

MicroCHeaP Newsletter – Edition 1

Welcome to the first edition of the MICROCHEAP newsletter. The aim of the newsletter is to keep members of the MICROCHEAP consortium informed of the latest news and matters of interest relating to renewable energy industry, the micro-combined heat and power (micro-CHP) industry, and the renewable micro-CHP industry. The network has a website that can be found online at <http://www.microcheap.org/>

The newsletter is produced by members of the European Commission-funded co-ordination action project MICROCHEAP, and is published quarterly.

The CA will stimulate further development in the field, focus research, minimise duplication of effort, and help to transfer cutting-edge technology from research institutions to industry.

Project Objectives

This co-ordination action intends to bring together industrial specialists and research experts to focus entirely on renewable micro-CHP technology. It will co-ordinate and steer research in this field and highlight the most promising technologies with the highest potential for market penetration in existing and future market conditions.

Principal outputs will be:

- A comprehensive state of the art and market review.
- Mapping of current research activities and centres of excellence, to help steer research.
- Expert group meetings to co-ordinate key areas of current research.
- A report recommending the future direction of European research.
- An analysis of potential links between micro-CHP and other RES.
- A technology transfer/training programme, to spread best practice.
- Targeted dissemination of the project's results to stimulate commercialisation and further RTD Technology from research institutions to industry.

The global aim is to inspire the development of energy systems that can produce all the heat and electrical needs for a single dwelling. This will aid in the development of a sustainable energy infrastructure, reduce harmful environmental emissions, and allow natural resources to be used in a more economical and ecologically sound manner.

ÅF-Process's contribution to the MicroCHeaP newsletter in May of 2005

By Henrik Bjurström.

The contribution of ÅF to the MicroCHeaP project up to and including April 2005 was focused on the database in WP3 and has consisted mainly of a scanning of activities in Sweden in the field of small-scale CHP. We have also made an attempt to study the status of work in Lithuania.

As Magnus Pålsson at Lund University was to do the same work in Sweden, according to the distribution of work in the files from ECN, we decided together with Magnus Pålsson to share the workload. Magnus Pålsson mapped activities in Lund and the surrounding area, while we have covered the rest of Sweden. We have delivered the answers that we have received to ECN and expect to complement this in the near future when we have nagged the reticent small-scale CHP labs or companies into contributing information.

Some reflections may be made based on work so far:

From a market point of view, the field is definitely not yet as mature in Sweden as it is in the UK where domestic gas-CHP based on Stirling engines (e.g. WhisperGen) is a clearly identifiable segment. If the scale in the Swedish labs or companies sometimes fits the criteria (< 5 kW), the reason is that it is a suitable scale for demonstrating the advantages that could be had when scaling up into capacities that are more relevant to the energy systems actually used.

From the point of view of technology there are two "major" poles: Southern Sweden with combustion engines (Lund University of Technology as well as Turbec and splinter groups) and Stockholm with fuel cells. One may call them Centres of Excellence if one wishes to do so. Labs outside these travel less common technological avenues: ORC, steam engines, thermovoltaics etc...

In parallel to these hardware activities, some system studies were performed in order to identify opportunities offered by micro- or mini-CHP. We understand that these are not to be reported in the WP3 database. There are also well publicised demonstration projects managed or arranged by the prospective client for equipment manufacturers: e.g. the initiative for a fuel cell/CHP demonstration project was taken by the City of Stockholm, with manufacturers and power companies also being involved. This is a rather typical one-of-a-kind initiative that cannot be called a durable activity. Another example was the microCHP unit installed by Vattenfall at its lab in Älvkarleby, which was however scuttled before a monitoring programme was started. It is doubtful whether such projects fit within the database, but their visibility makes them an important part of the CHP landscape.

Slovak Agricultural University in Nitra as an operator of one of three biogas plants in the agricultural sector in Slovakia

By Ján Gaduš

The Slovak Agricultural University is a top educational, research and cultural institution, occupying a unique place in the education of experts in agriculture and related scientific areas. During its fifty-plus year existence, study programmes in the areas of economics, technology, landscape creation, environmental studies and other areas have been introduced, thus changing a primary agricultural type of the institution into a university with a wide range of scientific activities. The Slovak Agricultural University as the fourth largest university in the Slovakia, currently provides a temporary home for over 10,000 young people, studying in different disciplines and at different stages. The educational process is carried out by almost 500 pedagogical and scientific staff. Their aim is not only to teach, but also to carry out basic and applied research, as well as provide counselling and expertise services.

The Slovak Agricultural University is divided into 6 faculties (Faculty of Agrobiology and Food Resources, Faculty of Biotechnology and Food Sciences, Faculty of Economics and Management, Faculty of European Studies and Regional Development, Faculty of Horticulture and Landscape Engineering, Faculty of Agricultural Engineering), scientific and pedagogical departments, information technology departments, special departments and the rector's office.

The fact that the proportion of the biomass use in energy production in the agricultural sector in Slovakia is nearly negligible, has led the Slovak Agricultural University in Nitra to start dealing with the issues of renewable energy sources. In 1995 the Department of Mechanics and Engineering of the Faculty of Agricultural Engineering joined the preparation of a new international research project Biogas-Technology for Regenerative Energy Supply in Eastern Europe (Bulgaria, Slovakia, Ukraine), which was submitted and approved within the EU programme INCO-COPERNICUS under the registration number EU Joint Research Project – Inco-Copernicus No. PL 962023 Regenerate. The main co-ordinator of the project was an Austrian partner Forschungszentrum Seidersdorf, GmbH., the rest of the partners were from Bulgaria, Germany, Sweden and Ukraine. The project duration was from 1996 to 2000. The main output of the project was a biogas plant of the Slovak Agricultural University in Nitra newly built in its facilities at the University Agricultural Farm Ltd. in Kolinany.

Until the start of the operation of the Biogas plant in Kolinany there were only two biogas plants operating in agricultural sector in Slovakia: Agros, Ltd Batka and PPD Brezov. The biogas plant in Batka had started its pilot operation in December 1994 and the biogas plant in Brezov started its pilot operation in October 2000. The biogas plants in Kolinany and Brezov are operated on the base of pure 100% cattle manure (Kolinany – 80 live-stock units, Brezov – 180 live-stock units) and the biogas plant in Batka uses a combination of pig manure and hen droppings (designed for processing manure from 13,200 pigs and 220,000 hens). Except these three biogas plants there is no other operating in agricultural sector in Slovakia. The produced biogas of all of them is used for combined power and heat production (CHP).

The University Agricultural Farm is a specialised independent facility of the Slovak Agricultural University and it is located in Kolinany, which is 10km far from Nitra. To the main aims of the farm belong the followings:

- Creating conditions for practical education of the university students and for the verification of results achieved in the university staff research projects,
- Providing demonstration, promotion and consultancy activities for the professional public,
- Carrying out agricultural and food production and other services, connected with educational and research activities.

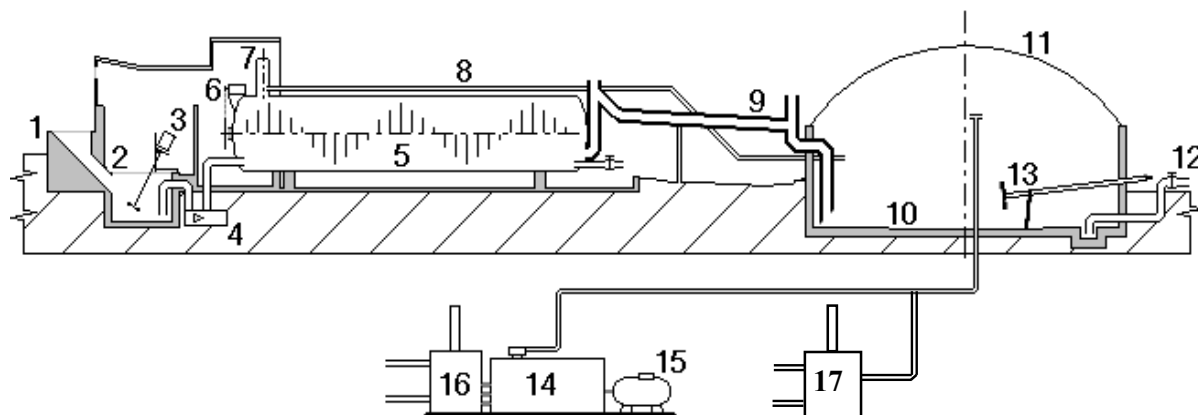
The farm uses 2,305 hectares of farmland. Organizationally it is divided into two centres from which one is in Koliny and the other one in Oponice. The centre in Koliny cultivates approximately 60% of the farmland.

Plant production is oriented mainly on cereals (50%), bulk feed (37%) and sugar-beet (9 %). A focus of the animal production is in stock raising for milk production (640 pcs) and meat production (150 pcs).

The Biogas plant in Koliny, which was built within the above-mentioned Regenerate project, is a large-scale one but it does not serve for industrial purposes. It has been intended as a demonstration facility to fulfil research and educational purposes.

The Biogas plant in Koliny was designed to process manure from 80 live-stock units and to a consequent cogenerative production of heat (45 kWt) and electric power (22 kW_e) from the produced biogas. The main parts of the biogas equipment are presented in Picture 1.

A main part of the whole equipment is a bioreactor (5), what is a fermentor of a horizontal flow type with 100 m³ volume. The designed daily production of the biogas is approximately 150 m³. The biogas production process is carried out in the fermentor without any access of air. The operating temperature is a mesophilic one of a range from 32 to 38 °C. The duration of the biomass in the fermentor is 20 days. The biogas produced is collected in a biogas tank holder (7) from which it is led through a pipeline to a low-pressure dry gasholder (11). The gasholder is created by a special rubber sheet gas-proofly attached to an out-let substrate tank (10). Residual biogas released from the substrate, which has already left the fermentor, is captured here, too. The biogas is consequently used for burning in a cogeneration unit (engine (14), generator (15)), see the picture 3, and in an adapted gas boiler (17). Scrap heat is transferred to an exchanger (16) for its further utilisation.



Picture 1: Schema of the main parts of the Biogas plant Koliny

In the years 2000 – 2004 the Slovak Agricultural University in Nitra participated in the international project of the EU 5th Framework Programme *EFFECTIVE - Holistic Integration of MCFC technology towards a most effective systems compound using biogas as a renewable source of energy* (N°. NNE5-1999-00224). Except other it carried out long-term endurance experiments of the biogas powered MCFC fuel cells. The biogas was used to test Molten Carbonate Fuel Cells (MCFC) that has been currently one of the most progressive ways to exploit this renewable energy source. In a matter of fact, a fuel cell is an electrochemical source of energy.

Forthcoming Events

MICROCHEAP Annual Meeting
28th - 29th September, Copenhagen

Nordic Bioenergy Conference
25th – 27th October 2005. Trondheim, Norway
<http://www.bioenergy2005.no/>

Sustainable Energy, Energy Efficiency and Environmental Solutions Expos 2005
18th – 20th October 2005, Olympia, London
<http://www.energy-expo.info>

1st European Fuel Cell Tech & Applications Conference
14th – 16th December 2005, Rome, Italy
<http://www.renewableenergyaccess.com/rea/events/view?id=24979>

The Sustainable Energy Meeting Place
15th - 16th November 2005. Rome, Italy
<http://www.greenpowerconferences.com/events/GreenPowerMed.htm>

International Hydrogen Energy Congress & Exhibition
13th – 15th July 2005, Istanbul, Turkey
<http://www.ihec2005.org/>



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