



## Public Report Package

### Cross European cooperation to support cogeneration and district heating - Outcome of the OPET CHP/DH project

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The OPET CHP/DH project was carried out as a part of the OPET network (Organisations for the Promotion of Energy Technologies). The general objectives of the network are knowledge transfer, dissemination and promotion of research results and supporting market uptake of innovative and efficient energy technologies. The objectives of the project were to promote technical improvements as well as market development tools and thereby to support the further use of efficient CHP/DH technologies in favour of EU policies. The project had obtained financial support from the European Commission.

#### Introduction and objectives

Energy efficiency, environmental protection and fuel flexibility are central EU objectives. Extended use of CHP (cogeneration of heat and power) and DHC (district heating and cooling) are important means to fulfil these objectives. The activities were organised in work packages that addressed specific objectives:

- Improving District Heating and CHP sectors in Central and Eastern Europe
- Supporting market uptake of small and micro scale CHP
- Supporting biomass CHP and District Heating
- Informative measures of the EU CHP directive and general knowledge transfer
- Improving Energy Efficiency in Industry
- Promoting EU Clean, Efficient and Renewable energy Technologies in China
- Supporting market penetration of EU Energy-Efficient Technologies in China

The project consortium included 38 partners from EU, CEEC and China and was managed by Danish Technological Institute. During the project period a large range of activities have been carried through at national and international level as well as specific local actions in the partner countries. All results and outcomes of the project are presented on the web site [www.opet-chp.net](http://www.opet-chp.net).

#### Work package 1: Improving CHP/DH sectors in CEEC

District Heating has a long tradition in the Central and European Countries (CEEC) and a large share in the heat market. More than 40 million people in the CEE countries covered by these studies are DH users and its share in the residential heat market is approximately 37%. The DH production decreased significantly in almost all CEE countries in the last decade due to the reduction of heat consumption both in industrial and residential sectors.

The activities in work package 1 of the project were focused on supporting a development towards improvement of the economic and environmental performance of the district heating and cogeneration sectors in the Central/Eastern European Countries. The main objectives were to develop and promote appropriate tools and measures to overcome barriers for improvements in the sector, and thereby to provide key market actors with an increased understanding of the problems related with upgrading and modernisation of the existing systems and of the possible solutions to these problems. The work was divided into activities targeting the policy framework conditions as well as the current sector situation. Furthermore a series of pilot projects were initiated and case studies were investigated to show the application of the tools and measures in practice.

Each of the CEEC partners (covering Bulgaria, Czech Republic, Estonia, Latvia, Lithuania, Poland, Romania and Slovakia) made national surveys covering the current situation for CHP/DH on a policy, sector and company level. The surveys provide a comprehensive overview of the existing framework and conditions as well as exposure of the important barriers for development and improvements. Important needs to the further development of the DH sector were identified and investigated:

- Legislative and regulatory measures
- Energy planning at local level and implementation of national heat laws
- Financing possibilities for investments in renovation projects
- Tools to handle Emission trading, National allocation plans
- Increase in the use of RES and waste heat
- Competition among heat suppliers
- DH renovation
- Updating DH installations to CHP
- Implementation of small scale CHP using gas or biomass
- Heat metering
- Tools to handle disconnection problems, conditions for connection and disconnection
- Promotion and marketing tools
- Human resource development, capacity building, training and education
- Benchmarking among district heating companies
- Customer relations



*CHP plant in Herring, Denmark (source: Elsam)*

### **Work package 2: Small and micro scale CHP**

Small and micro scale CHP technology helps to reduce transmission losses and costs for the grid, enables a quick response to clients' demands and allows an easy use of renewable fuels, but it has not yet captured the European market. One of the objectives was, therefore, to analyse technical and non-technical barriers to market development. To fulfil this, the partners of WP2 compiled reports on available technologies as well as on the legal and economic conditions for small and micro scale CHP in their home countries. The partners have complemented the analysis of the frame conditions with descriptions of domestic best practice examples.

Generally, CHP has a long tradition in most of the countries represented in this work-package. Nevertheless, in particular in the CEE countries M/SCHP units are rather few, although the technology is available almost everywhere and governmental promotion policy facilitates the investment in most of these countries. In other countries, such as Germany and Austria, micro and small scale CHP is far more common. On these developed markets, innovative technologies such as micro-turbines and fuel cells are already used in few projects. The European project of a virtual power plant - a series of centrally controlled residential fuel cell

micro-CHPs installed in multi-family- houses, small enterprises, public facilities etc. - shows innovative ways of using modern M/SCHP technology.

With the organisation of workshops and conferences including on innovative technologies, the work package consortium has pushed the development of the market for small and micro scale CHP in Europe. Several events such as a national conference in Warsaw on the EU-CHP-Directive in March 2004, some sector specific workshops (e.g. micro turbines in Belgium food industry in June 2003) and some regional CHP conferences e.g. the Austrian event "Micro and Mini CHP in a liberalized market" in last October in Vienna, have been carried out to fulfil the objectives.

### **Work Package 3: Biomass in CHP and District Heating**

The biomass CHP and DHC task focused on the technologies connected with the use of biomass resources for combined heat and power or district heating purposes and the whole supply chain. The technology issues covered in the project included a.o.:

- Fuel supply and quality of fuel
- Planning, commissioning and operation of biomass installations
- Exploring potential for demonstrations and retrofits etc.

The work concentrated on exchanging experiences on the latest innovative technologies in biomass district heating and CHP including the whole production-utilisation chain. Leading biomass countries, Finland, Sweden, Denmark and Austria have long experience in use of biomass DH and CHP. New EU Member States use DH and CHP but mainly by fossil fuels. Some partners have only little experience of biomass DH and CHP. The key aim was to bring the needed expertise together to exchange information and experience and to exploit possibilities for further market penetration.



*Biomass foresting in Finland.*

The whole biomass utilisation chain was demonstrated in Finland, Austria and Sweden by organising study tours. Finland concentrated in large scale and woody biomass, whereas Sweden and Austria in small scale and biogas. Tours included visits to biomass production sites and plants. Study tours have been supported also by training actions and descriptions of the best practise case projects. Some OPET partners e.g. ECBREC, Poland and NIFES, Scotland have sent their potential biomass users to several events abroad as well as organised events in their own countries. International and national seminars have been organised in Austria, Finland, Lithuania, Poland, Scotland, Slovakia, Sweden and the Netherlands reaching almost 2,000

participants interested in biomass DH and CHP. Preliminary studies and surveys of implementing biomass potential in DH and CHP in different participating countries have been reported.

For future implementation of the biomass potential WP3 have investigated barriers, national legislations and incentives in several countries. Results have been published in national reports and a cross-national summary report, which also includes a SWOT-analysis of the whole sector. Leading researchers have presented the latest research results of biomass use in DH and CHP in the events. Also results of the new innovative biomass DH and CHP technologies have been presented by first investors of certain technologies e.g. biomass bundling, biogas micro turbines, co-firing of biomass in large-scale CHP plants.

Also advice and support in evaluation potential, locations and technologies for biomass district heating or CHP was carried out in Lithuania (37 municipalities and companies), Scotland (5 pre-feasibility studies carried out) and Finland (technology presentations in international events). The articles and technical papers published in journals and websites are also part of the sustained effort to raise awareness of bio energy as a business and environmental opportunity.

#### **Work package 4: Knowledge transfer and support for implementation of EU legislation**

The general objective of work package 4 was to support the European CHP/DHC sector by providing the market with relevant information regarding the development on the political as well as technological level. The main focus was on supporting market actors dealing with the implementation of the new EU directive on promotion of cogeneration (2004/8/EC, in short "CHP directive") and the possible consequences of this directive.

A wide scale of dissemination activities was carried out on both international and national level. This has provided a broad awareness among CHP industry, national authorities, national associations, international organisations and associations representatives etc. of the CHP directive and its implications. The content and requirements of the Directive itself was not the only objects for dissemination, focus was also on the practical tools and methods to use for fulfilling these requirements. By providing information about the obligations of the directive together with examples of methods to fulfil these requirements as well as actions taken in other countries, the activities carried out by the partners have been a considerable factor for the initialisation of the implementation process in several countries.

A cross-national report on the status of the implementation of the CHP directive in different European Countries was elaborated. Such publications or information are not generally available in many countries. National actors have shown to be a promising target group for this kind of cross-national information. The cross-national report provide a good basis for assessing the different national CHP support scheme/mechanisms, national certification methodologies etc. making comparisons easier. This can in longer terms also be a basis for a closer co-operation between Member States in the implementation process and be a first step towards a larger degree of harmonisation of schemes and methods.

A large range of other dissemination activities was carried out in general support of the CHP sector. These activities have promoted the advantages of CHP as well as different CHP technologies and informed about legislative and organisational framework conditions etc. Promotion of the economic and environmental advantages of CHP towards potential investors is particularly important to support the development of the CHP market situation.

The activities in this task included the following:

- Investigation of existing national CHP potential studies with focus on methods
- Information about methods of CHP calculation and certification
- Investigation of methods for monitoring CHP development
- Articles in national and international magazines
- Regular electronic newsletters throughout the project period
- A CHP/DH information website: [www.opet-chp.net](http://www.opet-chp.net)
- Contribution to national and international CHP/DH events

#### **Work package 5: Energy efficiency in industry**

The main objective of this work package was to support and promote energy efficiency activities, new and innovative technologies and practices. Main market actors in this field was addressed by means of different approaches, ranging from soft measures as seminars, information dissemination, awareness building and training to direct approach and consulting in assessing potential investments, directly defining technology improvements and enforcing efficiency standards.

The task covered the following activities:

- Training of industry sector market actors in energy management
- Promotion of energy efficient motors
- Promotion of energy efficient boilers
- Promotion of energy efficient lighting
- Energy efficiency benchmarking in selected industrial sectors

A complete set of training material in energy management for industrial managers were provided as an important part of the activities. This training material is available in different languages and was used in a series of successful training courses in partner countries.

The promotion of energy efficient boilers are of special relevance to the market at this moment, as a new EU Directive on Emission Trading will enter into action on January 1, 2005. Promotion of Energy efficient lightning in industry was successfully carried out in cooperation with the EU Greenlight programme. In several countries, direct support to selected textile industries were carried out. Energy benchmarking was introduced as a tool to improve energy efficiency to the bakery industry in the partner countries. This caused modernisation and improvements in several bakery industries in the partner countries.

### **Work package 6 and 7: Promotion of China-EU cooperation in the field of CHP**

The overall general objective of the EU-China cooperation was:

- To disseminate EU CHP Technology in China, increase the knowledge of EU energy policies and systems among Chinese market actors and decision makers
- To present European efficient energy technologies, experience, policies and related incentives, in addition to promotion and dissemination tools among which the OPET Network itself to a qualified audience



*CHP plant in Hangzhou, China*

These aims were selected in a scenario where Chinese economy is growing at a rate of more than 7% of GDP per year and the energy demand is increasing at an even higher rate: both in the tertiary sector for space heating cooling, and in the industrial cement and steel sectors strongly driven by building construction. Several Chinese authorities have expressed calls for making energy efficiency the number one priority in China's energy strategy.

The work was mainly based on two specific means: a technical magazine "Energy Engineering" for disseminating news and articles, and an International Workshop on CHP and Tri-generation. The effectiveness of the two actions was reinforced by the growing interest in China about CHP and Tri-generation as tools for a rational use of the new domestic energy resource: the western natural gas. Distributed generation is in addition considered to be a mean to counterbalance the electricity shortage. Both the magazine and the workshop have imported news, opinions and technical advice from Europe. Furthermore a series of brochures of European best cases of energy efficiency were published. The information coming from the EU partners was translated into Chinese and published on the OPET China Web Site.

The work also included a report analysing Chinese market potentials for CHP and tri-generation. The report identifies further collaboration possibilities between Europe and China in technology transfer, product import and financing projects. It includes background information on current situation, potentials and prospective as well as major barriers of CHP development in China.

Others achievements related to OPET projects in China:

- Increased awareness of Chinese energy actors on OPET and EU energy policies, technologies and best cases etc.
- Established and strengthened networking among OPET China partners, EU partners as well as Chinese energy organisations and governmental departments related to energy as well as industrial enterprises etc., which are significant for completion of existing projects and development of future collaboration
- Increased capabilities of China partners to act as "bridge" or "window" for Chinese energy actors to EU, through exchange and collaboration with EU partners, in terms of study, events for dissemination etc.
- Extended channels for getting and updating EU information and cooperation potentials dedicated to OPET network.

China is now on the way to market economy. Experiences and lessons (such as policies, legislations, technologies, incentive instruments for market penetration etc.) are needed on the way to sustainable development.

#### **Further information**

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