Investment Project: Construction of a power plant that produces electricity from Biomass as a renewable source.

Executive summary

The proposed project deals with the evaluation of the viability of a private investment in the field of electricity production which is the development of a 1.0 MWel biogas station using dried olive-pomace and wood residues. The Nominal Production Capacity of the station will be 8.760 MWh/year and the Actual Production Capacity will be 8.000 MWh/year. The total cost of the project will be 3.400.000 Euros. The investment seems to be very attractive due to the fact that under certain circumstances it displays remarkably high internal rates. For the basic scenario (cost of raw materials 420.000 euro per year and 30% state funding), even in a five year projection, the IRR is 13,7%, much more than the risk – free rate (2%). In a ten years projection the IRR becomes 24,7%.

1. Introduction

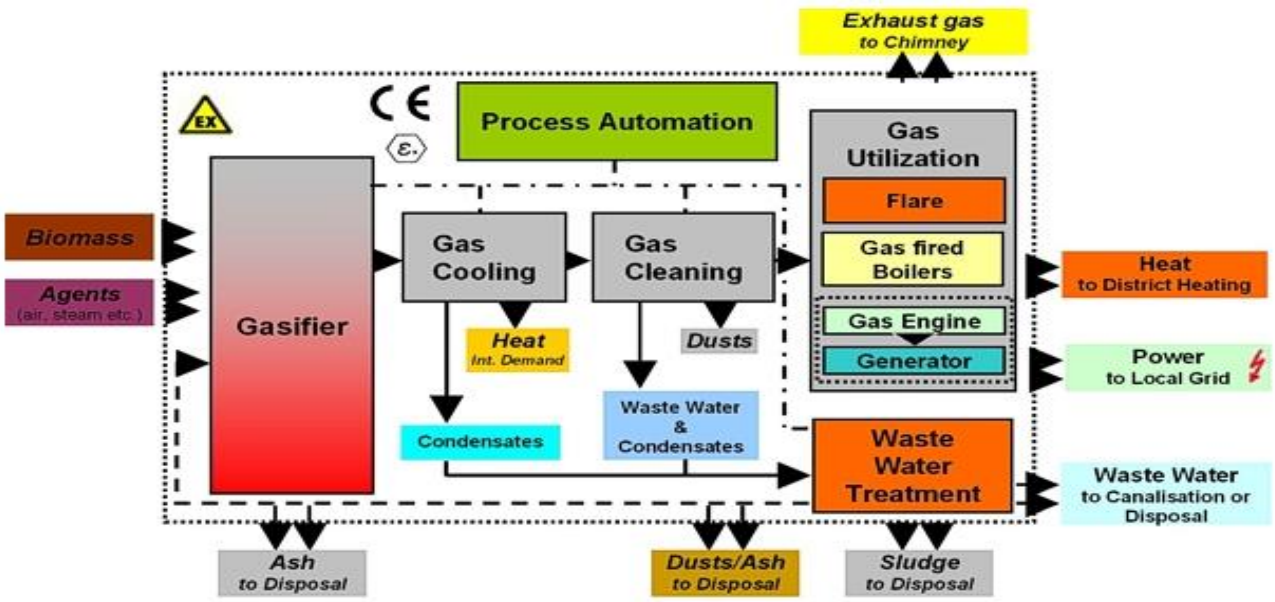
The purpose of this report is to draw up an Investment/Business Plan for the development of a 1.0 MWel biogas station for electricity production (method: biomass gasification - syngas) in Municipality of Chalkidiki, Prefecture of Central Macedonia, Greece. It is mentioned that electricity production through biomass gasification is a Renewable Energy Source.

A project like the one that is proposed in this assignment has the following objectives:

- Developing new energy capacity to meet increasing energy demand;
- Developing new energy capacity to reduce energy import dependency;
- Reducing greenhouse gases and pollutant emissions produced by the energy sector by substituting fossil fuels with a more sustainable energy source, such as a renewable one (biomass).
- Reducing potential industrial or agricultural waste disposal problem.

Biomass gasification is the conversion of solid biomass such as wood, agricultural residues etc., into a combustible gas mixture called “producer gas”. The solid biomass is partially burnt in the presence of air or oxygen to produce a low or medium calorific value gas. Partial combustion process occurs when air supply is less than adequate for combustion of biomass to be completed. Taking into account that biomass contains carbon, hydrogen and oxygen molecules, complete combustion would produce carbon dioxide and water vapour. Partial combustion produces carbon monoxide as well as hydrogen that are both combustible gases.

Overview of the biomass gasification process:



Output - Capacity

The maximum electrical output power rises up to 1.000 kW thus the Overall Capacity of the station will rise up to **1.000 KW or else up to 1,0 MWel**.

Syngas is produced through the process of gasification using as a raw material, dried olive-pomace and wood residues. The advantage of exploiting the olive-pomace is that it is essentially a by-product of a production process and it cannot be placed on a market.

The production capacity of the biogas station is stable. The energy production depends only and exclusively on the supply rate of raw materials.

The station will work 8.000 hours per year (capacity factor, c*f* = 8000/8760, taking into account the regular but also sudden - unplanned equipment maintenances). Thus, capacity factor of the station is 91, 32% and it is considered stable.

Thus the **Nominal Production Capacity** of the station will be 8.760 MWh/year and the **Actual Production Capacity** will be 8.000 MWh/year (8.760 X c*f* of the station).

2. Legislative framework. According national legislation framework, for 1,0 MWel biogas stations for electricity production, there is no obligation to obtain installation, production and operation licences (permits).
For production licence – article 4, paragraph 4(d) of National Law no. 3468/2006, as it was amended by article 2, paragraph 12 of national Law no. 3851/2010.
For installation and operation licences - article 8, paragraph 8 of National Law no. 3468/2006, as it was amended by article 8, paragraph 13 of national Law no. 3851/2010.
There is a need for environmental licensing. According to national laws, the project is described as intermediate degree of nuisance due to the fact that electricity production is above 0,5 MWel (ΚΥΑ no. 3137/191/Φ.15/2012).
Energy Pricing: The price of the energy that is produced by biogas stations (article 13, par. 1 of national Law no. 3468/2006, as it was amended by subparagraph ΙΓ.5 of the Law no. 4254/07.04.2014 – the " New Deal" for Renewable Energy Sources) can be found in category 11 – biomass which is utilized by thermal processes like gasification from stations with installed power ≤ 1MW, and the selling price of the electrical energy (feed – in – tarrif) for this category is **198 € / MWh** for investment projects that have received some kind of state subsidy for their implementation and **180 € / MWh** for investment projects that have not received any state subsidy.
Sale of electricity contract: The contract of sale is for twenty (20) years with the possibility of automatic extension for up to seven (7) years more (subparagraph ΙΓ. 4 of the national Law no. 4245/2014). The Hellenic Electricity Management Organization (ΛΑΓΗΕ) has the obligation to buy all the produced energy.

3. Economic Analysis of the Investment - Analysis of Investment Costs

3.1 Total Cost of the Project

TABLE 1: COST OF THE INVESTMENT

Capital Factor of the Investment	**VALUE**
Building, electrical networks and connections	700.000 €
Machinery	2.300.000 €
technical studies, consulting, education	400.000 €
SUM.	**3.400.000 €**

3.2 Funding scheme of the investment

TABLE 2.1: FUNDING OF THE INVESTMENT		
SOURCE	**PERCENTAGE (%)**	**VALUE**
OWN FUNDS	50%	1.700.000 €
STATE SUBSIDY	30%	1.020.000 €
LOAN	20%	680.000 €
SUM	**100%**	**3.400.000 €**

** ESPA EU program – with procedures that are specified in Commission Regulation (EU) No 651/2014/ article 47, declaring certain categories of aid compatible with the Internal Market in application of Articles 107 and 108 of the Treaty.*

3.3 Turnover

The investment will work in full capacity from the first year (**Nominal Energy Production – amount of electrical energy which can be sold:** 8.760 MWh/year and the **Actual Energy Production – amount of electrical energy which** will be sold: 8.000 MWh/year). Taking into account that the selling price of the electrical energy (feed – in – tarrif) is **198 € / MWh** (0,198 € / KWh) which is stable for at least 20 years and also that the annual adjustment is 0% (the annual adjustment of 50% over the inflation has been abolished by the subparagraph ΙΓ. 8 of the National Law no. 4254/2014), then the overall turnover can be calculated as **1.583.580 €** per year (for the first year and then it will be reduced gradually taking into account 0,5% losses in energy production from the second year – see also table 3).

TABLE 3: TURNOVER							Assumptions	
PRODUCTS	**1st YEAR**	**2nd YEAR**	**3rd YEAR**	**4th YEAR**	**5th YEAR**		*Price / Output*	
MWh (Nominal)	8.760	8.760	8.760	8.760	8.760		91,3%	cf
MWh (Actual)	7.998	7.958	7.918	7.879	7.839		198,00 €	/ MWh
SUM	***1.583.580 €***	***1.575.662 €***	***1.567.784 €***	***1.559.945 €***	***1.552.145 €***		0,0%	Annual Adjustment
							-0,50%	System losses (from the 2nd year)

3.4 PROJECT - COSTS ANALYSIS

A. Raw material costs

The production unit needs about 1,7 tn of raw materials per hour.

The station will work 8.000 per year

Thus the consumption of raw materials can be calculated at about **14.000 tn/year**.

The estimated price for the raw materials (olive-pomace from the food industry, and wood residues from agricultural activities) is about 30 € /tn (we will consider it as stable for each year of the investment). Thus the overall cost for the supply of the raw materials is about **420.000 € / year.**

B. Land cost (land rent and other leases: 10.000 €

C. Annual maintenance costs and structural repair costs: 100.000€

D. Premium Costs for the machinery (0,3% of the overall value of the machinery)**: 6.900 €**

E. Staff costs: The establishment will employ six (6) people as a staff (work in three shifts).

- Wages of one (1) mechanical engineer (Higher education) for supervising as a project manager (monitoring of the whole production procedure): 1500 € / month (gross salary) * 14 months = 21.000 € per year

- Wages of two (2) technicians to the technical support of the station for the maintenance and function of the machinery: 1200€ / month (gross salary) * 14 months = 16.800 € per year * 2 = 39.900 € per year

- Wages of three (3) workers of the station: 950€ / month (gross salary) * 14 months = 13.300 € per year * 3 = 33.600 € per year.

F. Overall energy cost: Electricity consumption at about 120.000 KWh per year with 0,152 € /kWh = 18.240 € and consumption of 5000 liters of diesel per year with 1,45 € /liter = 7.250 € per year.

Thus the expenses after the implementation of the investment plan for products or services connected with it are the following:

TABLE 4: COST ANALYSIS	1st YEAR	2nd YEAR	3rd YEAR	4th YEAR	5th YEAR		Assumptions	
Raw material costs	420.000 €	420.000 €	420.000 €	420.000 €	420.000 €		420.000 €	
Premiums	6.900 €	6.900 €	6.900 €	6.900 €	6.900 €		0,30%	the value of the machinery
Maintenance	100.000 €	100.000 €	100.000 €	100.000 €	100.000 €		100.000 €	annually
Cost of land use (land rent and other leases)	10.000 €	10.000 €	10.000 €	10.000 €	10.000 €		10.000 €	anually
Staff costs (wages)	94.500 €	94.500 €	94.500 €	94.500 €	94.500 €		94.500 €	anually
Overal cost of energy	25.490 €	25.490 €	25.490 €	25.490 €	25.490 €		25.490 €	annually
Other expenses/consumables	10.000 €	10.000 €	10.000 €	10.000 €	10.000 €		10.000 €	annually
SUM	**666.890 €**	**666.890 €**	**666.890 €**	**666.890 €**	**666.890 €**			

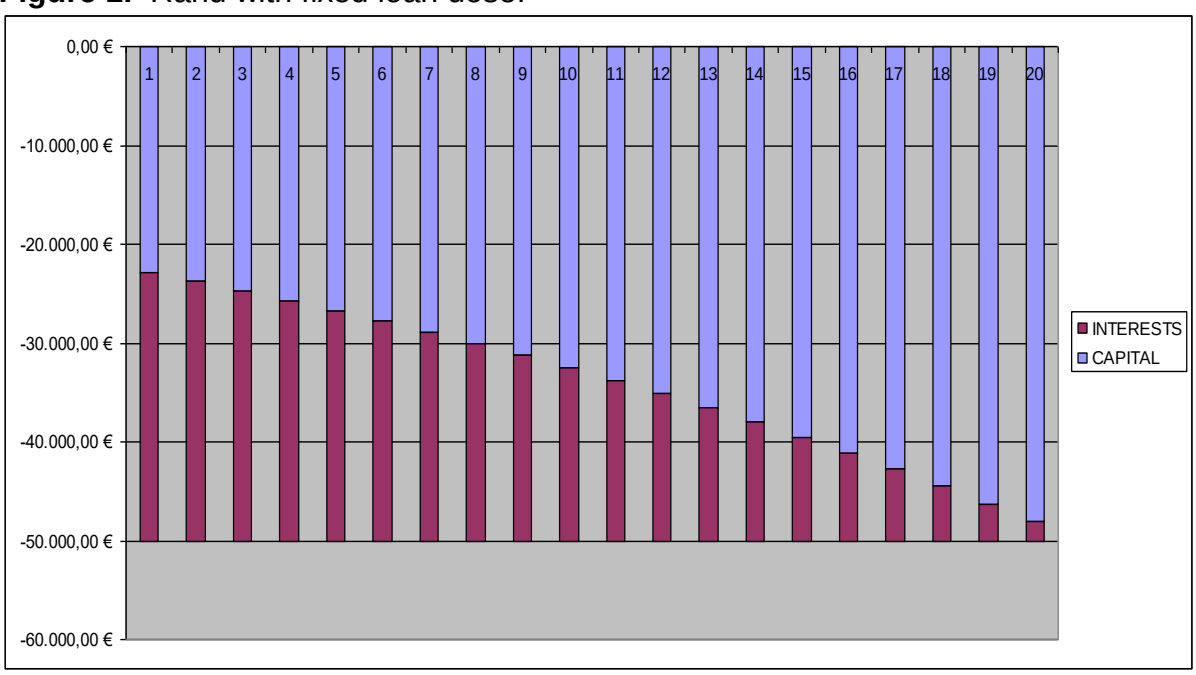
3.5 PROJECT – LOAN COST

The loan is 680.000 € for 10 years with an interest rate of 8,00% (repayment in 20 installments).

Table 5: Loan Cost

LOAN	680.000,00
Interest Rate	8,00%
Number of payments per period	2
Periods (Years)	10
Payment per period	-50.035,59 €

Figure 1. Rand with fixed loan dose.



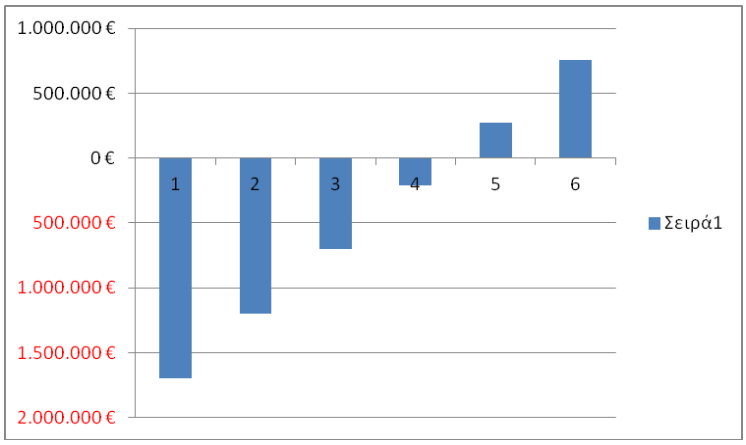
3.6 CASH BUDGET OF THE INVESTMENT (For 5 years projection)

TABLE 6: CASH BUDGET	Building Period	1st YEAR	2nd YEAR	3rd YEAR	4th YEAR	5th YEAR
Cash Inputs (inflows):						
Earnings / Profits before depreciation		852.290 €	848.128 €	844.305 €	840.846 €	837.777 €
Loan (for fixed assets)	680.000 €					
State Subside (ESPA Program)	1.020.000 €					
Own Funds	1.700.000 €					
Total Cash Inputs (inflows)	**3.400.000 €**	**852.290 €**	**848.128 €**	**844.305 €**	**840.846 €**	**837.777 €**
Cash OutFlows:						
Investment Cost	3.400.000 €					
Servicing of Loans (for fixed assets)		46.940 €	50.695 €	54.751 €	59.131 €	63.861 €
Taxes		191.695 €	190.613 €	189.619 €	188.720 €	187.922 €
Dividends		110.594 €	109.969 €	109.396 €	108.877 €	108.417 €
Total Cash Outflows	**3.400.000 €**	**349.229 €**	**351.278 €**	**353.766 €**	**356.728 €**	**360.200 €**
Inflows - Outflows	0 €	503.061 €	496.850 €	490.539 €	484.118 €	477.577 €
Cash Equivalents	0 €	503.061 €	999.911 €	1.490.450 €	1.974.568 €	2.452.145 €

3.7 INVESTMENT PERFORMANCE (for 5 – year projection)

TABLE 7: RETURN ON INVESTMENT						
		1st Year	2nd Year	3rd Year	4th Year	5th Year
Own funds / Dividends	1.700.000 €	503.061 €	496.850 €	490.539 €	484.118 €	477.577 €
Risk Free Rate	2,0%					
Net Present Value	2.312.806 €					
Internal Rate of Return	13,7%					

3.8 INVESTMENT PAYBACK



3.9 INVESTMENT APPRAISAL – DESITION RULES

NET PRESENT VALUE OF THE INVESTMENT	612.806 €	>0
BENEFIT - COST RATIO	1,36	>1
INTERNAL RATE OF RETURN	13,7%	>2%

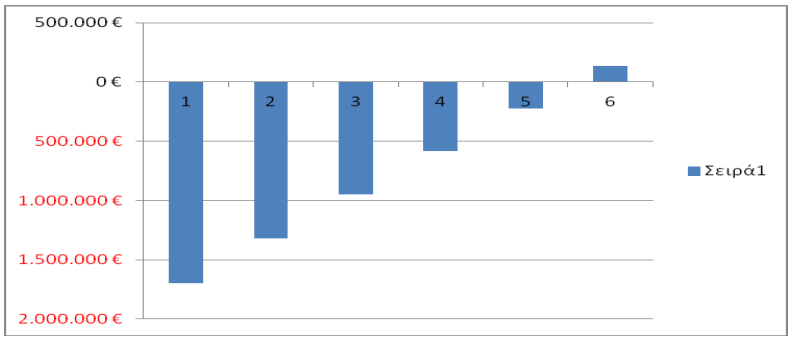
4. SENSITIVITY ANALYSIS (one variable)

A. If seems that the price of the raw materials plays an important role in the viability and the profitability of the investment and the IRR values.

I. If we assume that the estimated price for the raw materials (olive-pomace from the food industry, and wood residues from agricultural activities) is increased for about 15 € /tn (we will consider it as stable for each year of the investment), then overall cost for the supply of the raw materials is about **630.000 € / year. This change will have as a result the reduction of the IRR to 2,6%, as follows:**

TABLE 8: RETURN ON INVESTMENT						
		1st Year	2nd Year	3rd Year	4th Year	5th Year
Own funds / Dividends	1.700.000 €	379.161 €	372.950 €	366.639 €	360.218 €	353.677 €
Risk Free Rate	2,0%					
Net Present Value	1.728.809 €					
Internal Rate of Return	2,6%					

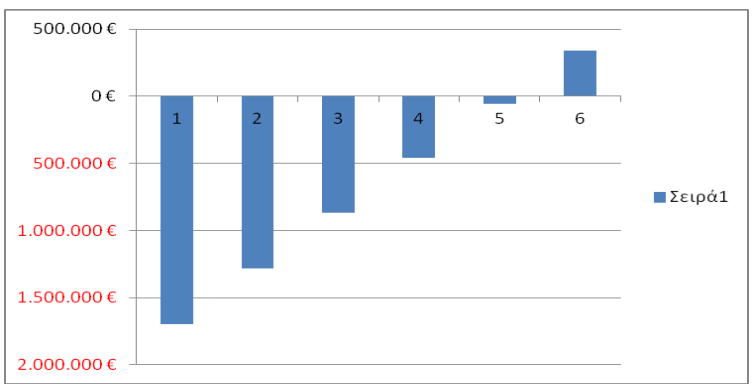
Investment payback



II. If we assume that the estimated price for the raw materials (olive-pomace from the food industry, and wood residues from agricultural activities) is increased for about 10 € /tn (we will consider it as stable for each year of the investment), then overall cost for the supply of the raw materials is about **560.000 € / year. This change will have as a result the reduction of the IRR to 6,5%, as follows:**

TABLE 9: RETURN ON INVESTMENT						
		1st Year	2nd Year	3rd Year	4th Year	5th Year
Own funds / Dividends	1.700.000 €	420.461 €	414.250 €	407.939 €	401.518 €	394.977 €
Risk Free Rate	2,0%					
Net Present Value	1.923.474 €					
Internal Rate of Return	6,5%					

Investment payback



B. The subsidy (EU Funding) from the State is also plays an important role in the viability and profitability of the investment and in the IRR values. If we assume no EU funding for the project then the economical results of the investment are the following:

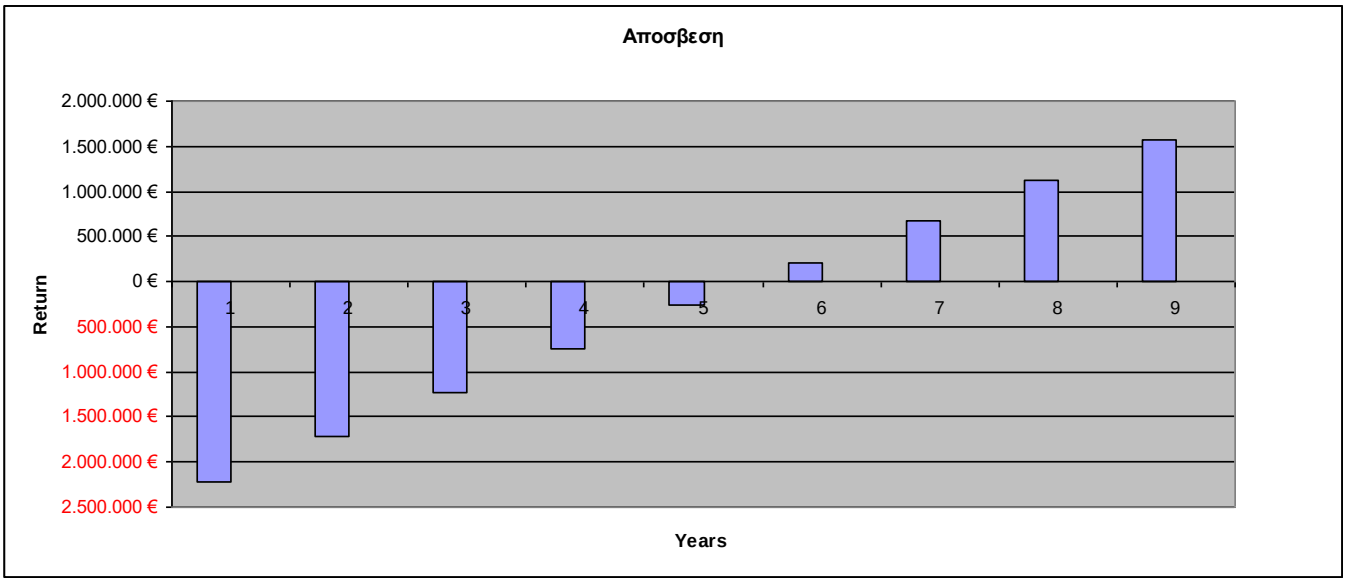
Five year projection

TABLE 10: RETURN ON INVESTMENT						
		1st Year	2nd Year	3rd Year	4th Year	5th Year
Own funds / Dividends	2.720.000 €	503.061 €	496.850 €	490.539 €	484.118 €	477.577 €
Risk Free Rate	2,0%					
Net Present Value	2.312.806 €					
Internal Rate of Return	-3,4%					

NET PRESENT VALUE OF THE INVESTMENT	-407.194 €	<0
BENEFIT - COST RATIO	0,85	<1
INTERNAL RATE OF RETURN	-3,4%	<2%

Ten year projection

TABLE 11: RETURN ON INVESTMENT										
		1st Year	2nd Year	3rd Year	4th Year	5th YEAR	6th YEAR	7th YEAR	8th YEAR	9 YEAR
Own funds / Dividends	2.720.000 €	503.061 €	496.850 €	490.539 €	484.118 €	477.577 €	470.903 €	464.085 €	457.109 €	449.960 €
Risk Free Rate	2,0%									
Net Present Value	3.901.613 €									
Internal Rate of Return	10,5%									



In a ten (10) years projection for the first case senario (cost of raw materials – 420.000 euro/year and State subsidy 30%), as seen below, **the IRR of the investment is 24,7**. On the other hand for the above scenario (cost of raw materials 420.000 euro and State subsidy 0%) in a ten (10) years projection the **IRR is 10,4%**. It is obvious that with the state funding the project becomes much more attractive for the investors.

SENSITIVITY ANALYSIS (THREE VARIABLES)

In order to use the excel: Sensitivity analysis we assume three different senarios changing each time 3 parameters of the economical analysis of the project.

Sensitivity analysis

worse case senario: raw material costs 630.000 € (45 per ton)

Maintenance: 200.000 €

Overall cost of energy: 40.000 €

Possible

poossible case senario: raw material costs 490.000 € (35 per ton)

Maintenance: 100.000 €

Overall cost of energy: 20.000 €

Optimistic

optimistic case senario: raw material costs 420.000 € (30 per ton)

Maintenance: 50.000 €

Overall cost of energy: 15.000 €

Σύνοψη σεναρίου				
	Τρέχουσες τιμές:	Pessimistic	Possible	Optimistic
Μεταβαλλόμενα κελιά:				
H19	420.000 €	630.000 €	490.000 €	420.000 €
H21	50.000 €	200.000 €	100.000 €	50.000 €
H24	15.000 €	40.000 €	20.000 €	15.000 €
Κελιά αποτελεσμάτων:				
B60	0 €	0 €	0 €	0 €
C60	538.750 €	311.600 €	465.000 €	538.750 €
D60	532.539 €	305.389 €	458.789 €	532.539 €
E60	526.228 €	299.078 €	452.478 €	526.228 €
F60	519.807 €	292.657 €	446.057 €	519.807 €
G60	513.266 €	286.116 €	439.516 €	513.266 €

Return of Investment: Worse case senario						
		1st Year	**2nd Year**	**3rd Year**	**4rh Year**	**5th Year**
Own funds / Dividends	1.700.000 €	311.600 €	305.389 €	299.078 €	292.657 €	286.116 €
Risk Free Rate	2,0%					
Net Present Value	1.410.362 €					
Internal Rate of Return	-4,2%					
Return of Investment: possible						
		1st Year	**2nd Year**	**3rd Year**	**4rth Year**	**5th Year**
Own funds / Dividends	1.700.000 €	465.000 €	458.789 €	452.478 €	446.057 €	439.516 €
Risk Free Rate	2,0%					
Net Present Value	2.133.407 €					
Internal Rate of Return	10,5%					
Return of Investment: Optimistic						
		1st Year	**2nd Year**	**3rd Year**	**4rth Year**	**5th Year**
Own funds / Dividends	1.700.000 €	538.750 €	532.539 €	526.228 €	519.807 €	513.266 €
Risk Free Rate	2,0%					
Net Present Value	2.481.025 €					
Internal Rate of Return	16,7%					

TURNOVER AND COST ANALYSIS

(For 10 years projection) – Initial scenario

TABLE 12a: TURNOVER										
PRODUCTS	**1o YEAR**	**2o YEAR**	**3o YEAR**	**4o YEAR**	**5o YEAR**	**6o YEAR**	**7o YEAR**	**8o YEAR**	**9o YEAR**	**10o YEAR**
MWh (Nominal)	8.760	8.760	8.760	8.760	8.760	8.760	8.760	8.760	8.760	8.760
MWh (Actual)	7.998	7.958	7.918	7.879	7.839	7.800	7.761	7.722	7.684	7.645
SUM	***1.583.580 €***	***1.575.662 €***	***1.567.784 €***	***1.559.945 €***	***1.552.145 €***	***1.544.385 €***	***1.536.663 €***	***1.528.979 €***	***1.521.335 €***	***1.513.728 €***
TABLE 12b: COST ANALYSIS	**1o YEAR**	**2o YEAR**	**3o YEAR**	**4o YEAR**	**5o YEAR**	**6o YEAR**	**7o YEAR**	**8o YEAR**	**9o YEAR**	**10o YEAR**
Raw material costs	420.000 €	420.000 €	420.000 €	420.000 €	420.000 €	420.000 €	420.000 €	420.000 €	420.000 €	420.000 €
Premiums	6.900 €	6.900 €	6.900 €	6.900 €	6.900 €	6.900 €	6.900 €	6.900 €	6.900 €	6.900 €
Maintenance	100.000 €	100.000 €	100.000 €	100.000 €	100.000 €	100.000 €	100.000 €	100.000 €	100.000 €	100.000 €
Cost of land use (land rent and other l	10.000 €	10.000 €	10.000 €	10.000 €	10.000 €	10.000 €	10.000 €	10.000 €	10.000 €	10.000 €
Staff costs (wages)	94.500 €	94.500 €	94.500 €	94.500 €	94.500 €	94.500 €	94.500 €	94.500 €	94.500 €	94.500 €
Overal cost of energy	25.490 €	25.490 €	25.490 €	25.490 €	25.490 €	25.490 €	25.490 €	25.490 €	25.490 €	25.490 €
Other expenses/consumables	10.000 €	10.000 €	10.000 €	10.000 €	10.000 €	10.000 €	10.000 €	10.000 €	10.000 €	10.000 €
SUM	**666.890 €**	**666.890 €**	**666.890 €**	**666.890 €**	**666.890 €**	**666.890 €**	**666.890 €**	**666.890 €**	**666.890 €**	**666.890 €**

CASH BUDGET OF THE INVESTMENT (For 10 years projection)

TABLE 13: CASH BUDGET	Building Period	1st YEAR	2nd YEAR	3rd YEAR	4th YEAR	5th YEAR	6th YEAR	7th YEAR	8th YEAR	9nth YEAR	10nth YEAR
Cash Inputs (inflows):											
Earnings / Profits before depreciation		852.290 €	848.128 €	844.305 €	840.846 €	837.777 €	835.125 €	832.921 €	831.196 €	829.987 €	829.331 €
Loan (for fixed assets)	680.000 €										
State Subside (ESPA Program)	1.020.000 €										
Own Funds	1.700.000 €										
Total Cash Inputs (inflows)	**3.400.000 €**	**852.290 €**	**848.128 €**	**844.305 €**	**840.846 €**	**837.777 €**	**835.125 €**	**832.921 €**	**831.196 €**	**829.987 €**	**829.331 €**
Cash OutFlows:											
Investment Cost	3.400.000 €										
Servicing of Loans (for fixed assets)		46.940 €	50.695 €	54.751 €	59.131 €	63.861 €	68.970 €	74.488 €	80.447 €	86.883 €	93.833 €
Taxes		191.695 €	190.613 €	189.619 €	188.720 €	187.922 €	187.232 €	186.659 €	186.211 €	185.897 €	185.726 €
Dividends		110.594 €	109.969 €	109.396 €	108.877 €	108.417 €	108.019 €	107.688 €	107.429 €	107.248 €	107.150 €
Total Cash Outflows	**3.400.000 €**	**349.229 €**	**351.278 €**	**353.766 €**	**356.728 €**	**360.200 €**	**364.222 €**	**368.835 €**	**374.088 €**	**380.028 €**	**386.709 €**
Inflows - Outflows	0 €	503.061 €	496.850 €	490.539 €	484.118 €	477.577 €	470.903 €	464.085 €	457.109 €	449.960 €	442.622 €
Cash Equivalents	0 €	503.061 €	999.911 €	1.490.450 €	1.974.568 €	2.452.145 €	2.923.049 €	3.387.134 €	3.844.243 €	4.294.202 €	4.736.824 €

INVESTMENT PERFORMANCE (for 10 – year projection)

TABLE 14: RETURN ON INVESTMENT										
		1st Year	**2nd Year**	**3rd Year**	**4rth Year**	**5th Year**	**6th YEAR**	**7th YEAR**	**8th YEAR**	**9 YEAR**
Own funds / Dividends	1.700.000 €	503.061 €	496.850 €	490.539 €	484.118 €	477.577 €	470.903 €	464.085 €	457.109 €	449.960 €
Risk Free Rate	2,0%									
Net Present Value	3.901.613 €									
Internal Rate of Return	24,7%									

5. Evaluation of the proposed investment

The investment seems to be very attractive due to the fact that under certain circumstances it displays remarkably high internal rates. For the basic scenario (cost of raw materials 420.000 euro per year and 30% state funding), even in a five year projection, the IRR is 13,7%, much more than the risk – free rate (2%). In a ten years projection the IRR becomes 24,7%, a fact which make the investment very attractive, taking also into account that the lifespan of a project like that (biogas station is about 20 to 25 years).

In general, the key elements to ensure that the biomass project is financially sustainable are:

- Secure and stable supply of quality biomass feedstock.
- Easy access to a stable market for the produced electricity and heat.
- Biomass is available as process residues (at low costs including the cost of collecting, transporting, and storing biomass).

Two are the major parameters which are guaranteeing the viability of the proposed investment: (II) The contract of sale of the whole production (energy production as electricity) which is for twenty (20) years with the possibility of automatic extension for up to seven (7) years more and (II) the selling price of the electrical energy (feed – in – tarrif) which is stable and for this category of investment is **198 € / MWh.**

It is very important for the investors to know that the cost of the raw materials plays a crucial role in the IRR values. Thus, long term agreements for raw materials supply must be achieved, in prices as low as possible, in order to make the investment more profitable. For five year projections the relationship between the price of raw materials and IRR is shown in the following table:

Raw material costs	IRR
420.000	13,70%
490.000	10,20%
560.000	6,50%
630.000	2,60%

It must also be mentioned that important elements to ensure an economically viable biomass project are:

- The biomass applied for the energy production has no current alternative use that will cause social impact if removed (for example, as food or feed).
- The biomass supply is based mainly on residual biomass (secondary and tertiary biomasses), in order to realize climate and environmental benefits.

In our project raw materials are olive-pomace from the food industry (by – products of olive oil production), and wood residues from agricultural activities which has no other alternative use and are considered as residual biomass.

Revenues from the thermal energy

It is worth mention that during the operation of the unit we have also production of thermal energy which can be offered for sale for example to owners of greenhouses. Thus, more revenues for the investment can be succeeded.

If we assume a production of thermal energy of about 200-300 kWh per day, offering it for sale for 0,16 €/kWh for 200 days per year then this could offer to the investment about 150.000 – 230.000 € per year, more revenues.

But, it is very difficult to calculate the amount of these revenues due to the fact that there are not secured and the frequency of disposal throughout the year cannot be identified. The production of thermal energy and the disposal to the buyers is not stable and secure throughout the years. So in this project we didn't take into account that kind of revenues.

Social and Environmental Benefits

Employment: The bioenergy plant can generate employment in the region.
Economy: The plant can benefit the local economy - economic growth through employment creation and income generation.

Protection of the environment: By substituting fossil fuel with a more sustainable energy source, a reduction in GHG and pollutant emissions can be succeeded. More environmental benefits from reducing alternative fossil fuel-based electricity generation can be achieved in conjuction with reduced health costs and better overall air quality from pollution externalities. Also by using olive-pomace as a raw material, a reduction of the disposal problem of this food production waste can be succeeded.

Biogas station is going to offer a lot of social and environmental benefits which cannot be quantified and cannot be added to the overall incomes of the project in order to evaluate more accurately the real net rate of return and the social usefulness of the investment.

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