EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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2013-09-11

CEN Workshop Business Plan

'Eco-efficient Substations'
(CEN/WS 73)

(Approved in the kick-off meeting on 2013-09-11)

1. Status of the Business Plan

Business Plan as approved at the Kick-off meeting of the Workshop.

2. Abbreviations

WS CEN Workshop

CWA CEN Workshop Agreement

DH District Heating

EHP Euroheat & Power Association

3. Background to the Workshop

Heating is the largest single energy end-use in Europe. It is responsible for approximately 50% of total final energy consumption[1]. DH systems provide heating for a wide range of customers, from residential building to agricultural sectors, including commercial, public and industrial customers.

There are more than 7 000 DH systems in Europe, currently supplying more than 10% of total European heat demands with an annual turnover of €25-30 billion and 2 EJ (556 TWh) heat sales. Market penetration of district heating is unevenly distributed, being close to zero in some countries while reaching as high as 70% of the heat market in others.

The benefits of district heating and district cooling are most apparent in areas with high density energy demands. In the European Union some 73% of the population live in cities, expected to

[1] *European Commission, The Renewable Energy Progress Report*

rise to an estimated 80% by 2030. At present 69% of total primary energy demands are concentrated in urban areas[2].

Nowadays, the substations for residential buildings and offices are in most cases handicraft works. Through agreeing on harmonising a number of features in district heating substations, the district heating industry will be able to produce in series district heating substations with a significantly reduced handicraft parts. By achieving a harmonisation of district heating substations, the industry will be able to manufacture safer, more environmentally friendly cost-competitive equipment.

At European level, energy-efficient technologies are supported through communications from the Commission:

- **COM(2008) 772** – Energy efficiency, with which Member States have made a commitment to reduce consumption of primary energy by 20% by 2020.
- **COM(2006) 545** – Action Plan for Energy Efficiency, it aims at achieving a 20% reduction in energy consumption by 2020. The Action Plan includes measures to improve the energy performance of products, buildings and services, to improve the yield of energy production and distribution, to reduce the impact of transport on energy consumption, to facilitate financing and investments in the sector, to encourage and consolidate rational energy consumption behaviour and to step up international action on energy efficiency.

Besides these communications, the Commission took concrete effective measures by issuing several Directives and Regulations, like:

- **Directive 2010/31/EU on the energy performance of buildings (being recast through the Energy Efficiency Directive).** The buildings sector represents 40% of the EU total energy consumption. Reducing energy consumption in this area is therefore a priority under the '20-20-20' objectives on energy efficiency. This Directive contributes to achieving this aim by proposing guiding principles for Member States regarding the energy performance of buildings.
- **Directive 2010/30/EU on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products.** This Directive establishes a framework for labelling and consumer information regarding energy consumption for energy-related products.
- **Directive 2009/125/EC establishing a framework for the setting of ecodesign requirements for energy-using products.** This Directive aims at protecting the environment by reducing the environmental impact of energy-using products.
- **Machinery Directive (2006/42/EC)**
- **Energy Efficiency Directive (2012/27/EU)**
- **Measuring Instruments Directive (2004/22/EC)**

[2] *European Construction Technology Platform*

- **Pressure Equipment Directive (97/23/EC)**
- **Directive 92/42/EEC on efficiency requirements for new hot-water boilers fired with liquid or gaseous fuels.** Liquid or gaseous fuel fired hot-water boilers with a rated output of between 4 kW and 400 kW must meet efficiency requirements that are harmonised across the European Union (EU) (standard boilers, low-temperature boilers and gas condensing boilers).
- **Regulation EC 66/2010 on the EU Ecolabel.** EU Ecolabel is a voluntary environmental labelling system. It enables consumers to recognise high quality eco-friendly products. The EU Ecolabel may be awarded to products and services which have a lower environmental impact than other products in the same group.

The establishment of this CWA is also in relation to the **Regulation (EU) No 1025/2012 on European standardisation**. This Regulation aims to eliminate or reduce the barriers to the free movement of goods which can arise from the adoption of different national technical regulations, by encouraging transparency of national initiatives vis-à-vis the European Commission, European standardization bodies and other Member States.

Several European Standards exist in the DH sector. These standards cover areas as 'Heat exchangers', 'Heating systems in buildings' and 'Heat meters'. A detailed list of these standards is provided in Annex A.

Moreover, the Workshop may resolve to establish other links, as required, for the completion of the work. Also, there are different national legislations setting up rules and recommendations the Workshop's participants have to consider, e.g. German DVGW W551.

The main target group of this Workshop is, in first place, the European substations manufacturers and the DH substations industry in general. Nowadays, in Europe, two manufacturers are dominating the market: Danfoss and Alfa Laval. Both are present all over Europe and worldwide. But there are also a number of local manufacturers. A rough estimation of the potential is given below for some European countries:

Estimation of producers for substations for multi-family houses:

- Poland: around 8 000 pieces/year (Danfoss Poland: 4 000 pcs/year; Elektrotermex Ostroleka: 1 000 pcs/year; Metrolog Czarnków: 1 000 pcs/year; others: 2 000 pcs/year);

- Finland: around 3 500 pcs/year for substations capacity above 50 kW. 7 DH substation manufacturers are present in Finland;

- Sweden: around 5 000 pcs/year for substations capacity above 50 kW. 5 DH substation manufacturers are present in Sweden.

Moreover, with the objective of doubling the share of District Heating on the European heat market by 2020 (reaching approximately an 18 to 20% share), the manufacturing of DH substations should drastically increase.

It is expected the harmonisation of substations will allow district heating business being more competitive compared to other heating sources and systems industry, namely by better responding to the increase of a low energy demand.

A good business for all

It is estimated that the harmonisation of the substations will allow the manufacturers to **decrease their costs by at least 15%** (in the northern European countries; much more is foreseen in other EU countries). If we consider that the total sales of customer substations and corresponding equipment can be estimated to about M€ 250-350 per year at EU level, **annual savings of more than M€ 35** can be easily achieved. This represents more than 130 km of new DH systems annually, i.e. half of the annual DH growth in France.
With the objective of doubling the share of DH by 2020, enormous saving potential can be obtained.

4. Workshop proposers and Workshop participants

DHC+ Technology Platform (www.dhcplus.eu) is an initiative dealing with research and innovation for district heating, district cooling and kindred technologies. Its membership organization is formed by a wide range of European stakeholders in district heating and cooling, like utilities, components manufacturers, national associations, European associations, universities, research establishments, consultancies and so forth.

The DHC+ platform is formed with Working Groups / Task forces which form the backbone of the platforms' activities. Within these groups work items of various topics and project proposals are addressed. Task force participants are representatives of member organizations and other interested stakeholders.

This Workshop has been proposed by the members of the working group 'Eco-efficient substations' within the DHC+ platform. The Workshop proposers are:

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Helsingin Energia
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OPEC - Okręgowe Przedsiębiorstwo Energetyki Cieplnej Spółka z o.o.
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81-213 Gdynia, Poland
Contact person: Janusz Różalski

Regarding the Workshop's participants, they cannot be specifically defined at this stage but a non-exhaustive list of targeted groups potentially interested in participating to the Workshop is given below:

- District heating substation manufacturers;
- Universities dealing with district heating research;
- National DH associations;
- District heating companies.

It is in the interest of the proposers to ensure a good representation of the DH market in order to obtain a wider consensus as possible. Any interested stakeholder is welcome to register for membership in accordance with the CEN Rules for CEN Workshops.

Also, this CEN Workshop is supported by the EHP association and the DHC+ platform, both representing more than 60 members covering the entire DH spectre (Universities, DH companies, Research centres, National DH associations, District heating substation manufacturers, etc.) in more than 30 countries.

5. Workshop scope and objectives

The objective of this Workshop is to agree on a set of recommendations focusing on technical specifications, environmental aspects and testing procedures of DH substations within district heating systems.

The deliverable should be a CEN Workshop Agreement on internationally accepted rules on manufacturing district heating substations, in accordance with the state of the art and based on the actual operation and future prospects. These rules shall be applicable to all substation technologies and be brand neutral. As example, both direct and indirect connections should be taken into account. In the same idea, several solutions exist for domestic hot water preparation, like instantaneous preparation through heat exchanger or through cylinder. All these solutions should be considered in the CWA. If the project results are addressing components provisions

then the workshop should refer to existing standards and submit the development to the TC in question.

The deliverable CWA should give priority to the three so called work items; technical functional objectives, environmental aspects and testing procedures. The testing procedures will cover technical functions and environmental values. These results are covering the district heating substations all aspects but has nothing to do with how the local district heating production is carried out in a specific town.

Low energy buildings or older refurbished buildings will have substantially reduced needs compared to today demand which means that the proposed CWA shall respond to actual and future low temperature systems requirements.

The CWA intends to give the most effective overall solutions for various parts of the customer installation. EHP already developed 'Guidelines for district heating substations' (freely available through the EHP website at www.euroheat.org/ Technical-guidelines-28.aspx). These guidelines will serve as starting point for the CWA document.

An indicative content of the CWA is given in Annex B.

Yet, some topics will not be covered by the Workshop, as:

- It will not cover steam systems;
- It will not cover district cooling substations;
- It will not cover systems with pressure levels above 2.5 MPa;
- The testing will not cover equipment with a heating and hot water capacity above 500 kW[3];
- It is not meant to specify the different components of the substation such as meters or heat exchangers, but their functionality will be specified. However, some recommendations on their installation within the substation should be provided (see CWA indicative index), as integrated parts of it;
- It will not deal with investment or cost aspects;
- It will not make any statement on policy.

EHP wishes to negotiate the possibility to make the CWA freely accessible on a website.

6. Workshop programme

The CWA will be drafted and published in English.

The results of the CWA will be one deliverable, organised in different chapters (see indicative index in Annex B). Each chapter, which corresponds to a work item, will be developed by a

[3] However, bigger substations could be covered from technical and environmental perspective.

group of experts from interested Workshop's participants. Members of these task forces will be agreed upon during the Workshop's kick-off meeting.

Work items	Deliverable	Duration (in months)
Technical	Chapter on technical specifications for Harmonised DH substations	19
Environment	Chapter on the environmental performance of harmonised DH substations	9
Testing	Chapter on the testing procedures for harmonised DH substations	15

A more detailed explanation of the work items and their organization is provided in Annex C.

In addition to the Kick-off meeting, two plenary meetings and a final meeting will take place every six to seven months, where all the Workshop participants shall be present. If needed an extra meeting can take place. The results - the CWA - can be expected 20 months after the Kick-off meeting.

An overview schedule is given below while a more detailed schedule is given in Annex D.

CW schedule																				
	Month																			
Acitvities	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Kick-off meeting																				
Plenary meeting 1																				
Plenary meeting 2																				
Final meeting																				
Work item 1: Technical																				
Work item 2: Environment																				
Work item 3: Test																				

Overview schedule for a 20 months' Workshop

7. Workshop structure

The Workshop proposers suggest a chair and co-chair to be appointed, subject to the approval of the kick-off meeting:

Chairperson:

The Chairperson should be appointed during the Kick-off meeting.

The responsibilities of the Workshop's chairperson include the following tasks:

- to chair Workshop plenary meetings;

- to ensure that the Workshop delivers in line with its Business Plan;
- to ensure a smooth communication flow between the Task Forces leaders (see below);
- to manage the consensus building process. In particular, the Chairperson must ensure a fair representation / involvement of each participant;
- to interface with the CEN-CENELEC Management Centre (CCMC) regarding strategic issues, problems arising, external relationships, etc.

Vice-chairperson

The Vice-chairperson will work on a voluntary basis. The Vice-chairperson should be appointed during the Kick-off meeting.

The responsibilities of the Vice-chairperson are to assist the chairperson in its function and to replace him in case of absence/unavailability.

Secretariat

Danish Standards, the Danish CEN Member, provides the WS Secretariat. The appointed person is Mr Henryk Stawicki. The activities and responsibilities of the Secretariat are:

- registration of WS participants;
- organizing WS plenary meetings;
- producing WS plenary meeting reports and action lists;
- administrative contact point for WS;
- managing WS membership lists;
- managing WS document registers;
- collection of the fees paid by the WS members.

Task forces leaders

They should be appointed during the Kick-off meeting. Their responsibilities are:

- to ensure the good development of the work items they are responsible for;
- to distribute the work among the task force participants;
- to organise task force meetings when necessary (physical meetings and/or teleconference);
- to stay in regular contact with the chairperson / vice-chairperson;
- to keep informed the leaders of the other task forces on the progress of the work they are responsible for.

Task forces participants

The task force participants should be registered as WS members. Their responsibilities are:

- to develop the work as described in the Business Plan;

- to dedicate sufficient time/effort to ensure the professional development of the work they are involved in.

Detailed responsibilities of the task forces' leaders and participants are given in Annex C.

8. Resource requirements

All costs related to the participation of interested parties in the Workshop's activities have to be supported by members themselves. CWA Members will be required to pay a fee of 3 500€ (VAT not included) in order to secure the financing of the secretariat of the Workshop. Members will support their own expenditure. Potential liaison officers representing other TC will not pay member fees.

Payback time of 30 hours!

Considering that the development of Eco-efficient substations can allow a saving of at least 30 M€ annually, calculations show that the CEN Workshop has a rate of return of 30 000%! In other words, the CEN Workshop has a payback time of only 30 hours! It is definitively worth investing in it.

The expected human resources required for the Workshop would be:

Activities	Men-month
Chairperson	1
Vice-chairperson	1
Secretariat	2.5
WG leader	Technical: 3.1 Environment: 2.5 Testing: 2.9
Participants not involved in any task force	0.4

Regarding the implication of the participants in the different task forces, the total estimated workload will be divided between the participants depending on their skills and availability. For each work item, the total estimated workload is presented below:

Task force	Total workload
Technical	6 men-month
Environment	4 men-month
Testing	6 men-month

9. Contact points

Chairperson
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Annexes

Annex A - Detailed list of existing European Standards in the District Heating sector

Annex B - Indicative content of the CWA

Annex C - Description and structure of the work items

Annex D – Schedule

Annex A - Detailed list of existing European Standards in the District Heating sector

The CWA may establish links with bodies that are currently working or have worked on related standards, e.g.:

- CEN/TC 107 'Prefabricated district heating pipe systems'
- CEN/TC 110 'Heat exchangers'; with standards:
  - EN 1148:1998, EN 1148:1998/A1:2005 'Heat exchangers - Water to water heat exchangers for district heating - Test procedures for establishing the performance data'
  - EN 247:1997 'Heat exchangers - Terminology'
- CEN/TC 164 'Water supply'
- CEN/TC 176 'Heat meters'; with standards:
  - EN 1434 series 'Heat meters'
- CEN/TC 197 'Pumps'
- CEN/TC 228 'Heating systems in buildings'; with standards:
  - EN 12828:2012 'Heating systems in buildings - Design for water-based heating systems'
  - EN 14336:2004 'Heating systems in buildings - Installation and commissioning of water based heating systems''
  - EN 15316 series 'Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies'; with special focus on Part 4-5 'Space heating generation systems, the performance and quality of district heating and large volume systems'

There is a Swedish Certification of district heating substations. It is a technical regulation (F:103-7e, April 2009) issued by Svensk Fjärrvärme AB, Swedish DH association. A unit certified according to the certification scheme fulfils the requirements set out in the Association's technical regulation District heating substations, design and installation (F:101).

Euroheat and Power, EU DH association, Guidelines for District Heating Substations issued in October 2008 can be used as a technical background for the CWA.

Annex B - Indicative content of the CWA

1. Technical standards

1.1. Introduction

1.1.1. Regulations

1.1.2. Units used

1.1.3. Connection principles

1.1.4. Low system temperature

1.2. The domestic warm water system
1.3. Radiator and ventilation system
1.4. Control system and communication
1.5. Pumps, safety equipment, valves, other equipment and temperature meters
1.6. Temperature difference (Δt)
1.7. Pressure drop

2. Environmental standards

2.1. Heat losses in substations (level of insulation)
2.2. Electricity consumption
2.3. Recycling procedure
2.4. Energy class system
2.5. Cooling of the return temperature

3. Testing procedures for certification

3.1. Certification process
3.1.1. Steps
3.1.2. Certificating body selection
3.2. Test methods
3.2.1. Assumption and preparations
3.2.2. Tests description
3.2.2.1. Technical tests
3.2.2.2. Environmental tests
3.3. Manufacturing inspection
3.4. Presentation of the results and certification

Annex C - Description and structure of the work items / task forces

General

This CWA is composed by three work items: Technical, Environment and Test.

Participation: Each work item will be undertaken by a task force. In principle, a Workshop member can participate to any task force. It can also participate to different task forces. Nevertheless, this is the Workshop secretariat which will ultimately evaluate the opportunity for a same member to participate in different task forces, based on the principle of member's skill, equal treatment and fair responsibility allocation.

Task force participants shall commit themselves to provide sufficient human resources allowing the task force to properly reach its objective. For that, a letter of commitment from the participants will be asked when registering to the Workshop.

Responsibilities: Each task force will designate a leader who will be responsible for checking the high quality of the work and for delivering the work in time. Members of the task forces should regularly meet / communicate. Also each task force leader shall ensure a smooth communication with other task forces leaders in order to obtain a coherent final CWA.

Work item 1: Technical

Objective: This task force shall prepare a chapter on technical specifications for harmonised DH substations.

The deliverable must be brand neutral and it must reflect the future use of DH systems, i.e. more flexible systems dealing with different qualitative and quantitative thermal energy, including low temperature demand.

Content: To fulfil the objective set above, the task force shall use the content of the Guidelines already prepared by EHP (freely available through the EHP website at www.euroheat.org/ Technical-guidelines-28.aspx).The Technical chapter shall also reflect the proposed content presented in Annex B of the present Business Plan. However, if the participants of this task force wish to deviate from the proposed content presented in Annex B of the present Business Plan, it has to be done under consensus of the Workshop's participants. If the submitted proposal reaches a consensus, changes can be done and an amendment to the Business Plan must be prepared. For minor changes, consensus can be found through e-mails exchange, but for major changes, the decision should be taken during plenary sessions. The chairperson is the person responsible to evaluate the importance of the changes.

Participants of the task force: Ideally, this task force shall be composed by highly qualified experts in DH substations. The number of participants to this task force will depend on the number of participants to the Workshop. Nevertheless, any interested member of the Workshop can join the task force.

Duration: 19 months

Expected workload: 3.1 men-month for the Technical task force's leader
+ 6 men-month to be divided between the task force's participants

Work item 2: Environment

Objective: This task force shall prepare a chapter on the environmental performance of harmonised DH substations. Between other, it shall provide energy classes in order to rank the performance of the substations.

Content: This chapter shall reflect the proposed content presented in Annex B of the present Business Plan. However, if the participants of this task force wish to deviate from the proposed content presented in Annex B of the present Business Plan, it has to be done under consensus of the Workshop's participants. If the submitted proposal reaches a consensus, changes can be done and an amendment to the Business Plan must be prepared. For minor changes, consensus can be found through e-mails exchange, but for major changes, the decision should be taken during plenary sessions. The chairperson is the person responsible to evaluate the importance of the changes.

Participants of the task force: Ideally, this task force shall be composed by highly qualified experts in DH substations with environmental background or by environmental experts with strong DH background. The number of participants to this task force will depend on the number of participants to the Workshop. Nevertheless, any interested member of the Workshop can join the task force.

Duration: 9 months

Expected workload: 2.5 men-month for the Environment task force's leader
+ 4 men-month to be divided between the task force's participants

Work item 3: Test

Objective: This task force shall prepare a chapter on the testing procedures for harmonised DH substations. This work must describe which type of tests must be done to the DH substations in order to certify that they are manufactured in conformity with the technical and environmental requirements set in the CWA.

Approved testing is part of the process of obtaining certification for a DH substation. Certification indicates that the quality and function/performance of a pre-fabricated DH substation has been examined and approved. The approved substation should be ranked depending on its performance, in accordance with the energy classes developed in Work Item 2.

Content: This chapter shall reflect the proposed content presented in Annex B of the present Business Plan as well as the objective described above. However, if the participants of this task force wish to deviate from the proposed content presented in Annex B of the present Business Plan, it has to be done under consensus of the Workshop's participants. If the submitted proposal reaches a consensus, changes can be done and an amendment to the Business Plan must be prepared. For minor changes, consensus can be found through e-mails exchange, but for major changes, the decision should be taken during plenary sessions. The chairperson is the person responsible to evaluate the importance of the changes.

Participants of the task force: Ideally, this task force shall be composed by DH experts with experience in testing or testing experts with strong experience in DH. The number of participants

to this task force will depend on the number of participants to the Workshop. Nevertheless, any interested member of the Workshop can join the task force.

Duration: 15 months

Expected workload: 2.9 men-month for the Testing task force's leader
+ 6 men-month to be divided between the task force's participants

Annex D – Schedule