100 %
2) No equity	30 %	70 %	0 %	100 %
3) Typical project financing	30 %	40 %	30 %	100 %

The following table shows a calculation of loan costs for the three different scenarios. The calculation is made for year 1 of operation with full-capacity operation. In this simplified example, the following parameters have been set:

- **Bank financing:** Loan interest rate of 10 %.
- **Funding:** The subsidies are considered as grants and thus carry no interest fees or assimilate. That says they will be considered as funds offered to the investors.
- **Equity:** Refers to the own capital of the **bioenergy project-dedicated company** i.e. part of the capital that has been invested by stakeholder(s) in the company.

Note: The **grace period is not considered** here.

<sup>5</sup> Source: [Possibilities of financing a biogas investment](#) (English), Rutz and Ferber (WIP – Renewable Energies), IEE Project BiogasIN, Munich, Germany, 2011

	<b>GENERAL PLANT DATA</b> <i>(Parameters that are <b>common</b> to each scenario)</i>
<b>Input/ Substrates</b>	12.500 tons
<b>Output power</b>	500 kW
<b>Output heat</b>	575 kW
<b>Total investment</b>	<b><u>1.750.000 €</u></b>
	<b>Revenues</b>
<b>Yearly electricity income (12 €ct/kWh)</b>	425.000 €
<b>Yearly heat savings</b>	50.000 €
<b>Total yearly revenues (A)</b>	<b><u>475.000 €</u></b>
	<b>Yearly costs</b>
<b>Substrates</b>	100.000 €
<b>Digestate retreatment</b>	50.000 €
<b>Labour</b>	30.000 €
<b>Technical Consultancy</b>	25.000 €
<b>Maintenance<sup>6</sup></b>	100.000 €
<b>General costs</b>	25.000 €
<b>Subtotal yearly costs (B)</b>	<b><u>330.000 €</u></b>

<sup>6</sup> Between 1.5 and 4% of the total investment costs; yearly, source: [Criteria to assess biogas investments: Guidelines for financing institutes and investors](#) (English), Ferber and Rutz (WIP – Renewable Energies) et. al. IEE Project BiogasIN, 2011.

	SPECIFIC DATA (Parameters that are specific to each scenario)		
Scenario	1) Extreme	2) No equity	3) Typical project financing
	Financing scheme		
Investment grant	0 €	525.000 €	525.000 €
Bank loan capital	1.750.000 €	1.225.000 €	700.000 €
Equity	0 €	0 €	525.000 €
	Specific additional costs		
Interests payments (C)	172.000 €	121.000 €	63.500 €
	Total yearly costs		
(D) = (B) + (C)	<b><u>502.000 €</u></b>	<b><u>451.000 €</u></b>	<b><u>393.500 €</u></b>
	Financial result overview		
Net income/ Cash-flow (A) - (D)	-27.000 €	24.000 €	81.500 €
Loan basis repayment	-48.500 €	-37.000 €	-21.500 €
Earnings	<b><u>-75.500 €</u></b>	<b><u>-13.000 €</u></b>	<b><u>60.000 €</u></b>

Observations and conclusions on this case:

- The role of state funding is major, as it is neither investors' own capital nor a debt capital. Thus, it:
  - Allows the investor to do further investments (own capital partially charged).
  - Reduces the debt costs as there are no interests on granted capital.
- Concerning the revenues:
  - A direct heat usage or feeding into the heat grid should be considered to increase revenues.
- Normally the repayment scheme is as follows:
  - The repayment of interests is high at the beginning and decreases afterwards.
  - The loan basis repayment follows an opposite evolution and balances the decrease in the repayment of interests keeping the overall annuity at the same level.

Notes:

- Normally a security margin should be considered including the efficiency of the plant, the reliability of the machinery and the availability and price of substrates (variation limited by long-term contracts).
- Yearly cost calculations are necessary to determine the lifetime of a plant. To find more data on funding, please refer to the implementation guide booklet "Implementing a bioenergy plant – Guideline for farmers", also delivered by IER (2012) within the BioEnergy Farm project.

## Summary on financing by banks

The following table shows the general legal parameters and risks on financing by banks from the point of view of investors (farmers/ forest owners):

Aspect	Project financing	Traditional loan financing
<b>Legal demands/ options</b>		
<b>Establishment of a bioenergy project-dedicated company</b>	Possible (More administrative complexity for the farmer or forest owner)	Not possible (Bioenergy activity not separated from other activities of the investor)
<b>Administrative complexity</b>	High	Low
<b>Number of parts involved in financing</b>	<ol style="list-style-type: none"> <li>1. Operators/ Investors</li> <li>2. Project company</li> <li>3. Bank</li> </ol>	<ol style="list-style-type: none"> <li>1. Operator/ Investor</li> <li>2. Bank</li> </ol>
<b>Operation of the plant</b>	Cooperation with shared responsibilities.	Cooperation is possible, but only one person is liable for the plant.
<b>Legal responsibility of the plant</b>	Project dedicated company	Investor
<b>Repayment of the bank loan</b>	Monthly rates taken from the global income of the farmer or the forest owner and cash-flow from the operation of the plant.	Monthly rates taken from the global income of the farmer or the forest owner.
<b>Securities</b>	Investor liable only with the asset he put in the project company.	Investor liable with private asset/ plant components: More risks for investors!
<b>Capacity to do further investments</b>	Yes	Limited (private property is already charged).
<b>Risks</b>		
<b>Assessment of financial performance history</b>	No: The bioenergy-project dedicated company is only created for project purposes!	Yes: The investor's financial background is carefully looked through by banks.
<b>Assessment of the project assets (see section 2.2)</b>	Very thorough	Very thorough
<b>Significant investment in equity</b>	Yes: 20 to 35 %	
<b>Leverage effect (Use of external capital in addition to equity)</b>	Strong: The project company enables the investor to get more debt capital from banks.	Low to moderate
<b>Risks for the bank</b>	Very high	Low
<b>Interest rates</b>	Very high	Moderate to high

### 3.3 Contracting

Generally spoken this refers to a takeover of investment costs, services, etc. by others (contractors) and it also may include all the phases of project: planning, construction, operation and maintenance. In some cases it is also referred to as the “Operator model” because in each variation of this option, the farmer or forest owner has a minor role often limited to the operation of the plant or even sometimes, just the supplying of substrates/ feedstock.

In addition, great care should be given to country specific data on this type of financing (See section 5.1 “Country specific data on Bioenergy project financing”).

#### Advantages and disadvantages of contracting<sup>7</sup>

Contracting can take various forms; in the following table, the focus is set on general advantages and disadvantages of contracting before studying two possible schemes:

Advantages	Disadvantages
The farmer or forest owner does not have to create a company or to invest in the project through private or own company capital. Thus he has a lower financial risk <sup>m</sup> .	The bioenergy plant remains property of the contractor for a predetermined period, thus the farmer has no or little influence on technical decisions.
A professional bioenergy expert (contractor) is responsible for the operation of the plant and its maintenance (e.g. case of plant-operation or energy contracting).	The farmer’s earnings are diminished by the contracting rates.

#### 3.3.1 EPC – Energy performance contracting<sup>h,i</sup>

It is used to improve already existing plants. In this case, a so called energy service company (ESCO<sup>j</sup>) implements and finances energy saving measures at the client’s (farmers/ forest owners) property. The payment is made by the client to the ESCO on the base of the measured energy efficiency improvements. The ESCO guarantees that savings will reach or exceed the global payment of the client (divided in annual shares) within seven to ten years. An ESCO could be a local or regional energy agency as well as a private company providing energy services.

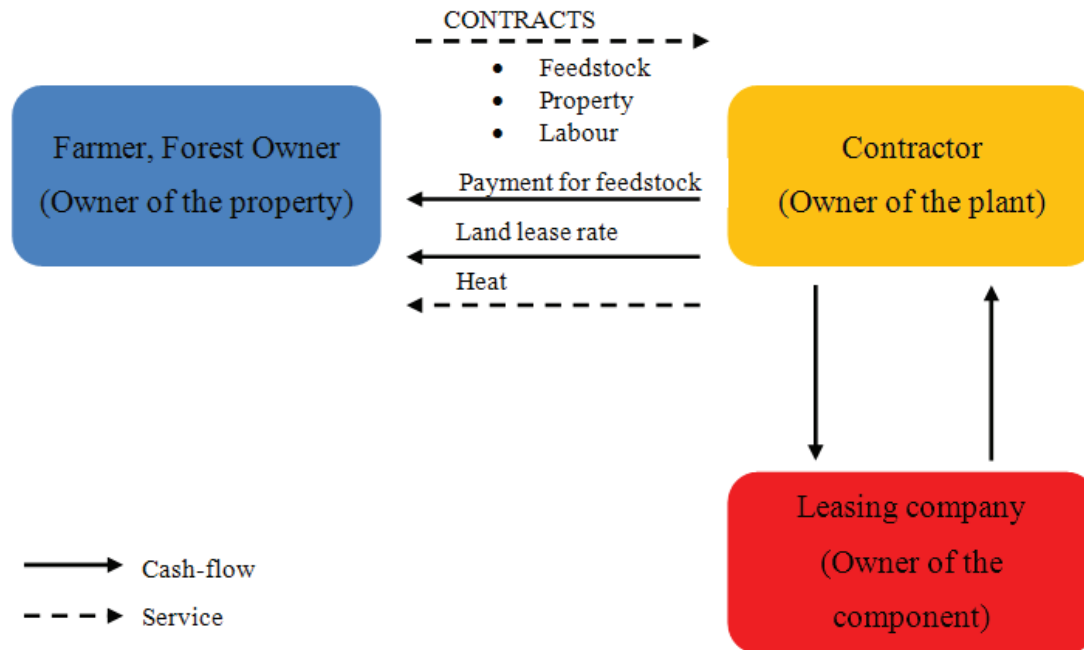
#### 3.3.2 Energy or Plant-operation contracting

In this case, an external company operates and maintains the bioenergy plant located on the farmer’s or forest owner’s lands. This is especially interesting for people willing to produce bioenergy from the organic waste on their lands but who have no or very little expertise in bioenergy solutions and lack capacity to invest money and/ or time in such projects.

<sup>7</sup> Source: [Possibilities of financing a biogas investment](#) (English), Rutz and Ferber (WIP – Renewable Energies), IEE Project BiogasIN, Munich, Germany, 2011

### Example:

A generic contracting scheme is described below. The focus is set on the possible relations between the contractor and the farmer or forest owner:



**Figure 4:** Contracting<sup>b</sup> between a contractor (owner of the plant) and a farmer (supplier and operator).<sup>8</sup>

In this second case:

- The farmer or forest owner provides a lot to the contractor, including:
  - The piece of land on which the plant is built.
  - Labour; the farmer or forest owner operates the plant.
  - Substrates.
- The contractor:
  - Benefits from all these services and pays the farmer or forest owner in counterpart. In some cases, part of the payment can be under the form of heat or electricity partial use by the farmer or forest owner for its own facilities (e.g. heat the stables, dry crops or wood stocks, etc.).
  - Takes responsibility for all that is related to financing.

<sup>8</sup> Source: [Possibilities of financing a biogas investment](#) (English), Rutz and Ferber (WIP – Renewable Energies), IEE Project BiogasIN, Munich, Germany, 2011

### 3.4 Leasing

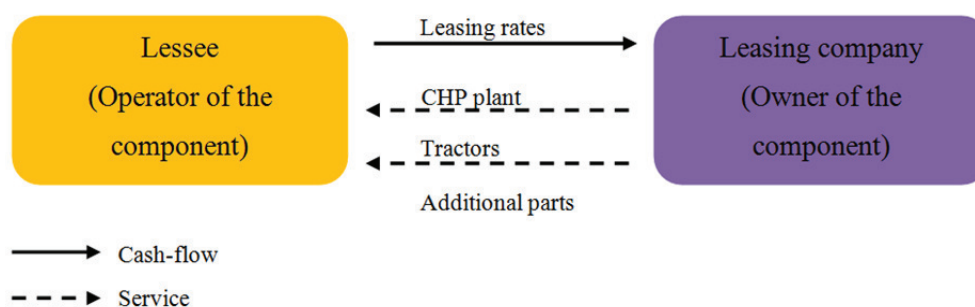
In the case of leasing, the farmer/ forest owner (lessee<sup>u</sup>) does not have to provide equity as in other financing options and there are two well-identified parts:

- The operator of these goods (lessee<sup>u</sup>).
- The leasing company (lessor<sup>v</sup>) which provides and owns material and various components (plant, machines, etc.).

In the case of leasing, the leasing company builds and finances the plant by company capital or equity capital from leasing partners. After the end of the construction, the leasing company leaves the plant to the lessee who bears the risks of operation. The lessee keeps all the revenues of the bioenergy plant but has to pay pre-defined leasing rates to the leasing company for the period of time the leasing contract was established. After the leasing contract is over, the leased object can:

- Be sold to the lessee at its residual value.
- Be taken back by the lessor at his own expense.

In the case of bioenergy plant facilities the deconstruction of a digester or a wood oven for example, can be costly and economically uninteresting for the lessor.



**Figure 3:** Relation and flows between the lessee and the lessor.<sup>9</sup>

Advantages <sup>12</sup>	Disadvantages <sup>12</sup>
A farmer/ forest owner can get expertise in bioenergy plant operation from leasing partners.	The leasing company does not have direct influence on the operation of the plant. Thus, success or failure of the project is beyond their responsibility. Farmers who gather in a leasing should therefore pay attention to the operator skills.
External investors such as individual farmers or forest owners have the opportunity to join the leasing company.	
Farmers or forest owners with low equity capital have the opportunity to construct and to operate a bioenergy plant by themselves.	The overall amount paid for a device by the lessee within the contract period is usually a bit more expensive than its original price (interests).
The leasing company legally owns the leased goods. Therefore it is a warranty for farmers of good operational state of the machinery.	

<sup>9</sup> Source: Possibilities of financing a biogas investment (English), Rutz and Ferber (WIP – Renewable Energies), IEE Project BiogasIN, Munich, Germany, 2011



### 3.5 Renting

In this case, the client pays a fixed monthly rate to rent the goods he needs, no downgrading of that fare can be expected. Therefore, along the years, there is a gap forming between the real value of the good and the associated monthly rates that the client has to pay. To compensate this difference, renters can benefit from tax diminishment to ease financial impact of such investments.

In the case of bioenergy plant though, renting is often only considered for temporary needs of machinery, for example a woodchipper, etc.

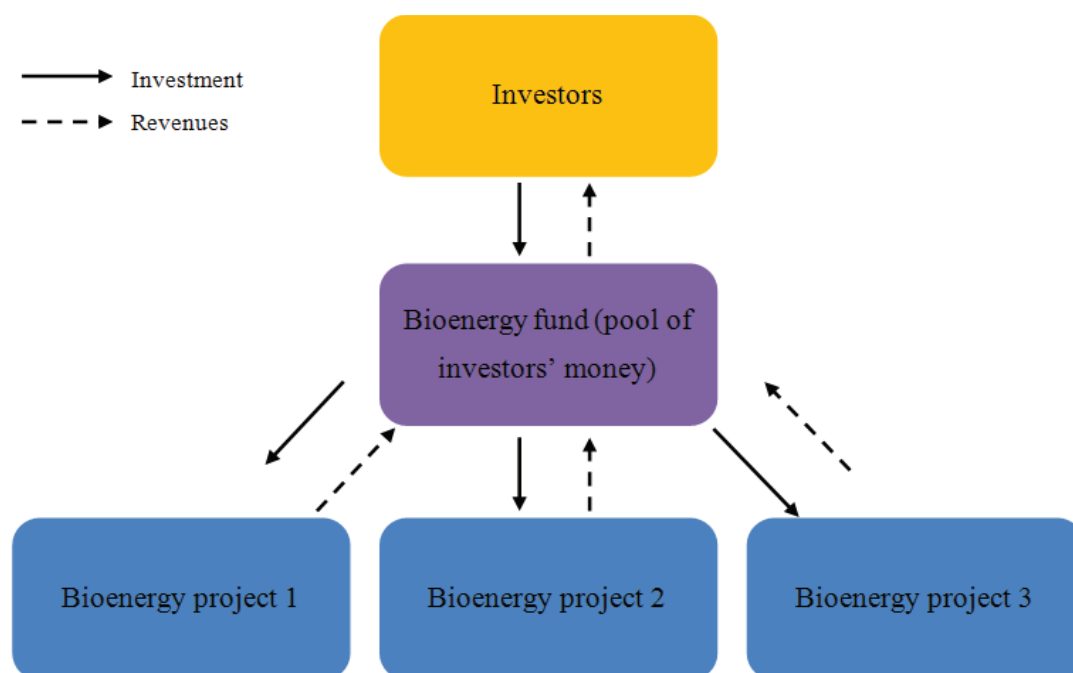
### 3.6 Investment Funds

A group of investors that want to invest their money profitable can gather their capitals in a common investment fund, which is the equivalent of a community operation of several plants. The signatories of the shares are involved as stakeholders in the project company. This means that each partner or co-entrepreneur is involved with his share of all capital gains and losses of the company. Losses that may occur, particularly in the initial phase of the project will be allocated pro rata to the investors. In case of losses, the individual losses will be deductible from both private investor wage and income tax. The process of combining several investors' funds rises the global equity capital which allows the strengthening of the project itself and divides the risks for the investors.

Note:

- In the same way as leasing, investment funds can be useful for bigger projects to acquire heavy machinery necessary to operate forest or agricultural resources.

This financing option can result in various structures and relations between individual investors. Below is given a generic structure of those relations:



**Figure 6:** Investment funds for bioenergy plants<sup>10</sup>

<sup>10</sup> Source: [Possibilities of financing a biogas investment](#) (English), Rutz and Ferber (WIP – Renewable Energies), IEE Project BiogasIN, Munich, Germany, 2011

Advantages <sup>13</sup>	Disadvantages <sup>13</sup>
The farmer or plant operator does not have to take out a loan and charge estate.	Investors are regularly liable with all assets invested in the fund.
The revenue of each partner is proportionally linked to its own investment.	Investors have no influence on the operation of the bioenergy plant. Therefore, they have to assess thoroughly the operator(s) skills.
The investors' confidence in renewable energy funds is continuously rising due to good performance of such funds in the past few years.	To participate in a renewable energy fund, a bioenergy plant operator often has to undergo a complex application procedure in order to prove particular ecological interest and/ or skills for bioenergy plant operation and maintenance.
The plant operator must not necessarily provide securities. Operate a plant funded by an investment is therefore possible even for a farmer with low equity/ investment capacity.	

## 4 COUNTRY SPECIFIC DATA ON BIOENERGY PROJECT FINANCING

This chapter shows the specific financial options and country specific examples of the six countries (Germany, The Netherlands, Belgium, Italy, Poland and Estonia) within the BioEnergy Farm project.

### 4.1 Germany

#### Bioenergy projects in Germany<sup>11</sup>

In Germany, besides investors such as municipalities, energy or waste companies and/ or industry, also private investors (farmers or forest owners) gather to invest in a bioenergy plant and operate it. The capital cost per kW capacity varies according to the size and type of the plant, the type of substrates and the location. For wood combustion plants the capital cost per kW capacity are generally comprised between 100 and 400 €/kW and generally spoken the typical capacity of a biomass plants is about 1 to 5 MW so investment costs are comprised between 0,5 and 3 million Euros. For biogas plants the capital cost per kW capacity are generally comprised between 3500 and 7000 €/kW and generally spoken the typical capacity of a biomass plants is about 75 to 500 kW so investment costs are comprised between 1 and 3 million Euros. Thus, investors can very seldom finance their projects only with equity. Projects often include a large part of debt capital ranging from 30 to 45 % as far as capital from banks is concerned.

#### 4.1.1 Financing

##### ▪ EQUITY

This option is often used in combination with other financial options.

##### ▪ FINANCING BY BANKS

Besides the house bank, which should be contacted first in financial questions about a bioenergy project, there are some banks specialized in bioenergy projects like the Umweltbank AG, the Deutsche Zentral-Genossenschaftsbank (DZ Bank), the Deutsche Kredit Bank (DKB) and the Hypovereinsbank. The equity asked by those banks is generally between 20 and 30 % of the total investment.

Generally speaking, each bank can finance a variety of projects, ranging from Short Rotation Forestry (SRF) to Combined Heat and Power plants (CHP). Due to the high demand in the past 20 years, financiers developed a variety of financing mixes adapted to each situation. Banks also developed a technical expertise on the various wood combustion and biogas energy production solutions.

Note:

- Several funding and low interest financing options are given by public institutions such as “Kreditanstalt für Wiederaufbau” (KfW) and “Landesrentenbank” (LR) in Germany. This low-interest financing option is delivered through private banks. To obtain complete information about these options please refer to the implementation guide booklet “Implementing a bioenergy plant – Guideline for farmers”, section 8.4 “Subsidy regulations”.

To see an example of a loan request form, edited by the Umweltbank AG, for a biogas project, go to:

[https://www.umweltbank.de/pdf/Kredit Antrag\\_Biogas.pdf](https://www.umweltbank.de/pdf/Kredit Antrag_Biogas.pdf)

<sup>11</sup> Source: Examples for financing of biogas projects in Germany, Austria, The Netherlands, Denmark and Italy (English), Hahn (IWES), Rutz (WIP – Renewable Energies) et. al. IEE Project BiogasIN, 2010

## ▪ CONTRACTING

The four principal forms of contracting in Germany<sup>17</sup> and their general features are:

- ✓ **EPC – Energy performance contracting:** Involves energy supply.
- ✓ **Energy or Plant-operation contracting:** Involves the whole technical aspect of the plant and the energetic management.
- ✓ **Technical plant management:** Involves zoned crafts (Is not going to be explained).
- ✓ **Financing contracting:** Involves an investment relief through financing takeover.

Important information on contracting can be found in the DIN standard 8930 part 5 "Contracting" from November 2003. The DIN 8930-5 includes, among others, definitions of "Contracting", "Contractor" and "Contracting takers".

The most active contractors in Germany are listed below:

<http://www.carmen-ev.de/dt/energie/bezugsquellen/contractoren.html>

### EPC – Energy performance contracting

An example of energy contracting request form for a wood combustion project, edited by Umweltbank, can be found on:

[https://www.umweltbank.de/pdf/Kredit Antrag\\_Waerme.pdf](https://www.umweltbank.de/pdf/Kredit Antrag_Waerme.pdf)

The following table shows the potential clients<sup>12</sup> for energy supply, i.e. it show when this option should be taken:

Type of client	Potential interest and profitability of energy supplying
Swimming pool, Schools, Hospitals, Large public housing Foresters with wood-drying facilities Dairies, Breweries, Slaughterhouse Residential areas with dense development and multi floors buildings	High Potential
Purely residential area with dense development Small community buildings Scattered businesses Small or medium industry buildings	Medium Potential
Purely residential area with scattered development Little groups of family houses Small isolated facilities with little energy needs	Not to consider

### Energy or Plant-operation contracting<sup>17</sup>

In Germany, contracting companies propose to farmers and forest owners to build and operate a bioenergy plant on their own land at their own expense and risks. The lease of land is framed into a legal land registry contract and may last from 5 to 20 years.

<sup>12</sup> Source: [Wann rechnen sich landwirtschaftliche Biogasanlagen? – Betrachtung des Wärmenetzes](#) (German), Kilburg (C.A.R.M.E.N. e.V), Rosenheim, Germany, 2010

<sup>17</sup> Source: Marktübersicht der Energiecontracting-Anbieter (German), m+p gruppe (Der Facility Manager), Germany, 2010

### Example of a plant-operation contracting<sup>13</sup> for wood-combustion:

This example is inspired of the real case “Plant-contracting in Freiburg” as presented in “Biomasse – Leitfaden für Kreditinstitute – Handbuch zur Prüfung und Finanzierung von Biomasseheizkraftwerken, Forseo“(2008).

In Meppen, a company A operates about 25 bioenergy plants. Among others, it operates a plant Y located close to Meppen city that provides heat for 135 apartments and 8 additional public buildings. The owner of the plant is Mr. M, a well-known farmer of the area.

The distribution network extends on several streets in the neighborhood with a total length of 1 km and a yearly capacity of 1400 MWh. In the central heating room two wood pellet boilers, a substrate conveyer, a storage tank and accessories are installed.

Technical description of the devices:

- Boiler 1: 150 kW
- Boiler 2: 540 kW
- Storage facility volume: 90 m<sup>3</sup>
- Storage facility weight capacity: 50 t of wood pellets

The contracting has the following assets and characteristics:

- Mr. M contacted the company A because they were well known in Meppen area.
- A contract was set between the two parts stating that:
  - The company A will build and operate for 20 years a plant Y on Mr. M’s lands.
  - The company pays an agreed monthly fee to Mr. M for the renting of the plant building.
  - The company A owns the plant and is thus completely responsible for it.
  - The responsibility of the company A stops at the limits of the plant extent. It is not responsible for the network maintenance and operation.
  - It is Mr. M’s work to educate and deal with neighbors in order to seek acceptance and support for the project.
  - The company A is also responsible for management of the plant, substrate supplying and storage as well as the optimization of the installations.

Additional points of interest:

- Banks may be involved, under certain circumstances, in contracting as a debt provider for the contractor or for the client if he needs additional liquidity to meet his duties.
- Contracting companies respond to tenders and have to provide the client with the most attractive bid to get a contract.

Advantages for Mr. M:

- No capital commitment and no investment risks.
- Regular guaranteed income.
- An efficient production and use of energy with state-of-the-art facilities.
- Discharge of operation and maintenance.
- Quality and reliability of service.

<sup>13</sup> Source and generic example inspired from: Biomasse – Leitfaden für Kreditinstitute – Handbuch zur Prüfung und Finanzierung von Biomasseheizkraftwerken (German), Forseo, Germany, 2008, page 32

## Financing contracting

It is very similar to leasing. Here the contracting company selects the technology of main energy facilities that will be built on the farmer's or forest owner's site. In addition to financing, construction and planning, the contractor assumes, if necessary, the optimization and service functions. The success of risk remains with the client.

This form of contracting is widely spread for industrial and commercial enterprises that want to benefit, for their planned energy-related investments, of the experience of an engineering partner.

- **Leasing**

Plays a minor role within the financial options relevant for Germany.

- **Renting**

Plays a minor role within the financial options relevant for Germany.

- **Investment funds**

The investment funds allow to gather each partner's equity and to invest this on common projects reducing the recourse to external financing means and distribute costs (e.g. administrative, interest rates, etc.). Therefore, fund financing yet plays a growing role on the bioenergy project market.

In Germany only a few projects are realized with investment funds, for example:

- “Biogasfonds Hünxe” of the Aufwind Schmack Betriebs GmbH & Co. Hünxe Biogas KG:  
[http://www.umweltfondsvergleich.de/fondsportraits/biogasfonds\\_huenxe.html](http://www.umweltfondsvergleich.de/fondsportraits/biogasfonds_huenxe.html)
- “Biogasfonds Sachsen-Anhalt“ of the ABO Wind Biogas Sachsen-Anhalt GmbH & Co. KG:  
<http://www.abowind.com/de/kapitalanlagen/fonds-biogasanlage-sachsen-anhalt.html>

### Example of “ABO Wind Biogas Sachsen-Anhalt GmbH & Co. KG.” investment fund<sup>14</sup>:

It was created by ABO Wind AG, in order to promote the production of local and sustainable energy as well as involve citizens in clean energy projects.

“ABO Wind Biogas Sachsen-Anhalt GmbH & Co. KG.” (Short: biogas KG) owns three **biogas** plants in the villages of:

- Kemberg (Wittenberg)
- Kunrau and Miesterhorst (Altmark Salzwedel)

The plants are located on three independent farms in Sachsen-Anhalt and are each operated year-round by biogas KG own crews of 10 people. The plants are fed with substrate such as cattle or poultry manure as well as grass or corn silage.

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<sup>14</sup> Source: *Biogasfonds Sachsen-Anhalt – Beteiligungsangebot*, <http://www.abowind.com/de/pdf/Biogasprospekt.pdf> (German), ABO Wind AG, Wiesbaden, Germany, 2005.

It is possible for external investors to participate in the fund and therefore become a co-owner of the plants (limited partnership). Their degree of responsibility is pro-rata of their equity share in the company.

The investment for the three biogas plants including permits, infrastructure, construction and start of operation costs is 5.15 € millions. The biogas KG has acquired the biogas plants at a fixed price, so that no additional investment is required. The loans for long-term financing the biogas plants are protected with relevant insurance.

The earnings forecast of the plants are secured thanks to:

- Contracts covering the entire life of the plants for the feeding of the plants with liquid manure, solid manure and renewable raw materials.
- The guaranteed feed-in tariffs<sup>k</sup> of an average of 0.165 €/kWh for the first 20 years of operation.
- Security margin considering:
  - Possible technical issues: 6 % margin.
  - Additional safety margin: 10 %

The average production has been set to approximately 9.56 millions kWh forecasts, while for the first year of operation, 75 percent of the expected feed revenues were scheduled.

The limited liability partnership includes the following frames:

- Total contribution: 1.850.000 €.
- Minimum investment: 5.000 €.
- Minimum investment for residents of the villages of Kember and Kunrau/Miesterhorst: 3.000 €.

The concept of participation is included in a solid frame:

- The ABO Wind AG has a fixed price guarantee for the Biogas plants, including planning, design and sales as a general contractor - including 2 years warranty.
- The revenue risk is spread over three locations; the plants are not operated by individual farmers, but entrepreneurially - run agricultural cooperatives each with approximately ten employees.
- The continuous supply of substrates is contracted by the local agricultural co-operatives secured over the entire project period.
- The debt capital financing is ensured, so that the implementation of the project is feasible, regardless of the interest in participation.
- ABO Wind AG provides for the entire limited partnership a guarantee placement and has the funding to ensure equity.
- The agricultural cooperatives take over the respective technical operation of biogas plants.
- The components of the plants are state-of-the-art devices.
- A full-maintenance contract for the first ten years is signed with the manufacturer of the CHP.
- ABO Wind deals with the technical and commercial management.
- All systems as well as the loss of revenue are completely insured.



### 4.1.2 Funding

Some specific funding options will be mentioned in this section aiming at a better comprehension of the whole financing process, but it is not part of this booklet to describe funding more precisely. To find more data on funding options and comprehensive examples of funding calculation, according to technical specifications and use of the network capacity, for heat delivery network, please refer to the implementation guide booklet “Implementing a bioenergy plant – Guideline for farmers”, also delivered by IER (2012) within the BioEnergy Farm project.

For more information please follow the links:

- <http://www.carmen-ev.de>
- <http://www.bio-energie.de/foerderung>

Specific funding options in Germany are:

#### a) EEG 2012<sup>15</sup>:

EEG regulates both kind of bioenergy forms (i.e. biogas production and wood combustion). The EEG 2012 set the following feed-in tariffs for electricity sourced from biomass:

Plant production (rated average annual capacity)	Subsidy in €/kWh (KWK bonus included)
Up to 150 kW	14,3
Between 150 kW and 500 kW	12,3
Between 500 kW and 5 MW	11,0
Between 5 MW and 20 MW	6,0

These figures are based on the rated average annual capacity and feed-in tariffs are applicable for share of production comprised in each category.

For example, a plant with rated average annual capacity of 750 kW will deliver its electricity on the network with the following pricing:

- 150 kWh at 14.3 €cts (share up to 150 kW averaged capacity).
- 350 kWh at 12.3 €cts (share comprised between 150 kW and 500 kW of averaged capacity).
- 250 kWh at 11 €cts (share above 500 kW of averaged capacity).

This equals an average price of 12.27 €cts/kWh.

In the EEG 2012 there are some differences in comparison to previous versions. On previous versions there used to be several bonuses that projects could cumulate such as for example:

- Emissions (formaldehyde) bonus.
- NaWaRo (Nachwachsenden Rohstoffen) bonus.
- Manure bonus.

<sup>15</sup> Source: Erneuerbare Energie Gesetz 2012 [https://energypedia.info/images/c/cf/Eeg\\_2012\\_bf.pdf](https://energypedia.info/images/c/cf/Eeg_2012_bf.pdf), 2012

Now, a given biomass project can either have:

- A fixed bonus salary depending on its power production whenever it reaches all the different criteria that were mandatory to get single small bonuses at the same time.
- Have no subsidy at all if not all of the above criteria are reached.

For the case of upgraded biogas there are fixed feed-in tariffs and the price varies according to the amount of biogas upgraded for the grid:

- Up to : 700 m<sup>3</sup> = 3 €cts/kWh.
- Between: 700 m<sup>3</sup> and 1000 m<sup>3</sup> = 2 €cts/kWh.
- Between: 1000 m<sup>3</sup> and 1400 m<sup>3</sup> = 1 €cts/kWh.

#### **b) Gasnetzzugangsverordnung (GasNZV) – Gas Network Access Ordinance:**

This section is only relevant for biogas plant investors and it is related to the sales of bio-methane (upgraded biogas) on the grid.

In the case of GasNZV there are no fixed feed-in tariffs and the price varies according to the market price of natural gas and the sale of biogas as “green energy”. The last version of the bio methane selling regulation is from 2010<sup>16</sup> and sets the following rules and frames:

The grid operators are obliged to grant priority access to plants which have put in an access request.

The grid access costs are split between the grid operator and the bio methane supplier as follows<sup>19</sup>:

- 75 % of the costs are taken over by the grid operator.
- 25 % of the costs are taken over by the plant operator.

According to GasNZV, this repartition of the costs applies for the connecting pipeline up to 10 km as well as additional parts (e.g. gas pressure metering plant, compressor, calibrated measurement plant, etc.). The grid operator owns it and thus has to cover related costs of maintenance and operation.

When the connection pipeline length is below 1 km, the bio methane costs for the supplier should never overcome 250.000 €.

Additional information can be found on the website of “Biogaspartner” website at the addresses given at “4.1.3/ General information” and in the references.

<sup>16</sup> Source: Gas Network Access Ordinance, <http://www.biogaspartner.de/index.php?id=10141> (German), Biogas Partner, Dena, last consulted: February 2012

### 4.1.3 Further information and consulting

In Germany there are many organizations that promote and help the development of renewable energies. Links to some relevant websites of environmental and energy partners are listed:

Agency	Website
<p><b>Bundesverband der Energie- und Klimaschutzagenturen Deutschlands (EaD)</b></p> <p>It is the joint representation of German regional and local energy- and climate protection-agencies. Additional members of EaD are other organizations that are working for the promotion of energy efficiency and support the same goals as energy agencies. For farmers and forest owners these agencies help them with realization of their bioenergy plant, not only with feasibility studies, concept elaboration, dimensioning, etc., but also with the financing of such projects.</p>	<p><a href="http://www.energieagenturen.de">www.energieagenturen.de</a></p>
<p><b>Deutsche Energie-Agentur GmbH (dena)</b></p> <p>German competence centre for energy efficiency, renewable energies and intelligent energy systems. Its aim is to create economic growth and secure prosperity while reducing energy use. It develops markets for energy efficiency and renewable energies with actors from politics, economics and society. Dena focuses primarily on market-based instruments and innovative energy services, which are flanked by regulatory policy and market preparation, also on consulting and stakeholder processes.</p>	<p><a href="http://www.deutsche-energie-agentur.de">www.deutsche-energie-agentur.de</a></p>
<p><b>Fachagentur Nachwachsende Rohstoffe e.V. (FNR)</b></p> <p>The main role of FNR is to support research and development in the area of renewable resources. It also informs the public about current research results, gives advice on a wide range of applications of renewable energy resources and organizes and takes part in scientific events. But it also supports farmers /forest owners financially with different development programs.</p>	<p><a href="http://www.bio-energie.de">www.bio-energie.de</a></p>

Further addresses, websites and links:

- Internationales Biogas und Bioenergie Kompetenzzentrum (IBBK)  
Telefon: +49 7954 926203  
[www.biogas-zentrum.de](http://www.biogas-zentrum.de)  
[info@biogas-zentrum.de](mailto:info@biogas-zentrum.de)
- Regionale Bioenergieberatung in der Landwirtschaft  
[www.bioenergie-portal.info](http://www.bioenergie-portal.info)
- Fachverband Biogas e.V. (FvB)  
[www.biogas.org](http://www.biogas.org)  
[info@biogas.org](mailto:info@biogas.org)
- Thüringer Landesanstalt für Landwirtschaft (TLL)  
<http://www.thueringen.de/de/tll/>
- Centrales Agrar-Rohstoff-Marketing- und Entwicklungs-Netzwerk e.V. (C.A.R.M.E.N)  
<http://www.carmen-ev.de/>
- Institut für Energiewirtschaft und Rationelle Energieanwendung (IER), Universität Stuttgart  
[www.ier.uni-stuttgart.de](http://www.ier.uni-stuttgart.de)
- Deutsches BiomasseForschungsZentrum (DBFZ) gGmbH  
[www.dbfz.de](http://www.dbfz.de)  
[info@dbfz.de](mailto:info@dbfz.de)

For further addresses, websites and links see the references or refer to the implementation guide booklet “Implementing a bioenergy plant – Guideline for farmers” section 8.5, also delivered by IER (2012) within the BioEnergy Farm project.

## 4.2 The Netherlands

### Bioenergy projects in the Netherlands

A recent study by AgentschapNL provides a picture of the biogas sector in the Netherlands. Of the 113 existing biogas installations at that time, 78 have provided information for the study.

A distinction is made between four size classes:

A. Co-fermentation <500 kWe	19 plants
B. Co-digestion of between 500 and 1,000 kWe	29 plants
C. Co-fermentation > 1000 kWe	30 plants
D. Other fermentation (no manure, but industrial fermentation)	7 plants

The average investment cost of the biogas installations increased tremendously in recent years, but this is mainly due to the larger sized plants:

	For 2005	2005 - 2006	2006/2007	After 2008
Investment costs per installation €	1,769,000	2,972,487	3,831,000	5,480,000
Avg. power in kWe	555	913	1355	1998
Capital investment per € / kWe	3183	3256	2828	2743

[Source: Evaluatie van vergisters in Nederland, november 2011, Agentschap NL]

Due to the larger projects the funding needed per project increased, which makes it more complex to fund.

#### 4.2.1. Financing

Sources of Financing of bioenergy projects may include:

- Private parties through equity contribution;
- Bank Financing
- Government-backed financing (subordinated loans from local authorities)
- Exploitation subsidies (SDE)
- Investment subsidies;
- Tax subsidies
- Credit Supplier of the manufacturer
- In case of gate fees: negative working capital

#### 4.2.2. Own equity

A certain percentage of the total investment costs needs to be paid with own equity from the entrepreneur. The percentage depends on the type of project and the risk assessment of the bank that finances the project. As a guideline for biogas projects currently 40-50% of own equity is demanded by the banks. For wood incineration projects this is 25 to 40%.

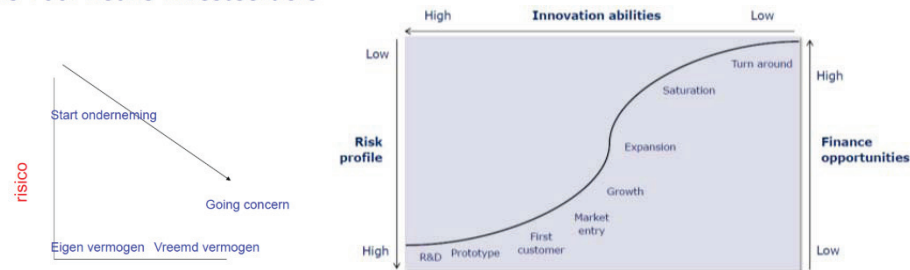
The initiators of bioenergy projects are diverse: farmers, recyclers, energy companies, etc. The financial viability of these initiators can be significantly different. Cooperation between different parties for this reason has an added value. Also builders of biogas plants are now often a partner in the projects.

Examples:

<http://www.agentschapnl.nl/actueel/nieuws/alternatieve-financiering-bio-energieproject>  
[http://www.agentschapnl.nl/sites/default/files/bijlagen/anl0193\\_factsheet5\\_AltFinanciering\\_02.pdf](http://www.agentschapnl.nl/sites/default/files/bijlagen/anl0193_factsheet5_AltFinanciering_02.pdf)

In general banks require a greater percentage of own equity for new ventures and projects with innovative techniques.

Basis voor keuze investeerders



[Source: 'Aspecten financiering Duurzame Energieprojecten', inleiding van W. Verster, Rabobank Nederland, Praktijkdag Bio-Energie 2011]

Furthermore, the risk assessment made by the banks is of great influence: is the financing of the project entirely depending on the project to generate cash flow ("nonrecourse financing") or can the bank fall back on a sponsor of the project ("recourse financing")?

#### 4.2.3. Bank financing

The basic conditions that banks in the Netherlands use for a funding request:

- A complete business plan, ie *including an investment overview, exploitation overview over lifetime and contracts with parties etc.*
- Permits: all environmental and building permits need to be final (incl. MER, if necessary)
- If applicable decisions of subsidies (SDE and local subsidies);
- Financial securities: First Security is always cash flow. This should be sufficiently clear and realistic in the forecast.

Furthermore a good understanding of the technical risks of the plan is necessary:

- Partner Risks (contractors, equipment suppliers, supporters, raw material suppliers, etc.). In case of long term relationships also assess the creditworthiness of strategic partners.
- Is the technology used on all parts proven technology?
  - Review by external independent party
  - Experiences
- Are maintenance contracts available, and do they give sufficient guarantee for a trouble-free operation?
- Safety: are all necessary safety precautions followed?

#### 4.2.4. Government-backed financing

The goal of provincial investment funds is to make the financing of the projects easier with a limited contribution of approximately 15% - 25%. The money is provided in the form of a subordinated loan so the bank can see it as own equity in their risk assessment. Most provinces in the Netherlands have some investment fund for renewable energy projects.

Examples:

Overijssel.

<http://www.overijssel.nl/thema's/economie/nieuwe-energie/nieuwsbrief-nieuwe/nieuwsbrief-0/@154218/duurzaam/>

Gelderland

<http://www.gelderland.nl/eCache/DEF/20/211.Zm9udD0xJnRleHQ9MA.html>

Noord-Holland

<http://www.odenh.nl/>

#### 4.2.5. Operational subsidies

The last 5 years the Dutch government had 4 consecutive different operating subsidies for renewable energy (the MEP, OV-MEP, SDE, SDE+). Most of the approximately 100 biogas plants in the Netherlands are running with the MEP subsidy (to 2007), a small number of newer plants used SDE subsidy (2008-2010). The SDE+ subsidy is very recent (from 2011), so there are no working installations based on this scheme yet. The terms of the different regimes are clearly different, and switching from one scheme to another is not possible. For this reason the profitability of digesters in the Netherlands strongly depends on the building year and subsidy regime.

##### SDE +

The current scheme “Stimulerend duurzame energie” (SDE +) promotes the production of renewable energy. Government funding is desirable because the production costs of renewable energy (such as bio-methane) is higher than that of fossil fuels. The SDE + subsidizes only the so called financial gap between the costs of sustainably produced gas, heat and electricity and the costs of fossil fuels. This means that the subsidy is higher when the price of fossil fuels decreases and less when the price increases. The scheme provides a grant per amount of energy supplied, for up to 12 years. The amount of the subsidy depends on the stage in which the applicant registers (there can only be registered once a year). In each successive stage, the subsidy per unit of delivered energy increases, but also the risk of depletion of the total budget. In this way the government hopes to deploy the subsidy budget as effectively as possible, because the cheapest technologies which need the lowest subsidy per unit of energy supplied will have the highest chances for subsidy.

In the first two years of the scheme (2011 and 2012) there are almost no co-fermentation projects funded, especially because geothermal and organic waste digestion projects registered on the first phase. The amount of subsidy in the first phase is for co-fermentation projects not sufficient for a profitable business case.

For more information about the SDE + please visit the [website](#) of AgentschapNL. Also the [application process](#) is explained on this website.



### **a. Investment subsidies**

In recent years provincial governments have given investment subsidies to biomass projects to help achieve their goals for renewable energy production. Influenced by the economic crisis, these schemes are reduced or phased out and replaced by investment funds (see: "government-backed financing".)

### **b. Tax arrangements**

#### **EIA**

The purpose of the energy investment reduction (EIA) is to stimulate investments in energy saving equipment or renewable energy. The scheme is designed for entrepreneurs who pay income tax or corporation tax in the Netherlands.

The EIA is a tax deduction. The scheme provides direct financial benefit to entrepreneurs who invest in energy saving equipment and sustainable energy. Apart from the depreciation of the investment (purchase and production costs) of these assets, 41.5% of the investment can be extra deducted from the taxable profit. In the Energy List all assets which are eligible for EIA are listed.

#### **MIA / VAMIL**

The MIA and VAMIL are two different arrangements, which are often combined. The MIA (environmental investment reduction) allows entrepreneurs to reduce the taxable profit. Up to 36% of the investment can be extra deducted from the taxable profit. The percentage of the deduction depends on the environmental impacts and the prevalence of the asset.

With the VAMIL the investment can be depreciated at an arbitrarily time. For investments from 2011, this is limited to 75% of the investment. Faster depreciation reduces the taxable profit in the first years and so less taxes have to be paid in those years. This gives you an interest rate and liquidity advantage.

Both schemes use a single list, called the Environmental List. This list includes all assets that qualify for MIA and / or VAMIL. Each year a new Environmental List is created.

More information about these tax schemes:

[http://www.belastingdienst.nl/wps/wcm/connect/bldcontentnl/belastingdienst/zakelijk/ondernemen/bedrijfskosten\\_en\\_investeren/investeringsregelingen/](http://www.belastingdienst.nl/wps/wcm/connect/bldcontentnl/belastingdienst/zakelijk/ondernemen/bedrijfskosten_en_investeren/investeringsregelingen/)

## **For more information**

Cornelissen Consulting Services B.V.

Phone: +31 (0)570 667000

[www.cocos.nl](http://www.cocos.nl)

[info@cocos.nl](mailto:info@cocos.nl)

Stimuland

Phone: +31(0)529478180

[www.stimuland.nl](http://www.stimuland.nl)

[info@stimuland.nl](mailto:info@stimuland.nl)

Stichting Groen Gas Nederland

[www.groengas.nl](http://www.groengas.nl)

[info@groengas.nl](mailto:info@groengas.nl)

AgentschapNL

[www.agentschapnl.nl](http://www.agentschapnl.nl)

InfoMil

[www.infomil.nl](http://www.infomil.nl)

## 4.3 Belgium

### Bioenergy projects in Belgium<sup>17</sup>

Bioenergy plants are financed depending on their size. Most larger facilities are financed by associations of municipal corporations or larger energy companies and private bankers. Smaller bioenergy plants such as pocket digesters are financed by farmers who loan money with their bank. Sometimes, beside the farmer, also the constructor becomes owner of the plant and they get a loan of f.e. 2/3e by the bank. In recent years a renewed interest in cooperative corporations is noticeable. Private people sign in and become shareholder of the corporation which benefits they would like to enjoy.

Average investment cost for a wood combustion plant can be estimated round about 220 – 800 €/kW depending on the size, co-combustion and other variables. In Flanders, because of its smaller scale operations, pocket digestion<sup>18</sup> has become quite popular. Investment cost are high though averaging 6000 – 10 000 €/kW. Larger biogas plants have an investment cost of around 5000 €/kW.

#### 4.3.1 Financing

For financing a bioenergy project a proportion of 30/70 of own capital/debt capital is normal. Project with a lifespan under 20 years can also be financed at 80% debt capital of the total cost. The total return on investment has to be about 8% to make a profitable business. Debt capital comes mostly from banks and government financing. The table below gives an overview of possible financing channels.

Financing method	Government stimulus
Own capital	
Friends, family and fools	Investment company PMV win-win loan ( <a href="http://www.pmv.eu/">www.pmv.eu/</a> )
Banks	Participation funds: Starter's loan Participation funds: Starteo-Optimeo Participation funds: Initio PMW: Guarantee scheme European Investment Bank
Risk capital	Business angels network (BA) Participation funds: BA+ PMV: Seed and Early Stage PMV: Growth financing PMV: Arkimedes Specific funds for niche sectors

<sup>17</sup> Source: Examples for financing of biogas projects in Germany, Austria, The Netherlands, Denmark and Italy (English), Hahn (IWES), Rutz (WIP – Renewable Energies) et. al. IEE Project BiogasIN, 2010

<sup>18</sup> Definition pocket digestion : max 5000 tons/year and max motor input of 200 kW; based on own biomass, mainly aimed at own energy supply

The examples for Belgium will be limited to small operations, since there are only a limited amount of somewhat larger businesses with low readiness to share financial numbers.

#### Example of wood combustion plant in Flanders

- A pig farmer in Neerpelt made an investment of €30 000 for a small wood burner of 60 kW i.e. €500/kWh. About 1/3 of the investment was needed to install isolated piping. The farmer estimated to save 15 000 liters of fuel oil annually with this wood combustion unit.
- Farm “Ter Weeden” in Kruishoutem installed a wood burner with a capacity of 165 kW to heat their chicken stables. The total investment cost was €114 000, i.e. €690/kW.
  - Cost burner unit: +€69 000
  - Cost inlet system: +€6 000
  - Cost heat exchanger and piping: +€20 000
  - Labor cost: + €3 000
  - Wood chips storage room: + €30 000
  - Cost dosing unit: + €3 000
  - Central heating of stable: + €13 000
  - Subsidies (30%): - €30 000
  - **Total investment: €114 000**

#### Example of a pocket digester in Flanders

One system is provided by the company Bioelectric and has an investment cost of €95 000 for a production capacity of 10kW. Annual costs for maintenance is €3 000 or about €0,047/kWh depending on the service hours. Flexibility forth system very high because of the turning back meter.

### **4.3.2 Contracting**

Different kinds of contracting for biogas plants are also possible. This gives farmers, land owners, etc. the option of buying the produced electricity and heat without making a large investment at once thus spreading the costs in time. Whereas when they own the installation they themselves own the produced energy and have to make a large investment. Also these lease type contracts have a clause that the installation becomes property of the leaser after a certain amount of years.

A dairy farm in Hove, a village in Flanders, leases a biogas installation with a capacity of 10kW from bioelectric. Normally they would pay €0,14 - €0,16 for one kWh of electricity, but with the installation they pay a reduced price of €0,08/kWh. An initial investment of €1500 was made to pay for cables and adjustments to existing utilities.

### **4.3.3 Funding**

Funding for smaller agricultural project can be applied for with the Vlaams LandbouwInvesteringsFonds ([VLIF](#)). This funds wants to stimulate farmers financially to adapt to economic, social and ecological changes. The installation of energy reducing installations, renewable energy projects, combined heat and power ... are eligible for this funding support.

The extent of the support ranges from 8 to 38 percent of the total investment cost. In practice support of 25 to 30 is granted for wood burners and pocket digesters. The minimum investment sum is €15 000 (VAT exclusive). This amount may be connected to one or several investments. The maximum allowed investment support is €1 000 000 per farm manager for the period 2007 – 2013. Specific regulations and type of agreements can be found on the website of the VLIF. (Source: <http://www.vlaanderen.be/VLIF>)

Another important assist measure is the investment deduction granted by the “Agentschap Ondernemen” of the federal government finance department. It gives a certain percentage of the total investment cost for the project as a reduction on the tax on profit. It is a onetime tax deduction which can be quite significant. Investments made to save energy grant a 15,5% tax deduction.

#### 4.3.4 Further information and consulting

Agency	Website
<b>Enterprise Flanders</b>	
Enterprise Flanders (Agentschap Ondernemen) is a government agency, charged with the economy and enterprise policy in Flanders, the Dutchspeaking northern part of Belgium. In close collaboration with our sister-organisation <a href="#">Flanders Investment &amp; Trade</a> we help foreign entrepreneurs and investors to establish or expand a business in Flanders.	<a href="http://www.agentschapondernemen.be">www.agentschapondernemen.be</a> <a href="http://www.subsidiedatabank.be">www.subsidiedatabank.be</a>
<b>BeCeFi</b>	
The Belgian Knowledge Centre for SME Financing (BeCeFi) is a national reference centre for the financing of small and medium sized enterprises. Via our homepage you can download the publications of BeCeFi. For entrepreneurs our website offers practical information about the financing of their projects.	<a href="http://www.cefib.be">www.cefib.be</a>

Further addresses, websites and links:

ODE

Koningsstraat 35

1000 Brussel

Algemene e-mail: [info@ode.be](mailto:info@ode.be)

Biogas-E vzw

Graaf Karel de Goedelaan 34 - 8500 Kortrijk

Tel. +32(0)56 241 263

Fax. +32(0)56 241 224

[info@biogas-e.be](mailto:info@biogas-e.be)

<http://www.biogas-e.be>

Vlaamse Regulator van de Elektriciteits- en Gasmarkt

Graaf de Ferrarisgebouw Koning Albert II-laan 20, bus 19 - 1000 Brussel

Tel. +32 (0)2 553 17 00

Fax. +32 (0)2 553 13 50

[info@vreg.be](mailto:info@vreg.be)

<http://www.vreg.be>

## 4.4 Italy

### Bioenergy projects in Italy<sup>19</sup>

In 2008 the ratio in Italy between gross renewable production and internal gross electricity consumption (which takes the foreign balance into account) was 16.5% (www.gse.it). Gross production from renewable sources amounted to 17.5% of total gross production. Among the different renewable energy sources, biogas reached a production level of 1 599.5 GWh in Italy in 2008, equivalent to about 2.75% of gross production from renewable energies. About 80% of this production derives from the recovery of biogas from municipal waste landfills. The remainder comes from about 150 biogas plants located on farms. About 40 of these agricultural biogas plants are simple, low-cost plants made by laying a plastic cover over a slurry storage tank.

Thanks to the renewable source incentive system, interest in the co-digestion of slurry with energy crops and agro-industrial waste has grown in Italy during 2009 and 2010. At present, several new plants have started up and many are under construction and/or in the planning stage. The capital cost per kW capacity varies according to the size and type of the plant, the type of substrates and the location.

#### 4.4.1 Financing

There are several opportunities for financing biogas projects in Italy.

According to several banks in Italy equity capital of 20-30% of the capital costs is required for sound financing of biogas projects.

#### Financing method

The most common financing method in Italy is credits from private banks including both, traditional and project financing.

Generally, many banks in Italy are well prepared to finance biogas projects and usually have dedicated experts. Most house banks of farmers are familiar with this topic and will provide assistance in biogas projects.

- FINANCING BIOGAS PLANT:
  - i. A loan hypothecary: the loan given by the bank request a guarantee on the payment by locking the farm/land as a guarantee in the case of missing mortgage payments
    - a.
  - ii. Leasing: this is the mainly used form in Italy. The lasting of the leasing is 18 year and 20% of equity (e.g. own capital of the owner of the biogas plant).
 

Main banks and offices that carry this activity are:

    - Leasint S.p.A.: Intesa Sanpaolo Group, is the more active in this sector, with dedicated products (e.g. Leasenergy for electric production, CHP and energy saving).

<sup>19</sup> Source: Examples for financing of biogas projects in Germany, Austria, The Netherlands, Denmark and Italy (English), Hahn (IWES), Rutz (WIP – Renewable Energies) et. al. IEE Project BiogasIN, 2010

- Agrileasing: Iccrea group.
  - Unicredit Bank
  - Biella leasing: Banca Sella Group.
  - UBI Leasing: UBI Banca Group
- iii. Leasing/loan: it is a mixed form between loan and leasing, by Banca Sella Group and provide:
- a. Leasing on mobile items, like engines, stirrers, etc.
  - b. Loan on brick&mortar structures (e.g. concrete pits, tanks, etc.).

- **FINANCING WOOD COMBUSTION: the ESCo – Energy Service Company**

Beside the type of financing stated for the biogas plant (which is owned by farmers mainly in Italy), for the wood combustion there is another option: The energy service company.

The energy service company (acronym: ESCO or ESCo) is a commercial business providing a broad range of comprehensive energy solutions including designs and implementation of energy savings projects, energy conservation, energy infrastructure outsourcing, power generation and energy supply, and risk management. In all instances, The ESCO starts by performing an in-depth analysis of the property, sometimes at risk, designs an energy efficient solution, installs the required elements, and maintains the system to ensure energy savings during the payback period. The savings in energy costs are often used to pay back the capital investment of the project over a five- to twenty-year period, or reinvested into the building to allow for capital upgrades that may otherwise be unfeasible. If the project does not provide returns on the investment, the ESCO is often responsible to pay the difference. In fact the end user of the energy pay usually a fixed tariff a bit less than the cost of energy from fossil fuels. The Esco in Italy have the rights to sell white certificates, and since often (e.g. heating grid, CHP, etc.) the plant is quite expensive, this allow to pay the extra plant costs, and then the income for the ESCo is the saving in energy costs, given the higher cost of money to the bank.

#### **4.4.2 Funding**

Some specific funding options will be mentioned in this section aiming at a better comprehension of the whole financing process, but it is not part of this booklet to describe funding more precisely. To find more data on funding options and comprehensive examples of funding calculation, according to technical specifications and use of the network capacity, for heat delivery network, please refer to the implementation guide booklet “Implementing a bioenergy plant – Guideline for farmers”, also delivered by IER (2012) within the BioEnergy Farm project.

For more information please follow the link:

<http://www.fonti-rinnovabili.it/index.php?c=nincentivi>



In Italy, the national energy services company (GSE) is implementing the renewable source energy production incentive scheme. The scheme involves two alternative incentives according to the electricity producer's request:

**a) the issue of Green Certificates:**

**The support mechanism**

Plants with a capacity of at least 1 kW which are connected to the electricity network are eligible for the GC mechanism. However, plants with a capacity of up to 1 MW (0.2 MW for wind power) may opt for the all-inclusive fixed tariff.

The support mechanism differs according to the technology used.

In fact, Law No 244/2007 introduced a table of multiplication coefficients on the basis of which the number of GCs issued varies according to the renewable source used.

Table 2 of financial law 2008 (upgrade to law 23/07/2009 n.99):

1	Wind power, for plants larger than 200 kW	1,00
1 b	Offshore wind power	1,50
2	Geothermal	0,90
3	Wave and tidal power	1,80
4	Hydro	1,00
5	Biodegradable waste, biomass other than that included in the point below	1,30
6	Biomass and biogas produced by local agriculture or forestry	1,80
7	Landfill gas and residual gases from purification processes and biogas other than those included in the point above	0,80

**Average price for certificates**

The Energy Markets Regulator (GME), which manages the GC market, publishes all the information on exchanging certificates (quantities and prices) online.

No real floor bottom price has been set for green certificates, since the price is determined by the market, according to the principle of supply and demand.

Nonetheless, the Ministerial Decree of 18/12/2008 established that, in order to prevent an excessive supply, during the three-year period and at the holders' request, the GSE can withdraw the GCs for production referring to years up to 2010. The withdrawal price is the average price over the previous three years for exchanges of all GCs regardless of the reference year, either on the GME-regulated market or through bilateral contracts. The 2010 withdrawal price for GCs is €88.90/MWh.

There is also a reference price, which is the price at which the GSE puts GCs onto the market (the regulations allow for this possibility in order to deal with demand which exceeds supply) which, per MWh of electricity, is equal to €180 minus the annual average electricity transfer

price for the previous year (defined by the AEEG). The GC reference price set by the GSE for 2010 is €113.8/MWh.

In the event of excessive supply, where the price paid by the GSE to withdraw GCs is lower than the GSE's selling price, it is probable that a GC market will develop between a minimum price, equal to the price paid by the GSE to withdraw GCs, and a maximum price equal to the GSE's selling price.

**b) an all-inclusive flat rate (only for plants that produce less than 1 MW):**

<b>SOURCE</b>	<b>RATE (c€/kWh)</b>
<b>Biogas and biomass, excluding liquid biofuels with the exception of pure vegetable oils traceable through the integrated administration and control system laid down in European Council Regulation (EC) No. 73/2009 of 19 January 2009</b>	<b>28</b>
<b>Landfill gas, sewage gas and liquid biofuels with the exception of pure vegetable oils traceable through the integrated administration and control system laid down in European Council Regulation (EC) No. 73/2009 of 19 January 2009</b>	<b>18</b>

In order to receive the incentive, the producer must apply to the GSE for RES (Renewable Energy Source) plant certification. In particular, newly built, upgraded, partially or totally renovated or reactivated plants using renewable sources that came into operation after 1 April 1999 may be certified as RES plants.

Italian Law No. 99 of 23 July 2009 definitively established that it is possible to combine incentives, without being obliged to prove the origin of the biomass. In other words, a biomass plant owned by a farm, or operated in connection with an agricultural, food, farming or forestry company may combine the all-inclusive fixed rate, after it comes into commercial operation, with other public incentives with advance capitalization not exceeding 40% of the cost of investment.

### 4.4.3 Further information and consulting

In Italy there are many organizations that promote and help the development of renewable energies. Links to some relevant websites of environmental and energy partners are listed:

Agency	Website
<p><b>Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile (ENEA)</b></p> <p>ENEA is the name for Italian National Agency for New Technologies, Energy and Sustainable Economic Development. The Agency's activities are devoted to: basic, mission-oriented, and industrial research exploiting wide-ranging expertise as well as experimental facilities, specialized laboratories, advanced equipment; new technologies and advanced applications; dissemination and transfer of research results, thus promoting their exploitation for production purposes; provide public and private bodies with high-tech services, studies, measurements, tests and assessments; training and information activities aimed at broadening sector expertise and public knowledge and awareness.</p>	<p><a href="http://www.enea.it">http://www.enea.it</a></p>
<p><b>Legambiente</b></p> <p>Legambiente (League for the Environment) is the most widespread environmental organization in Italy, with 20 Regional branches and more than 115,000 members. It is acknowledged as "association of environmental interest" by the Ministry of the Environment; it represents the UNEP National Committee for Italy, it is one of the leading member of EEB ("European Environmental Bureau") the Federation of European environmental organization, and of IUCN - the World Conservation Union. The headquarter is in Rome, with a staff made up of fifty professionals and experts on different fields of activity.</p>	<p><a href="http://www.legambiente.it">http://www.legambiente.it</a></p>
<p><b>Unione Nazionale Comuni Comunità Enti Montani (UNCCEM)</b></p> <p>The National Union of Mountain Towns and Communities (UNCCEM) is a national organization - present in all the Italian regions - gathering and representing mountain municipalities and communities, as well as associating counties, associations, chambers of commerce and other entities operating in the Italian mountain areas.</p> <p>After the XV Congress of Trento held in February 2010, UNCCEM has taken a "green" direction. UNCCEM's new strategy and focus in fact, is increasing sustainable energy production in the mountain areas thanks to hydropower, wind power, biomass and photovoltaic.</p>	<p><a href="http://www.unccem.it">http://www.unccem.it</a></p>

Further addresses, websites and links:

- Sportello Fonti rinnovabili  
<http://www.fonti-rinnovabili.it/>
- Il Portale italiano delle Energie Rinnovabili  
<http://www.energie-rinnovabili.net/>
- Chimica verde  
<http://www.chimicaverde.net>
- Associazione Italiana di Tecnologia Alimentare (AITA)  
<http://www.aita-nazionale.it/>
- Consorzio Italiano Biogas e Gassificazione (CIB)  
<http://www.consorziobiogas.it/>
- Ministero dell' ambiente  
<http://www.minambiente.it>
- Ministero delle politiche agricole alimentari e forestali (MIPAAF)  
<http://www.politicheagricole.it>
- Unione delle province d'Italia (UPI)  
<http://www.upinet.it/>
- Gestore Servizi Energetici  
<http://www.gse.it>

For further addresses, websites and links see the references or refer to the implementation guide booklet “Implementing a bioenergy plant – Guideline for farmers” section 8.5, also delivered by IER (2012) within the BioEnergy Farm project.

## 4.5 Poland

The Polish Agricultural Market Agency keeps statistics on agricultural biogas plants. As of the end of March 2012, there are 22 biogas plants using various agricultural inputs. The table below presents inputs used for agricultural biogas production in 2011.

	Input used for agricultural biogas production	Amount of input used for agricultural biogas production (in tons)	% share in cumulative input
1.	liquid manure	265 977,84	56,67%
2.	corn silage	108 880,68	23,20%
3.	post-distillation slurry	30 465,11	6,49%
4.	manure	11 080,53	2,36%
5.	fruit and vegetable waste	10 984,35	2,34%
6.	mixture of lecithin and soaps	8 906,87	1,90%
7.	potato pulp	7 258,49	1,55%
8.	beet pulp	6 922,45	1,47%
9.	grass silage	6 817,10	1,45%
10.	grain silage	5 973,80	1,27%
11.	whey	1 933,00	0,41%
12.	grain	1 611,77	0,34%
13.	stomach contents	1 278,30	0,27%
14.	flour, bread, breadcrumbs	607,04	0,13%
15.	alfalfa silage	400,00	0,09%
16.	fatty waste	285,65	0,06%
<b>Total:</b>		<b>469 382,98</b>	

Data: Agricultural Market Agency [www.arr.gov.pl](http://www.arr.gov.pl)

From the amount of input indicated above, agricultural biogas plants produced 36,64 million m<sup>3</sup> agricultural biogas that was used to produce 73,43 GWh electric power, 54,16 GWh of which went to the grid. The remaining power was used for production and own purposes or utilized in some other way.

As a result of agricultural biogas combustion in cogeneration systems, 88,80 GWh of heat was produced. The heat was utilized mainly in technological processes of agricultural biogas plants or undertakings directly connected with them, ex. heating of buildings for livestock. According to various sources, the process of biogas plants' development has been initiated in approximately 300 localizations in Poland.

### 4.5.1 Financing

#### ▪ EQUITY

This option is often used in combination with other financial options. Currently, there are a few investors on the market specializing in agricultural biogas plants construction. Poldanor company is the market leader in biogas plants' construction. The company operates 8 plants, 7,4 MW power in total, using substrates from own pig farms. Other investors include: Grupa Polskie Biogazownie, Biogas East Sp. z o.o., Esperotia Energy Investments Spółka Akcyjna (EEI), Biogaz Zeneris sp. z o.o., who build installations and offer full investor support service. Also energy companies, like ENERGA engage in biogas plants' construction.

#### ▪ FINANCING BY BANKS

The bank specializing in agricultural investment support is Bank Gospodarki Żywnościowej, cofinancing agricultural biogas plants' construction with "Green Energy" investment loan. The loan is available both for individuals and legal entities engaged in economic activities in the production of fuels and energy from renewable sources. The bank also offers "project finance" method investment support.

Bank Ochrony Środowiska credited investments in 10 biogas plants, 2 of them agricultural.

#### ▪ CONTRACTING

Plays a minor role within the financial options relevant for Poland.

#### ▪ LEASING

Plays a minor role within the financial options relevant for Poland.

#### ▪ RENTING

Plays a minor role within the financial options relevant for Poland.

#### ▪ INVESTMENT FUNDS

Plays a minor role within the financial options relevant for Poland.

### 4.5.2 Funding

Biogas investors in Poland, apart from using their own funds, can apply for co-financing from the European Union funds and environmental protection funds. Moreover, they can use the scheme of support for electric power production from renewable sources.

#### **EU Means**

In 2012 the European programmes co-financing projects concerned with renewable energy sources finish admitting applications – both in the case of Operational Programme Infrastructure and Environment and the Regional Operational Programmes in individual voivodships.

The Agency for Restructuring and Modernisation in Agriculture (ARiMR) closed the call for applications for co-financing small agricultural biogas plants from the means of the Rural Development Programme in the last months of 2011, admitting a few hundred applications from farmers. The offer concerned co-financing construction of small (up to 500 kW) installations producing agricultural biogas and electric power from agricultural biogas. Farmers could receive up to 50% (80% for flood victims) cost refund, but not more than 500 000 PLN net.

#### **Environmental Protection Funds**

The National Fund for Environmental Protection and Water Management allocates means for inter alia, biogas plants' construction in the framework of Green Investments Scheme.

In the application call “Agricultural Biogas Plants” there were two forms of co-financing available: non-refundable that can cover up to 30% of eligible costs, and loans that can cover up to 45% of investment costs. The minimal value of investment was 10 million PLN.

In the first call in 2011, 11 investment projects received financing. There is another call planned for 2012.

Voivodship Funds for Environmental Protection and Water Management occasionally support biogas investments, depending on the priorities set for a given voivodship.

### **Electric Power Production from Renewable Energy Sources Support Scheme**

Financial support mechanism during operation rely on property rights for certificates issued under certificates of origin for energy, presented in the table below.

<b>Act of Parliament Energy Law</b>	
Focus	Energy Law rules: <ul style="list-style-type: none"> <li>the priority purchase, transmission, distribution of and payment for electricity and heat from renewable energy sources by the grid system operators</li> <li>the nationwide equalisation scheme for the quantity of electricity purchased and paid for</li> </ul>
Target groups	operators of plants which provide electricity/heat/biogas from renewables (e.g. from biomass) to the grid system
Content/ How regulation works	<p>Mechanism of subsidies, i.e. certificates of origin for energy, for biomass plants which provide electricity to the grid (e.g. biogas plants or CHP wood plants) rests on: for every produced (not necessary sold) MWh electric energy the certificate of origin for energy is issued. Then the property rights is sold, what generates income. There are following types of certificates of origin of energy in Poland:</p> <ul style="list-style-type: none"> <li>from renewable energy source (customary named as green certificates) – support lasts to the end of 2017,</li> <li>from high-efficiency cogeneration for electric power under 1 MW (yellow certificates) – support lasts to the end of 2012,</li> <li>from high-efficiency cogeneration from biogas (violet certificates) – support lasts to the end of 2018,</li> <li>from high-efficiency cogeneration from the rest of fuels and plants of electric power min. 1 MW (red certificates) – support lasts to the end of 2012,</li> <li>of agricultural biogas next putting into distribution network (brown certificates) – support lasts to the end of 2019 (legal acts has not been introduced yet, so in fact the mechanism is not operating yet). The amount of produced biogas will be counted over on the basis of lower heating value into equivalent amount of electricity coming from renewable energy sources according to the formula</li> </ul> $E = M \cdot r \cdot 0,42 / 3600 \text{ [MWh]}$ <p>where:  M – the amount of produced biogas in m<sup>3</sup>,  r – lower heating value in MJ/m<sup>3</sup>  0,42 – so far this value has been merely proposed mean efficiency of electric energy generation in renewable source</p>



Detailed Amount of subsidy / Links	<p>Below possible cases with achieved incomes from certificates of origin sale are enumerated:</p> <ul style="list-style-type: none"> <li>• electricity coming from biomass or biogas – green certificates – 283 PLN/MWh</li> <li>• electricity production in high-efficiency cogeneration from biomass – green + red certificates – 283 PLN/MWh + 9 PLN/MWh = 292 PLN/MWh</li> <li>• electricity production in high-efficiency cogeneration from biogas in plants of electric power below 1 MW – green + yellow certificates – 283 PLN/MWh + 126 PLN/MWh = 409 PLN/MWh</li> <li>• electricity production in high-efficiency cogeneration from biogas in plants of electric power min. 1 MW – green + violet certificates – 283 PLN/MWh + 58 PLN/MWh = 341 PLN/MWh</li> <li>• agricultural biogas production and putting into distribution network – brown certificates – 283 PLN/MWh</li> </ul> <p>The value of certificates of origin for energy partially is subject to marketable mechanisms and is changing during time, see:</p> <p>➤ <a href="http://wyniki.tge.pl/wyniki/rpm/">http://wyniki.tge.pl/wyniki/rpm/</a></p> <p>For general information on Energy Law see:</p> <p>➤ <a href="http://isap.sejm.gov.pl/DetailsServlet?id=WDU19970540348">http://isap.sejm.gov.pl/DetailsServlet?id=WDU19970540348</a></p>
Comments	<p>Please note: subsidies will be changed after introducing Act on Renewable Energy Sources which proposes correction factors for certificates of origin for energy from different type of sources. For general information see:</p> <p>➤ <a href="http://212.160.99.106/docs//2/19349/19352/19353/dokument19334.pdf?lastUpdateDay=27.01.12&amp;lastUpdateHour=5%3A10&amp;userLogged=false&amp;date=Saturday%2C+28+January+2012">http://212.160.99.106/docs//2/19349/19352/19353/dokument19334.pdf?lastUpdateDay=27.01.12&amp;lastUpdateHour=5%3A10&amp;userLogged=false&amp;date=Saturday%2C+28+January+2012</a></p>

### 4.5.3 Further information and consulting

National Energy Conservation Agency (NAPE)  
 Tel. + 48 22 50 54 661  
<http://www.nape.pl>  
[nape@nape.pl](mailto:nape@nape.pl)

Energy Conservation Foundation (FPE)  
 Tel. + 48 22 50 54 661  
<http://www.fpe.org.pl>  
[biuro@fpe.org.pl](mailto:biuro@fpe.org.pl)

Institute for Renewable Energy (EC BREC IEO)  
 Tel. +48 22 825 46 52  
<http://www.ieo.pl>  
[biuro@ieo.pl](mailto:biuro@ieo.pl)

Polish Biomass Association (POLBIOM)

Tel. +48 22 542 11 04

<http://www.polbiom.pl>

polbiom@poczta.onet.pl

Polish Biogas Association (PBA)

Tel. +48 58 622 81 81

<http://www.pba.org.pl>

info@pba.org.pl

Renewable Energy Association (SEO)

Tel. +48 22 433 12 38

<http://www.seo.org.pl>

biuro@seo.org.pl

Polish Economic Chamber of Renewable Energy (PIGEO)

Tel. +48 22 548 49 99

<http://www.pigeo.org.pl>

pigeo@pigeo.pl

Energy Regulatory Office (URE)

Tel. +48 22 661 61 07

<http://www.ure.gov.pl>

ure@ure.gov.pl

The Energy Market Agency (ARE)

<http://www.are.waw.pl/>

biuro@are.waw.pl

Environmental Information Center (CioS)

Tel. +48 22 57 92 215

<http://www.ekoportal.gov.pl>

centrum@cios.gov.pl

Center for Information about the Energy Market (CIRE)

<http://www.cire.pl>

Agencja Rynku Rolnego (Agricultural Market Agency)

[www.arp.gov.pl](http://www.arp.gov.pl)

Agencja Restrukturyzacji i Modernizacji Rolnictwa

[www.arimr.gov.pl](http://www.arimr.gov.pl)

## 4.6 Estonia

### Support mechanisms for each type of renewable energy

Support mechanisms for renewable energy depend on the market segment they are applied to. Direct support mechanisms as well as indirect support mechanisms are used.

Many support mechanisms are defined in the legislation. Direct support mechanisms in the Electricity Market Act (in Estonian is available in <https://www.riigiteataja.ee/akt/112122011009>) are targeted to increasing the share of renewable energy sources in the electricity production market. Provisions in the Alcohol, Tobacco, Fuel and Electricity Excise Duty Act (in Estonian is available in <https://www.riigiteataja.ee/akt/123122011005>) describe the indirect support mechanism for liquid biofuel sales. Direct support mechanisms for combined heat and power generation (cogeneration) are incorporated in the Electricity Market Act. Environmental taxation is applied according to the Environmental Charges Act (in Estonian is available in <https://www.riigiteataja.ee/akt/114032011040>), and includes indirect support mechanisms for renewable energy utilisation in energy production.

There are also indirect support mechanisms applicable to renewable energy sources. Pollution charges are not applied if renewable energy sources are used in energy generation. The application of renewable energy sources is promoted through the building regulations.

#### 4.6.1. Direct support mechanisms in electricity market legislation

In Estonia:

- the feed-in tariff and subsidy options may not be used at the same time;
- very large producers with net electrical capacity greater than 100 MW will not receive support through the feed-in tariff and subsidy mechanisms;
- producers may not subsidise the production of electricity from renewable energy sources at the expense of other production and vice versa.

Once the producer has decided to accept the income from feed-in tariff, the producer is entitled to sell electricity from the renewable energy source as a fixed supply to a seller appointed by the Transmission System Operator (<http://www.pohivork.ee/>). The appointed seller has an obligation to buy the electricity from renewable energy sources at the price of approximately €0.073 per kWh. When the appointed seller applies for it, the Transmission System Operator is required to compensate the appointed seller for any additional costs borne by the appointed seller due to the obligation to buy the electricity from renewable energy sources.

A subsidy is available for those producers who have decided to sell electricity from renewable energy sources on their own. In this case, the producer of electricity from a renewable energy source is entitled to sell that electricity into the marketplace and apply for a subsidy in the amount of approximately € 0.053 per 1 kWh of electricity sold. This subsidy is paid by the Transmission System Operator.

A combined heat and power station may use combination of fossil and renewable fuel (mixed fuel) at the same time. The share of electricity from renewable energy sources is calculated on the basis of the energy content, and the energy content is determined through the fuel quality and fuel amount data. More detailed guidelines for calculating the share of electricity from renewable energy sources are described in a separate regulation of the Minister of Economic Affairs and Communications. A special promotion mechanism is also applied for Cogenerators. The market for electricity from high-efficiency cogeneration is guaranteed.

The price of biomass fuels may fluctuate. In order to ensure the competitiveness of biomass users producing electricity in the fuel market, a special provision in the Electricity Market Act (in Estonian is available in <https://www.riigiteataja.ee/akt/112122011009>) has been adopted for Cogenerators using mixed fuel. If the electricity is produced in a combined heat and power plant, the regulator of the electricity market (the Estonian Competition Authority) may change the feed-in tariff or subsidy when the producer submits an application for a feed-in tariff or subsidy increase. When the feed-in tariff or subsidy is changed, the Competition Authority has to consider if the new support will cover the justified expenses incurred in the generation of electricity. This includes the costs incurred in the performance of the obligations arising from the legislation and the operating licence as well as debt service and a reasonable profit margin. A detailed methodology for determining the justified feed-in tariff or subsidy is published on the website of the Competition Authority.

In light of the enormous potential of wind energy and the constraints in the electricity grid, Estonia has adopted limitations for the support mechanisms available for wind energy. The producers of wind energy in Estonia may sell electricity at the feed-in tariff until the total annual amount of electricity generated from wind is not more than 200 GWh. In addition, they may receive a subsidy up to the point where the total annual amount of electricity generated from wind in Estonia exceeds 400 GWh.

Producers are entitled to sell electricity from renewable energy sources at the feed-in tariff or receive a subsidy up to 12 years from the start of production. The day on which a generating facility provides at least 80 per cent of the nominal power for the first time is deemed to be the start day of production. If electricity from renewable energy sources is generated by means of an facility that commenced operations before 1.01.2002, the feed-in tariff or subsidy may be paid until 31.12.2012.

#### **4.6.2. Indirect support mechanisms**

Environmental charges are applied in Estonia according to the Environmental Charges Act (in Estonian is available in <https://www.riigiteataja.ee/akt/114032011040>). These charges fall into two categories: natural resource charges and pollution charges. Environmental charges must be paid, when someone removes natural resources from their natural state, disposes of the waste or pollutes the air, water, groundwater or soil. Usually this person will also have to have an environmental permit. If that person does not have environmental permit for this activity or the activity does not meet the criteria set in environmental permit, higher levels of environmental charges can be applied. Although water is seen as a resource, environmental charges are not applied if the water is used in the energy generation process. For other renewable energy sources, environmental charges are not imposed.

Combustion processes are linked with emissions to air, water usage or waste disposal. Producers of energy must pay pollution charges for emissions into the ambient air. Charges are levied for emissions (from thermal power plants and boilerhouses) including sulphur dioxide (SO<sub>2</sub>), carbon monoxide (CO), particulates, nitrogen oxides, volatile organic compounds, mercaptans, heavy metals and compounds of heavy metal. Producers of heat must also pay pollution charges for their carbon dioxide (CO<sub>2</sub>) emissions. CO<sub>2</sub> emissions in combustion processes are calculated according to the methodology established in Ministry of Environment regulations (in Estonian are available in <http://www.envir.ee/1172431>). According to the regulations, CO<sub>2</sub> emissions from biofuels are not counted. In other words, biofuels are exempted from CO<sub>2</sub> pollution charges.

#### **4.6.3. More specific information about financial support mechanisms of renewable energy**

There are different support measures for bioenergy production in the structural assistance activities. Structural assistance is channelled to different fields divided among three operational programmes. Energy-related activities are financed under the Operational Programme for Development of Living Environment. “Development of the Energy Sector” is provided to operations intended to reduce the adverse environmental impacts of the energy sector and to increase the use of renewable energy sources. The renewable energy objectives are broader use of renewable energy sources and use of alternative sources of energy in transport.

More detail information about structural assistance is available in the homepage of Ministry of Economic Affairs and Communication (in Estonian is available in <http://www.mkm.ee/struktuurifondid-4>).

There are also different support measures for biomass and bioenergy production in the domains of agriculture and forestry. For the forestry the list of measures with detail rules is available in the homepage of Private Forest Centre (<http://www.eramets.ee/toetused>). For the agricultural said all the measures implemented are available in the homepage of Agricultural Registers and Information Board (ARIB) (<http://www.pria.ee>).

In addition to agricultural area-related aids also different investment support for bioenergy projects can be applied according to the Estonian Rural Development Plan (the information of the support measures is also available in the homepage of ARIB):

- investments into the production of bioenergy (the objective of the agricultural producer applying for support is that predominant share of produced bioenergy will be used on-farm);
- diversification into non-agricultural activities (investments into bio-energy production in case the energy is predominantly marketed);
- improving the economic values of forests and adding value to forestry products (among the other eligible activities/investments, also purchase of tangible and intangible assets to acquire and introduce new products, processing methods and technologies (incl. the purchase of movable equipment or machinery (technology for collecting and processing wood chips and waste at the site)) for biofuel production and non-movable equipment or machinery for the production of wood pellets, wood briquette, charcoal and chips);
- adding value to agricultural and non-food forestry products (investments for the purchase and implementation of equipment and technologies to produce biofuels from agricultural

products and non-wood forestry products and from processing waste of agricultural and non-wood forestry produce processing industry or taking into use of renewable energy and biofuels and waste energy of the production process).

The regulations and comments of the taxation and payment facilities of the aspects of renewable energy are available in the homepage of Ministry of Finance (<http://www.fin.ee/?id=2021>) or in the homepage of Estonian Tax and Customs Board (<http://www.emta.ee/?id=2516>).

#### 4.6.4 Further information and consulting

**Ministry of Economic Affairs and Communication** (in Estonian *Majandus- ja Kommunikatsiooniministeerium*)

<http://www.mkm.ee>

Sustainable Energy Division (in Estonian *Säästva Energia Talitus*)

telephone: +372 625 6497

contact person: Madis Laaniste

e-mail: [Madis.Laaniste@mkm.ee](mailto:Madis.Laaniste@mkm.ee)

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**Ministry of Agriculture** (in Estonian *Põllumajandusministeerium*)

<http://www.agri.ee>

Plant Products Bureau (in Estonian *Taimakasvatussaaduste büroo*)

telephone: +372 625 6235

contact person: Martti Mandel

e-mail: [Martti.Mandel@agri.ee](mailto:Martti.Mandel@agri.ee)

Calculator of Energy Crops (in Estonian *Energiakultuuride kalkulaator*)

[http://www.agri.ee/energia/index.php?module=2&op=&dok\\_id=1](http://www.agri.ee/energia/index.php?module=2&op=&dok_id=1)

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**Ministry of Environment** (in Estonian *Keskkonnaministeerium*)<http://www.envir.ee>Environmental Management Department (in Estonian *Keskkonnakorralduse osakond*)

telephone: +372 626 2921

contact person: Valdeko Palginõmm

e:mail: [Valdeko.Palginomm@envir.ee](mailto:Valdeko.Palginomm@envir.ee)Ambient Air Department (in Estonian *Välisõhu osakond*)

telephone: +372 626 2976

contact person: Heidi Koger

e-mail: [Heidi.Koger@envir.ee](mailto:Heidi.Koger@envir.ee)

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**Private Forest Centre** (in Estonian *Erametsakeskus*)<http://www.eramets.ee>

telephones +372 683 6059 or +372 683 6065

e-mail: [metsameede@eramets.ee](mailto:metsameede@eramets.ee)

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**Agricultural Registers and Information Board** (in Estonian *Põllumajanduse Registrite ja Informatsiooni Amet*)<http://www.pria.ee>

Investment support measures

telephone +372 737 7678

e-mail: [info@pria.ee](mailto:info@pria.ee)

Animal and agricultural land support measures

telephone +372 737 7679

e-mail: [info@pria.ee](mailto:info@pria.ee)

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**Environmental Investment Centre** (in Estonian *Keskkonnainvesteeringute Keskus*)

<http://www.kik.ee/et/energeetika/taastuvenergeetika.html>

Structural Funds Unit (in Estonian *Struktuuritoetuste üksus*)

telephone +372 627 4197

contact person: Siim Umbleja

e-mail: [Siim.Umbleja@kik.ee](mailto:Siim.Umbleja@kik.ee)

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**Enterprise Estonia** (in Estonian *Ettevõtluse Arendamise Sihtasutus*)

<http://www.eas.ee>

telephone +371 627 9700

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## 5 GLOSSARY

### A/ Report vocabulary

- a) **Amortization rate:** Monthly pay back rate, consisting of principal and interest.
- b) **Contracting:** This concept bases on the idea of financing the whole facility and its construction by the contractor. The farmer only receives 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 plant can be utilized by the farmer. Profit participation can be content of the contract as well.
- c) **Cash-flow:** It 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 and finite time period.
- d) **Certificates (financing application):** A biogas contractor finances and operates a biogas plant on foreign property.
- e) **Credit:** See loan
- f) **Debt capital:** Money acquired from external from external sources, distinguished from equity capital.
- g) **Equity (capital):** The sum of starting capital, the capital reserve and of the retained earnings (e.g. annual heat sells, etc.).
- h) **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.
- i) **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 seven to ten years. The advantage of an ESCO is the availability of financial resources, expertise, and the minimized risk for the customer.
- j) **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.
- k) **Feed-in tariff:** Tariff for guaranteed revenues usually in €/kWh from selling electricity by feeding it in 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.
- l) **Financial institute:** Organization providing borrowed capital to investors. A financial institute can for example be a bank, or a leasing company.
- m) **Financial risk:** The financier's risk of loan default. Financial institutions rate each loan request on the possibility of loan default.
- n) **Financier:** The financier provides debt capital. Financiers can be banks, leasing organizations, or private persons.
- o) **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.
- p) **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.

- q) **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.
- r) **Investment fund:** A sum of money, owned by one or more investors, which is managed as one entity.
- s) **Investor:** The investor spends money on a certain capital asset.
- t) **Leasing (financing):** Leasing financing is characterized by the separation of lessor and lessee. Leasing in Biogas projects is often used for the CHP plant. Leasing in wood combustion projects is often used for heavy handling equipment (e.g. tractors, crushers, etc.) or storage facilities.
- u) **Lessee:** In a leasing financing, part that has to pay leasing rates to the lessor.
- v) **Lessor:** Finances the leasing object and commits it to the lessee for operation.
- w) **Loan:** Money loaned at an agreed interest rate for a fixed term of years.
- x) **Payback period:** Payback period refers to the period of time required for the bank to get back all its initial investment thanks to the cash-flow of the funded project.
- y) **Project financing:** Project financing is intended to finance a very particular investment which is repaid by its own cash-flow. Prerequisite to access project funding is to create a project-dedicated company. In case of financing a biogas project, the financier's investment is secured by the estimated cash-flow of the plant selling of 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.
- z) **Securities:** Property of the investor that covers the loan sum in case of project failure and loan default.
- aa) **Subsidies:** A subsidy is a form of financial assistance paid to a business or economic sector.
- bb) **Tipping fee:** It is only used in the Netherlands among the project's partner countries. This is a charge in Euros per ton, for the unloading or dumping of waste at a landfill, transfer station, recycling centre, or waste-to-energy facility, also called a disposal or service fee.
- cc) **Traditional loan financing:** Financing of an investment by private or business loan.

## B/ Additional vocabulary

*This report was aimed at being understood by non-financiers, thus the vocabulary used was the simplest possible vocabulary. In application forms though or during interactions with financiers, investors in bioenergy projects may have to deal with additional, more complex terms. This second vocabulary list is aimed at helping investors in throughout the financing process.*

**Debt capacity:** It refers to the ability of borrowing money. The debt capacity is the maximum amount of funding that an organization can borrow while still being able to repay in a timely manner without forfeiting its financial ability. Financiers use Debt Service Coverage Ratio (see below) to assess the debt capacity.

**Debt Service Coverage Ratio (DSCR):** This measurement is used by bankers to assess if the borrowers have an acceptable level of debt. It is calculated as follows:

$$DSCR = \frac{(Annual\ Mortgage\ Payments + Property\ Taxes)}{Gross\ Company\ Income}$$

**Due Diligence (DD):** It refers to an investigation or audit of a potential investment. It designates the process carried out by banker to assess a client's creditworthiness before granting a loan for example.

**General Contractor (GC):** Entity that generally provides all construction work for a given building. The structure is thus delivered turnkey to the client. Have recourse to such a company may imply extra costs for the client as if it used the services of several independent contractors for the different sub-parts of the whole plant.

**Joint venture:** Business agreement in which parties agree to develop, for a finite time, a new entity and new assets by contributing equity. They exercise control over the enterprise and consequently share revenues, expenses and assets. There are other types of companies such as JV limited by guarantee, joint ventures limited by guarantee with partners holding shares.

**Leverage effect:** Leverage refers to the use of external capital in addition to equity. It is beneficial when the revenue generated by the plant is higher than the cost of credit.

**Off-Balance-Sheet Financing:** A form of financing which dramatically increases the investment capacity by using the leverage effect. In this case, large capital expenditures are kept off of a company's balance sheet through various classification methods. Companies will often use off-balance-sheet financing to keep their debt to equity and leverage ratios low.

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

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

**Renewable Energy Certificate:** See Green Certificate.

**Return on equity (ROE):** The ROE is useful for assessing the profitability of a company it is also used to compare a company's profitability to that of other firms in the same industry. The ROE equals the amount of net income returned as a percentage of shareholders equity. Return on equity measures a corporation's profitability by revealing how much profit a company generates with the money shareholders have invested. ROE is expressed as a percentage and calculated as:

$$ROE = \frac{Net\ Income}{Shareholder's\ Equity}$$

**Return on investment (ROI):** The ROI helps the investors to assess the efficiency of their investment and compare it to the performance of other investments they made. To calculate the ROI, the return of an investment is divided by its cost. ROI is expressed as a percentage or a ratio and calculated as:

$$ROI = \frac{(Gain\ from\ Investment - Cost\ of\ Investment)}{Cost\ of\ Investment}$$

**Special Purpose Vehicle (SPV):** An entity used to isolate financial risks. It is also known as a "Bankruptcy-remote entity" whose operations are limited to the acquisition and financing of specific assets. It is the structure used in the case of a project financing scheme i.e. the company created has no purpose but to invest in the planning, construction, operation and maintenance of a given bioenergy plant. It is related to leverage methods to increase the investment capacity of an investor.

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