South Nyírség Bioenergy Project

Project Design Document for Hungarian Government

Version 2.6

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1 General information

1.1 The subject of the project

South Nyírség Bioenergy Project

1.1.1 Location of the project

Fuel supply area: Szakoly-Balkány region
Sites of the power station: Szakoly
The power station is located in 1.5km from the nearest residential building.
(The location map of the project site is shown in Annex 1.)

1.1.2 Geographic features of the region

The project is to be implemented in the so-called "Northern Great Plain Region" that is located in the Eastern - North-Eastern part of Hungary. (The region is shown in green in the map in Annex 1.) This region incorporates three counties (from west to east): Jász-Nagykun-Szolnok; Hajdú-Bihar and Szabolcs-Szatmár-Bereg. The actual project location within the region is in its easternmost part on both sides of the border between the two latter counties, in the so-called Dél-Nyírség (South Nyírség) region. This location is indicated as "Fuel supply region" in the map, in yellow-green.

The main figures that characterize the Northern Great Plain Region are:

Land area:	17729km^2
Population:	1551000people
Density of population:	87.5 person/km^2.

The most important feature of the region is its transit role towards the Ukraine and Romania.

The actual project area, i.e. the fuel supply area is approximately 4000km^2. This area is a typical lowland region, very poor in mineral resources and its other endowments are not very favorable, either. In the northern part of the region low rolling sand dunes can be found, which are the most valuable parts of the region from the aspect of energy plantations and forests. There are no big differences in elevation within the region but the climate is rather variable. The local climate is somewhat dryer in the summer and a bit warmer in the winter than in the surrounding Hungarian Great Plain.

The total number of sunny hours is 2020-2150 per year and the annual mean temperature is 10-11 °C. The area is also very windy and sandstorms are not uncommon. It is one of the driest parts of Hungary with only 500-550 mm of precipitation a year. The distribution of precipitation is rather uneven and unpredictable. This is one of the major reasons why agriculture is less successful. Irrigation however can be ensured as the region boundary is the Keleti Főcsatorna (Main Eastern Channel) and the region has the Berettyó and Ér rivers and the Kálló Channel in it, as well as abundant underground water reservoirs.

1.1.3 Economic features of the region

The region has rather contradictory economic features as Debrecen and Nyíregyháza, Hungary's two biggest cities besides the capital, are located in it while the rural areas are among the most backward territories in the country. Most industries and businesses are concentrated to the big cities. Food processing, machinery and textile industries are the most important ones. Both cities have high standard educational facilities, universities, providing highly qualified workforce for the region. At the same time outside the cities some 50% of the regions population lives in areas with less than average economic features, characterized by low level of investments and activity of capital. The following figures well demonstrate the situation.

Indicator	As a percentage of country average
Per capita GDP	63.4 %
Per capita income	85.6 %
Foreign investment per capita	24%
Number of enterprises per 1000 people	75 %

If the two cities are not taken into account then the economy of the region is dominated by agriculture. Still due to the unfavorable endowments the productivity of agriculture is not very high, as shown by the following figures:

Indicator	As a percentage of country average
Agricultural area	21.8%
Density of domestic animals (per 100 ha agricultural area)	25.3%

The development level of the region is also well shown by the utilities available for the population and the length of road network:

The percentage of population supplied with

- public water network: 91.5%
- public sewers: 35.3%
- access to natural gas network: 70.2%

Road network lengths:

- dual highway (motorway) : 10 km (100 km under preparation or construction)
- primary trunk road: 418 km
- secondary trunk road: 739 km
- other paved roads: 3749 km
- road length per 100 km^2 : 27.7 km

1.1.4 Site of the power station

After an initial evaluation 9 sites were selected for further examination. The evaluation has taken into account the existing infrastructure, the connection to the road system and accessibility, ownership issues, prices, vicinity of residential areas, environmental constraints, etc.

Having evaluated several potential sites, the village of Szakoly has been selected as the location for the project. Following public hearings, the municipality has committed itself to support the project, and offered land for the power plant.

1.2 Participants of the project

Hungary

Entity Name	Liget Bioenergia Művek Kft.
Address	4254 Nyíradony, Honvéd st. 92.
Contact	Mr. István Polgári, Managing Director

Entity Name	EGI-Contracting Engineering Co. Ltd.
Address	1027 Budapest, Bem rkp. 33-34
Contact	Mr. Zoltan Lontay, Head of Department, Energy Efficiency Department

Japan

Entity Name	Tohoku Electric Power Co., Inc.
Address	1-7-1 Honcho, Aoba-ku, Sendai, Miyagi 980-8550, JAPAN
Contact	Mr. Takeyoshi Yaegashi, Senior Manager

Contact Person: Mr. István Polgári, Managing Director of Liget Bioenergia Művek Kft.

The owner of the project is a project company, Liget Bioenergia Művek Kft. (hereinafter called Liget). A registration of the company is attached as Annex 3, ”Company Registration” (a copy of the original registration) and Annex 4, “English Version of Company Registration” (a translation of the original version).

Other participants of the project are EGI-Contracting Engineering Co. Ltd. (hereinafter called EGI) and Tohoku Electric Power Co., Inc. (hereinafter called Tohoku). Local entrepreneurs established Liget Bioenergia Művek Kft. Under an assignment from Liget, EGI is responsible for project development. The other participant of the project, Tohoku invests into the project and will receive carbon credits.

1.2.1 Organization of project implementation

The project is implemented in four steps.

(1) Preliminary project development

The preliminary project development started with the emergence of the first project idea and ended with the completion of a pre-feasibility study. This step has been completed by the developers (local politicians and entrepreneurs) of the project. A pre-feasibility study was prepared by EGI Contracting/Engineering.

(2) Project development
This step started with approving the pre-feasibility study and ends with reaching the bankable phase of development.

The pre-feasibility study has been evaluated and approved by both the local government, the local politicians and entrepreneurs who initiated the project. As an important move the project company has been established.

In order to reach the bankable stage, engineering and business development activities have to be performed.

The project company assigned EGI to accomplish both the engineering and the business development tasks. EGI undertook to finance these project development activities up to and including arranging financing. It means that EGI will only be paid for their efforts when a commercial bank opens a credit account.

By working with EGI, a reputable engineering firm, the project company will enjoy increased credibility.

The upfront financing of the project development activities makes EGI strongly interested in the success of project development. We note that EGI took a high level of risk. In case the project development activities fail for any reason, EGI will not be able to recover any of its costs spent on project development activities.

With the cooperation of Mitsubishi Research Institute (hereinafter called MRI), Liget, EGI, and Tohoku prepare project design document for the project.

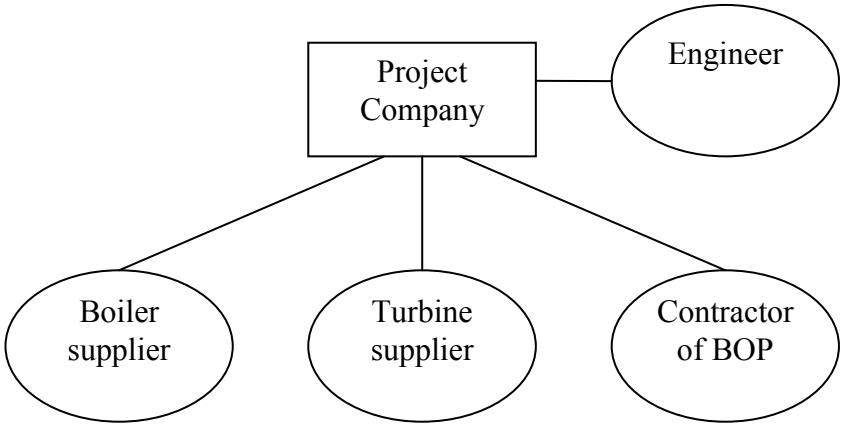
Liget, EGI, and Tohoku agree to work together for the project development as investors.

(3) Construction
The construction step starts with signing the financing contracts and ends with the acceptance of the facilities.

By the time of signing the financing contracts all the procurement contracts will be fully negotiated and signed. It means that construction activities will immediately start.

In order to save on costs the project company will apply the “multiple contracts” procurement model. The scheme of the model is shown below[1]:

[1] BOP = Balance Of Plant



The two pieces of main equipment, the boiler and the turbine will be directly procured by the project company, while the balance of plant will be procured as a separate package. The project company will be assisted by an engineer.

1.2.2 Fuel suppliers

The project company will procure fuels from a variety of suppliers.

The most important fuel supplier will be a state owned forestry company. This company will supply both wood chips and round logs.

The second category of fuel suppliers will include wood traders, who already have experience with producing and marketing wood chips and saw dust.

Finally, the project company will co-operate with smaller companies, as well, which will work on a regional basis. The project company will give concession to these entrepreneurs to collect and process a variety of raw materials to get wood fuel. The scope of raw materials includes fruit orchard cuttings, wastes from primary wood processing and other biomass materials. The details are explained in the chapter 2.2

1.3 Declaration

The authorized representatives of the participants of the project reached agreement that the full amount (i.e. 100%) of Emission Reduction Units (ERUs) acquiring from the project activity and authorized by the Hungarian Government should be transferred to the Japanese investors for its financial contribution to the project. The declaration, which was signed in March 30th, 2004, is attached to this document.

Consequently all the ERUs is to be transferred to Tohoku.

1.4 Time schedule for execution of the project (incl. construction)

The schedule for the project is as follows:

A. Conceptualization of the Project. (Done.)

B. Preparation of a Project Description. (Done.)

C. Letter of Endorsement. (Received.)

D. Technical basic design (Done.)

E. Tendering process for main equipments (In progress. Completion expected by the middle of January, 2006.)

F. Fuel procurement contract (Agreed general contract)

G. Legal documents for company registry (In progress. Completion expected by the middle of February, 2006.)

H. Finance (In progress. Completion expected by the middle of February, 2006.)

I. Construction completed. (4^{th} quarter of 2007.)

J. Commercial operation. (From 1^{st} quarter of 2008.)

K. ERU accounting period. (2008-2012.)

2 Technological and financial information

2.1 Technological information

2.1.1 General description

The traditional steam cycle with less than 20MWe generating capacity is applied to produce electricity from biomass fuel. Theoretically other technologies could be available, too, such as gasification of the biomass, and power generation in gas turbines. The steam cycle has been selected because this is the technology which is best proven and fully commercial, what means that the technical risk can be minimized.

The installed boiler plant is a suspension fired unit with water-cooled vibrating grate. The wood chips are dosed by screw conveyors into the air spouts which evenly distribute the fuel across the combustion chamber. Fine particles ignite when entering the combustion chamber, whereas large particles fall onto the grate. The particles burning on the grate radiate and ignite the small particles in suspension. The air spouts will evenly distribute the fuel on top of the grate. As the fresh fuel is fed on top of the burning fuel it dries and ignites fast. As a large fraction of the energy is released in suspension, the boiler reacts quickly to load changes.

The water-cooled vibrating grate is connected to the boiler drum with flexible tubes and forms a naturally circulating evaporator circuit. The grate consists of two panel walls, which are mounted on blade springs. The movement of the grate is provided by a grate drive connected to the grate with two beams. The grate part moves in opposite directions in order to even out mass forces in the grate steel structure.

The fuel moves along by vibration, which means that the fuel will hop over the grate surface. Thus there will be no mechanical wear of the grate surface.
The lower part of the combustion chamber is not refractory lined, which prevents formation of slag as the wall temperature is well below the melting point of wood ashes, even with contaminations.

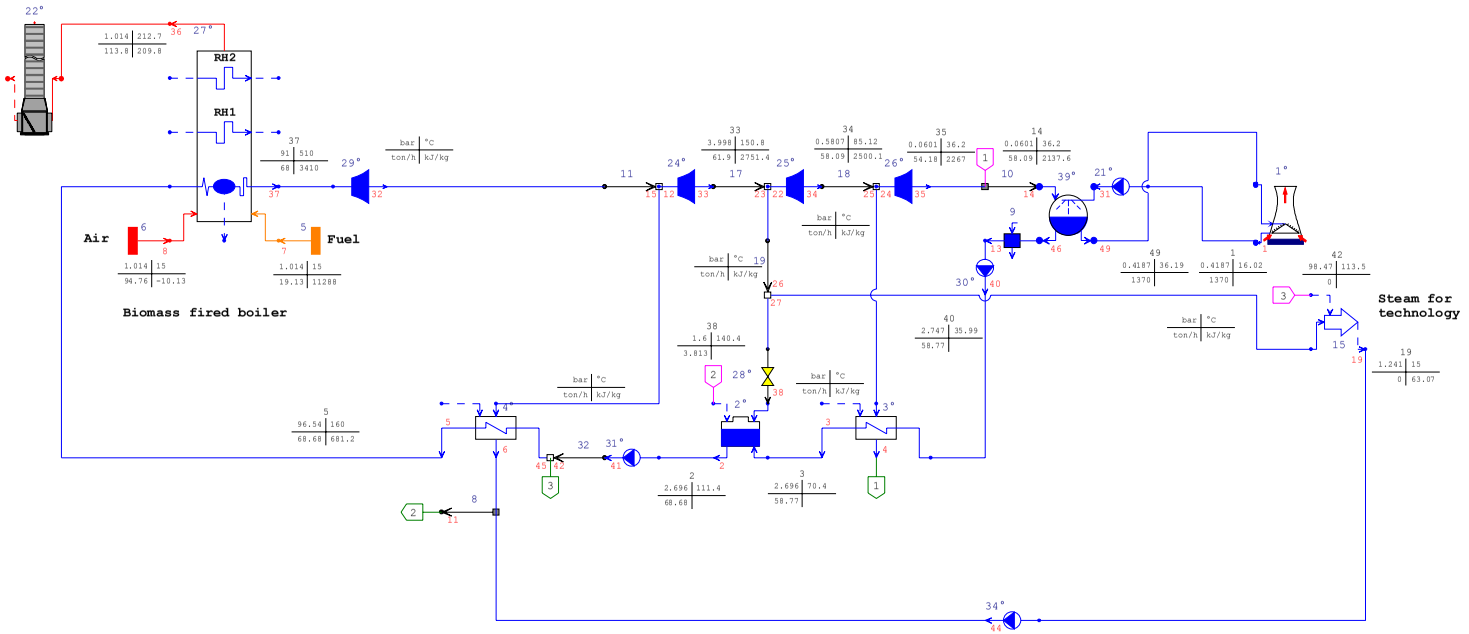
A refractory lined band is installed above the throat of the combustion chamber in order to increase the particle temperature and thereby speed up particle combustion and lower the CO emission. By applying refractory to the boiler walls, the radiation intensity in the upper part of the combustion chamber is increased, which increases the particle temperature. Thus, combustion speeds up.

The boiler is a natural circulation boiler, as all heated surfaces have an upward water flow. All downcomers are kept free from the influence of heat and are therefore unhindered by the rising steam bubbles. The unheated downcomers also secure ample and quick water supply to the heating surfaces located farthest from the drum.

The boiler permits quick firing as the pressure part (the heat influenced heating surfaces) contains only a small quantity of water. Due to the efficient circulation, the same temperature is maintained throughout the pressure part. Undesired thermal strains, which might otherwise cause thermal cracking, are thereby avoided.

The applied technology is well proven conventional condensing power station technology (many of them operating in Hungary), apart from the fuel being wood. Different wood combustion technologies were evaluated and the final selection was done on the basis of the best applicability not only to the general Hungarian conditions, but to the actual local conditions, such as fuel type. The supply of training materials and training for the plant operators is included in the scope of supply of the equipment suppliers . In the training special attention is paid to the fuel specific issues, such as handling the fuel storage equipment, proper mixing of different quality fuels.

The following diagram shows a design for the primary components of the biomass-fueled generation installed in this project, as well as some key parameters under design conditions:



Ambient temperature	11	[°C]
Gross power	19087	[kW]
Net power	18258	[kW]
Net electric efficiency(LHV)	30.41	[%]
Net heat rate(LHV)	11840	[kJ/kWh]
Net fuel input(LHV)	60050	[kW]

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FLOW DIAGRAM
Steam-water cycle without process steam

Design for the primary components

2.1.2 Installed equipment

The basic elements of the power plant are as the follows:

- Boiler complete with firing equipment, ignition burners, blowdown system, ash removal system
- Electrostatic precipitator (ESP)
- Chimney
- Steam turbine with generator complete with mixing condenser, feedwater preheaters, lube system, , interconnecting piping
- Electric switchgear and transformers
- Water treatment plant
- Air-cooled cooling tower for the condenser with interconnecting piping
- Woodyard with fuel storage spaces and silos, chopper and fuel management (transportation) equipment

2.1.3 Technical data for the performance of the plant

Key factors of the project power plant are as follows:

Table 2.1-1: Key Factors of the Power Plant

Item	Unit	Value
Pressure of produced steam	bar	93 ±2
Temperature of produced steam	°C	515 ±5
Boiler efficiency	%	89%
Cycle (power generation) efficiency	%	32,5%

The technical parameters and annual performance of the plant was calculated with "Thermoflex" heat flow calculation software, on the basis of the above flow diagram. The main parameters and results of the calculation are summarized in the following tables:

	Capacity		Yearly production					
			I	II	III	IV	Total	
Renewable generated electricity	19,142	MW	38026	36292	24020	38205	136543	MWh
of which peak			9849	9400	6221	9895	35365	MWh
of which off-peak			23424	22356	14796	23534	84110	MWh
of which off-off-peak			4753	4537	3003	4776	17068	MWh
According to operation mode			40355	38515	25492	40545	**144906**	MWh
of which peak			10538	10058	6657	10588	37840	MWh
of which off-peak			25064	23921	15832	25182	89998	MWh
of which off-off-peak			4753	4537	3003	4776	17068	MWh
Steam sales	0,0	t/h	0	0	0	0	0	t
	0,0	MW	0	0	0	0	**0**	GJ
Hot water sales	0,00	MW	0	0	0	0	**0**	GJ
Total exported heat			0	0	0	0	**0**	GJ
for households							0	GJ
for other purposes			0	0	0	0	0	GJ
Woodchip consumption		t/h	44182	44819	30084	45113	164198	ton(s)
HV= 10,8 MJ/kg	0,0	MW	477169	484049	324903	487217	**1773338**	GJ
Natural gas consumption	0	Nm³/h	0	0	0	0	0	Nm³
HV= 34 MJ/Nm³	0	MJ/h	0	0	0	0	**0**	GJ
for households			0	0	0	0	0	GJ
for other purposes			0	0	0	0	0	GJ
of which in boilers							0	GJ
of which in gas engines			0	0	0	0	0	GJ
Oil consumption	12960	GJ/yr	3240	3240	3240	3240	12960	GJ
Own consumtion of electric power	0,0	MW	0	0	0	0	0	MWh
of which peak			0	0	0	0	0	MWh
of which off-peak			0	0	0	0	0	MWh
Make-up water consumption	10,6	m³/h	22924	23114	15494	23368	84900	m³
Effective operational hours			2166	2184	1674	2208	**8232**	hour(s)

2.2 Biomass fuel availability and procurement

2.2.1 Forestry originated fuel

One of the most important components of this project is a procurement plan of biomass fuels. First, the availability of biomass fuels in the region is assessed. The data of the National Forestry Database, which was prepared by the State Forestry Service in January 2003, indicates that ca. 240000 m3 (which is equal to 167095 t with the assumption of 30% moisture content) thick firewood and ca. 200000 m3 (139 313t) thin firewood are available in the region2. If all available firewood is utilized, ca. 440000 m3 (300000 t) firewood would be available annually.

In order to calculate the amount of fuel available for the new biomass plant, the current local use of firewood needs to be calculated primarily that used by the local households. This demand for firewood is likely to remain stable or even increase if the natural gas prices will grow.

Since no detailed statistics of the firewood use of the individual regions are available; our calculation is based on the experience of National Forestry Service. This experience shows that in Hajdu-Bihar county the vast majority (85-90%) of the produced thick firewood is used locally by residential users. This is also true for the thin firewood from the final utilization of the forests. The thin firewood of soft leaf and pine forests is usually left in the forest, which needed to be burnt during the cleaning up of the harvesting area. In very cold winters, however, such as in 2002-2003 lack of firewood may occur and in these occasions even this fuel was collected and utilized.

In Szabolcs-Szatmár-Bereg county both the theoretically available and the actually harvested wood quantities are higher by some 100-150000 m3/year while the population is not much different. This means that a surplus quantity of firewood is produced. Most of the hard leaf fraction of this is transported and sold to other counties (Szolnok, Békés, Csongrád). The thin firewood is not collected except from those areas, which are clear cut.

Having all this in mind and staying on the safe side it can be assumed that the total quantity of firewood from clear cuts remains in the region and can cover the local demand. In this case only the surplus amount of clear cut firewood is available for the power plant. Currently the total amount of thick firewood of clear cuts is 145000m3. According to the current forestry planning schemes the total amount of available wood is 167000 m3. The difference that would be available for the plant is 22000m3 thick firewood. From the other two processes (clearing and thinning) altogether ca. 71000 m3 is available theoretically. There is no actual indication, how much of this is used locally, but based on the experience of other regions and projects, and staying on the safe side, we assume that only 25% of this (i.e. 17750 m3, rounded: 18000 m3) is available for the project.

This means that altogether 18000+22000=40000m3, or 28000 t thick firewood is available.

[2] The detailed information is given in the Annex2, ”Availability of Firewood in the Region”.

The same figure for the thin firewood is more than 70000 m3. If the other thin firewood quantities (those from the clearing and thinning processes), which is more than 93000 m3 in the regions investigated are added then the total amount is 163000m3 (114000 t) thin firewood, which is available as fuel for the power plant.

It is clear from the above figures that the majority of the potential fuel comes from the thin firewood, most of which is currently left in the forests. Therefore the most important task is to organize the logistics of collecting and transporting this fuel to the power plant. This task requires procuring the necessary – not too expensive – machinery and employing local workforce. The collected wood would be bought in collection centers, which are to be set up at 40-50 km from each other. Such collection centers could be organized for example in the vicinity of Haláp, Vámospércs, Nyíradony, Nyírbátor, Nagykálló and Baktalórándháza. The wood delivered to these centers should be chipped on the site by the mobile chippers and stored there in order to reach the optimum moisture content before delivering the chips to the power plant. With proper organization the mobile chippers can serve more than one collection centers thus reducing the necessary investment.

In addition to the firewood, a considerable part of a tree is under ground. The quantity of the underground stump and roots depends on the tree species, age and local conditions but it is usually estimated as 20-25% of the above ground part. The thinner roots, however, are not possible and not economical to reclaim. Thus it is safe to assume that some 15-20% of the underground part can be utilized.

The regeneration of the nearby forest is made with full soil preparation i.e. the stumps in the clear cut area are removed and are usually deposited in storage areas. The stump storage areas require considerable plot area (15-20%) and this process is also harmful for the environment deteriorating in the soil structure and the micro environment within the soil. During the bulldozing of the stumps the topmost layer of the soil which is most fertile is removed. Due to these reasons a different way of stump processing has been initiated and is preferred.

Some years ago in the region examined a stump chipper machine was installed, which worked sufficiently but no demand for the chips, was there. Utilizing this machine and the related experience would be beneficial for the project.

According to the data of the National Forest Service in the two counties investigated, the stumps were removed from altogether some 250-270 ha acacia (black locust), 250-260ha poplar, primarily hybrid poplar forests. If the average yield of the clear cut acacia forest is assumed at 200 m3/ha then the volume of the stumps, assuming the above 15%, amounts to 8000-8500 m3 i.e. 7000-7500 tons. Using the same methodology, the mass from the poplar stumps can be estimated at 17-18000m3 i.e. 12-13000tons. At the same time some 65-70000 m3 wood comes from the clear cut pine forests. Most (70%) of these forests are also regenerated by full soil preparation so the quantity of the pine stumps can be estimated at 9-10000m3 i.e. 6-7000tons.

With the above reasoning in mind, it can be safely stated that in the examined regions some 34-36000m3 i.e. 25-27000 tons stumps could be collected to be used in the power plant.

The following table shows the summary of forestry originated biomass potential in the targeted region. Comparing with the table for the procurement plan (page 17), the available biomass in the region is enough for the supply to the region.

Table 2.2-1: Summary of Biomass Potential in the Region

	m3	ton
Thick firewood	40000	28000
Thin firewood	163000	114000
Stumps	34000	25000
Total	237,000	167000

The calorific value, in terms of MJ/kg, does not depend on whether thick or thin wood, neither too much on the wood species, rather on the moisture content of the wood. With conservative assumption all our calculations are based on the calorific value of the normal forestry-originated fuel, i.e. on 10.8 MJ/kg.

2.2.2 Energy plantations

Despite the above optimistic figures, the risk of instabilities in fuel supply is present. The logical answer to addressing this risk is plantation. It has been understood that the project company has to identify partners which are ready and prepared to produce fuel from plantations.

Establishing energy forests would not only contribute to the safe fuel supply of the power plant but could also help the utilization of fallows. After the accession of Hungary to EU some 15000 ha area must be taken out from agricultural cultivation in this part of the Great Plain. Approximately 10% of this area is planned to be utilized for energy plantations, but lack of market for the product has blocked these projects so far. The change in the environment of biomass-based energy production has given a boost to the energy plantation plans recently.

The project company evaluated the potential species and technologies for energy plantations. The scope of species included various types of wood, Salix, and Mischantus. The scope of technologies included intensified forestry technologies, and short rotation plantations. It has turned out that under the specific conditions of the region (sandy soil, dry weather, etc.), intensified acacia plantations offer the best opportunities.

Negotiations are under way between the representative of the project and an enterprise that has initiated energy forest plantation in the region. Their technology has been developed based on local forestry experience, matching very well with the special conditions there. The technology includes short harvesting period plantation of acacia, with harvest in every two years. The harvesting machine will also chip the wood, thus the harvested wood is ready for burning. Harvesting is done outside the vegetation period, namely during the winter season. Harvested wood sticks are 2,5-3 cm in diameter and are approx. 3 m long. Biomass production of the plantation is outstanding as the harvesting period is covering the intense growth phase of the plants.

Life cycle of the plantation is 10-11years, after which the area should be cleaned and planted with other wood species or with agricultural plantations.

Biomass yield of the plantation is projected to reach 30-40 tons/hectare/year, under average weather circumstances.

The project can mostly utilize agricultural areas that are currently not cultivated, it would offer employment in a county with very high rate of unemployment and would make use of the existing machinery owned by agricultural associations.

It is to be noted, that the capacity of power plant would require production on several thousand hectares. When the realization of the power plant gets to a more advanced phase, the detailed way of cooperation will be worked out in order to optimize the fuel supply to the power plant.

2.2.3 Other sources, contingency

Besides the forestry-originated sources, several further sources of fuel wood are available. Some initial negotiations and estimation of available quantities have been done. The final fuel mix, however, can be decided upon on the basis of continuous economic optimization, taking into account the prices, reliability, seasonality of supply and other factors. At the current stage the following sources and potential quantities are foreseen:

(1) Sources with high certainty and availability

- Cuttings and saplings from orchards:
  Area of orchards in the region: 10000 ha
  Assumed quantity of biomass fuel: 20000 t/year
  Remark: seasonal supply

- Wastes from wood processing plants (chips, sawdust):
  Number of plants: 30
  Assumed quantity of biomass fuel: 60000 t/year

- Biomass from cities (maintenance of parks/roads):
  Cities considered (Debrecen, Nyíregyháza, Nyírbátor, Mátészalka, Hajdúszoboszló, Hajdúböszörmény)
  Assumed quantity of biomass fuel: 20000 t/year
  Remark: seasonal supply

(2) Reserve/Contingency sources

- Fuel wood from Romania (near the border):
  Area of forests considered: 25000 ha
  Assumed quantity of biomass fuel: 5000 t/year

- Fuel wood from maintenance of roadside trees (near the border):
  Area considered: 2000 ha
  Assumed quantity of biomass fuel: 1000 t/year

Thus with the fuel demand of the plant being 167,000 t/year, it has been concluded that sufficient fuel wood is available in the region.

2.2.4 Procurement plan of the biomass fuel

Although fuel procurement plan in detail with suppliers are still under negotiation, the basic plan of fuel mix and quantities from each source is prepared. The following table shows the detail of the fuel procurement plan.

Biomass fuels are supplied only from the suppliers who are certified by Hungary government for proper forest managements. The certification is required to the fuel suppliers as the contract condition.

Table 2.2-2: Fuel Procurement Plan[3]

Unit: ton

Supplier	soft broadleaved wood chips	poplar-pine	forestry chips	hardwood chips	sunflower seed shell	stump	sawdust	bark	orchard pruning chips	Thick firewood	sawmill waste	Total
Local supplier 1.		1000	3000	10000			10000	2000	16000			**42000**
Local supplier 2.		5000	1000	5000			4000					**15000**
Local supplier 3.	10000	20000			6000		6000	15000				**57000**
State forestry		25000	20000			10000	5000			25000	5000	**90000**
Wood trader 1		15000							5000			**20000**
Total	**10000**	**66000**	**24000**	**15000**	**6000**	**10000**	**25000**	**17000**	**21000**	**25000**	**5000**	**224000**

Table 2.2-3: Expected Fuel Mix, Monthly Breakdown

	Jan	Febr	March	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
soft broadleaved wood chips	0	0	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	**10000**
poplar-pine	8000	4000	4000	4000	6000	6000	6000	6000	6000	6000	5000	5000	**66000**
forestry chips	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	**24000**
hardwood chips	1000	1000	1000	1500	1500	1500	1500	1500	1500	1000	1000	1000	**15000**
sunflower seed shell	500	500	500	500	500	500	500	500	500	500	500	500	**6000**
stump					2000	2000	2000	2000	2000				**10000**
sawdust	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	3000	**25000**
bark	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1000	1000	**17000**
orchard pruning chips	0	7000	7000	7000	0	0	0	0	0	0	0	0	**21000**
sawmill waste	400	400	400	400	400	400	500	500	400	400	400	400	**5000**
Sub Total	**15400**	**18400**	**19400**	**19900**	**16900**	**16900**	**17000**	**17000**	**16900**	**14400**	**12900**	**13900**	**199000**
Thick firewood													**25000**
Total													**224000**

[3] The data in the table are the results of preliminary agreement with concrete companies and entrpreneurs. The names, however, are kept confidential as contract negotiations are in progress

In order to keep safety of fuel supply at an adequately reliable level the project company applies the following strategy:

1. The project company enters into long-term contracts with the fuel suppliers. The contracts contain heavy penalties against the suppliers if they fail to comply with their contractual obligations.
2. The project company "overbooks" the supplies. They keep a larger than necessary capacity of fuel sources in contractual relationship.
3. In addition to regional fuel supplies the project company keeps contacts with potential foreign suppliers.
4. The most important element of safety strategy is the initiation and encouragement of energy plantations. We refer to the chapters on fuel potential and fuel procurement.

2.2.5 Competing use of biomass

One of the potential leakages is that the project diverts biomass from other users such as residents who use firewood for heat or companies which use biomass for their activities, and thereby increases fossil fuel use. In this regard, as suggested in the above chapters, most of the forestry-originated firewood is not used at the moment, it remains unharvested. Still, some 50,000 t/year of wood is currently supplied to another biomass plant some 150 km away. Even if some of this quantity is diverted to the new plant due to the lower transportation distance, there is no danger that it will be substituted by fossil fuels, as the plant that currently buys the wood, can only use biomass fuel due to technical and economic reasons.

The rest of the potential fuel wood, which is generated during forestry works or wood production for industrial purposes, is either sold for the residential consumers as firewood, or burned on the site (in spite of prohibitive regulations) or simply left on the site. Waste wood from sawmills and wood processing plants is either sold as firewood, or deposited in communal waste landfills.

2.3 Financial information

2.3.1 Procurement of finance

The project is to be financed in project financing scheme.

The owner of the project is a low capital project company, "Liget Bioenergia Művek Kft.". The project company is developing the project up to reaching the bankable stage.

"Bankable" means, that

- the basic technical design has been developed
- fuel supply contracts have been signed
- the power sales contract has been signed
- all the necessary licenses and permits have been obtained
- at least the major heat supply contracts have been signed
- all the engineering and procurement contracts have been signed.

In the project development phase the project company negotiated a carbon deal and came to an agreement with an interested JI partner*. Parallel to carbon negotiations the project company will apply for support from national/EU regional development funds. It has to be noted that the project complies with the eligibility criteria of major EU funds.

A part of the finance will be ensured by co-operating with the government's SMS (small and medium size) enterprise support program run by MFB, the Hungarian Development Bank.

* ; Tohoku is JI partner as well as equity investor.

2.3.2Investment and operation costs, prices

(1) Investment cost of the plant

The investment and operational costs, including the fuel costs are included in the detailed business plan of the project.

The investment cost of the biomass-fired power plant is calculated on the basis of information obtained from the tender procedure run for the main equipment and from information of potential suppliers for the auxiliary equipment.

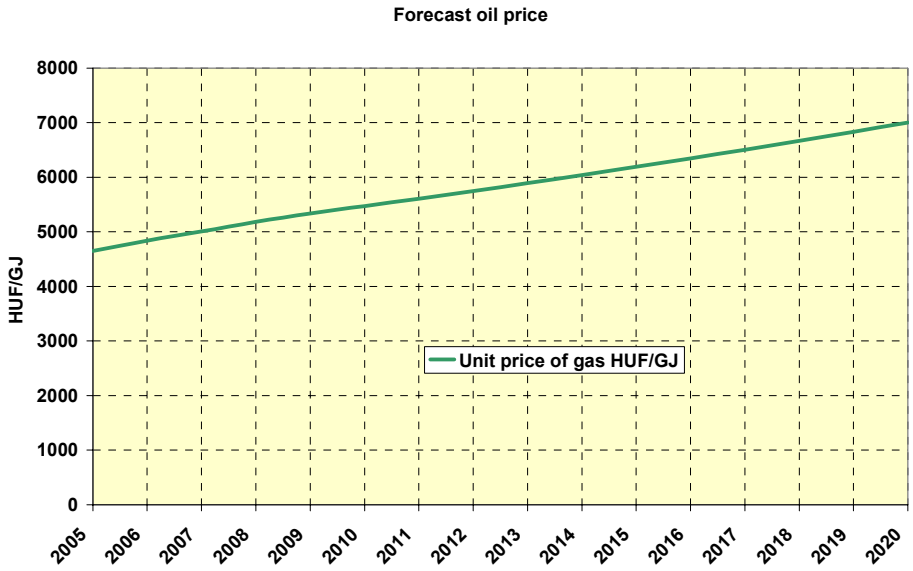
.(2) Setting for fuel prices and electricity prices

For the calculation of operational costs, fuel prices of biomass fuels and electricity prices are set as followed:

- Fuel prices

  The prices of wood and woodchips differ according to quality, transportation distances and other factors ranging from 8000-10500 HUF/t.
  The prices of light fuel oil are free market prices.

  The business calculations are based on forecast prices, revenues and costs. It was assumed that price of fuel oil will be linked to general consumer inflation, which from Hungary's accession the EURO zone, will be linked to the average euro inflation. With this assumption the forecast light oil price variation is as shown in the following diagram.

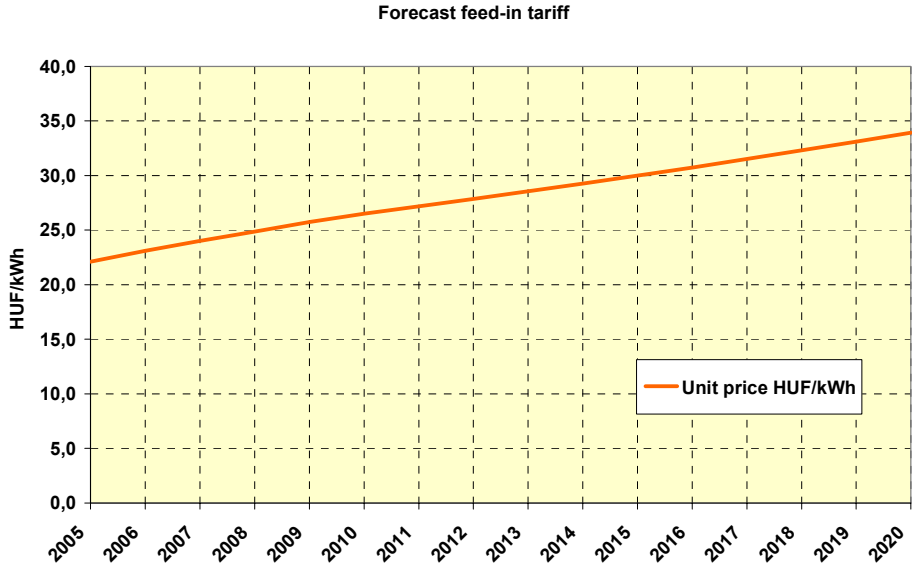


- Feed-in electricity prices

  The feed-in price, that is the price the generated electricity is sold for, is assumed to be also linked to the consumer inflation, therefore the trend, as shown in the following diagram, is similar. This assumption is verified by the fact that the recent change in the regulation of the "green" energy reflected the official inflation rate.

It is to be noted that the feed-in tariff is a single component tariff, i.e. it only includes the unit price, no demand charge is paid for such electricity. The current values of the feed-in price – following the most recent change of the Act on Electricity and related regulations are the following:

peak-time	26.1	Ft/kWh
off-peak time	23	Ft/kWh
Night rate	9.3	
annual average	22.1	Ft/kWh



- Purchased electricity prices

  According to new regulations it is not possible to sell all the gross electricity produced, and buy all the electricity that is needed for the operation of the plant ("own consumption") from the grid. Still, some of the power consumption within the plant do not fall in the category of "own consumption" and so it can be covered from electricity purchased from the grid. The current prices are the following:

peak-time	15.0	Ft/kWh
off-peak time	10.0	Ft/kWh
annual average	11.3	Ft/kWh

- Water price

  The make-up water of the cycle and of the cooling towers will come from the own wells of the plant. The costs of providing water are taken as 300HUF/m^3 in average[4]. This value is based on the cost of other projects where an own well provides the water. The price includes the cost of water treatment (chemicals).

[4] The actual value depend on the level of treatment for the various waters

(3) Operational costs

The business model takes into consideration the following operational cost items[5]:

- Fuel (wood chip) cost. The calculated quantity of necessary fuel is 164 200 tons/year.

- Fuel oil cost. According to the calculations, the annual fuel oil quantity used for ignition and by the start-up boilers is 12960 GJ/year. The annual fuel oil cost is round 60 million HUF.

- Electricity costs. The boiler (burners, fans), the steam cycle itself (feedwater pump, cooling tower) and the fuel preparation uses 12378 MWh electricity a year. As according to the current legislation only the net power can be sold to the grid, all own consumption directly related to power generation must be evaluated at the feed-in tariff. Thus the value linked to the power consumption is 285 million HUF.

- Maintenance costs. In lack of detailed maintenance contract offers, the annual maintenance costs are assumed as 2% of the total investment cost. This is a widely accepted and proven assumption method.

- Wages. At least 30 people are needed for the direct operation of plant. With the currently acceptable 1,5MHUF/person annual cost, taking into consideration the inflation, the annual wages with all their taxes and fees included amount to 60 million HUF.

- Water. Both the steam cycle needs water for make-up, both the cooling tower for spraying. The calculations show that the annual demand for treated water is 84900 m^3/year. This result in some 25 million HUF/year water cost.

Besides the above listed cost items the business model takes into account the depreciation and a 1% contingency.

[5] Please note, that all costs are shown at 2005 price level.

2.4 Risk identification and security agreements

This section explains the general risks related to implementation of the project. This project is an "energy production" type project. As such it bears the following risks:

Risks related to the energy market (as the external economic environment of the project)

- fuel procurement
- power sales
- heat sales

Risks related to implementation/construction

- availability of financing
- availability of technology
- availability of site
- fitness to purpose
- performance to specification
- licenses

Risks related to operation

- management
- skilled labor
- availability of fuel
- changes of the legal environment
- natural disasters or accidents

In the following paragraphs the above risks and the related mitigation strategies are described.

2.4.1 Risks related to the energy market

Fuel procurement

As it was described in earlier chapters of this material the project company has developed a strategy to keep risks related to fuel supply limited. The main elements of this strategy can be summarized as follows:

1. The project company enters into long-term contracts with the fuel suppliers. The contracts contain heavy penalties against the suppliers if they fail to comply with their contractual obligations.

2. The project company "overbooks" the supplies. They keep a larger than necessary capacity of fuel sources in contractual relationship.

3. In addition to regional fuel supplies the project company keeps contacts with potential foreign suppliers, too.

4. The most important element of safety strategy is the initiation and encouragement of energy plantations.

It must be added, that some risk is imposed on the project by the seasonality of certain fuel wood sources. However, not all the sources of fuel wood are seasonal. Forestry-originated and waste wood from the wood processing plants is rather stable, although extreme weather conditions may cause temporary stop in the supply. Seasonality can more be a problem later, when the energy plantations will have a more important role. (The harvesting period in these cases is typically between October and April). Nevertheless, seasonality is addressed in two ways:

- Short term breaks in fuel supply are overcome by installing proper storage area in the plant. That is why the relatively large woodchip storage (suitable to store 24 days's reserve), and the additional log storage area with 8-day reserve is designed for the plant.

- The longer term seasonality will be handled by proper contracting with the fuel suppliers, that will encourage them to store some their wood themselves.

Power sales

The risks of power sales are negligible until 2010 according to the present legislation. As it was described in the chapter "The Product and Its Competitive Advantage" the buy-back of green power by local power distribution companies is compulsory and a subsidized feed-in tariff is regulated. After 2010 this system will be replaced by another system (e.g. green certificates) to be applied at that time by the EU.

2.4.2 Risks related to implementation/construction

Availability of financing

As described in the chapter "Financing", the project can be financed if it is attractive enough.

Availability of technology

As it was described in the chapter "The Technology", a proven technology, the so called steam cycle power generation is applied. This technology has been commercially available for several decades. The suppliers will have to have proper references.

Availability of site

We refer to the chapter "Project Location". According to that a final site is available.

Fitness to purpose

Proper engineering practices will guarantee that the biomass power plant fits to the purpose. The engineer/consultant of the project EGI Contracting/Engineering has all the qualifications that are necessary to implement a 20 MW thermal power plant.

Performance to specification

Once commercially available technology is applied, the performance to specification is a project management issue. Here we have to refer again to the experience of EGI, the engineer/consultant, selected by the project company.

Licenses
The power plant is designed according to all relevant environmental, construction, health, fire protection, etc. regulations. For these reason the risk related to licensing is negligible.

Out of the several requirements, the environmental ones are the most difficult to comply with. In the paragraphs below we summarize the relevant regulations and the scope of licenses the project company will have to obtain.

2.4.3 Risks related to operation

Management
The implementation of the project is to be managed by the project company. The owners of the project company are experienced persons themselves, who have successfully managed various industrial and energy projects before. In order to extend the experience base the project company has decided to work with EGI Contracting/Engineering in the project development and project implementation phase. EGI as a main contractor implements projects in the volume of EUR 30-40 million/year. The management of a project of the size and complexity of the Dél-Nyírség Bioenergy project will be well within the capacity range of EGI.
Tohoku will also contribute to the management of construction and operation based on the experiences of electric power business for fifty years in Japan.

Skilled labor
As it was introduced in the chapter "Project Location" there are two major cities very close to the project site. These two cities Debrecen and Nyíregyháza have power plants and other power facilities. It means that "industrial power culture" is available within vicinity of 20-30 km. It will be no difficulty to find 25-30 skilled persons to work at the bio-energy plant. The project company has started negotiations with the key persons.

Availability of fuel
We refer to the comments above.

Changes of the legal environment
Hungary has very recently harmonized its legal system to that of EU. It is rather unlikely that this legal environment will basically change in the project period.

Natural disasters or accidents
The project company will enter into insurance contracts with reliable insurance companies to mitigate the risks related to natural disasters and accidents.

3 Baseline study which includes especially the followings

3.1 Verification of additionality

The project will reduce anthropogenic GHG emissions by displacing fossil fuel electricity generation. The project will generate on average approximately 102,000 tonnes of ERUs annually and about 510,000 tons for the five year initial crediting period.

3.1.1 General background of the biomass-fired power plants in Hungary

Hungary's international commitments

As a party of the United Nations Framework Convention on Climate Change (UNFCCC) and a signatory of the Kyoto Protocol, Hungary committed itself to reduce its CO_2 emissions by 6% related to its average emission level between 1985-87 (80,1 Mt CO_2) between 2008-2012. It appears, that having in mind the country's emission trends, it may be safely stated, that mainly due to the changes in the structure of the economy, Hungary is not likely to meet severe problems fulfilling its obligations. Therefore, Hungray's CO_2 emission commitments are not among the most important drivers of the utilization of renewable energies.

From this aspect, with Hungary's accession to the EU, the European Union's international commitments and overall environmental goals impose heavier obligations on the country.

According to the EU's White Paper[6] the renewable energies are to reach a 12% share of the total energy consumption on the Community level. Furthermore, the EU Directive 2001/77/EC[7] stipulates, that on the EU-level the share of renewable-generated electricity shall reach 22.1% of the total power generation by year 2010.

These ambitious goals, however, when broken down to the individual member states and accession countries, considerably differ in each country. During the accession negotiations it was agreed that Hungary will have to increase the total share of renewables from the current 3.6% to 5%, and the share of renewable-generated electricity from 0.7% to 3.5%. (It is to be noted that some previous years due to the very dry weather and the low water levels the production of the hydro-power plants was much less, thus the actual share of renewable-generated powers was around 0.4%.)

Of the two requirements the latter is the more stringent, requiring serious efforts, as it actually means around 800% increase. In order to meet these goals, the government has introduced some subsidies that are explained in the following section on legislation.

[6] Energy for the future: renewable sources of energy. White Paper for a Community Strategy and Action Plan. COM(97)599 final (26/11/1997)

[7] Directive 2001/77/EC of the European Parliament and of the Council - of 27 September 2001 - on the promotion of electricity produced from renewable energy sources in the internal electricity market

Legal environment

Already as early as in 1999, the governmental decree 1107/1999 on the Energy Saving Program and Action Plan until 2010 has set concrete goals regarding renewable energies. According to the decree the total 28 PJ/year of renewable energy utilization is to be increased to 50 PJ/year. The most important tool of promoting the utilization of renewables, especially the power generation from such sources, however, was decree 56/2002 (XII.29)GM, which stipulates the obligatory procurement of all electricity that is generated from renewable energy sources. (i.e. it is compulsory for the power utility company to buy such electricity at a centrally set, official prices. The utility company then is compensated by the state-owned electricity wholesaler, MVM.) The feed-in tariff set by the same decree and its later amendments, is rather favorable.

As a result of the better economic conditions, a boom of biomass-fired power plants has been experienced: several such projects were initiated and implemented (or is under construction). The most important ones are: Pécs (49.9MWe), Kazincbarcika (30MWe) and Bakony Power Station (20 MWe).

3.1.2 Verification of the additionality of the project

The additionality of the project activity is demonstrated and assessed using the "Analysis of References," which is one of the methods presented in the official guideline prepared by the Hungarian government (hereinafter called, "Manual") . Under this method, the economic performance of the GHG emission project shall be compared to a reference value. In this case, if the selected economic indicator of the actual project is lower than the reference value than the project can be considered additional.

When using the analysis of references method, the Manual requires project proponents to calculate project activity's IRR (which does not include GHG reduction sales) and if its IRR is lower than 8% (which is presented as "mild additionality criterion in the Manual" and considered the lower limit of economic attractivity) then the project is considered additional.

The IRR is calculated with the following formula, which is presented in the Manual.

$$\sum_{i=0}^{n} \frac{(-B_i + \acute{A}_i - K_i + M_i)}{(1+IRR)^i} = 0 \text{ , where}$$

n = m + z; m being the length of the project implementation (construction) (years), z being the total project lifetime (construction: 2 years, project operating lifetime: 15 years).

B_i is the investment cost in year i (2006: 4,661 MHUF, 2007: 5,797 MHUF).

$\acute{A}_i$ is the revenues in year i (3,218 MHUF/yr).

K_i is the total O&M costs in year i (2,003 MHUF/yr).

M_i is the remaining value of the equipment in year i. The remaining value of the equipment in the last year of the economic lifetime of the project shall reflect the actual market value, in other years M_i=0 (No remaining value is expected in the project).

The table on the next page shows the cash flows of the project scenario (with/without credit revenues) and IRRs in accordance with the IRR formula of the Manual.

The project's IRR when revenue from the ERU sales not included is 7.4%. On the other hand, the project's IRR when taking the revenue into account, is 8.1%.

The 7.4% is below the above reference value of the Manual. If registered under the JI project, the project will generate on average approximately 102000 tons of ERUs annually, and its revenues raise the IRR by 0.7 points, bringing the IRR closer to a level acceptable to the project company as well as investors.

Therefore, the project activity meets the additionality criterion of the Manual.

(1) Project Cash Flow without ERU

Million HUF

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Investment cost	-4661	-5797															
Revenue			3218	3218	3218	3218	3218	3218	3218	3218	3218	3218	3218	3218	3218	3218	3218
O&M cost			-2003	-2003	-2003	-2003	-2003	-2003	-2003	-2003	-2003	-2003	-2003	-2003	-2003	-2003	-2003
Remaining value																	0
Revenue of ERU	0																
Net cash flow	-4661	-5797	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215

Project IRR without ERU	7.4%

(2) Project Cash Flow with ERU

Million HUF

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Investment cost	-4661	-5797															
Revenue			3218	3218	3218	3218	3218	3218	3218	3218	3218	3218	3218	3218	3218	3218	3218
O&M cost			-2003	-2003	-2003	-2003	-2003	-2003	-2003	-2003	-2003	-2003	-2003	-2003	-2003	-2003	-2003
Remaining value																	0
Revenue of ERU	491																
Net cash flow	-4170	-5797	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215

Project IRR with ERU	8.1%

3.2 Emission baseline

Baseline is the estimation of the emission volume without the execution of the JI project, which serves as comparison base for the determination of the emission reduction resulting from the project.

3.2.1 Project boundaries

For the purpose of determining GHG emissions of the project activity, the following emissions sources are included:

- CO_2 emissions from on-site fuel consumption of light fuel oil for the start-up burners in the biomass power plant; and
- CO_2 emissions from off-site transportation of biomass that is combusted in the project plant.

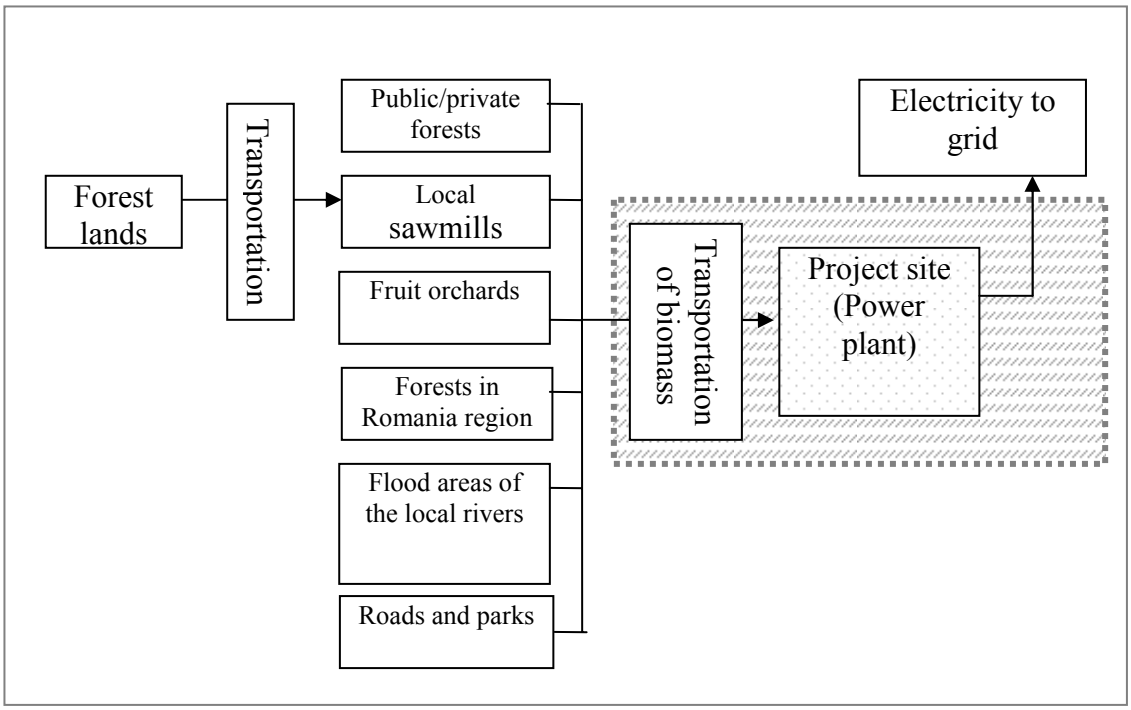
For the purpose of determining the baseline, the following emission sources are included:

- CO_2 emissions from fossil fuel fired power plants connected to the electricity system;

In general biomass projects, especially those utilizing herbaceous plants certain amount of the biomass could be dumped or left to decay or burned in an uncontrolled manner resulting in CH_4 emissions. In such cases CH_4 emissions should be included in the project boundary. In the current case the method of storage of woodchips prevents anaerob conditions and thus CH_4 formulation. Combustion only happens in the boiler, under controlled conditions. Therefore CH_4 emissions emissions are not taken into account in this case.

The spatial extent of the project boundary encompasses the power plant at the project site, transportation of biomass to the project site (truck), and all power plants connected physically to the grid that the project power plant will be connected to. The spatial extent of the project electricity system, including issues related to the calculation of the emission factors of the grid electricity, is evaluated by the Hungarian government taking into account load control, and capacity planning.

The following figure illustrates the project boundary and the following table explains which emissions sources are included and which are excluded from the project boundary for determination of both baseline and project emissions.



* The project boundary is marked with dashed line.

Table 3.2-1: Overview on emissions sources included in or excluded from the project boundary

	Source	Gas		Justification / Explanation
Baseline	Grid electricity generation	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Uncontrolled burning or decay of surplus biomass	CO_2	Excluded	It is assumed that CO_2emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative. Note
Project Activity	On-site light fuel oil consumption due to the project activity	CO_2	Included	Light fuel oil is used for start-up burner.
		CH_4	Excluded	Insignificant quantity.
		N_2O	Excluded	Insignificant quantity.
		CO_2	Excluded	Excluded. The emission from the transportation of biomass for the project power plant is smaller than the one from the current activity.
	Off-site transportation of biomass	CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be small.
		CO_2	Included	It is shown that off-site transportation related emissions reduce due to the project activity. Due to the great level of uncertainty in monitoring the reduction this is not included in the project overall CO_2 reduction
	Combustion of biomass for electricity and / or heat generation	CH_4	Excluded	This emission source must be included only if CH_4 emissions from uncontrolled burning or decay of biomass in the baseline scenario are included.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be small.
		CO_2	Excluded	It is assumed that CO_2emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
	Biomass storage	CH_4	Excluded	Excluded for simplification. Since biomass is stored for considerably shorter periods than one year, this emission source is assumed to be small.
		N_2O	Excluded	Excluded for simplification. This emissions source is assumed to be small.
		CO_2	Excluded	Excluded for simplification. This emissions source is assumed to be small.

3.2.2 Emission baseline

Hungarian government presents the methodology for calculating the baseline eimissions of electric power projects in their official guideline for JI projects (Manual). The project proponents are allowed to apply the reference emission factors of the Manual for their calculations of baseline emissions.

Reference Emission Factors for 2008 - 2012

Year	Emission factor (g/kWh)
2008	707,5
2009	710,6
2010	713,8
2011	703,9
2012	694,0

Source: Hungarian official guideline for JI projects: "Manual for evaluating the additionality of Joint Implementation projects and for calculating the baseline emissions of electric power projects"

The emission factor is calculated as the weighted average of the power plant specific emissions, where the weighing is based on a factor that expresses to what extent the individual plant takes part in the system load control. These factors are based on the utilization factor of the power plants. The forecast energy balances for 2005, 2010 and 2015 from MAVIR's (Hungarian Power System Operator Company) 2003 capacity planning document, which is the latest available information, are used as the basis for the reference factors.

Drawing upon the above reference emission factors, the baseline emission for electricity, which will be avoided due to the project, is calculated as follows:

Baseline emission of year y = Generated electricity of year y * Emission factor of year y

Table 3.2-2: Baseline Emissions

Year	Emission factor (g/kWh)	Generated electricity (MWh)	Baseline emission (t-CO_2)
2008	707,5	144906	102,521
2009	710,6	144906	102,970
2010	713,8	144906	103,434
2011	703,9	144906	101,999
2012	694,0	144906	100,565
Total	-	724530	511,489

Thus, the estimate of the total baseline emissions during the crediting period (2008-2012) is 511,489 t-CO_2.

The uncertainty level of baseline emissions can be deemed to be very low.

- The emission factors of the grid electricity are obtained from the official numbers, as a result there is no uncertainty; and

- The generated electricity will be monitored by the meter and the numbers are cross-checked by the government for the subsidies.

3.2.3 Project emissions

Project emissions include CO_2 emissions from combustion of diesel oils for transportation of biomass to the project plant (PET_y) and CO_2 emissions from on-site consumption of fossil fuels due to the project activity ($PEFF_y$).

$$PE_y = PET_y + PEFF_{CO2,y}$$

Where:

PETy are the CO_2 emissions during the year *y* due to transport of the biomass to the project power plant in tons of CO_2

$PEFF_{CO2,y}$ are the CO_2 emissions during the year y due to light fuel oil for the start-up burner in tons of CO_2

a) CO_2 emissions from combustion of diesel oils for transportation of biomass to the project plant

[General data of transportation]

Table 3.2-3: General data of trasportation

	Item	Value	Unit
General data	Typical truck capacity	95	m3
	Truck diesel fuel consumption	40	l/100 km
	Woodchips average density	350	kg/m3
	Specific CO2 emission of diesel oil	73.33	t CO_2/TJ
	Net calorific value of diesel oil	43.33	GJ/ton
	Density of diesel oil	0.82	kg/m3
Truck CO2 emissions	Fuel consumption	32.8	kg/100 km
	Energy consumption	1.42	GJ/100 km
	Related emission	104.2	kg CO_2/100 km
Emission of woodchip transport	Truck capacity	33.25	ton/truck
	Specific emission	0.031344	kg CO_2/km/ton

The specific emission is calculated based on the following formula:

EF of diesel oil = CO_2 emission of diesel oil * Net calorific value of diesel oil
= 73.33t- CO_2/TJ * 43.33GJ/t-diesel *1/1000
= 3.177389 t- CO_2/t-diesel

Fuel consum. of truck = EF of diesel oil * Fuel consumption * Truck capacity
= 3.177389 t- CO_2 * 32.8kg/100km / 33.25t/truck
= 0.031344 kg-CO_2/km/ton

[Current situation]
The potential fuel suppliers already supply woodchips for other customers. The major customers and the supplied woodchip quantities are:

- Chipboard factory (distance 70 km) - 80 000 t/year
- Chipboard factory (distance 450 km) - 50 000 t/year
- Biomass plant (distance 150 km) - 50 000 t/year

Using the specific transportation emission factor, the total transportation related emissions can be calculated as follows (please note that transportation distance are accounted for twice, as the trucks have to return):

(140km * 80,000t + 900km * 50,000t+ 300km * 50,000t)* 0.031344 kg CO_2/km/t
= 2,249,920kg CO_2,

i.e. rounded: 2,232 t- CO_2 per year.

Thus the estimate of the typical and average CO_2 emissions related to the transport of one ton of woodchips is

2,232 tCO_2/180,000 t-woodchips = 0.0124 t-CO_2/t.

[The gross transport-related emissions of the project]
The fuel mix of the project consists of woodchips, round wood, fruit orchard clippings/prunings, ad typical sawmill wastes (bark and sawdust). The sawmills are in the direct vicinity of the plant (directly neighboring and 3 km), therefore transportation emissions related to those fractions of the fuel mix are considered insignificant.

The data of the fuel supply contracts reveal that some 85% of the fuel mix is not sawmill waste. The transport related CO_2 emissions can be calculated from the following data as follows:

Table 3.2-4: Data of fuel supply

	Item	Value
Fuel quantities	Regional supply (woodchips, round wood)	85%
	Local supply (sawmill waste)	15%
Annual fuel demand	Total	164 198 t
	of which regional supply (woodchips, round wood)	139 568 t
	of which local supply (sawmill waste)	24 630 t
Average transport distance for regional	supply	30 km

Thus the total CO_2 emissions will be:
30 km * 2 * 139,568 t * 0.031344kg CO_2/km/t = 262,477 kg CO_2,

i.e. 262 tCO_2 per year.

Thus the estimate of the typical and average CO_2 emissions related to the transport of one ton of woodchips is:

$$262\ tCO_2/139{,}568\ t\ woodchips = 0.00188\ t\ CO_2/t.$$

[The net transport-related emissions of the project]
It is not clear how much of the project's fuel need will be covered by the woodchips that are currently transported elsewhere. It is assumed that the much shorter transportation distance (and lower costs) and the good price will encourage the suppliers to divert most of their transports to the new power plant. Still, in order to make a conservative estimate, we assume that only 50 % of the above regional supply (139,568 tons) fuel, i.e. 69,784 t fuel will be covered by such woodchips. Then the net emissions of the project can be calculated as follows:

(a) Net transport emissions related to the woodchips, that are currently supplied elsewhere:

$$69{,}784\ t * (0.00188\ t\text{-}CO_2/t - 0.0124\ t\text{-}CO_2/t) = -734\ t\text{-}\ CO_2$$

(b) Transport emissions related to the woodchips, supplied from the region:

$$69{,}784\ t * 0.00188\ t\text{-}\ CO_2/t = 131\ t\text{-}\ CO_2$$

Total net emissions:

$$(b) - (a) = 131t\text{-}CO_2 - 734t\text{-}CO_2 = -603t\text{-}CO_2 \text{ per year}$$

There is actually some further emission savings. However, we do not wish to include these among the calculated emission reduction as its monitoring is rather difficult (involves the acquisition of data that are partly confidential and we do not have control over.). Therefore, the emission from the transportation of the biomass for the project power plant is considered zero.

(b) On-site CO2 emissions from combustion of light fuel oil for the start-up burner in the project plant

CO2 emission from combustion of light fuel oil is calculated as follows:

$$PEFF_y = FF_{project\ plant,y} * EF_{CO2,diesel}$$

Where:

$FF_{project\ plant,y}$ is the quantity of light fuel oil combusted in the biomass power plant during the year y, and

$EF_{CO2,diesel}$ is the CO2 emission factor of the light fuel oil (TJ/t-oil * tCO_2/TJ),

Light fuel oil is used for the start-up burner in the project plant. Our estimate shows the burner needs 12,960GJ for its operation per year. According to the Revised 1996 IPCC Guidelines for National Greenhouse Gas, the specific CO_2 emissions of diesel oil (which has a similar composition of diesel oil) is 20.2 tC/TJ. Considering the fraction of carbon

dioxide (0.99), it is 73.33t-CO_2/TJ (20.2*0.99*44/12). Thus the estimated annual fuel oil related emission is:

12.96 TJ * 73.33t-CO_2/TJ = 950 t CO_2 per year

Table: Project Emissions from the on-site consumption of light fuel oil

Year	Project emission (t-CO_2)
2008	950
2009	950
2010	950
2011	950
2012	950
Total	4,750

Therefore, the estimated total CO2 emissions from the on-site consumption of light fuel oil is 4,750 t-CO2 during the crediting period.

Thus, the estimated total project emission during the crediting period (2008-2012) is 4,750 t-CO_2.

There is the uncertainty of estimation of the project emissions. Considering it, the relatively large amounts of the emissions are adopted for the estimation.

3.2.4 Leakage

The main potential source of leakage for this project is an increase in emissions from fossil fuel combustion due to diversion of biomass from other uses to the project plant as a result of the project activity. However, the plant referred to in the chapter on the competitive use of biomass physically cannot use other fuel than wood: it is designed and rebuilt directly for that purpose. This means that if the new plant is built, the other plant will have to procure a part (and not a very big part) of their fuel from elsewhere, but the fuel remains wood, the fossil fuel use will not increase. At the same time it is also ensured that their load factor will not decrease either: it is their elementary business interest to run at 100% load.

The other potential source of leakage is an increase in emissions from fossil fuel consumption of transportation from forest lands to the suppliers such as sawmills as a result of project activity. Such emissions, however, are associated with the operations of sawmills (and other activities), and difficult to monitor from the project proponent side.

3.2.5 Emission Reduction

The Manual presents the following formula for calculating CO2 emission reduction of the project activity.

$$\boldsymbol{CO_2 \text{ emission reduction [tons]}_y = X_y \text{ [g/kWh]} * E_{ki0;y} \text{ [GWh]}}$$

Taking into account the project emissions (CO2 emissions from the transportation of biomass), the revised formula is as follows:

$$\boldsymbol{ER_y = BE_y - PE_y}$$

Where:

ER_y are the emissions reductions of the project activity during the year y in tons of CO_2,

PE_y are the project emissions during the year y in tons of CO_2, and

Then, the emission reductions of the project activity for each year are obtained as follows:

Table 3.2-5: Emission Reductions of the Project Activity

Year	Baseline emission (t-CO_2)	Project emission (t-CO_2)	Emission reduction (t-CO_2)
2008	102,521	950	101,571
2009	102,970	950	102,020
2010	103,434	950	102,484
2011	101,999	950	101,049
2012	100,565	950	99,615
Total	511,489	4,750	506,739

Thus, the total emission reduction achieved during the crediting period (2008-2012) is **506,739** t-CO_2.

4 Sharing ratio of ERUs resulting from the execution of the project

The authorized representatives of the participants of the planned Hungarian-Japanese JI project reached agreement that the full amount of Emission Reduction Units (ERUs) resulting from the implementation of the project and allowed by the Hungarian Government is to be transferred to the Japanese participants in exchange for their financial contribution to the project. This agreement is confirmed by the Declaration, which is attached as Annex 5.
Consequently all the ERU is to be transferred to Tohoku.

5 Monitoring plan

5.1 Monitoring Methodology

The project is a grid-connected biomass fired electricity generation at a site where currently no power generation is installed. Biomass fuels for the project power plant are a by-product, residue or waste stream from agriculture, forestry and related industries (not including municipal waste). Since these conditions are quite similar to the one of the approved consolidated monitoring methodology ACM0006 ("Consolidated monitoring methodology for grid-connected electricity generation from biomass residues"), ACM0006 is referred to in developing the monitoring plan.

5.2 Monitoring Plan

The following table illustrates the data to be collected or used in order to monitor emissions and calculate the baseline emissions.

Project emissions parameters

The following table illustrates the data to be collected or used in order to monitor emissions from the project activity.

- The amount of all types of biomass combusted is monitored by metering the weight of the trucks at entering and leaving the wood yard and humidity analyses (1). This data will be cross-checked with fuel purchase receipts.
- On-site light fuel oil consumption for the start-up burners of the biomass power plant (2) will be metered through mass or volume (flow) meters.
- Off-site CO_2 emission due to transportation of biomass: as it was shown earlier, the net emissions related to transportation of fuel are negative. However, due to the difficulties of monitoring they are considered to be zero (a very conservative assumption).
- Several other types of data will be measured, such as fuel quantity and quality (heating value, moisture content), water use and others, but they are not related to the calculation of GHG emission reductions

ID number	Data Type	Data variable	Data unit	measured (m) calculated (c) estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived	For how log is archived data to be kept
1. $BF_{i,,y}$	Quantitative	Quantity of biomass type *i* combusted in the project plant during the year *y*	tons	m	Continuously, prepare annually an energy balance	100%	Electronic	Credit period + 2 yrs
2. NCV_i	Net calorific value	Net calorific value of fuel wood i	MJ/kg	m	By supply batch	100%	Electronic	Credit period + 2 yrs
3. $FF_{project\ plant,i,y}$	Fuel quantity	On-site light fuel oil consumption for the start-up burners	kl	m	Continuously	100%	Electronic	Credit period + 2 yrs
4. $EF_{CO2,diesel}$	Emission factor	CO2 emission factor for light fuel oil	t-CO2/kl	c	Yearly	100%	Electronic	Credit period + 2 yrs

Baseline emissions parameters

- Data required to calculate the emissions factor for displacement of electricity of the grid is given in the Manual prepared by the Hungarian government, so it is not included for the parameters below.
- Electricity quantity generated in the plant will be monitored by the routine energy meters for the power and heat. In a similar way, electricity sale is closely and adequately monitored. The monitoring will be performed continuously and the data will be aggregated on a monthly basis. This number is also cross-checked by the Magyar Energia Hivatal (i.e. Hungarian Energy Office),MEH, which is a government office which oversees and supervises the sales of subsidized electric energy and the payment of the subsidies.
- The accuracy of monitoring equipment will be checked by the government authority, Országos Meresügyi Hivtal (i.e. National Measurement Authority), which is responsible that all measurements that are done in an trustworthy/authorized manner.
- A calibration of monitoring equipment, which is described in the „Act on measuremets" (Act XLV of 1991 and its implemetation decree 127/1991(X.9.)Korm) will be done according to the law.

ID number	Data Type	Data variable	Data unit	measured (m) calculated (c) estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived	For how log is archived data to be kept
5. $EG_{project\ plant,y}$	Electricity quantity	Net quantity of electricity generated in the project plant during the year y	kWh	m	Continuously	100%	Electronic and paper	Credit period + 2 yrs
6. $EG_{SE,y}$	Electricity quantity	Net quantity of electricity sold to grid in the project plant during the year y	kWh	m	Continuously	100%	Electronic and paper	Credit period + 2 yrs

Leakage

No leakage is expected from the project activity.

5.3 Monitoring of Environmental Impact

Monitoring of environmental impacts will be conducted in the procedures described below. These monitorings, however, are not related to the GHG emissions and thus are not listed in the above tables.

- Air pollution will be regularly monitored in accordance with the relevant legislation (Decree 10/2003(VII.1.)KvVM, Decree 17/2001 (VIII.3.) Köm). It is compulsory to perform the measurement aof the following pollutants at least once in six months: NOx, CO, Particles (dust), HCl.
- Water pollution (e.g. COD, BOD, TOC, total solids, Na-equivalent, pH, heat pollution), will be monitored every quarter year, by laboratory tests. Besides, the process control equipment of the water treatment plant continuously monitors the quantity, conductivity and pH of the effluent water.
- Soil contamination from the fuel oil tank will be checked by three monitoring wells.

5.4 Plan for the Procedure of monitoring

The procedure of monitoring will include the following activities:

1. The power plant prepares a report with all the information that is necessary for verification (data to be determined for the verification period):
   - amount of wood fuel energy use (based on weight of fuel transports and humidity analyses)
   - power produced by the generator of the plant
   - fuel oil used
   - operational hours
   - maintenance records
   - results of performance tests
2. Engineers of the power plant will be assigned for internal audits (“the experts”) and be responsible for checking the relevant original documents (invoices, receipts, operational books, etc.).
3. The experts checks the condition of the power plant, makes interviews with the operational personnel, analyses the data recorded by the supervisory system.
4. When doubts arise about the reliability of the power plant report, the expert contacts the external partners of the power plant (fuel suppliers, power distributor, etc.).

6 Environment impact analysis:

6.1 Result of the environment impact analysis

[Air pollution]
The flue gases of the wood-fired boiler are discharged to the atmosphere though an electrostatic precipitator and a 40m high chimney. The impact zone (calculated according to the relevant national standards that correspond to the relevant EU regulations) of air pollution from the plant is 1275 m. As shown in the map in Annex 1, the distance from the nearest residential building is 1500m. Air pollution will be regularly monitored in accordance with the relevant legislation (Decree 10/2003(VII.1.)KvVM, Decree 17/2001 (VIII.3.) Köm). It is compulsory to perform the measurement of the following pollutants at least once in six months: NOx, CO, Particles (dust), HCl.

For power plants it the legislation that sets the technology limits, dependent on the input energy. The input energy of the planned plant exceeds 50 MW_{th}. For this capacity range the emission limits are defined by decree 10/2003. (VII. 11.) KvVM as follows:

Polluting material	Emission limit (mg/m^3) $50 \leq P_{th} < 100$
Solids	50
CO	250
Nitrous oxides (expressed as NO_2)	400
Sulfur-dioxide és sulfur-trioxide (expressed as SO_2)	In case of biomass firing 200
Chlorides (water soluble, expressed as HCl	200
Fluorides (water soluble, expressed as HF)	30

The quotations received from boiler suppliers have confirmed that the offered equipment can all meet the above standards. Some diffuse air pollution may be caused by the management and storage of wood fuel (dusting) but its impact range is short (within max. 50 m). Removal, storage and transportation of fly ash and slag will happen in wet conditions and in a closed system.

[Water protection]
The water supply of the planned power station will be ensured from well(s) drilled for this purpose. This will cover both the make-up water and the fire fighting water demand of the plant.

The possible sources of water and soil pollution are the following:

- Light fuel oil tank
- Boiler blow-down and oil separator
- Precipitation and effluents, primarily of the water treatment plant
- Communal waste waters

The pollution from the oil tank is prevented by the double-shell type tank, the 0.4 m thick watertight concrete foundation and the automatic leakage detector.

Communal waste waters are discharged to the sewer system of the nearby town and treated in the town's waste water treatment plants. Other effluents (contaminated precipitation, blow-down etc.) are discharged to a sewer through an oil and sludge separator. The separated oil and sludge is treated as hazardous waste. Other precipitation is first settled then stored in the firefighting water reservoir.

Most water from the well will be treated by the reverse-osmosis type water treatment plant (WTP). The WTPis designed in a way that the effluents can be discharged into the public sewer system complying with the relevant governmental decree 204/2001 (X.26.). This requires that the following emission limits would be complied with:

No.	Item	Limit (g/m^3)	Fine (HUF/kg)
1.	COD_{CR}	1200	10
2.	Organic solvent extract (oils-fats)	50	200
3.	Phenoles	10	1500
4.	Tar	5	5000
5.	ANA detergent	50	1000
6.	pH	below 6,5; above 10,0	100
7.	Sulfides	1	1500
8.	Sulfates	400	10
9.	N (NH_3 –NH_4)	150	100
10.	Active clorine	30	100
11.	Total dissolved solids - natural - from process	 2500 2500	 0,1 1
12.	Total fluorides	50	500
13.	Total iron	20	2
14.	10' sediment	150	1

Water pollution (e.g. COD, BOD, TOC, total solids, Na-equivalent, pH, heat pollution), will be monitored every quarter year, by laboratory tests. Besides, the process control equipment of the water treatment plant continuously monitors the quantity, conductivity and pH of the effluent water.

Wetting of the combustion residues (fly-ash, slag) requires extra water. The effluent from the water treatment plant can be used for this purpose, which reduces the discharged quantity to the sewer.

[Noise]
The most important sources of noise are:

- rotating equipment (fans, pumps) and other driven equipment (fuel transport) within the boiler house
- noise of combustion and material flows
- turbine and generator
- fans and pumps of the cooling tower
- pumps of the water treatment plant

The following noise limits apply (decree 8/2002 (III.22) KöM-EüM, both for the normal operation and the construction period of the plant):

- 50 dB daytime and 40 dB at night in the residential area, that is at 1300 m distance
- 70 dB outside, at 10 m from the plant boundary

In-boiler house noise is properly abated by the boiler building structure. Safety steam blow-off is equipped with a noise attenuator. The noise of the water treatment plant and the ESP is shielded towards the residential area. The distance to the residential area ensures proper noise abatement. The acoustic modeling of the plant shows that the resulting noise level at the closest residential area is 29,5 dB only.

[Wastes]
Solid waste management during the operation of the plant will be in accordance with the relevant legislation i.e. 98/2003 (VI.15.) Korm. (above the conditions of managing hazardous wastes) and 10/2002 (III.26.) KöM (above the list and classification of wastes). The typical wastes that are generated during the operation of the plant are the following:

- Fly-ash from the electrostatic precipitator (EWC code: 100103) and ashes, slag (EWC code: 100101) from the combustion system. As the fuel will be untreated wood, these wastes are not classified as hazardous wastes. They will be collected and transported in wet condition in closed metal containers.
- Wastes from the water treatment plant (EWC code: 1909..), no hazardous wastes.
- Oils from the engines, over drives, and different lubricants (EWC code: 1302..), which are all hazardous wastes,
- Oil contaminated wastes (filters, rags, EWC code: 150202), which are all hazardous wastes.

An inventory will be kept of all wastes that are generated during the operation of the plant. For the collection of wastes and hazardous wastes a separated collection area will be built and a log will be kept about the incoming and outgoing quantities. The treatment of hazardous wastes will be done by authorized companies.

[Solid and ground water pollution]
The preliminary design of the plant is already made with all the relevant legislation in mind i.e. the following decrees:

- 33/2000 (III.17.) Korm. about the duties regarding activities that influence the quality of underground waters
- 10/2000 (VI.2.) KöM-EüM-FVM-KHVM about the limits necessary for the protection of underground waters and geological fluids

Decree 33/2000 (III.17.) Korm. stipulates that electric power and steam generation must be reported to the authority and a copy of the report shall be attached to the environmental licensing documentation.

Soil contamination from the fuel oil tank will be checked by three monitoring wells.

[Expected licensing procedures]
Environmental license
The planned power plant falls into the category where the electric capacity is below 20 MW, while the input thermal energy exceeds 50 MW. According to decree 193/2001 (X.19.) Korm. in such cases no detailed environment impact study is necessary, but an IPPC (Integrated Pollution Prevention Control) licensing procedure is required. The documentation necessary for the IPPC procedure needs to be prepared before the construction license documentation is submitted to the authority. If the IPPC procedure is successful then the construction license may not require further environmental permits. The environmental license of the IPCC is planned to be issued in the end of March 2006.

Water license
A water license is necessary as the economic analysis shows that it is better to ensure the plant's water supply from an own well. The relevant authority of this case is VIZIG (Water Management Authority) with contribution from ÁNTSZ (General Surgeon's Office) the water works and the municipality.

Construction license
Before starting the construction it is mandatory obtain a license from the municipality. The necessary documentation either includes or refers to the above mention licenses and the corresponding documents. Preparing the licensing documentation is under way.

6.2 The local/regional development impacts

The original goal of developing the project was regional development. As it is described in other chapters of this document the South-Nyírség region is a heavily underdeveloped region of Hungary with poor economic records, high level of unemployment, etc. A group of local politicians and entrepreneurs realized that the conventional approach to regional development, which includes the upgrading of infrastructure (roads, telecommunication systems, canalization, etc.) only is not enough. It is necessary to initiate major "production type" projects, as well, which include concrete economic activities.

The developers of the project evaluated the geographical, economic, and cultural characteristics of the region. They found that:

- developed industrial culture
- highly qualified workforce
- entrepreneurial tradition
- up-to-date infrastructure

are missing in the region.

These characteristics keep investors back from business development resulting in a lowest-in-the-country capital investment intensity.

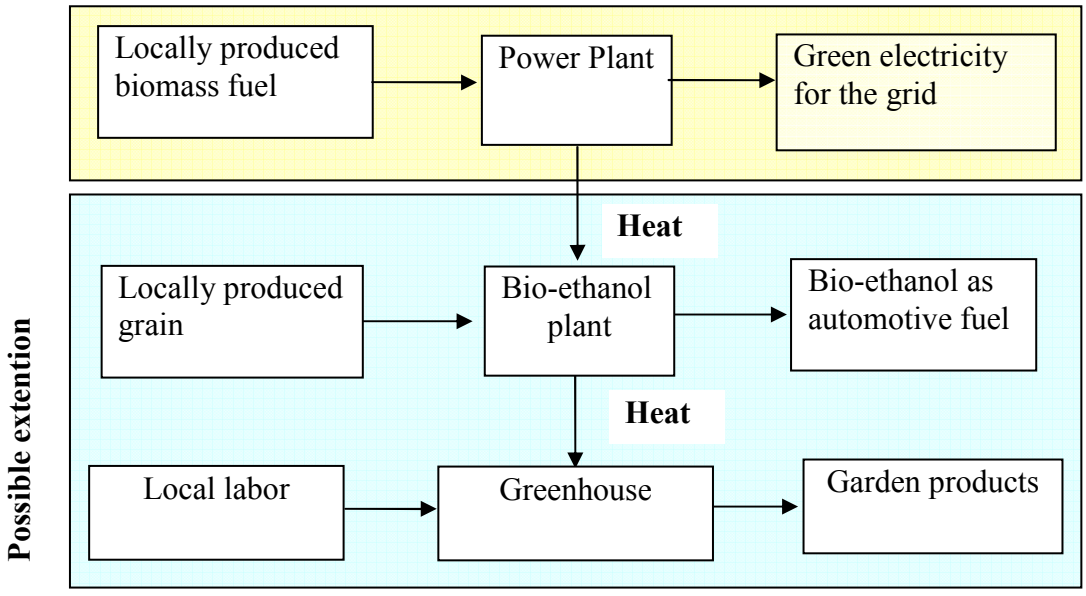
However, the developers identified a number of valuable features of the region as well. They understood that while industrial tradition was missing, agricultural and forestry tradition was present. Land was available, as well as, cheap workforce. The developers learned that as result of Hungary's EU accession even more land will be available as "alternative land use" is required by the European Union. It was also found that the state of the environment was good in the region as compared to some other regions of the country.

The developers discussed the issues of regional development with the responsible authorities including the Local Government of Hajdú-Bihar county, the Department of the North Great Plain Region[8], and the relevant municipalities. Based on the discussions the requirements for the projects were defined as follows:

[8] Territorial unit defined by EU.

Missing or available characteristic of the region or other expectations	How shall be characteristics or requirements be addressed by the project
Availability of agricultural land and tradition.	The project should include some kind of agricultural or forestry activities. Food production should be excluded because of EU policies.
Highly qualified workforce and industrial culture not available.	The project should not need many qualified laborers.
Under developed communication infrastructure.	The project shall not require the transportation of large quantities of feedstock and product materials into or from the region. The project shall not require frequent travels of participants from the western parts of Hungary or western Europe.
Compliance with national development strategies.	In order to get support from national and EU programs the project has to be developed in line with the relevant national and European development strategies.
Compliance with regional development strategies.	The project has to be treated as a major development project of the South-Nyírség region. This is necessary to receive intensive support from the local authorities in providing financial support and permitting.
The highest possible part of benefits should appear in the region.	The ownership and supervisory structure of the project shall be established in such a way that the project is embedded in the local society and the most of the benefits appear within the region.
Environmental compliance.	The project has to be designed in accordance with Hungarian and EU environmental regulations and policies. By proper design it can be expected that the relevant authorities issue all the necessary environmental permits and endorse the project as a JI initiative.

In the process of project development it became clear that if properly designed the project can contribute to fulfilling national and European goals in the field of renewable energy production, too. So maximization of renewable energy production and carbon mitigation was added to the original goal of regional development.
The general scheme of the resulting project is shown on the following diagram:



As it can be seen from the diagram the power plant project relies on locally grown biomass fuels. The fuels are produced in a sustainable way. Electricity, sold to the grid is replacing electricity from fossil fired power plants of the Hungarian electrical system. Although currently not a part of the project, serious negotiations are ongoing to develop the project into a combined heat and power project. (This is shown in the shaded part of the above diagram). If this development is successful, then the co-generated heat would utilized by a bio-ethanol plant. The waste heat from the bio-ethanol plant could be used by greenhouse gardening facilities.

As it was described in the above, it is planned to be implemented in rather backward region of the country that is characterized by low local investment rate, high unemployment, low GDP production capacity. Thus the most important feature of the project, besides its environmental benefits is that it is a major investment in the region, that will generate local revenues, taxes income for the municipalities and, above all new jobs.

The project has a major job creation capability. The expected impacts of the individual project activities on the employment are summarized in the table below:

Project activity	**Labor demand, capita**
Production of 100.000 t/a forestry origin material in the state and privately owned forestries of the region.	100
Production of 50.000 t/a other biomass fuel.	50
Processing (classifying, temporary storing, chipping, etc.) and transportation into the power plant of 167,000 t/a fuel.	60
Operation of the power plant.	50
Operation of the bio-ethanol plant.	30
Production of 100.000 t/a corn.	35
Storing and transportation of 100.000 t/a corn.	15
Operation of a 10 hectare greenhouse gardening facility.	60
Total	400

We note that the above assumption is very conservative. The real figures may prove to be much higher.

6.3 Other environmental effects

The environmental impact analysis other than GHG reduction is described in the section 6.1.

7 Summary of the public consultations:
Summary and minutes of the public consultations held during the preparatory phase of the project, incl. comments of the concerned parties.

Having selected the site, the public consultations were initiated on two levels, approaching the representatives of residents of the region (at the county-level local government) and of the town (the municipality of the town.)

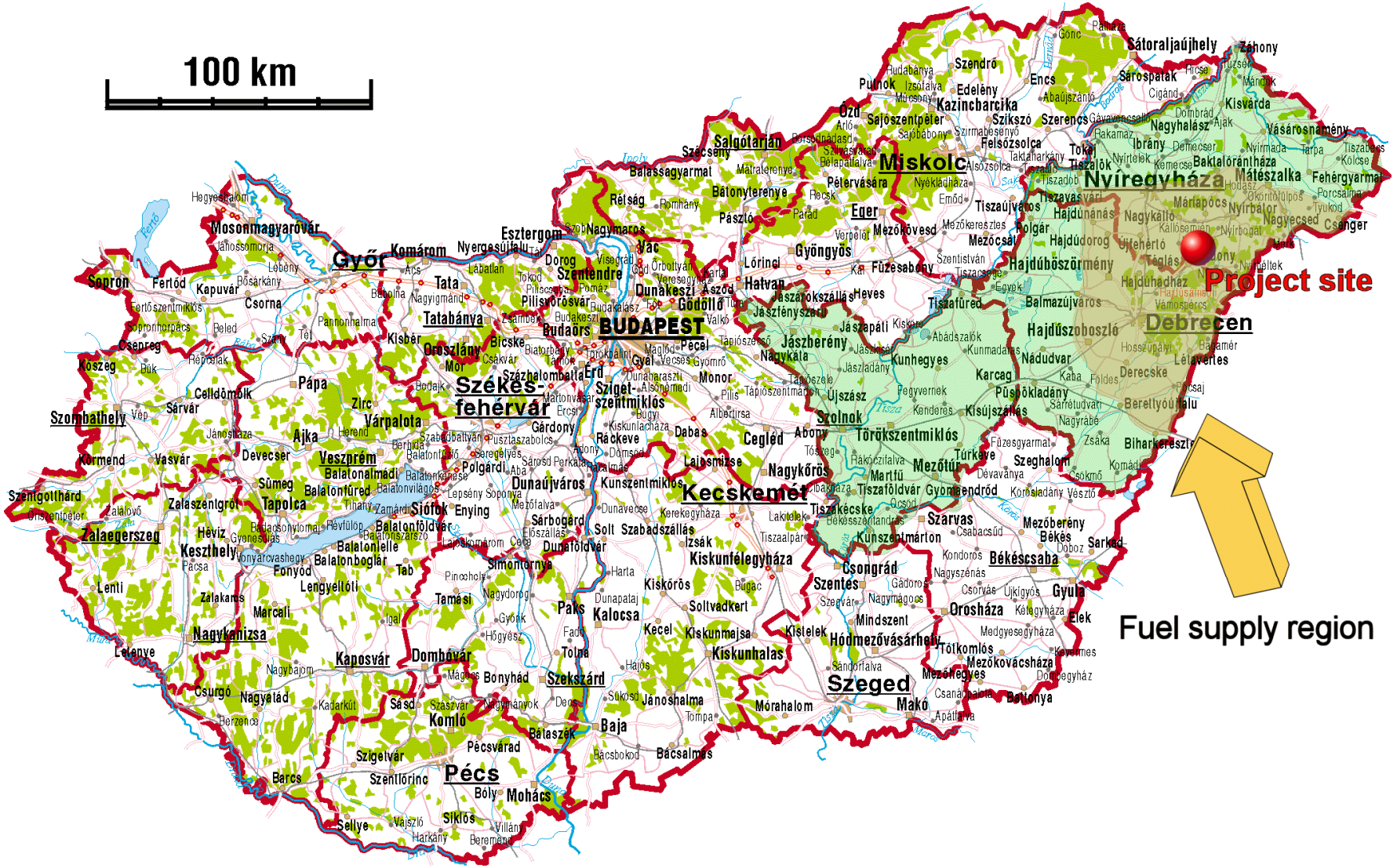
Both bodies most welcomed and offered support for the project. The Board of Representatives, however, made their support subject to the condition that they would visit a similar plant that is in operation.

Therefore a site visit was organized to Zolling, Germany to visit a 20 MW wood fired power plant. All members of the municipal board of representatives three other citizens and the representative of the local TV took part on the visit. On returning home, one-hour coverage of the site visit and the entire program was broadcast on the local TV.

The municipal representatives in the Zolling Plant

Following the successful site visit the municipality approved the project and held a public hearing. The public hearing was held on December 29, 2004. A protocol of the public hearing is given in Annex 6.

Annex 1: Location Map of the Project Site



<Map of the project site>

Annex 2: Table of Firewood Availability in the Region

Region	Species	Clearing			Thinning			Final use			Total			Total		
		total avail.	of which		total avail.	of which		total avail.	of which		total avail.	of which		total avail.	of which	
			thick	thin		thick	thin		thick	thin		thick	thin		thick	thin
		m^3	firewood m^3		m^3	firewood m^3		m^3	firewood m^3		m^3	firewood m^3		ton	firewood, tons	
Nyírbéltek	H.leaf	2050	344	1111	3800	1117	1049	13493	4318	2699	19343	5779	4858	8297	4508	3790
	S.leaf	358	60	194	5640	1658	1557	7975	2552	1595	13973	4270	3346	3808	2135	1673
	Pine	565	95	306	5685	1672	1569	2306	738	461	8557	2504	2337	2905	1503	1402
	Tot.	2973	499	1611	15126	4447	4175	23773	7608	4755	41872	12554	10541	15010	8146	6864
Nyírbátor	H.leaf	11607	1950	6291	16874	4961	4657	50125	16040	10025	78606	22951	20973	34261	17902	16359
	S.leaf	2686	451	1456	12956	3809	3576	9843	3150	1969	25485	7410	7000	7205	3705	3500
	Pine	3044	511	1650	3162	929	873	0	0	0	6206	1441	2522	2378	865	1513
	Tot.	17337	2913	9396	32991	9699	9106	59968	19190	11994	110296	31802	30495	43844	22471	21372
Kisvárda	H.leaf	1200	202	650	1543	454	426	721	231	144	3464	886	1221	1643	691	952
	S.leaf	548	92	297	7930	2331	2189	12214	3909	2443	20692	6332	4928	5630	3166	2464
	Pine	22	4	12	114	33	31	0	0	0	136	37	43	48	22	26
	Tot.	1770	297	960	9587	2818	2646	12935	4139	2587	24292	7255	6193	7322	3879	3442
Baktal.háza	H.leaf	8244	1385	4468	16490	4848	4551	48528	15529	9706	73263	21762	18725	31580	16974	14606
	S.leaf	668	112	362	13146	3865	3628	17258	5522	3452	31072	9500	7442	8471	4750	3721
	Pine	299	50	162	2022	594	558	3107	994	621	5428	1639	1341	1788	983	805
	Tot.	9211	1547	4992	31659	9308	8738	68893	22046	13779	109762	32901	27508	41839	22708	19131
Nyíregyháza	H.leaf	6074	1020	3292	9159	2693	2528	38026	12168	7605	53258	15881	13425	22859	12387	10471
	S.leaf	748	126	405	16535	4861	4564	33525	10728	6705	50807	15715	11674	13694	7857	5837
	Pine	503	85	273	983	289	271	508	163	102	1994	536	645	709	322	387
	Tot.	7324	1230	3970	26676	7843	7363	72059	23059	14412	106060	32132	25744	37262	20566	16696
Szabolcs-Szatmár-Bereg county Total	H.leaf	29175	4901	15813	47866	14073	13211	150893	48286	30179	227933	67260	59202	98640	52462	46178
	S.leaf	5007	841	2714	56207	16525	15513	80815	25861	16163	142029	43227	34390	38808	21613	17195
	Pine	4433	745	2403	11965	3518	3302	5921	1895	1184	22320	6157	6889	7828	3694	4134
	Tot.	38615	6487	20929	116038	34115	32026	237628	76041	47526	392281	116644	100481	145276	77770	67506
The two counties together	H.leaf	51367	8630	27841	85343	25091	23555	385887	123484	77177	522597	157204	128573	222906	122619	100287
	S.leaf	10021	1684	5432	75742	22268	20905	119440	38221	23888	205204	62173	50225	56199	31086	25112
	Pine	10294	1729	5579	39481	11607	10897	18730	5994	3746	68506	19331	20222	23732	11598	12133
	Tot.	71683	12043	38852	200566	58966	55356	524058	167699	104812	796307	238708	199020	302837	165304	137533

Annex 3: Company Registration

2003 -11- 21

A Hajdú-Bihar Megyei Bíróság mint Cégbíróság.
Cg.09-09-010103/3 szám

V É G Z É S

A Hajdú-Bihar Megyei Bíróság mint Cégbíróság a(z) **LIGET BIOENERGIA MŰVEK Energiatermelő és Szolgáltató Korlátolt Felelősségű Társaság** kérelmére elrendeli a cég bejegyzését a Cg.09-09-010103 számú cégjegyzékbe az alábbi adatokkal:

1 **Általános adatok**
Bejegyezve : 2003. november 12.
Cégforma : Korlátolt felelősségű társaság

2 **A cég elnevezése**
2/001 LIGET BIOENERGIA MŰVEK Energiatermelő és Szolgáltató Korlátolt Felelősségű Társaság

3 **A cég rövidített elnevezése(i)**
3/001 LIGET BIOENERGIA MŰVEK Kft.

5 **A cég székhelye**
5/001 4254 Nyíradony, Honvéd utca 92.

8 **A létesítő okirat kelte**
8/001 2003.11.07

9 **A cég tevékenysége**
9/001 **4011'03** Villamosenergia-termelés
Főtevékenység
9/002 **2414'03** Szerves vegyi alapanyag gyártása
9/003 **4012'03** Villamosenergia-szállítás
9/004 **4013'03** Villamosenergia-elosztás, -kereskedelem
9/005 **4030'03** Gőz-, melegvízellátás
9/006 **4100'03** Víztermelés, -kezelés, -elosztás
9/007 **6024'03** Közúti teherszállítás
9/008 **7310'03** Műszaki kutatás, fejlesztés
9/009 **7420'03** Mérnöki tevékenység, tanácsadás

11 **A cég jegyzett tőkéje**
11/001 3000000.-Ft, azaz hárommillió Ft készpénz.

12 **A cégjegyzés módja**
12/001 önálló

13 **A cégjegyzésre jogosult(ak) adatai**
13/001 Lontay Zoltán ügyvezető (an.: Tornallyay Katalin)
1014 Budapest, Csalogány u. 22-24. 4/23.
13/002 Polgári István József ügyvezető (an.: Czibulyás Erzsébet)
1015 Budapest, Csalogány u. 12/C. fszt. 11.

HAJDÚ-BIHAR MEGYEI CÉGBÍRÓSÁG DEBRECEN

17 **A magyar, illetve külföldi részvétellel működő cégben érintett állam(ok) betűjele**
17/001 HU

20 **A cég statisztikai számjele**
20/001 13143374-4011-113-09

21 **A cég adószáma**
21/001 13143374-2-09

1(09) **A tag(ok) adatai**
1/001 Derzsi Miklós (an.: Holhós Julianna)
4024 Debrecen, Varga u. 47/A.
1/002 A társaság irányítását biztosító befolyásolás fajtája: jelentős befolyás.
Lontay Zoltán (an.: Tornallyay Katalin)
1015 Budapest, Csalogány u. 22-24. 4/23.
1/003 A társaság irányítását biztosító befolyásolás fajtája: jelentős befolyás.
Polgári István József (an.: Czibulyás Erzsébet)
1015 Budapest, Csalogány u. 12/C. fszt. 11.
1/004 Szőke Károly (an.: Dormán Ilona)
4254 Nyíradony, Kossuth u. 62.

Felhívja a bíróság a cég figyelmét, hogy a bejegyzett TEÁOR besorolású tevékenységeken belüli hatósági engedélyhez kötött tevékenység csak az erre vonatkozó külön engedély birtokában kezdhető meg és gyakorolható. Ezen hatósági engedélyt - a Ctv. 23. § (3) bekezdése szerint - a cég az engedélyköteles tevékenység megkezdésekor köteles benyújtani a cégbírósághoz.

Figyelmezteti a bíróság a társaságot arra, hogy a társaság az 1997. évi CXLV. tv. 16. § (1) bekezdése szerint a székhelyét **cégtáblával köteles megjelölni.**

A társaság a kérvényen illetékbélyegben 60.000 Ft-ot bejegyzés címén lerótt, és a 20.000 Ft közzétételi költségtérítést befizette.

A bíróság a kérelmezőnek a záradékolt társasági szerződés 2 példányát, valamint 2 db címpéldányát megküldi azzal, hogy a bejegyzett cégjegyzésre jogosult(ak) az üzleti aláírásai(ka)t a cégjegyzéssel azonos módon köteles(ek) teljesíteni.

A cég bejegyzését követően a cég írásbeli képviselete, illetve hivatalos levelezése során fel kell tüntetni a céget nyilvántartó cégbíróság nevét, a cég nevét és székhelyét, a cég cégjegyzékszámát.

E végzés ellen fellebbezésnek nincs helye, azonban a végzésben foglalt adatok tartalmának jogszabályba ütközése miatt az ügyész, továbbá az, akire a végzés rendelkezést

tartalmaz - a rendelkezés őt érintő részére vonatkozóan - pert indíthat a cég ellen a cég székhelye szerint illetékes megyei bíróság előtt a bejegyző végzés hatályon kívül helyezése iránt.

A per megindításának a bejegyző végzés Cégközlönyben való közzétételétől számított 30 napon belül van helye. A határidő elmulasztása jogvesztéssel jár.

Debrecen, 2003. november 12.

Dr. Szűcs Gyula s.k.
megyei bírósági tanácselnök

A kiadmány hiteléül:

Nagy Mariann
tisztviselő

Annex 4: English Version of Company Registration

(date stamp: Nov. 21, 2003)

The Court of Hajdu-Bihar County as Company Court.
Cg. 09-09-010103/3 number

Ruling

On the request of LIGET BIOENERGY WORKS Energy Producing and Providing Limited Liability Company the Court of Hajdu-Bihar County as Company Court orders the registration of the company into the Cg. 09-09-010103 company register with the following data:

1 **General data**
Registered: November 12, 2003
Company form: Limited liability company

2 **Name of the company:**
2/001 LIGET BIOENERGY WORKS Energy Production and Distribution Limited Liability Company

3 **The abbreviated name(s) of the company:**
3/001 LIGET BIOENERGY WORKS Ltd.

5 **Seat of the company**
5/001 4254 Nyíradony, Honvéd st. 92.

8 **Issuing date of the establishment document**
8/001 November 7, 2003

9 **Activities of the company**
9/001 4011'03 Production of electricity
Main activity
9/002 2414'03 Manufacture of organic basic chemicals
9/003 4012'03 Delivery of electricity
9/004 4013'03 Distribution-, sales of electricity
9/005 4030'03 Steam and hot water supply
9/006 4100'03 Collection, purification and distribution of water
9/007 6024'03 Freight transport by road
9/008 7310'03 Research and experimental development on natural sciences and engineering
9/009 7420'03 Engineering activities, consultancy

11 **Registered capital of the company**
11/001 3,000,000.00HUF, i.e. three million HUF cash.

12 **Method of company representation**
12/001 independent

13 **Data of authorized company representative(s)**
13/001 Zoltan Lontay managing director (mother's maiden name: Katalin Tornallyay)
1014 Budapest, Csalogány u. 22-24 4/23

13/002 István József Polgári managing director (mother's maiden name: Erzséber Czibulyás)
1015 Budapest, Csalogány u. 12/c fszt. 11

(round seal of the court)
Inscription: Company Court of the Court of Hajdu-Bihar County, Debrecen city

Ruling Cg. 09-09-010103

17 **Letter mark of Hungary and in the company's operation participating foreign company's country(ies) of origin**
17/001 HU

20 **The company's statistical identification number**
20/001 13143374-4011-113-09

21 **The company's tax number**
21/001 13143374-2-09

1(09) **Data of the member(s)**
1/001 Miklós Derzsi (mother's maiden name: Julianna Holhós)
4024 Debrecen, Varga u. 47/A
1/002 Degree of influence on the management of the company: significant influence
Zoltan Lontay managing director (mother's maiden name: Katalin Tornallyay)
1014 Budapest, Csalogány u. 22-24 4/23
1/003 Degree of influence on the management of the company: significant influence
István József Polgári managing director (mother's maiden name: Erzséber Czibulyás)
1015 Budapest, Csalogány u. 12/c fszt. 11
1/004 Károly Szőke (mother's maiden name: Ilona Dormán)
4254 Nyíradony, Kossuth u. 62

The Court reminds the company that those –TEAOR classified- registered activities that require permission from concerned authorities, can only be started and exercised in possession of those permits. This authority permit(s) –according to Ctv.23 § (3)- should be submitted by the company to the Court at the beginning of the permit-liable activity.

The Court warns the company, that according to the Law of 1997. CXLV 16. § (1), the seat of of the company should be marked by a name-plate.

The company has duly paid 60,000.00HUF for the registration in fee-stamps and also 20,000.00HUF for publication.

The Court sends to the applicant two authenticated copies and two further copies of the registration with the note, that the authorized representatives should execute their business sign(s) in full accordance with their company sign(s).

Following the registration of the company, in written representations of the company or in official correspondence the name of the registration company Court, the name and seat of the company and the registration number should be listed.

No appeal lies against this ruling, however if the included data conflicts with the law, then the public prosecutor and those affected by this ruling can initiate lawsuit for the invalidation of the company registration ruling –for the part of the ruling affecting him/her- against the company in the competent county Court.

(round seal of the court)
Inscription: Company Court of the Court of Hajdu-Bihar County, Debrecen city

The lawsuit against the registration ruling can be initiated within 30 days following the publication of the registration ruling in the Company Journal. The failure to observe the deadline results in forfeiture of the right.

Debrecen, November 12, 2003

Dr. Gyula Szűcs personally
Council president of the County Court

For authentication of this document:

(handwritten sign)
(round seal of the court)
Inscription: Company Court of the Court of Hajdu-Bihar County, Debrecen city

Mariann Nagy
officer

Annex 5 : Declaration

Declaration of Intent

In relation to the planned Hungarian-Japanese joint implementation (JI) project, entitled the "South-Nyirseg Bioenergy Project" (hereinafter, the "Project"), anticipated in connection with the framework established by the Kyoto Protocol to the United Nations Framework Convention on Climate Change (hereinafter the "Protocol"), it is hereby declared that the participants of the Project intend that the full amount (i.e. 100%) of Emission Reduction Units (ERUs) resulting from the implementation of the Project is to be transferred to the Japanese participants in exchange for their financial contribution to the Project, subject to the fulfillment of the applicable requirements under the Protocol and under the applicable laws and regulations of Hungary and the applicable laws and regulations of Japan.

This Declaration of Intent is issued solely for the purpose of facilitating an application for approval of the Project with the Ministry of Environment and Water of Hungary as a JI project under the Protocol.

Tadashi Aoyagi

Tadashi Aoyagi
Mitsubishi Research Institute Inc.
Japan
東京都千代田区大手町二丁目3番6号
株式会社三菱総合研究所
地球環境研究本部長 青柳 雅

Lontay Zoltan Kovacsics István

Lontay Zoltan Kovacsics István
EGI Contracting Engineering
Hungary

EGI Energiagazdálkodási
Részvénytársaság
1027 Budapest II., Bem rakpart 33-34.
CIB 10700024-02534703-51100005

Annex 6 : Protocol of public hearing

Summary of the public hearing at Szakoly municipality on December 29, 2004

The subject of the "South-Nyirseg Bioenergy Project" was included in the agenda of the public hearing announced earlier (for other reasons). In the hearing the full body of local representatives and ca. 250-300 local residents (as many could fit into the local house of culture) participated. The selected proceeding was to have an open session of the representative body, and at the decision making of each item the local residents present have also voted.

The deliberation on the South.Nyirseg Bioenergy project followed the agenda item on the 2004 budget. On the days preceding the public deliberation the local television channel aired the project information compiled by EGI, and also the session of the representative body where the preliminary deliberation took place. (the outcome of this session was, that the project will be supported, if the body will have a chance to visit an operational bio power station. In order to comply with this requirement a study trip was organized to the power station in Zolling, Germany.)

The deliberation has started with an introduction by the notary (of the municipality), who expressed strong support for the project. As he put it: without the South-Nyirseg Bioenergy Project the municipality would face a difficult situation, the transmigration of the population cannot be stopped. On the other hand, if the transmigration continues, then the present institutional system will face an impossible situation.

Next, a video recording was presented, depicting the representative body's visit to Germany. This was followed by questions (from the audience). Some of the raised questions:
- what kind of smoke emission can be expected?
- how many trucks will approach the power station daily, on which route?
- how many people will be employed by the power station and how many by the fuel logistics?
- what kind of qualification should the employees have?
- will be enough fuel wood available for the operation of the power station?
- how can individuals participate in the energy plantation program?
- additional investments can be expected or not?
- the power station will have rail connection?

The questions were partially answered by the executives of the municipality, and partially by the participating "experts" (i.e. EGI and Liget representatives).

This was followed by a deliberation whether the decision made without the participation of 100% of the population will be (legally) valid or not (since not 100% of the population participated). Regarding this issue, the Mayor explained, that the decision is made by the representative body, the voting of the population only gives a basis for the decision. By the way, every family has received invitation to the public hearing (he added).

Finally the local residents present voted unanimously (only 5 people abstain from voting) to support the power station project. Based on the outcome of the voting, the representative body made an approving decision.

Compiled by: Zoltan Lontay

Note:
In accordance with the Marrakesh Agreement the project owner can request that those data which's publication might hurt it's business interest, to be withheld from public consultation