BIOCOGEN: EXISTING FLAGSHIP – Austria (A)

Biomasse Kraftwerk
Güssing GmbH & Co KG

Burgenland
AUSTRIA

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http://www.eee-info.net
http://www.bnet.at/cis/fwg

BACKGROUND *Source: http://www.eee-info.net/index_e.html*

Güssing is the European centre for renewable energy. One of the largest district-heating networks based on biomass and a RME plant for the production of organic diesel have also been set up and emphasize the importance of this form of energy for Güssing.

A new type of power station has recently been developed in Güssing in order to facilitate the production of electricity from biomass by small decentralised power stations. This utilizes a gasification process which has advantages over combustion processes particularly in the combined production of power and heating. The Güssing biomass power station produces 2,000 kW electric current and 4,500 kW heating from 1,760 kg. wood per hour.

In order to develop this project from the original concept to the finished result, a team consisting of the plant builder, Austrian Energy, scientists from the Vienna Technical University, the EVN and Güssing district heating joined forces in the expert network RENET and developed and developed this new, efficient and technically advanced system for the combined production of power and heating based on the gasification of biomass.

TECHNICAL INFORMATION *Source: http://www.eee-info.net/index_e.html*

The heart of the power station is the WIRBELSCHICHT steam carbureter. It consists of two connencted WIRBELSCHICHTSYSTEMEN (fluidised bed systems). During gasification the biomass is gasified with approximately 850 degree C under supply of steam. Using water vapor, instead of air as medium of gasification, results in a nitrogen free, tar-poor product gas, with a high heat value.

A part of the remaining coke is transported to combusting over a circulating bed material (sand), which act as heat distribution media. The warmth dissipating to the bed material is needed for the maintenance of the gasification reactions.
The flue gas is carried off separately, and the contained warmth is used for uncoupling of long distance heating. For the function of the gas engine, which is installed afterwards, the product gas must be cooled and cleaned. Naturally the warmth dropping with the cooling is used again for long distance heating. Afterwards the gas is freed from dust in a woven filter. After this procedure a scrubber reduces the concentrations of tar, ammonia and sour gas components. Due to this special procedure it is possible to lead back all residual substances into the process. As a consequence neither wastes nor waste water result during gas cleaning.

The gas engine converts the chemical energy of the product gas into electrical. Beyond that, the waste heat of the engine is used as well for the production of long distance heating. Since using biomass the efficiency obtained by that way is so far unique. The electrical efficiency is 25-28%, the overall efficiency
(electricity and warmth) is even more than 85%.

FUEL SUPPLY
Solid biomass (chips). The capacity is 4.5 MW heat and 2 kW electricity production.

Reasons for your choice as an examplar project (or bad case).

- Strong leadership
- Innovative partnership
- Environmental excellence (positive land use, minimal emissions etc.)
- Technology or technical excellence
- Appropriate siting and scale
- Community involvement/ social benefits provided (e.g. addresses fuel poverty)

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BIOCOGEN: DEMONSTRATION FLAGSHIP – Austria (B)

Biomass CHP Plant
based on an ORC cycle
and a newly developed
Fuzzy Logic control system
Tyrol, AUSTRIA

Stadtwärme Lienz
Produktions- und
VertriebsGmbH
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Schulstraße 1
Tel.: ++43/4852/604-2200
Fax:++43/4852/604-20277
E-mail: info@stadtwaerme-lienz.at

Contact: DI Heinz Reisinger, Tel.: 04852/604-20211
DI Gernot Pointner, Tel.: 0316/387-51020

source http://bios-bioenergy.at/bios/ebios.shtml

BACKGROUND
District Heating Plant of the Stadtgemeinde Lienz
Start of operation: October 2001
Owner: Stadtwärme Lienz Produktions- und VertriebsGmbH
Investment costs: CHP plant 7.7 Mio €; District heating grid:15.4 Mio €

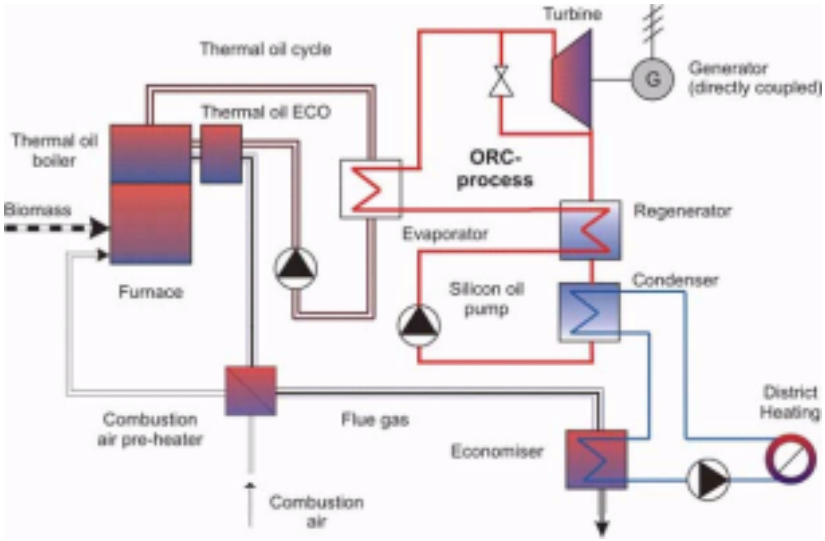
TECHNICAL INFORMATION
Nominal electric capacity: 1.000 kW
Nominal thermal capacities: 6.5 MW (thermal oil boiler + ECO) + 7.0 MW (hot water boiler) + 1.5 MW (heat recuperation in economiser)

Roofed storage capacity	5,000 Srm
Open storage capacity	10,000 Srm
Solar thermal collector	630 m2
Nominal power thermal oil boiler	6,000 kW
Nominal power thermal oil ECO	500 kW2
Nominal power hot water boiler	7,000 kW
Nominal power hot water ECO	1,500 kW
Nominal power oil boiler (peak load coverage)	11,000 kW
Maximum thermal power solar thermal collector	350 kW
Net electric power ORC	1,000 kW
Production of heat from biomass	60,000 MWh/a
Production of heat from solar energy	250 MWh/a
Production of electricity from biomass	7,200 MWh/a

- First 1,000 kWel biomass combined heat and power plant based on the ORC-process worldwide
- First use of a specially developed heat recuperation system for thermal oil boilers to increase the electric efficiency
-Use of a Fuzzy Logic control for process optimisation
-Efficient, multi-stage flu gas cleaning system consisting of multi-cyclone, economiser and wet electrostatic precipitator combined with a flue gas condensation unit
ORC Process:

1 regenerator	**5 pump**	**9 district heat input**
2 condenser	**6 preheater**	**10 thermo-oil input**
3 turbine	**7 evaporator**	**11 thermo-oil output**
4 generator	**8 district heat output**	

Source: http://bios-bioenergy.at



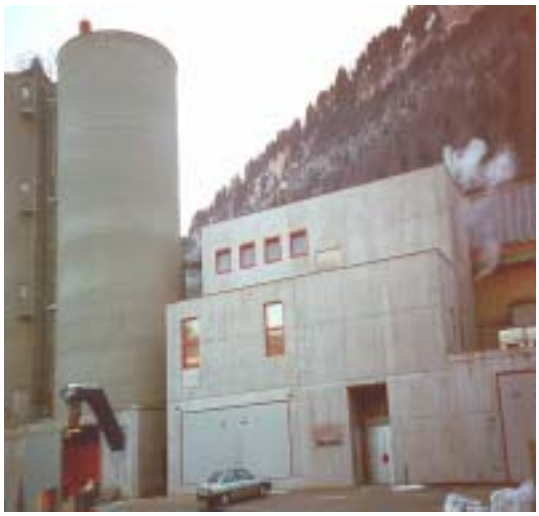
FUEL SUPPLY
The plant is fired with bark, saw dust, wood chips from local saw mills (90,000 Srm/a) and rural wood chips (10,000 Srm/a)

Reasons for your choice as an examplar project:

- Strong leadership
- Innovative partnership
- Economic performance
- Technology or technical excellence
- Appropriate siting and scale
- Community involvement/ social benefits provided (e.g. addresses fuel poverty)

BIOCOGEN: EXISTING FLAGSHIP – Austria (C)

Biomass CHP Plant Reuthe
Reuthe Vorarlberg
AUSTRIA



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BACKGROUND

The plant in Reuthe, which is the first cogeneration system of this kind in Austria, is a model for other similar projects. The biomass CHP plant in Reuthe was built in 1995 and put into operation in 1996. It is designed to

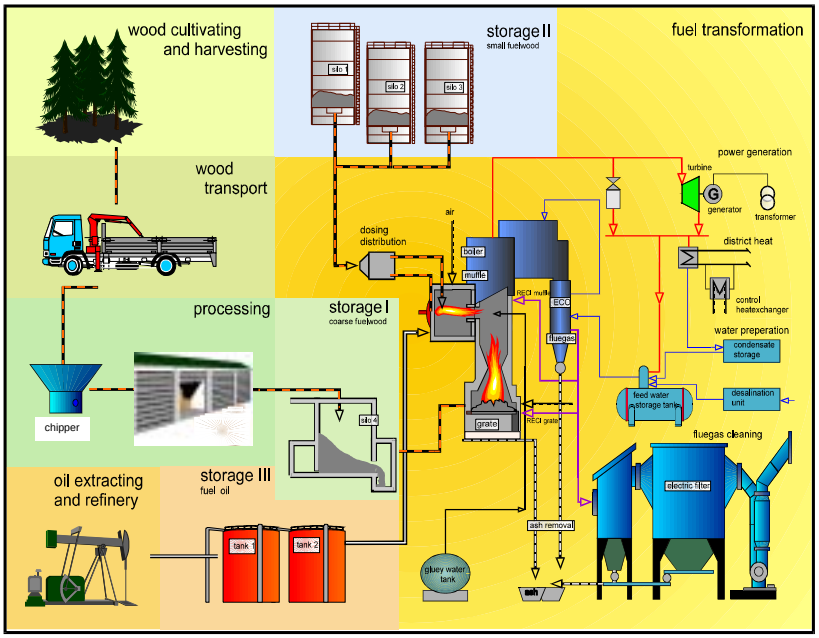
- utilize the fuel with an optimal efficiency,
- reach a significant reduction of emissions in comparison to the previous system,
- ensure operation at reasonable costs,
- enable the combustion of waste wood nearly without a need for processing and
- to cover the heat demand of the local district heating net and the process heat demand of the local industry

TECHNICAL INFORMATION

The Fuel Transformation in the power plant includes the steam generation and cogeneration of electrictity and heat. The steam is produced in a boiler consisting of two autonomous burners, a moving grate burner and a muffle burner.

Annual production	district heat	approx. 29 GWh
(normal year)	grid electricity	approx. 4.7 GWh
Boiler	steam mass flow	10 t/h
	steam temperature	445 °C
	steam pressure	32 bar
Burner	fuel input	max. 10 MW
	range of power at muffle	2 to 10 MW
	range of power at grate	2 to 4 MW
Fuel	composition	no bark, but partially water with
	small fuelwood	glue
		5% wood powder
		30% sawdust
	coarse fuelwood	65% shavings
	moisture content	wood chips
	lower heating value	8 to 12% atro
	input of small fuel-wood	4.5 to 4.8 kWh/kg
	input of coarse fuel-wood	2 200 kg/h
	fuel for pilot flame	1 100 kg/h
		fuel oil
Turbine	type	counterpressure turbine
	electric power	1.265 MW
Heat exchanger	type	condenser
	heat power	6.3 MW
Flue gas	particle separator	multicyclon with electrostatic filter
	flue gas volume flow	17 000 Nm^3/h (13% O_2)
	flue gas temperature	170 °C

Technical data of the CHP plant in Reuthe



Scheme of the stages of the biomass fuel cycle at the CHP Plant Reuthe

FUEL SUPPLY
Solid biomass (chips) 10 000 t/yr, capacity of 6.3MW heat / 1.3MW el.
Investment costs: 4.5 Mio €

Reasons for your choice as an examplar project. The reasons might relate to one or more of the following:

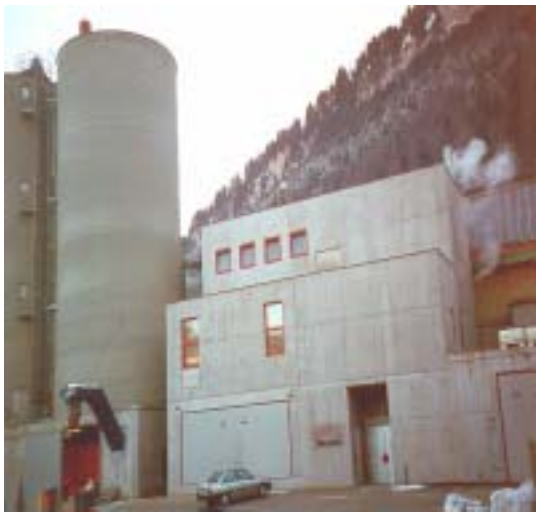
- Innovative partnership
- Economic performance
- Environmental excellence (positive land use, minimal emissions etc.)

- Appropriate siting and scale

PUBLICATIONS:
G. Jungmeier, G. Resch, J. Spitzer: „Environmental burdens over the entire life cycle of a biomass CHP plant“, Biomass and Bioenergy, Vol. 15, Nos4/5, 1998, Pergamon (311-323)

BIOCOGEN: EXISTING FLAGSHIP – Austria (C)

Biomass CHP Plant Reuthe
Reuthe Vorarlberg
AUSTRIA



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	flue gas volume flow	17 000 Nm^3/h (13% O_2)
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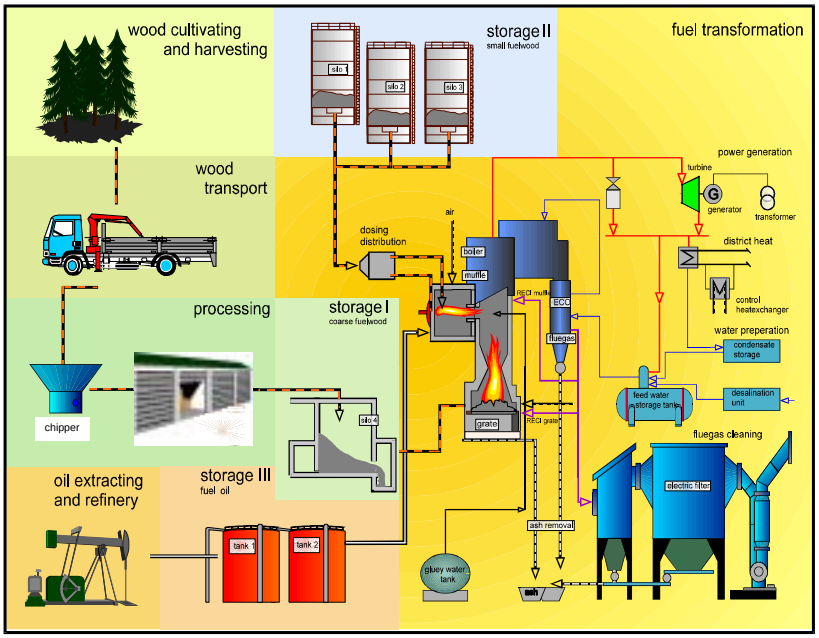

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BIOCOGEN: EXISTING FLAGSHIP – Denmark (B)

Plant Name: Herning Vaerket
Built in 1982, rebuilded for wood chips in 2000
Located in Herning, Denmark

BACKGROUND

The plant has been operating since 1982, originally using coal and oil. It was built as a CHP plant to supply district heating to the city of Herning (60.000 inhabitants) and the neighbouring city of Ikast (15.000 inhabitants) 15 km away from the plant.
It was built by ELSAM, the national power company of Denmark. ELSAM still owns the plant.
In year 2000 the boiler was changed to use biomass. Originally using coal and oil it is now fired with wood chips, and has been installed with a natural gas super heater to improve the steam performance.

TECHNICAL INFORMATION

The plant has a capacity of 90 MWe and 174 MJ/s.
The annual consumption of wood chips is 200.000 tonnes, and for steam performance 26.000 Nm^3/h of natural gas can be used in the super heater. Steam production is 425 tonnes/h at 525 °C and 115 bar.
The reconstruction has given a considerable reduction in CO_2 emissions, and there are no SO_2 emissions since Natural gas does not contain sulphur.
The plant can only be producing, when there is a need for district heating. The plant supplies most of the heat demand of Ikast and 80 percent of the demand in Herning. The plant has a 90.000 m3 storage tank, which is used in summertime, so it is operating only every second or third day. In wintertime it is on full speed.

FUEL SUPPLY

The plant is using 200.000 tonnes of wood chips together with natural gas

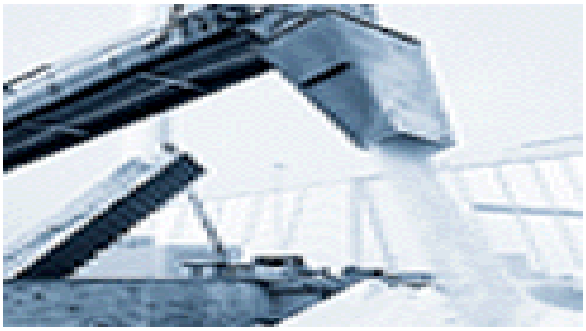
A political decision tells the Power plants to use 1,4 mill. tonnes of biomass as fuel for the power production. Daily speaking it is called the biomass plan.
The plant has been reconstructed to fulfill the biomass plan. Other plants have been built to use straw or wood chips together with coal at existing plants. But with straw there is problems with corrosion the boilers when temperature gets too high. To overcome the poor steam performance at having a lower

temperature, a super heater unit on natural gas has been installed at several plants.
The plant is placed on top of an important drinking water reservoir. This has animated to have attention to the use of raw and wastewater. Many initiatives have been made to improve recirculation of water to reduce the water consumption and the discharge.

Additional information:
www.elsam.dk

BIOCOGEN: EXISTING FLAGSHIP – Denmark (C)

Plant Name: Avedore 2, CHP plant
Builded in 2002
Located in Copenhagen, Denmark



BACKGROUND
Avedore 2 is a multifueled plant, capable of firing many different types of fuels: Natural gas, oil, straw and wood pellets. The straw and wood pellets are both CO2-neutral. The straw will come from farmers on Sealand, and the wood pellets from a hardwood floor industry. Cogeneration of electricity and heat allows Avedore Power Station to utilise up to 94% of the energy in the fuels. By comparison, power stations that exclusively generate electricity only utilise approx. 40% of the energy in the fuel.

TECHNICAL INFORMATION
Avedore 2 is one of the world's most efficient and environment friendly cogeneration plants and can utilise as much as up to 94% of the energy in the fuel. Avedore 2 has a capacity of 570 MW electricity and 570 MW district heat, corresponding to the power consumption of some 800,000 households and the district heating consumption of approx. 110,000 households.
Avedore 2's plant comprises several units that in combination offer record-high utilisation of the energy in the fuels. Avedore 2's main plant consists of an approx. 80 meters high main boiler that is connected to a 30 meters long steam turbine with associated 13 meters long generator.
Separate gas turbines Avedore 2 is also connected to two separate gas turbines (two modified aeroplane jet engines) that operate each their generator with a total capacity of 110 MW. The exhaust gasses from the gas turbines are used for auxiliary heating of water in the plant's main boiler, which contributes to a record-high efficiency in the electricity production.
Avedore Power Station has some of the world's most advanced environmental plants for flue gas cleaning and reclamation of mineral products such as ash and gypsum. The mineral products are used in the concrete and building industries. Avedore 2 is of great importance to achieving the national targets in the energy and environmental fields, as the plant replaces a total of 3 older coal-fired power station units in eastern Denmark. In that way Avedore 2 reduces the CO2-emissions in the East-Danish power sector by approx. 10 per cent of, at the same time as emissions of nitrogen oxides are reduced by 20 per cent and SO2 emissions by 30 per cent.

FUEL SUPPLY
The straw boiler can burn 150,000 tons of straw on an annual basis (25 tonnes per hour) which constitutes about 10% of Avedore 2's fuel consumption. The straw is a CO2-neutral

fuel and thus highly environmentally friendly. It is transported to Avedore Power Station from farmers in eastern Denmark on some 50 lorries a day. The ash from the straw is returned to the fields due to its fertiliser value.
The 300,000 tons of wood pellets will be produced at a factory that E2 is building in Koge, 40 km south of Copenhagen. They are, among other things, made from surplus wood from the manufacture of hardwood flooring at Junckers Industries in Koge. The wood pellets are shipped from Koge to Avedore Power Station's harbour.

Additional information:
www.E2.dk

BIOCOGEN: EXISTING FLAGSHIP – Finland (A)

Alholmens Kraft
Operational period : Continuous operation
Pietarsaari
Finland

BACKGROUND
Power plant process steam to UPM Kymmene Oyj Wisaforest site and district heat to the city of Pietarsaari. Electricity is produced to owners.
Alholmens Kraft LTd is owned by Pohjolan Voima Oy, Graninge Finland AB, Skellefteå Kraft AB, Perhonjoki Oy and Oulun Seudun Sähkö. UPM Kymmene, Kokkola City, Päijät-Hämeen Voima Oy and Perhojoki Oy own the Pohjolan Voima shares.

TECHNICAL INFORMATION
The power plant is combined condensing and CHP plant. Boiler capacity is 550 MW_{th}. Boiler plant can produce 240 MW_e, capacity to produce process steam is 100 MW_{th} and district heating capacity is 60 MW_{th}. Boiler is based on circulating fluidized bed technology. Boiler plant is used during the whole year except service time in summer.

FUEL SUPPLY
Annual fuel consumption is about 3500 GWh. The share of wood based fuels from pulp and paper mill is 30-35 %, sawing and forest residues 5 – 15 %, peat 45 – 55 % and coal or oil 10 %. One of the staring points of the power plant design was the maximum exploitation of bark and other wood based fuels, peat resources from neighbouring areas and existing commercial port and the possibility to import coal. The share of a particular fuel may vary seasonally.

Alholmens Kraft Ltd builds the world largest bio-fuelled power plant and the CFB boiler one of the biggest
Fuel procurement is also innovative and based on bundling the forest residues
Alholmens Kraft power plant introduces " best practice " biomass/fossil fuel co-fired power plant concept with extremely diverse fuel selection
Electricity production with competitive price
Demonstrate novel technology for solid multi-fuel and low emission co-generation in new commercial size
Sufficient fuel resources within economical transportation distance

Sources of information (e.g. reports, papers, reviews)
http://www.alholmenskraft.com/

BIOCOGEN: EXISTING FLAGSHIP – Finland (B)

Lahden Lämpövoima Oy
Operational period : Operation
Lahti
Finland

BACKGROUND

The Lahti power plant went into operation in 1976. Originally, the plant was heavy fuel oil fired, but in 1982 the plant was modified for coal firing. In 1986, a gas turbine generator set was installed at the plant. In the gasification project biomass gasifier was connected to the coal-fired boiler. The gasification has been in operation since January 1998. The plant is owned and operated by a local power company, Lahden Lämpövoima Oy that produces power and district heat for the city of Lahti. Lahden Lämpövoima is owned by Lahti Energia Oy.

TECHNICAL INFORMATION

Gasification enables the utilization of locally available low-price biofuels and recycled refuse fuels. It reduces maximum of 30 % of the plants annual coal consumption.

Thermal capacity of the gasifier is 30 – 70 MW_{th} depending on fuel quality. Fuel moisture is 20 – 60 %. Gasification temperature is 850 oC . Heating value of product gas is 1,3 – 5,1 MJ/kg.

The circulating fluidized bed (CFB) gasifier consists of three main parts;

- the reactor where the gasification takes place
- uniflow cyclone to separate bed material from the gas
- return pipe for circulating bed material

Electricity capacity of the existing power plant is 167 MWe (steam turbine) and 49 MWe (gas turbine). District heating capacity of the power plant is 240 MW.

FUEL SUPPLY

Annual fuel consumption in the gasifier is about 300 GWh. The available local fuels on annual basis in the Lahti area:

Fuel	Amount %	Moisture %
	weight of total	weight
Saw dust	10	45- 55
Wood residues	30	45 – 55
Dry wood residu	30	10 – 20
Recycled refuse	30	10 – 30

The share of a particular fuel may vary seasonally.

The primary advantage of CFB gasification technology is that it enables the substitution of expensive fuels. Benefits of the CFB gasifiers are

- Low fuel quality requirements
- A substitution of coal reduces CO_2, SO_2 and NO_x emissions
- Cheap fuel
- Low investment costs

- Boiler (power plant) operation independent from gasifier

Sources of information (e.g. reports, papers, reviews)
http://www.lahtienergia.fi

BIOCOGEN: PROPOSED FLAGSHIP – Greece

Ano Liosia cogeneration plant
March 2001 – ongoing
Site/ location: A. Liosia, Attiki
Country: Greece

General view of the engines of the Ano Liosia cogeneration plant.

BACKGROUND

Ano Liosia landfill site was for many years the main landfill site of Athens, a city of about 4.5 mill. inhabitants. One first attempt of the municipality of Ano Liosia to open wells in a limited area of the site to extract biogas for electricity production has failed. In 2000-2001 the Biogas Energy Ano Liossia EPE, a company created by the municipality of A.Liosia, and two private companies, TOMI AE and ED Ltd, opened new wells and extracted biogas to fire one of the biggest internationally landfill gas cogeneration projects. The electricity produced is enough for a town of 15000 inhabitants.

TECHNICAL INFORMATION

The extracted landfill gas fuels 11 gas engine modules, 1.255MW_e each. The total installed capacity is 13.8 MWe and 16.5 MWth. Each engine burns 700 Nm3/h of landfill gas having methane content of

45-60% and a lower heating value of 4.14 – 5.17 kWh/Nm3. The annual production of heat is 134.8 GWh and the annual production of grid electricity 112.5 GWh.
The cogeneration plant is in all year operation since 2001 and engages 6 employees.

FUEL SUPPLY
Not applicable.

The Ano Liosia cogeneration plant is a GOOD example for the following reasons:
It is the first big-scale landfill site with recuperation of gas for energetic reasons. The project is based in a modular basic unit, making it possible to get bigger or smaller accordingly to the biogas produced by the landfill and making it easy to be reproduced in several sizes in other sites. As in Greece landfill is the main way of dealing with waste there is great possibility that similar projects are to be implemented elsewhere in Greece. (Already an expansion of the site has been scheduled (9.5MWe), as well as two similar projects of different scale – one of 5 MW at the landfill of Thessalonica and one in Corfou of 1.5 MW)
The partnership of the project is also interesting as it involves a municipality (A.Liosia), that provided the land and the waste, a private constructing company, expert in environmental projects, as well as an Australian company engaged in projects of energy production from biogas, mine gas and biomass, that provided the engines.

POSSIBLE IMPROVEMENTS: There are already projects for the expansion in neighbouring sanitary wells that will provide an additional electrical capacity of 9.5 MW.

Additional information: The cogeneration unit is working without major problems since the commissioning.

Sources of information: personal communication
Web site details: www.tomi.gr, www.helector.gr

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Kouloumoundras Spyros, Helector, s.kouloumoundras@helector.gr

BIOCOGEN: EXISTING FLAGSHIP – Slovenia (A)

PIROLIZA & ECO ENERGETIKA
Operational period: from 1.2.2000
Motnica, Kamnik
Slovenia

Views of the power plant

BACKGROUND

Existing plant was part of wood processing factory STOL but with downfall of the factory it was sold separately to a private company PIROLIZA. They produce and sell power to different small companies in close neighbourhood (there are more than 60 small private companies in close neighbourhood). They are qualified producers of electricity (they have all necessary licences), so they can sell surpluses of electricity to the grid.

TECHNICAL INFORMATION

They have one boiler with nominal plant heat output of 9,2 MWh and biomass steam turbine with nominal electricity output of 1,2 MWe. A part of this biomass cogeneration plant is also a small hydropower plant with two turbines with nominal electricity output 180 kWe. In the beginning of the year 2003 they are planing to install a new steam turbine with nominal electricity output of 1,2 MWe, so they are planning to double the electricity production. Cogeneration is operating all year around, while they have to produce electricity for companies in industrial area. Heat is used only for heating in winter but they are planning to expand the use of heat also for cooling in summer.
They modernise the system of wood chips supply to the boiler (fully automated system), and built a new electrofilter (in the year 2003) for lowering emissions.

FUEL SUPPLY

Existing plant uses approximately 30.000 t of wood chips per year. The only supplier is a company named TISA (they are also the biggest owner of PIROLISA). Tisa is the biggest producer of wood chips in Slovenia. They produce more than 60% of all chips coming to the market (in Slovenia).

Wood chips are produced from wood waste from the wood processing industry (they have special contracts with the majority of sawmills in Ljubljana and its surroundings), from rest wood (wood palettes and wooden boxes). They have special contracts with bigger users of wooden palettes and wooden boxes in Ljubljana and its surroundings and they get demolition timber also from the dump.

With commissioning of the new turbine the use of wooden chips will rise 30 % per year.

Wood chips are produced in a special storehouse and then transported to the plant three times a day.

The quality of wood chips was controlled by accredited laboratory and it is according to our standardisation.

PIROLIZA is considered to be a GOOD example for Slovenia for following reasons:

- strong business interest (not common for Slovenia);
- strong wish for improvement of conditions in the plant and high investments in environmentally friendly technologies;
- preservation of jobs in local community;
- use of wood waste and rest wood from Ljubljana and its surroundings (unburdening the municipal dump Barje)
- first and unique example of coexistence of producer and user of wood biomass
- it is an important step forward to achieve Kyoto requirements for Slovenia (electricity produced here represents 20% of expected electricity from biomass in Slovenia)

POSSIBLE IMPROVEMENTS

Building of storehouse for wood chips near to the plant

Building friendly surrounding (lowering noise and dust)

Use of heat also for cooling in summer

Expanding the network – heating of settlements in their neighbourhood.

Sources of information

Web site details: www.tisa.si

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BIOCOGEN: PROPOSED FLAGSHIP – Slovenia (B)

Heating plant Zelezniki
Operating time since 1970
Zelezniki
Slovenija

Place for new boiler and steam turbine

Views on the district heating system plant in wood processing industry Alples

BACKGROUND

Existing plant is part of wood processing factory Alples. It was built in 1970 for needs of the factory. They expanded the network – heating of settlements in their neighbourhood, in 1976. It was the first biomass district heating system in Slovenia. In 1991 a special company was founded. The main owner (97%) now is the community of Zelezniki. They are planing to start with production of green electricity. Feasibility study for biomass coogeneration was prepared. They are planning to sell all electricity to the grid.

TECHNICAL INFORMATION

There are two biomass boilers: a new one with nominal plant heat output 6 MWth (built in 1998) and an old one with nominal plant heat output 10 MWth (built in 1978). The oldest is operating only in high season (in winter) – if necessary. They are planing to substitute this old boiler with new one – with the same nominal plant heat output. The renovation, together with steam turbine (with nominal plant electricity output 0,66 MWe), will be finished in 2005.
The new boiler is operating all year around, while they have to produce heat for company Alples. The planned boiler and also the steam turbine will operate only in winter (during heating season).
Two thirds of produced heat is sold to industry, 1/5 to households, the rest is sold to public and other buildings in town (school, kindergarten, bank, restaurant).

FUEL SUPPLY

Existing plant is using approximately 6.000 t of wood biomass per year. Mainly they are using wood waste and rest wood. 30 % wood biomass is coming from Alples, 50 % comes from 5 bigger wood processing companies (up to 50 km away), and other 20 % are coming from smaller sawmills and from the community dump.

With installation of a new boiler and steam turbine the use of wooden chips will rise for 30 % per year.

Heating plant ŽELEZNIKI is considered to be a GOOD example for Slovenia for following reasons:

More the 30 years of experience in wood biomass use – first biomass district heating system in Slovenia.
They prepared feasibility study for biomass cogeneration (it was financed from Ministry of environment, spatial planning and energy of Slovenia)
Plant is community owned but it has strong link to industry (source of wood waste)
Preservation of jobs in local community
High confidence of local population
First success biomass story in Alpine space in Slovenia
Use of wood waste and rest wood from town and its surroundings (disburdening the municipal dump)
It is an important step forward to achieve Kyoto requirements for Slovenia (electricity produced here will represent approximately 5 % of expected electricity from biomass in Slovenia)

POSSIBLE IMPROVEMENTS

Investments in new boiler and in steam turbine till the year 2005

Building of larger storehouse for wood chips near to the plant

Expanding the network – heating of new settlements in their neighbourhood (till the year 2009).

SOURCES OF INFORMATION (e.g. reports, papers, reviews): all information's are in Slovenian language and they are available in the District heating plant of Zelezniki
Web site details: n.a.

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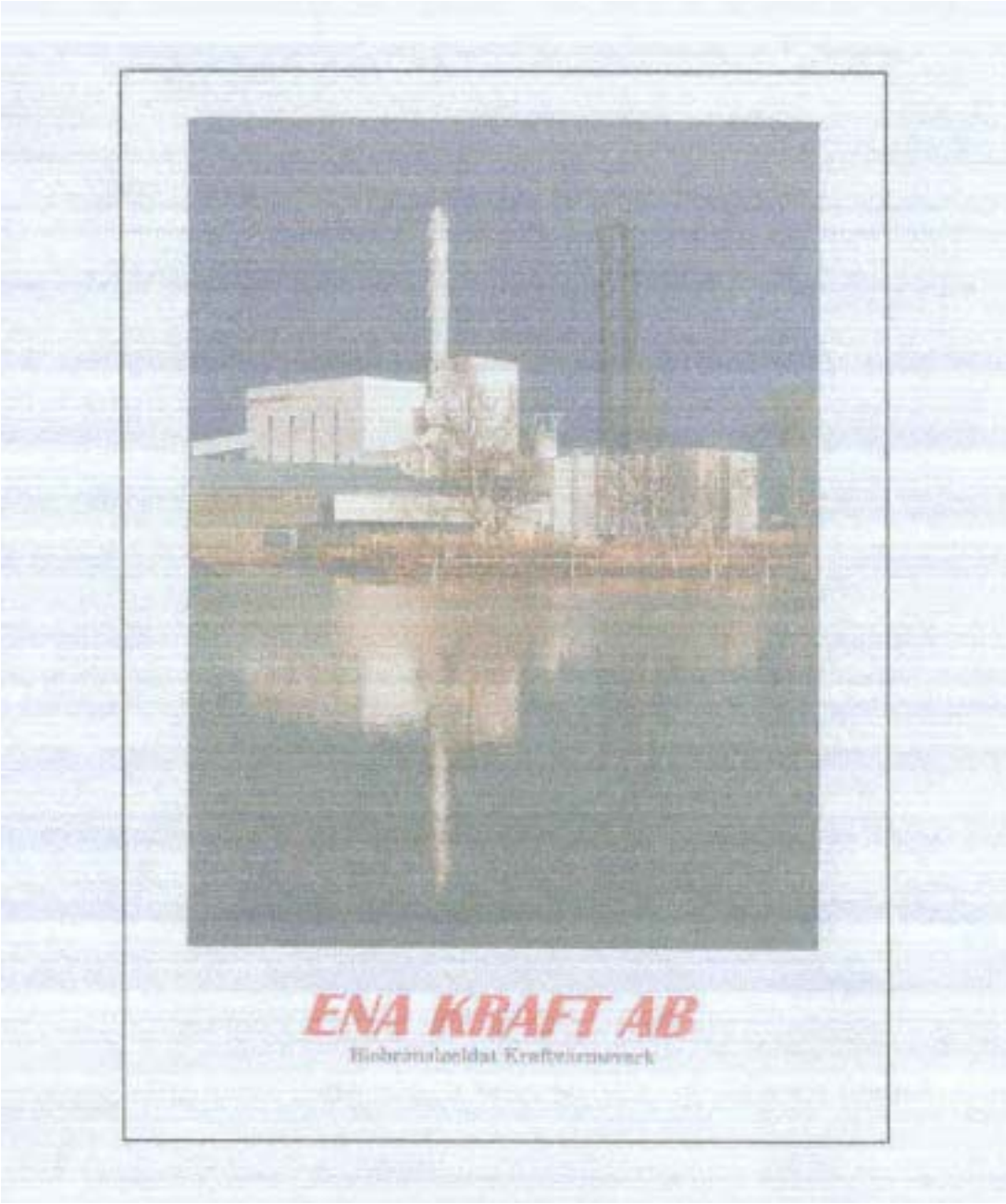
BIOCOGEN: EXISTING FLAGSHIP – Sweden (A)

ENA Kraft
Operational period 1994-current
Site/ location: Enköping, Sweden



BACKGROUND
ENA-Kraft Ltd is a combined heat and power plant located in Enköping, Sweden. The plant is owned by the companies Enköping energy and Västerås Energy. Energy has been produced at the plant since 1994.

TECHNICAL INFORMATION
The company owns a steam boiler at 75 MW supplied fuel and it supplies the district heating network with heat and produce electricity for the grid.

The main CHP boiler was delivered in 1994 by Burmeister & Wain Aktiesellskap and was and commissioned in 1995. The boiler is a vibrating grate boiler and have a boiler capacity of 55 MW_{th} electrical output 23 MW_e (including flue gas cooler).

FUEL SUPPLY
The main boiler was originally designed for burning of wood-fuel. The operating strategy today is to burn only biofuels including bark, sawdust, residues from logging operations and Salix (short rotation coppice).

Reasons for your choice as an examplar project:
ENA-kraft Ltd is one of the leading CHP-companies in Sweden with a strong and innovative leadership. Most of the fuel supply is locally produced and there are also connections to cleaning of sewage sludge in Salix plantations nearby. The fuel is then used by Ena-kraft.

Sources of information: Reports and personal contacts
Web site details: www.varmeverket.enkoping.se

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BIOCOGEN: EXISTING FLAGSHIP – Sweden (B)

Stora Enso Fors Ltd.
Operational period 1985 - current
Site/ location Fors, Sweden


Panna4.jpg

BACKGROUND
Stora Enso Fors Ltd is a card board mill located in Fors, 150 km north west for Stockholm, Sweden. The plant is owned by the company Stora Enso Ltd which is a Swedish/Finnish owned company, one of the largest in the pulp and paper industry. Paper products have been produced at the mill since 1950.

TECHNICAL INFORMATION
The main CFB boiler was delivered in 1985 by Ahlstrom (currently owned by Foster Wheeler) with the following data for combined heat and power production:

-Boiler capacity 55 MW_{th} electrical output 9.6 MW_e (back-pressure steam turbine).
-Steam data: 20 kg/s, 60 bar, 475° C.
-Process steam taken off at both 12 bar and 4.5 bar.
-Bed area: 275 m^2

FUEL SUPPLY
The fuel mix consists of a mix of bark, wood chips, wood pellets and sludge.

Reasons for your choice as an examplar project (or bad case). The reasons might relate to one or more of the following:
Stora Enso Fors is a forest products company operating in forefront for both good production economy but also environmental questions. The use of fossil fuels are nearly zero which is unique. The plant is run by a strong leadership and motivated personnel. The plant is certified by ISO and EMAS.

Sources of information Reports and personal contacts
Web site details: www.storaenso.com

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BIOCOGEN: EXISTING FLAGSHIP - Turkey

Bel-ka A.Ş
Operational period: continuous
Sincan / Ankara
Turkey



Views and General Schematic Plan of the Waste-Treatment Plant

BACKGROUND

In order to supply the increasing wastewater treatment demand of Ankara city, a feasibility study was done by ASKI in1989 and it was decided to build a waste-treatment plant. A Turkish-German consortium overtook the plant construction in 1992 according to the reassignment. The plant has been operational since 1997 and run almost (80%) separately from the national grid. Ankara Municipality is the full-owner of the plant since 2000 after all plant operational test periods are completed.

TECHNICAL INFORMATION

The sludge gathered from the wastewater treatment plant is processed under anaerobic conditions to produce methane gas. Then, the methane gas is used for the electricity generation in gas engines by combustion and for the hot water generation in cauldrons.

Technology used:
The process used in the plant is anaerobic sludge stabilized active sludge technique and mechanical sludge water removal with pressed band filter. The obtained biogas stored in the absorption tanks is fed to thermal generators each having a capacity of 1,650 kW and totally 3.2 MW of electrical energy is produced.
The solid waste treatment projects are operating all year round.

FUEL SUPPLY

The bio-gas (methane) obtained from the wastewater, with the energy content 2.38 kWh/m^3 and 24.700 kcal/h.

Bel-ka is considered a good example for Turkey for the following reasons:

- The average BOD_5 concentration was 145 mg/l and 350 mg/l at the peak times in Ankara Stream before the operation of the plant. Now, it is planned to keep the BOD_5 concentration level below 8 mg/l. By the way the water quality is improved from 4^{th} class to 2^{nd} class.
- The treated water obtained in the plant is also planned to be as an alternative water source for Sarıyar Damp, agricultural watering, fish production and recreation.
- According to Turkish wastewater regulations the plant is 90 % efficient on the basis of BOD_5 and 'suspended solid particles' and 85 % efficient in COD.

POSSIBLE IMPROVEMENTS

The plant improvements are planned to be done in three stages in years 2002, 2010 and 2025 consecutively. From the year 1997, one-third of the improvements were almost done. The plant will be capable of supplying the water treatment of city Ankara with a population of 6 million (estimated population, currently 4.5 million) by the year 2025. Also the improvements done on the plant will be in accordance with nitrogen and phosphorus removal units' addition.

ADDITIONAL INFORMATION

- The total investment done for the plant up to year 2003 is 9.267.433 Euro
- The district heat produced is 2,2 GWh and the produced grid electricity is 20 GWh.

WEB SITE DETAILS
http://www.aski.gov.tr

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BIOCOGEN: EXISTING FLAGSHIP – UK (B)

Slough Heat & Power
Slough, Berkshire
United Kingdom

Views of the Power Plant and the Slough Trading Estate

BACKGROUND
The plant has been operational since the 1920's and ran separate from the National Grid until the 1980's. It is a license exempt generator and distributor. SH&P is a subsidiary of Slough Trading Estates (established in the 1920's)

TECHNICAL INFORMATION
There are three generating stations with more than 90MWe capacity in total. Currently, in 2003, SH&P are running an estimated 20MWe of plant/ boilers on wood fuel. Electricity generation goes to the estate and is also exported to the National Grid (as a full participant under NETA). SH&P supplies major industrial facilities (e.g. a Mars confectionary business), commercial and domestic properties on the estate through a steam and hot water network.
Technology Used: Conventional power plant consisting of Gas Turbine, Gas Boilers, Steam Turbines and Fluidised Bed Boilers. The two fluidized bed boilers are designed to burn a mixture of fuels (coal, gas and RDF) and were converted to wood fuel in 2001/2002.
The project operates all year round.

FUEL SUPPLY
A mixture of virgin wood fuel and bio-waste streams. Woodfuel in the form of chips or pellets. Chips from forestry management, tree surgeons, sawmills and demolition timber. RDF (refuse derived fuel) briquettes are produced on site from non-recyclable paper and packaging waste streams.

SH&P is considered a GOOD example for the UK for the following reasons:

- One of very few large biomass projects, a leader in the field
- Co-firing, but moving progressively from fossil to renewable fuels
- Uses a multiplicity of fuels and is catalysing the establishment of a local sustainable wood fuel supply in the region through partnership with TV Bioenergy
- Sizing is appropriate to the industrial estate that hosts it, a regional rather than a national player more able to communicate with local communities

- Technology is tried and tested and flexible allowing the move to be made to sustainable fuels
- Entrepreneurial private sector management able to deal with changes in the market and with legislation

POSSIBLE IMPROVEMENTS

- Major modifications to fuel handling systems are still required to make the most of wood fuel use
- Considering pellet production and supply locally again opening up the market for smaller (including domestic) projects in the region
- Progressive move to clean, green wood waste fractions from mixed/ contaminated waste
- An eventual move to a mixture of existing wood plus energy crop (e.g. SRC) fuels

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ADDITIONAL INFORMATION

Slough Heat & Power have been recognised as a regional exemplar in the SE England Energy Strategy document " Harnessing the Elements".

WEB SITE DETAILS

www.sloughestates.com/static/ob_c_e_shp.asp

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BIOCOGEN: PROPOSED FLAGSHIP – UK (A)

Bracknell CHP Energy Centre
Bracknell, Berkshire
United Kingdom

New Broadway vision - Bracknell

BACKGROUND

The town of Bracknell lies in the southeast of England approximately 30 miles west of London, and has population of 52,000. The town centre was developed in the 1950s as a 'new town' and is currently the subject of an urban regeneration proposal to transform the area into a mature, mixed use development fully able to serve the needs of the local community in terms of housing, work/leisure environment and transport. It is envisaged that the new development and a portion of the surrounding existing development that will remain will have the bulk of its electricity, heat and cooling needs served from a new combined heat and power plant, fuelled from locally sourced woodchip.

TECHNICAL INFORMATION

The electrical capacity of the plant is anticipated to be around $8MW_e$, with the capability of operating independently of the local electricity network and therefore able to serve all connected loads via distribution over private wires. The thermal capacity is likely to be between $16MW_{th}$ and $24MW_{th}$ depending on the technology and operation of the generating plant employed, and this will provide district heating and hot water as well as cooling via absorption chiller equipment during the summer months.

FUEL SUPPLY

Locally sourced woodfuel in the form of chips from a mix of forestry management, tree surgeons, sawmills, demolition timber and short rotation coppice. It is anticipated that there will be a local wood pellet supplier in place once the project is complete.

Bracknell is considered a GOOD example for the UK for the following reasons:

The town centre re-development project has been identified as an opportunity to combine urban regeneration with an energy strategy based on sustainability and ultimately with the ability to provide for its own energy requirements independent of national fossil fuel networks. The CHP energy centre will be combined with other renewables technologies such as architecturally integrated photovoltaics, wind power, energy from green wastes and transport initiatives allowing Bracknell to become a 100% renewable energy community and will be a first for the UK.

Woodfuel supply will be from the local area from a mixture of sources, stimulating woodland management, diversity of agriculture through the planting of energy crops, diverting 'waste' wood from landfill, therefore directly benefiting local people and economy.

The intention is to establish an ESCO with a public-private sector makeup maximising the local benefit to the community of making the switch to local, renewable energy sources. So far, the project has shown consistent strength of vision from elected members, planners and local community groups. Realisation of the vision will create a real exemplar for the SE region and the UK more generally. Replication prospects are already lining up from adjacent centres such as Reading, Oxford, Maidenhead, Aylesbury and Didcot.

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