Businessplan

Eleborated by DEIAFA, 20/08/2015

Project title	:	[title]
Name (first / last), adress and telephone number of the farmer	:	[farmer]
Name of the expert (first / last)	:	[Deliverable #]
Date of businessplan elaboration	:	[date]

1 PURPOSE OF THE INVESTMENT

1.1 General reasons to invest

In recent years the interest in the production of renewable energy through anaerobic digestion of animal manure has increasingly grown on farms in the region of <#Region(BIOGAS)#>, mainly due to the national incentives devoted to such production.

<state here interesting reason to invest in your country>

1.2 Reasons to invest for farmer

The farm <#Name location/company(BIOGAS)#> is interested to invest in the anaerobic digestion in order to valorise own biomass and livestock waste produced through an anaerobic digestion plant. The digestate, after a suitable period of storage, is then distributed on the farm's land closing the circle and it is valuable as a fertilizer.

<state here interesting reason to invest for the farmer>.

2 NON TECHNICAL ASPECTS

2.1 General information of the farm

2.1.1 Farm legal status

The farm <#Name location/company(BIOGAS)#>, VAT number <state here the VAT number> located in <#City(BIOGAS)#>.

The partners of the business are:

− <state here sole administrator>, sole administrator.

− <state here partners>, partner.

− <state here partners>, partner.

2.1.2 Farming system

<state here an introduction about the farm production>.

The Utilised agricultural area (UAA) is approximately <state here the number of hectares [ha]>.

The farm <#Name location/company(BIOGAS)#> produces the following manure to feed the anaerobic digester:

The livestock has a total of about:

<#Cattle_no_1(BIOGAS)#> of <#Cattle_type_1(BIOGAS)#>

<#Cattle_no_2(BIOGAS)#> of <#Cattle_type_2(BIOGAS)#>

<#Cattle_no_3(BIOGAS)#> of <#Cattle_type_3(BIOGAS)#>

<#Cattle_no_4(BIOGAS)#> of <#Cattle_type_4(BIOGAS)#>

<#Cattle_no_5(BIOGAS)#> of <#Cattle_type_5(BIOGAS)#>

<#Cattle_no_6(BIOGAS)#> of <#Cattle_type_6(BIOGAS)#>

In order to improve the plant capacity, the farm may purchase the following biomass:

<#Cattle_supply_1(BIOGAS)#> of manure from <insert here the cattle type> for price of <#Cattle_supply_costs_1(BIOGAS)#>

<#Cattle_supply_2(BIOGAS)#> of manure from <insert here the cattle type> for price of <#Cattle_supply_costs_2(BIOGAS)#>

<#Cattle_supply_3(BIOGAS)#> of manure from <insert here the cattle type> for price of <#Cattle_supply_costs_3(BIOGAS)#>

<#Cosub_supply_1(BIOGAS)#> of <#Cosub_type_1(BIOGAS)#> for price of <#Cosub_costs_1(BIOGAS)#>

<#Cosub_supply_2(BIOGAS)#> of <#Cosub_type_2(BIOGAS)#> for price of <#Cosub_costs_2(BIOGAS)#>

<#Cosub_supply_3(BIOGAS)#> of <#Cosub_type_3(BIOGAS)#> for price of <#Cosub_costs_3(BIOGAS)#>

<#Cosub_supply_4(BIOGAS)#> of <#Cosub_type_4(BIOGAS)#> for price of <#Cosub_costs_4(BIOGAS)#>

<#Cosub_supply_5(BIOGAS)#> of <#Cosub_type_5(BIOGAS)#> for price of <#Cosub_costs_5(BIOGAS)#>

To sum up, <#Manure_input_total(BIOGAS)#> of manure and <#Cosub_supply_total(BIOGAS)#> of cosubstrates could be used to feed the anaerobic digestion plant.

2.1.3 Location

The plant will be built within the company, located in <#City(BIOGAS)#>.

The area subject to intervention is not burdened by environmental or hydrogeological constraints and it is outside of protected areas.

3 MARKET ANALYSIS AND SOCIAL ASPECTS

3.1 Market analysis

The farm has available all the necessary substrates for feeding the plant. Regarding the digestate produced by the biogas plant, it will be spread on the land of the farm, also to realize a cost-effectiveness in terms of reduced acquisition of mineral fertilizers.

3.2 Subsidies

To complete the total cost of ownership it is necessary to specify any grants or subsidies for various types of bioenergy produced by the plant. These are a result of policy implementation and vary from country to country. Financial aid is generally provided as a subsidy for: 1) The production of energy (€/kWhe, €/kWht), and 2) construction of the production system.

Currently feed-in tariffs subsidies for electricity produced for varying classes of generated power. Subsidies vary by country resulting in different rules for different locations. Rules implementing these differences are used in the analysis conducted by the system. The subsidy for this type of plant, for <indicate here the selected biogas valorization system> is about <indicate here the subsidies interesting this business plan> €/kWh.

3.3 Social and ecological aspects

The plant is far from medium and large population centers.

With regard to odour emissions, of great importance in the relationship with the surrounding homes, it should be noted as biogas plants have the great environmental value of breaking down a large part of emissions during the digestion process, it is considered useful to keep under control the impact of any odour emissions. In any

case the residual digestate is stabilized and produces an odour impact significantly lower than the manure.

In essence, the plant achieves a positive environmental balance.

4 SIZING AND TECHNICAL ASPECTS

4.1 Technical description of the plant (to be adapted for other options)

The plant will consist of the following structures:

4.2 Storage of liquid substrates

The tank V0 will have a volume of <indicate here the volume of the tank> [m3], and will be used for the loading of liquid matrix in the digestion system.

The tank V1 will have a volume of <indicate here the volume of the tank> [m3], and will be used for the loading of <indicate here the type of matrix> in the digestion system.

Total prestorage capacity is <#Storage_prestorage_capacity(BIOGAS)#>, for a period of <#Storage_prestorage_period(BIOGAS)#>.

4.3 Silo for solid biomass

The silo for solid biomass consist of <indicate here the number of trench> trench for a total capacity of <indicate here the capacity of trench>[t].

<They are already present at the moment of plant installation so no further investment is required.>/<they are not present so they have to be built for the plant installation>.

4.4 Digester

The digestion system will be organized in <indicate here the number of digesters> digesters <indicate here the shape of digester> for a total volume of

<#Digester_volume(BIOGAS)#>. The tank will be made of concrete and will be equipped with cover, thermal insulation, waterproofing and resistance to chemical and physical agents.

4.5 Gas purification unit

The gas purification unit consist of a <state here the type of purification system>.

4.6 CHP plant

The gas collected in the tanks will be sent to cogeneration plant, consisting of <indicate here the number of engines> endothermic engine with internal combustion; the maximum engine power, considering an electrical efficiency of 37% and 48% for the heat, is equal to <#CHP_e_capacity(BIOGAS)#>and <#CHP_th_capacity(BIOGAS)#>.

The cogeneration plant will be equipped with a general framework for command and control of all the equipment necessary for the operation.

4.7 Manure treatment

The digestate coming from the digester via a <#Manure_System#> will be separated into a thin and a thick fraction. In a later stage, the two streams can be further processed into, for example, chemical fertilizer or compost substitutes.

4.8 Storage structures of output materials

4.8.1 Thick fraction storage

After the separation the thick fraction of the digestate leaving the mechanical separator will have a volume of <#Separator_solid_volume(BIOGAS)#> and will be stored in a special pit.

4.8.2 Thin fraction storage

The thin fraction of the digestate leaving the mechanical separator will have a volume of <#Separator_liquid_volume(BIOGAS)#> and will be stored in a tank.

4.8.3 Torch

The plant will be equipped with safety torch with a flow rate of <#Flare_capacity(BIOGAS)#>.

This torch will have the function of burning the gas and prevent its release into the atmosphere in case of prolonged failure of the cogeneration module. Its activation will happen automatically.

4.9 Outputs of the plant <insert just the scenarios

4.9.1 Biogas

The plant will produce <#Biogas_prod(BIOGAS)#> of biogas. <insert here if the biogas is burned in nearby facility/plant.

4.9.1 Heat

The biogas produced will be used to make heat <at the farm>/<at nearby location>. The heat used will be <#Heat_prod(BIOGAS)#>.

4.9.2 CHP

The plant will produce <#CHP_electricity_prod(BIOGAS)#> of electricity and <#CHP_heat_prod(BIOGAS)#> of heat, with a nominal power of <#CHP_electricity_prod(BIOGAS)#> and <#CHP_th_capacity(BIOGAS)#>. The electricity will be <sold>/<used at the farm>. The heat will be <sold> at the end user located at <#Distance_to_user(BIOGAS)#> km from the anaerobic digestion plant/<used at the farm>.

4.9.3 Biomethane

The purified methane that could be produced is <#Biomethane_prod(BIOGAS)#> at requested level of purification. To sell it a pipe of <#Gasgrid_distance(BIOGAS)#> is required to be installed.

5 LOGISTICS OF SUBSTRATES, COSUBSTRATES, DIGESTATE

The anaerobic digestion plant will be fed daily with a mixture of about <#Manure_input_total(BIOGAS)#> of manure and <#Cosub_supply_total(BIOGAS)#> of cosubstrates.

Annually the mass output from the digestion system will be approximately <#Digestate_output_volume(BIOGAS)#>, equal to <#Digestate_nitrogen(BIOGAS)#> of Nitrogen to be distributed. After storing the liquid digestate will be spread on the farm's fields along with the solid digestate. <#Digestate_area(BIOGAS)#> will be required for the digestate distribution. The farmer <has enough land on his own>/<will distribute the digestate on neighborhood land and he has an agreement in place for that>.

6 MANPOWER NEEDS

The operation time expected for the cogeneration unit is <indicate here the expected working hours> [hours per year] maximum, and then about <indicate here the expected maintenance hours> [hours per year] are used for the maintenance of the system. To these must be added the hours spent on manual tasks management (collection of biomass, load the digesters, etc.) and those for administrative and bureaucratic activities. Overall are used about <#Manpower(BIOGAS)#> for the full operation of the plant.

7 SWOT ANALYSIS

7.1 Strength

- Low payback period
- New income source.
- Re-use of digestate, lowering the expenditure for mineral fertilizer.
- Self-supply

7.2 Weaknesses

- High investment costs.
- Training needed for the digester management

7.3 Opportunities

- Subsides available
- Society

7.4 Threats

- Negative impact on profit if costs of raw material rises.

Following the SWOT analysis, it can be assumed that the system presents a series of positive elements, both from the practical point of view and economically, sufficient to initiate the construction of the plant.

8 ECONOMIC VIABILITY

The annual profit of the biogas plant will be:

Biogas scenario: <#Yearly profit(BIOGAS)#>

Heat scenario: <#Yearly profit(HEAT)#>

CHP scenario: <#Yearly profit(CHP)#>

Biomethane scenario: <#Yearly profit(BIOMETHANE)#>

The simple payback time of the investment will be:

Biogas scenario: <#Simple payback time excl interest(BIOGAS)#>

Heat scenario: <#Simple payback time excl interest(HEAT)#>

CHP scenario: <#Simple payback time excl interest(CHP)#>

Biomethane scenario: <#Simple payback time excl interest(BIOMETHANE)#>

8.1 Investment cost (only chosen option will be shown here) (number provided as example)

Investements	Biogas	Heat	CHP	Biomethane	Manure treatment
Digester	**94,000**	**94,000**	**94,000**	**94,000**	**94,000**
Storage	**73,000**	**73,000**	**73,000**	**73,000**	**73,000**
CHP	**0**	**0**	**88,000**	**0**	**88,000**
Boiler on site	**2,000**	**5,000**	**0**	**0**	**0**

Boiler at end-user	**5,000**	**0**	**0**	**0**	**0**
Gas upgrade installation	**0**	**0**	**0**	**311,000**	**0**
Gas network	**24,000**	**0**	**0**	**0**	**0**
Heat network	**0**	**0**	**0**	**0**	**0**
Connection to grid	**0**	**0**	**0**	**28,000**	**0**
Separator	**0**	**0**	**0**	**0**	**0**
Struvite	**0**	**0**	**0**	**0**	**0**
Struvite storage	**0**	**0**	**0**	**0**	**0**
Stripper	**0**	**0**	**0**	**0**	**0**
Nitrogenstorage	**0**	**0**	**0**	**0**	**0**
UFRO	**0**	**0**	**0**	**0**	**0**
Dryer	**0**	**0**	**0**	**0**	**0**
Torch	**42,000**	**42,000**	**42,000**	**42,000**	**42,000**
Parteurization	**0**	**0**	**0**	**0**	**0**
Total Hardware	**240,000**	**215,000**	**297,000**	**548,000**	**297,000**
Land	**0**	**0**	**0**	**0**	**0**
Civil works	**0**	**0**	**0**	**0**	**0**
Advice & permits	**26,000**	**26,000**	**27,000**	**30,000**	**27,000**
Contingency	**24,000**	**21,000**	**30,000**	**55,000**	**30,000**
Startup costs	**0**	**0**	**0**	**0**	**0**

Total investmemt	**291,000**	**262,000**	**354,000**	**632,000**	**354,000**
Subsidy	**0**	**0**	**0**	**0**	**0**
Own contribution	**291,000**	**262,000**	**354,000**	**632,000**	**354,000**

8.2 Benefits per year *(only the chosen option will be shown here)*

	Biogas	Heat	CHP	Biomethane	Manure treatment
Avoid purchase of fossil fuel purchase	**59,700**	**40,000**	**17,600**	**0**	**17,600**
Sale of electricity	**0**	**0**	**21,500**	**0**	**21,500**
Avoided purchase of electricity	**0**	**0**	**0**	**0**	**0**
Sale of Biomethane	**0**	**0**	**0**	**46,000**	**0**
Avoided export of manure	**0**	**0**	**0**	**0**	**0**
Avoided purchase of fertilizer	**0**	**0**	**0**	**0**	**0**
Sales of fertilizer	**0**	**0**	**0**	**0**	**0**
VVO's	**0**	**0**	**0**	**0**	**0**
Exploitation subsidies	**43,900**	**29,400**	**16,400**	**120,600**	**16,400**
Total benefits	**103,700**	**69,400**	**55,400**	**166,600**	**55,400**

8.3 Costs per year *(only the chosen option will be shown here)*

	Biogas	Heat	CHP	Biomethane	Manure treatment
Electricity purchase	**1,800**	**1,600**	**0**	**4,200**	**0**
Wood chips purchase	**4,700**	**0**	**0**	**5,300**	**0**
Active carbon	**0**	**0**	**0**	**0**	**0**

Biomass purchase	**0**	**0**	**0**	**0**	**0**
Export of digestate	**0**	**0**	**0**	**0**	**0**
Additional costs	**0**	**0**	**0**	**0**	**0**
Personell	**2,300**	**2,300**	**2,300**	**2,300**	**0**
Maintenance	**10,200**	**4,200**	**8,900**	**18,700**	**5,400**
Insurance	**1,200**	**1,000**	**1,400**	**2,500**	**1,400**
Total costs	**20,100**	**9,200**	**12,600**	**33,000**	**6,800**
Annuity	**10,500**	**9,400**	**12,700**	**22,700**	**12,700**

8.4 Profit outcome ***(only the chosen option will be shown here)(numbers just as example)***

Investment Subsidy	**0**	**0**	**0**	**0**	**0**
Own contribution	**291,000**	**262,000**	**354,000**	**632,000**	**354,000**
Write-off/depreciation	**24,200**	**21,800**	**29,500**	**52,700**	**29,500**
Yearly profit	**83,600**	**60,200**	**42,800**	**133,600**	**48,600**
Simple payback time excl interest	**3**	**4**	**8**	**5**	**7**
Net present value	**409,800**	**242,600**	**4,600**	**487,900**	**53,500**

9 ADDITIONAL EXPLANATIONS BY THE BIOENERGY FARM EXPERT

(PLEASE DO NOT TRANSLATE THIS CHAPTER!)

Notice:

- ***<u>This is NOT PART of the farmer's business plan</u>, but demanded for reporting to EU and <u>has to be filled in</u> by the expert <u>in English</u>.***
- ***Please fill in all the blanks using notes, short sentences, etc.***

Project Overview		
Bioenergy project title in English:	• **XXXXXXXXXX**	
Location and country:	• **ITALY** • **XXXXXXXXXX**	
Motivation for project initiation **(Mark one or more with an X)**:	**Financial**	**Non-Financial**
	X Available subsidies X Additional source of income ☐ Option of a shared capital investment	X Availability of manure/biomass ☐ producing electricity and heat with a CHP installation ☐ gas upgrading for gas grid feed-in ☐ producing heat in a biogas boiler ☐ upgrading of the manure to (improved) fertilizers X Contribute to environmental or climate protection
	☐ Others:_____	
General technical concept		

Electric capacity (kW_{el})				Thermal capacity (kW_{th})			
≤ 50	**51-100**	**101-300**	**≥ 301**	**≤ 50**	**51-100**	**101-300**	**≥ 301**
	X					X	

Type and amount of energy per year and share of sold heat in percentage:	☐ Heat ☐ Electricity ☐ Biomethane production ☐ Others_____	✓ __xxx GJ_{th}/yr ⇒___**%** ***(Share of sold heat)*** ✓ _xxx kWh_{el}/yr ⇒**100 %** ***(Share of sold el.)*** ✓ _xxx m^3/yr ⇒____**%** ***(Share of sold gas)*** ✓ _____

Substrates	**Mass**
Manure_input_total:	__**xxx** (ton/yr)
Cosub_supply_total:	___xxx (ton/yr)

Overview of cost data

Currency conversion **(if relevant):**		_____ ⇔_____€
Planned **total investment costs** for the project:	X Biogas ☐ Heat ☐ CHP ☐ Biomethane ☐ Manure treatment	xxx €
Estimation of the benefits per year:	X Biogas ☐ Heat ☐ CHP ☐ Biomethane ☐ Manure treatment	**xxx** €/a

Costs per year	Expenditures
➢ Cost for Biomass input: ➢ Cost for energy and heat consumption: ➢ Cost for maintenance: ➢ Other costs (insurance, ect.):	**0** €/yr **xxx** €/yr **xxx** €/yr **xxxx** €/yr

Supporting role of the BioEnergy Farm expert	
First contact with farmer [YYYY MM DD]:	**XX/XX/XXX**
Last contact with farmer [YYYY MM DD]:	**XX/XX/XXX**
Estimation of the **working hours spent** on supporting **(total amount)**:	_XX___hours
Short description of the support given by the expert **(1 or 2 short sentences!):**	1. optimize the use of the biomass produced in the farm to minimize costs and focuses on the farm's autonomy
Reasons for the farmer to invest (1 or 2 arguments, **only if the project is going to be realized**):	1. National subsidy attractive for the farm 2. Reuse of animal waste and lower environmental emissions

Reasons for the farmer not to invest (1 or 2 arguments, **only if the project is not going to be realized**):	**1.** **2.**
Comments (using notes or short sentences, etc. - only if relevant):	
•	