

# **DISTRICT HEATING AND COOLING INCLUDING THE INTEGRATION OF CHP**

## **An IEA Implementing Agreement Strategy Document, August 2009**

### **Introduction**

The Implementing Agreement (IA) on District Heating and Cooling including the Integration of Combined Heat and Power (DHC/CHP) is one of seven buildings-related IAs operating under the auspices of the IEA. This strategy document aims to reflect this context, and to set out the specific issues for the effectiveness of this IA.

In general, the DHC/CHP IA seeks to determine the needs of its intended target audiences, identify the best ways to meet these through programmes of appropriate projects, and then manage and disseminate these as effectively as possible. This involves liaising closely with the industry, participating in appropriate IEA Secretariat initiatives and maintaining effective communication channels with other relevant IAs.

### **Background**

In the OECD countries, energy policy is currently being strongly driven by the protocol on greenhouse gas emission targets as agreed in the Kyoto summit of 1997. At the 2005 Gleneagles G8 an important role was given to the IEA in advising on alternative energy scenarios and strategies aimed at a clean, clever and competitive energy future. Two years later, at the Heiligendamm G8 it was agreed that “instruments and measures will be adopted to significantly increase the share of combined heat and power (CHP) in the generation of electricity”. District Heating and Cooling is an integral part of the successful growth of CHP: heat networks distribute what would otherwise be waste heat to serve local communities.

The IEA Secretariat has also underlined the importance of district heating by undertaking the CHP/DHC Collaborative whereby a series of ‘Country scorecards’ has been produced.

The mandate of the International Energy Agency incorporates the ‘Three Es’ of balanced policy making. These are:

- Energy security
- Economic development
- Environmental protection.

District heating and cooling is a key technology for helping to deliver these aspirations. Specifically, it is a mature technology that already delivers low carbon heating and cooling for many towns and cities. It allows heat that would otherwise be wasted to be recycled; it also provides a network for the effective use of low and zero carbon renewable sources of energy.

The use of locally available waste heat and the use of renewable heat energy contributes to energy security. This is due not only to inherent energy efficiency, but also through the fuel

flexibility of heat networks. The network provides the infrastructure for distributing any new source of heat to all connected buildings.

The recycling of waste heat is economically efficient, because it makes a resource from heat that would otherwise be discarded. District heating infrastructure is expensive to establish, so that an important task for the DHC/CHP IA is to sponsor research that reduces cost. Once established, the business case for district heating is compelling: the ongoing expansion of nearly all modern systems demonstrates this.

## **The DHC/CHP Implementing Agreement**

The Implementing Agreement on DHC/CHP, established in 1983, has pursued its priorities through activities organised in successive Annexes. These are financed by common funds from the participating countries, taking the form of an annual subscription determined according to the country's GDP and extent of district heating.

These Annexes last for three years, and are sequential: the current Annex IX runs from 2008 until 2011. The Executive Committee (ExCo), consisting of members from all the participating countries, has the full responsibility for the content and the quality of the work carried out, and shall act unanimously.

The activities carried out within each Annex comprise a cycle of end-user consultation, call for proposals, selection and management of projects, and subsequent dissemination. To achieve the best value for these projects, effective channels of communication are essential. The IA is committed to establishing links with other IAs and other organisations striving to promote effective DHC/CHP. The IA also seeks to use its voice at policy levels so that the opportunities offered by DHC/CHP are communicated.

### **Mission Statement of the DHC/CHP Implementing Agreement**

The mission of the DHC/CHP Implementing Agreement, is defined:

*To conduct highly effective Research and Development as well as policy analysis of District Heating and Cooling Systems (including the integration of CHP) with low environmental impact through international collaboration.*

### **Objectives**

Having adopted the mission statement as above, the ExCo has established the following objectives:

- 1) Selecting, managing and publishing collaborative co-funded projects and exchanging information on R&D projects between countries.*
- 2) Ensuring that the results from 1) are made available to the DHC utilities, the industry, policy makers and other potential users considered appropriate, and that communication channels are established between this IA and other related IAs, and relevant external organisations.*
- 3) Ensuring that the endusers of our R&D and information exchange activities can influence the choice of projects run by the IA and that there are feedback processes from the endusers of our work to the EXCO as well as to the financiers of the Implementing Agreement.*

## Implementation of DHC/CHP Programme

The core activity for the DHC/CHP IA is its ongoing research programme, which proceeds in the form of sequential cost-sharing annexes.

The DHC/CHP IA also undertakes other activities to improve the communication both with other organisations concerned with district heating, and with other technology research groups. Operating under the auspices of the IEA, DHC/CHP is fully committed to relevant initiatives from the Secretariat, and links with other implementing agreements.

The Executive Committee of the DHC/CHP IA meets every 6 months, so there are 6 meetings in each 3-year annex. Collectively, the principal activities for each meeting therefore comprise distinct elements of the project selection, management and dissemination cycle. Table 1 shows a generic schedule for the current annex and the planning for next:

**Table 1 Annex Schedule by ExCo Meeting**

Meeting	Annex N Activities	Annex N+1 Activities
I (eg May 08)	Final proposal decisions	
	Contracts drawn up	
II	Projects under way	
III	Projects under way	
IV	Projects under way	Discussion of fields of interest;
		In-country consultation re topics; country decisions on participation
V	Projects under way	Decision on fields of interest
		Call for proposals; proposals received; initial assessment
VI	Projects under way Report submission End-of-annex seminar	Voting to decide on winning proposals Proposal amendments

In order to select projects, the ExCo has the following priority subject areas:

*I) Priority research and technical development (R&D) topics that address the needs of the member countries.*

*II) Promotional materials and strategy papers that will advance the understanding and acceptance of CHP/DHC in member countries and within the IEA/OECD, particularly including ways which demonstrate the flexibility of DHC, its carbon saving potential, and its longevity.*

*III) Technology transfer materials that will improve the effectiveness with which DHC is introduced, analysed, planned, designed, operated and analysed.*

*IV) Materials developed by others that meet the ExCo's objectives, that can be translated or otherwise adapted and published under the auspices of this IA.*

## Communication

### Building Co-ordination Group

To ensure connection with other ongoing R&D activities, the DHC/CHP programme will continue to participate in the Buildings Co-ordination Group. This ensures effective exchange of information with other Implementing Agreements. It also more easily enables joint initiatives to be developed, such as targeted joint workshops.

### **Links with Other IAs**

The DHC/CHP has developed ongoing links particularly with the ECBCS Annex 49, focusing on Low Exergy systems, where community systems are a major element. Similarly Annex 50 will be dealing with Community Systems. The ECES group also remains of strategic importance to district heating. Colleagues from these IAs and specific Annexes have agreed to collaborate at the forthcoming District Heating Futures seminar/workshop.

In the past the DHC/CHP IA has remarked that this technology has tended to be overlooked. This situation seems to be improving. Not only does DHC offer one of the best practical ways for reducing carbon emissions it also naturally involves other technologies because heat distribution networks offer complete fuel flexibility. The DHC/CHP IA will continue to make a full contribution to integrating activities.

### **IEA Secretariat**

The DHC/CHP IA participated fully in the recent IEA Secretariat initiative CHP/DHC Collaborative.

Through the NEET initiative, DHC/CHP IA has sent materials, offered to attend events arranged in host countries, and offered invitation to attend ExCo meetings. No country has so far taken this opportunity.

The DHC/CHP IA has maintained links with the non-member section of the Secretariat. This followed links made when the Secretariat carried out its 'District Heating in Transition Economies'.

### **Seeking new members**

The DHC/CHP IA carries out activities aimed at securing the interest and subsequent membership of other countries. These include workshops, seminars, invitation to join ExCo meetings. There has been considerable success in terms of attracting the interest of such countries, but no further success in securing membership. This is despite an offer to allow half-price membership.

The main issues appear to be the length of time needed to identify the appropriate government department, the inertia that then ensues, and the subscription sum. Aside from the key mechanics of this programme (identification of most important topics; engagement with programme stakeholders; quality of research) this is highest priority. Consequently the DHC/CHP IA will continue to find ways to interest others, disseminating the work and the benefits of membership.

Since 80% of DH is in CEE/CIS countries, the IA seeks to promote its work vigorously in this region. Although cost remains the principal issue, this IA is flexible and will continue to try to attract new members. In particular, this IA has made an offer to those countries with high DH but low GDP for half price membership for the duration of one annex.

Generally, this IA has attracted countries with relatively large heating loads, but there may also be opportunities for extending membership to countries with larger cooling loads. Use of district cooling (DC) is growing dramatically throughout the world but especially in warm climates, such as the Middle East, where DC can have a significant impact on increasing energy efficiency and mitigating requirements for investments in infrastructure for electricity generation, transmission and distribution.

### **Trade Associations**

Contact with international umbrella organisations such as Euroheat & Power and IDEA will be maintained, including invitations to representatives of these programmes and organisations to attend ExCo meetings as observers.

Cooperation with the IDEA has led to the summer 2009 meeting being integrated with IDEA's 100<sup>th</sup> Congress. This also coincides in the US with the new impetus for low carbon technologies including district heating.

Euroheat & Power has also its own Research, Technology and Development group with whom links are maintained. Furthermore, a Technology Platform DHC+ has been established. Euroheat & Power carries out Secretariat duties for the Platform which has membership drawn principally from the industry and academia. The DHC IA has agreed to operate as a Mirror Group to review activities, with the Chairman having a place on the Steering panel. This cooperation has already led to the first major TP project dovetailing a DHC/CHP IA project.

This collaboration is also being used for the current Annex (IX) End-of-Annex seminar which will be set up as part of Euroheat's bi-annual Congress in summer 2011.

### **Policy makers**

The DHC/CHP IA has contended that District Heating and Cooling networks are not yet fully recognised as being one of the most significant ways to:

- Maximise the efficiency of the electricity generation process by providing a means to use the waste heat, saving energy whilst also displacing the need for further heat generating plant;
- Share heat loads, thereby using plant more effectively and efficiently;
- Achieve fuel flexibility and provide opportunities for introduction of renewable sources of energy as well as CHP and industrial waste heat.

For this reason, the DHC/CHP IA turned its attention to the policy debate. As well as providing a policy paper, there has been participation with IEA Secretariat initiatives, most recently the CHP/DHC Collaborative. Through its Annex IX project 'Opportunities and Barriers...' this IA continues to provide direct information for decision-makers. This project will provide analysis for non-EU countries. Together with links with the Technology Platform project that focuses on EU countries, a comprehensive global assessment will be achieved.

### **Website**

The DHC/CHP IA website contains details of the programme, including current projects, case studies and forthcoming activities such as workshops. A policy paper is available for download and a programme brochure is also available (currently being updated).

There is a dilemma of whether to make all information available to participant and non-participant countries alike. The risk is that non-participants may remain happy to accept free information at the cost to participant countries. The case for making it available is that by demonstrating the value of the work, potential participants may also see more clearly the value of joining. However, only by joining can the full benefits of knowledge sharing and representation of particular in-country circumstances be fully served.

The DHC/CHP will continue to use password protection to protect its latest work, but when projects become one year old they will be fully available via the website.