



# CHP Goes Green

Cogeneration plus renewable energies



CHP Goes Green

[www.chp-goes-green.info](http://www.chp-goes-green.info)

# Content



<b>CHP Goes Green</b>	<b>3</b>
<b>The Projects</b>	<b>4</b>
ARENE Ile-de-France, France <b>From waste treatment to biogas</b>	4
ARENE Ile-de-France, France <b>An energy positive farm thanks to a biogas unit</b>	5
Berliner Energieagentur Berlin, Germany <b>Fire brigade focus on bio-natural gas</b>	6
Ekodoma Riga, Latvia <b>Biggest green CHP project in Riga</b>	7
Rhein Main Biokompost GmbH Frankfurt am Main, Germany <b>Biogas-CHP in a waste treatment utility: Frankfurt am Main</b>	8
Grazer Energieagentur Steiermark-Graz, Austria <b>Whey used for the electricity and heat production</b>	9
Grazer Energieagentur Steiermark-Graz, Austria <b>Process-, district heat and electricity from wood waste</b>	10
Klimaschutzagentur Region Hanover GmbH Hanover, Germany <b>Cogeneration plant in an apartment building area in Laatzen</b>	11
Klimaschutzagentur Region Hanover GmbH Hanover, Germany <b>Heat supply of the sports and wellnes club Aspria</b>	12
Rhônealpiénergie-Environnement Rhône-Alpes, France <b>Biogas Cogeneration – high school of La Motte Servolex</b>	13
Rhônealpiénergie-Environnement Rhône-Alpes, France <b>Biogas cogeneration – Alpes Energie Bois</b>	14
SEVEn Prague, Czech Republic <b>Biogas plant in Třeboň – the first czech biogas plant with split cogeneration</b>	15
<b>CHP Goes Green partners</b>	<b>16</b>

## Imprint

### Published by:

Berliner Energieagentur GmbH  
Presse- und Öffentlichkeitsarbeit  
Französische Straße 23  
10117 Berlin

**Telephone:** +49 (0)30-293330-0

**Internet:** [www.berliner-e-agentur.de](http://www.berliner-e-agentur.de)

**Mail:** [office@berliner-e-agentur.de](mailto:office@berliner-e-agentur.de)

**Concept/Editor:** Dr. Frithjof Reul

The regional pages are written by each partner.

**Design:** [www.bernoh.de](http://www.bernoh.de)

**Photos:** Ivan Gulei/Fotolia.com (titel),

EMB Energie Mark Brandenburg GmbH (content)

**Print:** varioprint GmbH Berlin

## A European project brings cogeneration and renewable energies together

CHP Goes Green combines two measures with regard to CO<sub>2</sub> reduction: the improvement of energy efficiency by combined heat and power technologies (CHP) and the use of renewable energy sources (RES). The advantages of the implementation of green CHP are manifold: it is an environmentally friendly, easy and cost saving principle which boosts the regional economy, creates local jobs and helps to become independent of world fuel markets.

The project "CHP Goes Green" promotes the pairing of CHP and RES by raising awareness of key stakeholders and the public. For this purpose campaigns are conducted in the project regions of Berlin, Frankfurt/Main, Hannover, Graz-Styria, Prague, Riga, Ile-de-France and Rhônes-Alpes. In each region workshops and visit tours take place in order to show that good practice exist. Feasibility studies for green CHP projects and the development of diverse marketing material will support the use of RES in cogeneration. On the European level publications, the website and international seminars will help to disseminate green CHP concepts and project results.

The brochure at hand shows good practice examples via project fact sheets of all participating partners. The fact sheets illustrate the variety of possible applications in the project regions. The aim of the brochure has been reached when it inspires relevant players to develop similar green chp-projects.

### CHP principle

The simultaneous generation of power and heat in one plant is called combined heat and power (CHP) generation or cogeneration. CHP thus reduces the need for additional fuel combustion for the generation of heat and avoids the associated environmental impacts, such as CO<sub>2</sub> emissions. Cogeneration is a principle and not a single technology. In general, cogeneration can be applied in all cases where electricity is produced by thermal combustion, may it be based on fossil or renewable fuels. Compared to separate production of heat and power in conventional power plants and individual heating systems, CHP units achieve an up to 40 percent higher efficiency. There are large and small plants operating on the CHP principle.

### CHP in Europe

The European Union currently generates 11 % of its electricity using cogeneration. However, there is large difference between member States with variations of the share of cogeneration between 0 % and 45 %. According to official Eurostat figures from 2009, there is very little in Cyprus (0,4 %) and Greece (3 %). Denmark has the greatest share of cogeneration in total electricity generation (45 %) followed by Finland (36 %).

The data for the CHP Goes Green project partner countries is as follows: Germany: 13 %, France: 4 %, Czech Republic: 13 %, Latvia: 20 %, Austria 13 %. There is still an enormous potential to increase the figures in all countries within the next years.

### Renewable energies

Renewable energy is energy which comes from natural resources such as biomass, sun, wind, water and geothermal heat, which are renewable (naturally replenished). Renewable energies make a decisive contribution to climate protection and security of supply by replacing fossil fuels such as coal, oil, gas or uranium. Moreover, their use causes less environmental problems and considerably contributes to the domestic product. The renewable energy used in CHP units is usually biomass.

The figures with regard to "electricity generated from renewable sources in % of gross electricity consumption" show significant differences in the project countries (Eurostat 2008): In Germany 15 % of the generated electricity are coming from renewables, in France: 14 %, in the Czech Republic: 5 %, in Latvia: 41 % and in Austria 62 %.

# The Projects

ARENE Ile-de-France, France

## From waste treatment to biogas

The SIVOM of Yerres and Sénarts Valley, groups 16 cities and is responsible for the treatment of their waste. The Varennes Jarcy biogas plant has a treatment capacity of 80,000 tons per annum.

The SIVOM opened the biogas plant in 2002 in order to provide an answer for odor issues and to prevent waste incineration. Wastes arriving on the platform are mechanically sorted before entering the digesters.

The biogas produced fuels a CHP unit. The electricity is sold to the grid in the frame of a 15 years long buy-in obligation contract with a specific feed-in tariff. The heat is used for the process and to heat the administrative buildings. The digestate is composted so farmers can use it as fertiliser.



### Contact

#### Partner:

**ARENE Ile-de-France**

94 bis avenue de Suffren

75 015 Paris, France

Tel: +33 (0)1-53857383

E-mail: [j.cazas@areneidf.org](mailto:j.cazas@areneidf.org)



#### Operator:

**SIVOM de la Vallée d'Yerres et des Sénarts**

Route du Tremblay

91480 Varennes-Jarcy

Web: <http://www.sivom.com/>

### Technical specification on the biogas CHP unit

Location	City of Varennes Jarcy, Essonne, Ile-de-France
Heat use	On site use for the process and heating of administrative building
Electricity production	1,1 GWh <sub>e</sub>
Kind of fuel	Biogas
CO <sub>2</sub> reduction	633 t
Years of installation	2002
Start of operation	2002

## An energy positive farm thanks to a biogas unit

AgroParisTech, a major French training and research institute in agronomy, runs an experimental farm located in the west of the Paris region. It studies and experiments new technologies developed in the agricultural and agronomy sectors and has set up an innovative project Grignon Energie positive in order to become an energy positive farm i.e producing more energy than it consumes.

The farm biogas plant direction therefore decided to study the feasibility of a biogas unit based produced on site in 2005. The unit will treat manure from the farm as well as fermentable waste from agro industries and supermarkets brought by a partner waste treatment company, SITA. Both stakeholders created a dedicated company for the project to realise the investment and operate the biogas and CHP units, called Energaly.

The biogas produced will fuel a CHP unit. The electricity will be sell to the grid in the frame of a 15 years long buy-in obligation contract with a specific feed-in tariff. The heat will be used to heat the farm administrative buildings, workers flats and the dairy through a dedicated heating network. According to the scientific topic, searchers (private and public) will look at the mix composition that feed the biogas plant, the bacterian eco-system, and the best use on the soil for the digestate.



### Contact

**Partner:**

**ARENE Ile-de-France**

94 bis avenue de Suffren

75 015 Paris, France

Tel: +33 (0)1-53857383

E-mail: [j.cazas@areneidf.org](mailto:j.cazas@areneidf.org)



**Operator:**

**AgroParisTech – site de Grignon**

F-78 850 Thiverval Grignon

E-mail: [grignonenergiepositive@agroparistech.fr](mailto:grignonenergiepositive@agroparistech.fr)

Web: <http://www.agroparistech.fr/energiepositive/-English-version-.html>

### Technical specification on the biogas CHP unit

Location	City of Thiverval Grignon, Yvelines, Ile-de-France
Heat requirements	2,973 MW <sub>th</sub>
Electrical power	387 kW <sub>e</sub>
Kind of fuel	Biogas
CO <sub>2</sub> reduction	1,760 t
Years of installation forecasted	2012
Start of operation forecasted	2012
Investment in biogas and CHP unit	3,000,000 €

**Berliner Energieagentur Berlin, Germany**  
**Fire brigade focus on bio-natural gas**

In one of Berlin’s most important places – the station of the Charlottenburg-Nord professional fire brigade – Berliner Energieagentur (BEA) is operating its first bio-natural gas fuelled combined heat and power unit (CHP). With an output of 240 kW<sub>el</sub> and 365 kW<sub>th</sub>, it is one of the first and biggest plants of its kind in Berlin. Compared to conventional power generation with fossil fuels, annual carbon dioxide emissions are reduced by 1,350 tons.

At the fire station, heat is supplied centrally from a heating system located in the basement of the administrative building. In addition to the CHP, BEA also has installed a new natural gas fuelled condensing boiler with a thermal output of 854 kW to support the existing low-temperature boiler at times when large amounts of heat and hot water are required (peak load). All of the power generated is fed into the public grid and paid for as specified in the renewable energies Act (REA). The bio-natural gas is supplied by GASAG. The gas comes from various biogas plants located in Brandenburg, Saxony-Anhalt and Mecklenburg-West Pomerania.

To reduce the heat requirement of the property with a heated floor space of 21,500 square metres, BIM as the building manager, has completely modernised in respect of energy efficiency the administrative building of the fire station, investing about 10 million Euros from the Konjunkturpaket II (economic stimulus package).



**Contact**

**Berliner Energieagentur GmbH**  
 Französische Str. 23  
 10117 Berlin  
 Tel: +49 (0)30-293330-0  
 E-Mail: office@berliner-e-agentur.de



Technical specification on the biogas CHP unit	
Location	Berlin (Spandau)
Heated floor space	21,500 m <sup>3</sup>
Electrical and thermal power CHP unit	365 kW <sub>th</sub> 240 kW <sub>el</sub>
Kind of fuel	Bio natural gas
CO <sub>2</sub> reduction	1,350 t/a
Operating hours	6,600 h/a
Year of installation	2010
Start of operation	2010
Investment CHP unit	Ca. 200,000 €

## Ekodoma Riga, Latvia

### Biggest green CHP project in Riga

Ziepniekkalns is one of latest out of all Riga's neighborhoods, where Rigas Siltums is building a new biomass combined heat and power unit (CHP).

Rigas Siltums is the main heat supplier company of Riga municipality. The company over the years has shown increasing interest in energy efficiency and renewable energy sources. For Rigas Siltums is important to keep heat generation and distribution with high efficiency, at affordable costs for consumers and with the lowest environmental impact. Green CHP makes all of this possible.

With an output of 4 MW<sub>el</sub> and 22MW<sub>th</sub>, this CHP plant will be one of the first and biggest plants of its kind in Riga and Latvia.

The plant will cover the all year base heat load of the neighborhood, producing up to 21,000 MWh of electricity and 97,500 MWh of heat energy per year. Annual woodchip consumption will be 152,000 m<sup>3</sup> loose. Woodchips are widely available in Latvia, representing a local renewable energy source at a competitive price.

Compared to conventional heat generation with fossil fuels, annual carbon dioxide emissions are reduced by 23,778 tons. Currently the main fuel used in Ziepniekkalns is natural gas.

All of the electrical power generated will be fed into the public grid and paid with a determined feed in tariff.



#### Contact

##### Partner:

SIA "Ekodoma"

Noliktavas iela 3-3

LV 1010 Riga, Latvia

Tel: +37 (0)1-67323212

E-Mail: ekodoma@ekodoma.lv

##### Operator:

AS "RĪGAS SILTUMS"

Cēsu iela 3a

LV-1012 Riga, Latvia

Tel.: +37 (0)1-67017375 (technical service)

E-mail: iltums@rs.lv



#### Technical specification on the biogas CHP unit

Location of the plant	Tīraies iela 5a, Riga
Cogeneration technology	Steam turbine
Electrical power/thermal power	4 MW <sub>el</sub> and 22 MW <sub>th</sub>
Kind of fuel	Wood fuel (mainly woodchips)
Primary energy savings per year	31,2 %
CO <sub>2</sub> savings	23,778 t/a
Operating hours	5,250 h/a
Year of installation/ start of operation	Currently under construction. Commissioning planned in March 2013.
Investment	Ca. 16 M € (5.6 M € from EU Cohesion fund)

## Biogas-CHP in a waste treatment utility: Frankfurt am Main

### Project description

In Frankfurt am Main biogenic waste is utilized in one of Europe's modernst waste treatment utilities. Especially for the demand of the city of Frankfurt a combination of fermentation and composting was realized. The combination of dry fermentation and composting offers a high operational standard for the disposal of waste. The biogas, produced in the fermenter, is used for powering the CHP units. The heat is used in the fermentation process and for heating the facility in winter. The electricity produced is feed in the grid.

### Climate benefits

There are several environmental benefits by generating electricity in a biogas driven CHP-unit and a partially local use of heat. In comparison to heat supply with natural gas boilers and electricity purchase from power plants without CHP you can reach a broad reduction of greenhouse emissions. By the fermentation the methane emissions are avoided by the following composting. The greenhouse potential of methane is twenty four times higher than carbon dioxide.

### Repowering

In November 2010 the existing CHP unit (780 kW<sub>th</sub>, 499 kW<sub>el</sub>) was replaced by three motors with now 635 kW<sub>th</sub> and 680 kW<sub>el</sub>.

The advantages of the new plant are:

- **Higher electrical efficiency**  
The same amount of biomass generates more electricity.
- **Higher reduction of CO<sub>2</sub> emissions**  
Until now reduction of CO<sub>2</sub> of about 1,320 tons per year, (in future 1,980 tons per year)
- **Low-emission running**  
Clean burning and cleaning of exhaust emission avoid formaldehyde emission
- **Low running costs**  
Higher subsidies according to EEG. The legislative authority supports the installation with different bonuses, eg. Bonus for innovative technology, Bonus for CHP, bonus for reduction of the emission of formaldehyde.

### Contact



#### Partner:

**Energierreferat der Stadt Frankfurt am Main**

Galvanistraße 28

60486 Frankfurt

Tel: +49 (0)69-21239193

E-mail: energiereferat@stadt-frankfurt.de

Web: www.energiereferat.stadt-frankfurt.de

#### Operator:

**RMB GmbH**

Peter Dumin

Tel.: +49 (0)69-408986-0

E-mail: peter.dumin@rhein-main-biokompost.de

Web: www.rhein-main-biokompost.de



#### Technical specification on the biogas CHP unit

<b>Location</b>	Rhein-Main-Biokompost GmbH Peter-Behrens Straße 8 60314 Frankfurt
<b>Year of installation</b>	September 1999 Repowering November 2010
<b>Biogenic waste</b>	30,000 t/a
<b>Power BHKW-units</b>	Thermal power: 635 kW 2x 232 kW 1x 171 kW el. power: 680 kW 2x 250 kW 1x 180 kW Fuel power, 1,590 kW
<b>Biogas</b>	ca. 1,8 M m <sup>3</sup> /a
<b>Daily biogas quantity</b>	Ca. 5,100 m <sup>3</sup> , which is equivalent to ca. 2,500 l heating oil or ca. 25,000 kWh
<b>CO<sub>2</sub>-reduction</b>	1,980 t/a

## Whey used for the electricity and heat production

"Berglandmilch" creamery in Wels uses the waste product whey from the cheese production in a biogas plant

### Description of facility and application

Today Berglandmilch is one of the leading cottage cheese producers in Europe and market leader with dairy products in Austria. As a residue of the production of cottage cheese around 50 Mio. litre of whey occur every year, which has to be disposed, either as food for fattening or as powder for industry.

The idea came up to use this residue as energy source for the existing CHP plant and to substitute natural gas with biogas. The biogas fermenter is supplied with whey and rinse water and the following biogas engine produces power and heat at a capacity of 500 kW<sub>el</sub> and 580 kW<sub>th</sub>. The produced electricity is fed into the electricity grid and the produced heat is used for the hot water supply in the production process.

### Advantages for operator/energy user

The biogas plant is designed so that each day about 180,000 l whey and 180,000 l rinse water can be fermented to biogas. This means that every day up to 12 MWh electricity and 14 MWh of thermal energy are generated. Through this implementation, Berglandmilch has permanently solved the problem of whey disposal. The advantages are:

- Saving of disposal and transport costs for whey.
- Saving of 2,000 tons CO<sub>2</sub> emissions per year.
- Electricity production of 4 GWh/a is sold by fixed feed-in tariffs for 13 years according the Austrian Ökostromgesetz (green electricity act).
- Thermal energy production of 4,64 GWh/a is used in the production process.
- The produced heat can be used by 100 % during the whole year and covers 35 % of the total heat demand.
- The surrounding farmers get a high quality fertilizer.
- Cost savings of 450,000 €

### Contact

#### Partner:

Grazer ENERGIEagentur

Kaiserfeldgasse 13/1

A-8010 Graz

Tel: +43 (0)316-811848-0

E-mail: schinnerl@grazer-ea.at

Web: www.grazer-ea.at/BiomasseKWK



#### Operator:

Berglandmilch eGen

Schubertstraße 30

A-4600 Wels

Tel.: +43 (0)7242-46996-250

E-mail: office@berglandmilch.at



#### Technical specification on the biogas CHP unit

<b>Cogeneration technology</b>	Biogas engine
<b>Type</b>	Jenbacher JMS 312 GS-N
<b>Fuel</b>	Biogas
<b>Year of Installation</b>	2006
<b>Thermal power output</b>	580 kW
<b>Electrical power output</b>	500 kW
<b>Investment costs</b>	2 M € (netto)
<b>Subsidies</b>	100,000 € (netto)
<b>Annual operating hours</b>	8,760 h/a
<b>CO<sub>2</sub> savings (if possible)</b>	2,000 t/a

## Process-, district heat and electricity from wood waste

Industrial wood residues provide heat and electricity supply for a wood processing factory and catholic/public/private buildings.

### Description of facility and application

This wood processing manufactory in the center of the Austrian alps was founded in 1874 and employs 300 people nowadays. It has specialized its production at wide plank floors and natural wood panels with an export ratio at 75 %. The different production processes create high amounts of wood waste at different places in the factory. Additionally the disposal of this waste caused high efforts and costs.

The philosophy of STIA includes working with natural raw materials, producing high quality and act sustainable. Based on these, the aims of STIA were to create good working conditions for employees, make use of the wood residues and generate sustainable heat and electricity.

### Advantages for operator/energy user

These plants for suction of wood waste, burning in a boiler and producing heat and electricity were implemented in 1999 and 2006. The plants are designed to use all wood residues from the industrial processes and enable the sustainable process heat supply, the operation of a district heating system and the green electricity sale. The advantages are:

- Saving of disposal and transport costs.
- Cleaner workplaces through automatic suction of wood residues from production processes and transportation to large storages.
- The produced heat can be used by 100 % during the whole year and covers the heat demand of the district heating (catholic/public/private buildings) and the factory (drying, steaming).
- Electricity is sold by fixed feed-in tariffs for 13 years according the Austrian Ökostromgesetz (green electricity act).

### Contact

**Partner:**

Grazer ENERGIEAgentur  
Kaiserfeldgasse 13/1  
A-8010 Graz

Tel: +43 (0)316-811848-0

E-mail: schinnerl@grazer-ea.at

Web: www.grazer-ea.at/BiomasseKWK



**Operator:**

STIA Holzindustrie GmbH

Sägestraße 539

A-8911 Admont

Tel.: +43 (0)3350-0

E-mail: info@admonter.at



Technical specification on the biogas CHP unit	
Location	STIA Holzindustrie GmbH Sägestraße 539 A-8911 Admont
Cogeneration technology	Biogas engine
Type	Jenbacher JMS 312 GS-N
Fuel	Biogas
Year of installation	2006
Thermal power output	580 kW
Electrical power output	500 kW
Investment costs	2 M € (netto)
Subsidies	100,000 € (netto)
Annual operating hours	8,000 h/a
CO <sub>2</sub> savings	2,000 t/a

## Cogeneration plant in an apartment building area in Laatzen

The enercity Contracting GmbH is responsible for the warm water and heat supply of 238 apartments of a housing area in the city of Laatzen. The 2009 installed cogeneration was built during the refurbishment of an existing condensing boiler of 640 kW and a low temperature boiler of 870 kW. The heating station is situated directly above the top flat, which made a very potent noise protection necessary.

Within the first 5 month of 2010 the plant reached 2,780 operating hours and covered 73 % of the required heat. The produced power is fed in the national electricity grid.

The cogeneration power is powered by bio natural gas and reaches a capacity factor of 90 %.



### Contact

#### Partner:

Klimaschutzagentur Region Hannover GmbH  
Goethestraße 19  
30169 Hannover  
Tel: +49 (0)511-220022-0  
E-mail: H.Steinkraus@klimaschutzagentur.de

#### Operator:

enercity Contracting GmbH  
Glockseestraße 33  
30169 Hannover  
Tel.: +49 (0)511-430-2333  
Fax.: +49 (0)511-430-1834  
E-mail: info@enercity-contracting.de



### Technical specification on the biogas CHP unit

Location of the plant	Otto-Hahn-Str. 5, Laatzen
Cogeneration technology	BHKW by Sokratherm, Typ GG14
Electrical power, thermal power	140 kW <sub>el</sub> and 216 kW <sub>th</sub>
Kind of fuel	Bio natural gas
Operating hours	6,500 h
Year of installation/ start of operation	2009
Investment	195,000 €

## Heat supply of the sports and wellnes club Aspria

### Heat supply with a combined heat and power plant powered by Biogas

The enercity Contracting GmbH (eCG) is responsible for the future-oriented heat supply of a Sports and Wellnes Club in Hannover. eCG is in charge for the heat supply, which includes operation, maintenance and repair of the heat supply plant. The combined heat and power plant has a capacity of 70 kW electrical and 115 kW thermic. Together with an additional gas-fired condensing boiler with an over all capacity of 960 kW provides approximately 1,512,000 kWh/a. The combined heat and power plant is on the balance sheet powered by methane (biogas). The electricity produced by the plant (appr. 490,000 kWh/a) is fed in the national electricity grid. The biogas is produced in a biogas-plant run by eCG and partners. It is processed to reach natural gas quality, which can be fed in the public distribution grid.



#### Contact

##### Partner:

Klimaschutzagentur Region Hannover GmbH  
Goethestraße 19  
30169 Hannover  
Tel: +49 (0)511-220022-0  
E-mail: H.Steinkraus@klimaschutzagentur.de



##### Operator:

enercity Contracting GmbH  
Glockseestraße 33  
30169 Hannover  
Tel.: +49 (0)511-430-2333  
Fax.: +49 (0)511-430-1834  
E-mail: info@enercity-contracting.de



#### Technical specification on the biogas CHP unit

Location of the plant	Rudolf-von-Bennigsen-Ufer, Hannover
Cogeneration technology	block heat and power plant E 0836 DN 70 Buderus
Electrical power, thermal power (BHKW)	70 kW <sub>el</sub> and 115 kW <sub>th</sub>
Kind of fuel (BHKW)	Bio natural gas
Thermal power	2 x 200 kW <sub>th</sub> und 2 x 280 kW <sub>th</sub>
Kind of fuel (thermal power)	Natural gas
CO <sub>2</sub> savings	Appr. 633 t/a
Operating hours	Appr. 7,000 h/a
Year of installation/ start of operation	2009
Investment	496,000 € (gross)

## Biogas cogeneration – high school of La Motte Servolex

### Owner

The Public Local Institution of Education and Agricultural Training (EPLEFPA) was established in 1958 in the manor of Reinach.

The High School of General, Technological and Agricultural Teaching provides initial training and the vocational training centre offers many professional courses leading to qualifications.

### A context favourable to biogas

The farm on Reinach manor gives teachers the possibility of organising practical training sessions, of using real technical and economical situations. Workshops open to the school and high school valorise the whole farm: milk cow breeding, sheep and snails, cheese production, horticultural activities...

The "EPLEFPA" of La Motte Servolex wishes to continue its initiative to improve the energy self-sufficiency of its farm and the control of animal wastes: storage, agricultural recovery and odors.

In this context, in January 2008, the School has asked a consultant to carry out a pre-feasibility study for the implementation of a biogas plant on the farm's site.

It shows that the agricultural High School wants to develop a new model of French agricultural biogas development. Indeed, with this project, the school intends to remain in a local approach to the process and therefore:

- the deposits of material are limited, mainly the waste generated by the school and the farm will be processed
- the power plant is fairly small in order to avoid administrative complexity.

Considering that for the time being this scale of development does not exist on the French territory, the innovating approach of the High School of La Motte Servolex creates a new development model for biogas.

In the school's project, the anaerobic digestion of 2,500 gross tons of materials generates the production of 80,000 m<sup>3</sup> of biogas per year. 85 % of the biogas comes from organic matters produced on the school's site. This biogas is burned in CHP to produce simultaneously electricity and heat.

The electricity is injected into the electrical local network, and the produced heat is used to heat:

- the horticultural greenhouses
- the cheese dairy of the school

The digestate is stored in a storage tank, and then spread on the agricultural land as organic fertilizer.

### Objectives

- A local production of renewable energies
- A reduction of CO<sub>2</sub>/Territorial energy climate plan
- The use of by-products: liquid manure, manure, organic waste, green waste...
- The implementation of an educational project (monitoring, biology and flow analysis).

### Particularities

- Territorial project
- 85 % of matter from the school
- Internal use of the thermal energy

### Contact

RhôneAlpénergie-Environnement  
10 rue des Archers  
69002 LYON

Tel: +33 (0)478-37-2914

Fax: +33 (0)478-37-6491

E-mail: [lionel.tricot@raee.org](mailto:lionel.tricot@raee.org)

Web: [www.raee.org](http://www.raee.org)



#### Technical specification on the biogas CHP unit

Volume digester	450 m <sup>3</sup>
Biogas CHP	45 kW <sub>e</sub>
Expected production	400 MWh/a thermal energy 370 MWh/a thermal energy
Global energy efficiency	69 %
Optimized organic matter	2500 t/a of optimized organic matter
Total investment	730,000 €
Subsidy rate	about 50 %
CO <sub>2</sub> reduction	80 t/a

Rhône-Alpes, France  
**Biomass cogeneration – Alpes Energie Bois**

**A context favourable to biomass electricity**

The SAS (simplified joint-stock company) "Alpes Energie Bois" is a family-owned company from which Michel COCHET is the leader. The company is affiliated to "Bois du Dauphiné", saw-mill which has a capacity of about 140,000 m<sup>3</sup> (round wood). All the infrastructure is based on the site of Cheylas (Isère), between Grenoble and Chambéry.

The "Alpes Energies Bois" biomass CHP is the first unit implemented in connexion with the call for tender "Biomass 3" launched in 2009.

This procedure is a good example of the concept of cogeneration applied to timber industry at a relatively low power level, 3.6 MW<sub>e</sub>. It shows that the activity of a timber industry can lead to the production of renewable energies.

The fuel resource is derived from the activity of the sawmill and from the forestry regional activity related to it.

The heat produced by the cogeneration process is used for the drying unit and the granulation unit.

The ambition and motivation of the owner were a key factor in the anticipation of the actions. Indeed the idea of the project was born in 2007, its implementation began in April 2009 and commissioning was carried out in September 2010. The purchase contract has been concluded for a period of 20 years.

**Descriptive**

The project is distinguished by its industrial dimension. The granulation unit was scheduled and sized to 45,000 t in 2011 and 55,000 t beyond.

The company "Alpes Energies Bois" believes in the product quality and opportunities towards the Italian market. For a fuel valued at 50 €/t (about 18 to 20 €/MWh PCI), the selling price of electricity is 139 €/MWh<sub>e</sub> and the heat around 20-25 €/MWh.

A flue gas condenser is used to optimize the energy efficiency. Process control is carried out in great detail through a large number of sensors monitored by computer. The concern for environmental quality is highly taken into account. This is measured within the organization of the timber yard and the visible homogeneity of the fuel.

The quality of combustion is taken into account through extensive facilities including a system of continuous monitoring of flue gases emissions.

This process allows a perfect energy and financial independence.

**Contact**

**RhôneAlpénergie-Environnement**  
 10 rue des Archers  
 69002 LYON  
 Tel: +33 (0)478-37-2914  
 Fax: +33 (0)478-37-6491  
 E-mail: lionel.tricot@raee.org  
 Web: www.raee.org



Technical specification on the biogas CHP unit	
<b>Total investment</b>	22 M € (1/3 granulation unit, 2/3 CHP) – 10 years financing
<b>Subsidy rate</b>	none except a subsidy from the regional council for hot water network
<b>Condensing steam turbine and extraction</b>	3.6 MW <sub>e</sub> alternator
<b>Steam process HP</b>	14,5 MW, 17 t/h, 500°C, 64 B
<b>Expected production</b>	28,800 MWh/a electrical energy 40,000 MWh/a thermal energy
<b>Optimized organic matter</b>	Over 42,000 t of local wood chips
<b>Global energy efficiency</b>	77 %
<b>CO<sub>2</sub> reduction</b>	about 12,000 t/a

## Biogas plant in Třeboň – the first czech biogas plant with split cogeneration

### A context favourable to biogas

The 1 MW<sub>e</sub> biogas plant in Třeboň, South Bohemia, is the first Czech biogas plant with significant supply of heat. The plant is situated about 2 km north from the town's periphery and the input substrates are pig slurry and energy crops, mainly corn and grass silage (15,5 and 4,3 kt/a).

The special design feature is only a small (175 kW<sub>e</sub>) cogeneration unit at the spot to cover the electricity and heat self consumption of biogas production, while the majority of produced raw gas is transported by a dedicated 4,3 km long pipeline to the spa facility in the town, where a new biogas CHP plant (844 kW<sub>e</sub>) was built, which supplies heat to the spa central heating system and an adjacent multi-apartment residential building. Two heat accumulators with total volume of 200 m<sup>3</sup> are installed to equalize the daily fluctuations of heat demand. Thanks to this concept, most of the heat generated can be effectively used (over 5,000 MWh/a) and the overall efficiency of biogas energy utilization is about 60 % compared to typically only 35 % at biogas plants with no heat supply.

The main contractors were MT Energie for the biogas production plant and Stavcent for the CHP plant and the piping. The cogeneration units were supplied by Tedom (the smaller one) and GE Jenbacher.

The financing was covered by a bank loan and a subsidy from EU structural funds (30 %). The project received the award "The Czech Energy and Environmental Project of the Year 2009".



### Contact

#### Partner:

SEVEn

Americká 17

120 00 Praha 2

Tel: +42 (0)221-592-523

E-mail: seven@svn.cz

Web: www.svn.cz

#### Operator:

Bioplyn Třeboň s.r.o.

Dukelská 134

379 01 Třeboň

Tel: +42 (0)384-721-211

E-mail: aqua@trebon.cz

Web: www.trebon.cz



#### Technical specification on the biogas CHP unit

Location	Třeboň, South Bohemia, CZ
Capacity	175+844 kW <sub>e</sub> , 223+840 kW <sub>t</sub>
Fuel	raw biogas
CO <sub>2</sub> reduction	9,950 t/a
In operation	December 2009
Capital costs	125 M CZK (5 M €)

# CHP Goes Green partners

## 9 partners in 7 countries

The consortium of CHP Goes Green consists of 9 partners in 7 countries. Project coordinator is the Berliner Energieagentur.

### ARENE Paris, France



ARENE is the Regional Agency for the Environment and Energy of the Paris Region. It contributes to the integration of sustainable development issues by regional stakeholders from local authorities to companies. Two of the focuses of the agency are rational energy use and renewable energy development. Its means of implementation are based upon:

- Raising awareness on environmental issues, disseminating "best practices" and promoting pilot projects
- Assessing new practices and assisting in experimenting them

Thanks to the skills of its team and its regional experts, ARENE delivers operational and strategic information to local authorities and companies.

ARENE disseminates know-how of best practices from communication to technical expertise, providing technical support such as feasibility studies for innovative projects.

ARENE is a member of RARE (French Network of Regional Energy and Environment Agencies) and of FEDARENE (European Federation of Regional Energy and Environment Agencies). ARENE participates to European projects to exchange on best practices in the field of energy between member States.

More on [www.arenidf.org](http://www.arenidf.org)

### Berliner Energieagentur Berlin, Germany



The Berliner Energieagentur GmbH is a private Energy Service Company. The Agency was founded in 1992 on the initiative of the Berlin House of Representatives to open up energy saving potentials and to promote the use of renewable energies. Equal shareholders are the State of Berlin, Vattenfall Wärme AG, GASAG Berliner Gaswerke Aktiengesellschaft and KfW Bankengruppe.

Innovative projects that save energy costs and reduce carbon dioxide emissions have been developed and implemented for public and nonprofit facilities, real estates and building companies, industry, trade and service companies as well as for hospitals.

The Contracting Department of Berliner Energieagentur is specialised in supply with small and micro combined heat and power units (CHP). As contractor, the agency finances and operates these units. The agency has equipped more than 40 sites in Berlin and its surrounding with highly-efficient energy centres in commercial, residential and public buildings. Twenty of these objects are equipped with small CHP installations that produce ninety percent of the electricity that is required at the site and 100 percent of the heat base load.

More on [www.berliner-e-agentur.de](http://www.berliner-e-agentur.de)

### COGEN Europe Brussels, Belgium



COGEN Europe is the European Association for the Promotion of Cogeneration. Its principal goal is to work towards the wider use of cogeneration in Europe for a sustainable energy future. The association was created in 1993 to reflect the clear need for greater co-operative efforts at a European level to realise the full potential for cogeneration. COGEN Europe is promoting the widespread development of cogeneration in Europe and world-wide. To achieve this goal, COGEN Europe is working at the EU level to promote energy efficiency policies and support schemes. Another task is to remove administrative, financial and technical barriers to a successful exploitation of the potential of cogeneration. COGEN Europe's membership includes more than 70 power companies, national cogeneration associations, suppliers, utilities, consultancies and ESCOs in 25 countries.

More on [www.cogeneurope.eu](http://www.cogeneurope.eu)

### Ekodoma Riga, Latvia



Ekodoma is an engineering consultancy practice with its permanent office in Riga, Latvia. Ekodoma operates in the

Baltic countries since 1991, working towards energy efficiency, renewable energies, environment and economy. It has undertaken a large number of successful local and international projects on energy efficiency, renewable energy and energy policy, including several of the European Commission.

In Latvia Ekodoma is involved as consultant for renewable energy and energy efficiency in the power, district heating, domestic and industrial sectors since 1991. During this period Ekodoma has developed a network of cooperation with several Latvian municipalities, district heating companies and industries. Ekodoma always stimulates energy efficient, renewable energy and energy management activities and investments. Ekodoma has an easy access to the companies in almost all sectors and in particular has been implementing a wide range of project in the district heating sector in relation to the use of biomass.

More on [www.ekodoma.lv](http://www.ekodoma.lv)



### **Energierferat der Stadt Frankfurt am Main Frankfurt am Main, Germany**

The Energierferat has been founded as part of the Cities Environmental department in year 1990. Its aim is to set up and implement the energy and climate protection plan for the City of Frankfurt am Main. The City as founding member of the "Climate Alliance" has set an aim in the year of reducing the CO<sub>2</sub>-emissions by 50% until year 2010.

The work is concentrated in three working fields:

- office buildings and electricity saving
- energy planning and CHP
- residential buildings and renewable energies

Our main work is to act as facilitator, organizing round tables between partners, sometimes we set up feasibility studies as a first step of a project. Thus we are not competitors to other consultants, planners, investors but are organizing projects, which will be carried out by other partners. In that way energy efficiency, climate protection and economic development and creation of working places is combined.

More on [www.energierferat.stadt-frankfurt.de](http://www.energierferat.stadt-frankfurt.de)

### **Grazer Energieagentur Styria-Graz, Austria**



GEA started its operation as a limited company in the year 1998 with support by the SAVE programme of the EU. The agency has currently a staff of 12 highly qualified people, their expertise ranging from technical, economic to legal and marketing backgrounds.

The main shareholders are the City of Graz and the Municipal Utility of Graz (Energie Graz GmbH & Co KG) with a small share of the regional heat and gas utility. In the advisory board the chamber of commerce, the chamber of labour and the Energy Commissioner of Styria are, in addition to the shareholders, also represented.

The essential task of Graz Energy Agency is to promote energy efficiency and renewable energies with a special emphasis on innovative energy services (like Third Party Financing, Performance Contracting, energy management, ecological oriented rehabilitation of buildings etc.). GEA is the main institution for implementing the municipal energy policies of the City of Graz and also carrying out several programs for the Styrian regional government. The agency focuses mainly on larger energy consumers like public buildings, companies, residential areas etc.

More on [www.grazer-ea.at](http://www.grazer-ea.at)

### **Klimaschutzagentur Region Hannover GmbH Hanover, Germany**



The climate protection agency Hanover Region consolidates all regional activities concerning climate protection since 2001 and strengthens its role as an economic driving force in the Hanover Region. The non-profit agency informs businesses and citizens on a wide range of topics. Therefore it develops and realizes, together with its partners, information campaigns on the subjects of energy saving, renewable energies and innovative technologies.

As a public private partnership the agency is supported by its eleven shareholders, the public institution "Hanover Region" and the federal state capital Hanover, two energy companies and other renowned enterprises as well as an association with more than 50 members.

More on [www.klimaschutzagentur.de](http://www.klimaschutzagentur.de)

**Rhônealpennergie-  
Environnement**  
Lyon, France



The Energy and Environment Agency in Rhône-Alpes. Founded in 1978 as a private non-profit organisation, RAEE has about 75 members, including: the Regional Council, District Councils, major cities, urban communities, energy producers and suppliers, social housing agencies, non-profit organisations, professionals of the energy and environment sectors, etc.

Fields of activity:

- The rational use of energy
- Renewable energy sources
- Protection of the environment
- Climate Change
- Sustainable Development
- Implementation of programmes and collective actions
- Advice and support for launching and managing projects

More on [www.raee.org](http://www.raee.org)

**SEVEn**  
Prague, Czech Republic



SEVEn – Energy Efficiency Center, a public benefit company, is an independent, not-for-profit consultancy established in Prague in 1990. It supports both economic development and environmental protection by encouraging efficient and clean energy use.

SEVEn focuses on developing business activities related to renewable energy and energy efficiency and on finding cost-effective ways to save energy. It strives to support economic development while protecting the environment. SEVEn is trying to help overcome barriers preventing full realization of the potential for cost-effective energy savings in households and in industrial and commercial sector. In its consulting-related activities, SEVEn combines its technical knowledge of the possibilities for renewable energy and energy efficiency with economic analyses, comprehensive evaluations including environmental effects, proposals for optimal methods of financing, and the preparation of business plans for actual projects.

More on [www.svn.cz](http://www.svn.cz)

## Notes



## Contact

Berliner Energieagentur GmbH  
Französische Straße 23  
10117 Berlin

Telephone +49 (0)30-293330-0

Fax +49 (0)30-293330-93

Mail [office@berliner-e-agentur.de](mailto:office@berliner-e-agentur.de)

Internet [www.berliner-e-agentur.de](http://www.berliner-e-agentur.de)



# CHP Goes Green



The sole responsibility for the content of this brochure lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EACI nor the European Commission are responsible for any use that may be made of the information contained therein.

[www.chp-goes-green.info](http://www.chp-goes-green.info)