

Program for Workshop 2

Workshop 2 “Technical”

2 Days duration

Expected participants:

Technical and managing staff from DHC utilities,
DHC industry and technical designers.

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Smart and flexible 100% renewable district heating
and cooling systems for European cities



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Program for Workshop

The main objective of workshop 2 “Technical” was to provide specific training on how to optimize technical solutions in 100% renewable project implementation.

A key input for the technical workshop was introduction of tools:

- energyPRO (EMD)
 - <http://www.emd.dk/>, <http://www.emd.dk/energypro/>
 - Tutorial (self-study of energyPRO):
<http://www.emd.dk/files/energypro/Tutorials/The%20complete%20tutorial.html>
- Calculation tools for pipes
 - ISOPLUS, <http://en.isoplus.dk/> , “ISOCALC”
 - LOGSTOR, <https://www.logstor.com/>, “LOGSTOR calculator”:
<http://calc.logstor.com/#Login>

Main addressed topics:

- *Design of substations and lay-out of DHC grid with low temperatures*
- *RES production plants and how to calculate production prices*
- *Case studies*

Day one

- 1. Welcome** by the regional task force and PlanEnergi (15 minutes)
 - a. Presentation of regional status and goal
 - b. Presentation of the program (overview over technical installations; installations in houses, transmission and distribution network, production technologies)
- 2. Installations in houses** (60 minutes). *Where possible, local representatives of suppliers of equipment demonstrate operation and regulation of house installations and heat meters.*
 - a. Diagrams for heating and cooling installations, direct and indirect district heating, prices of house installations, cooling, how to utilize low flow temperatures and secure low return temperatures, heat meter and working principles.
 - b. Presentation of Danish examples by PlanEnergi
 - c. Local examples by local consultants. Prepared before the workshop
 - d. Discussion of local needs of capacity building of installers and how this could take place.
 - e. Includes calculations for one regional case study.
- 3. The transmission and distribution network** (120 minutes)
 - a. Pipe types, dimensioning of pipes (pressure, flow, software, heat loss), heating and cooling, pumps, excavation, prices.
 - b. How to avoid heat losses (low temperature systems). Available software for calculations.
 - c. Presentation of Danish examples by PlanEnergi
 - d. Local examples by local consultants
 - e. Discussion of local needs of capacity building of installers and how this could take place.
 - f. Includes calculations for one regional case study.
- 4. Production technologies** (120 minutes)
 - a. Presentation of technologies: Excess heat from industries, incineration plants etc., Solar thermal, Biomass boiler, Biomass CHP, Biogas CHP, Heat pumps, Geothermal heat, Storage technologies
 - b. Technical solutions, energy in- and output, prices for investment, operation and maintenance. Danish data by PlanEnergi and local data by local consultants.
 - c. Includes calculations for one regional case study.

Day two

5. **Calculation of district heating production plant** (60 minutes)
 - a. Simple calculation of production costs in reference and RES system
 - b. Calculation in EnergyPRO of production costs in reference and RES system.
6. **Group work. Case calculations** (60 minutes)
 - a. Preparation of energyPRO and spreadsheet (installation), introduction to energyPRO before the workshop
 - b. Case calculation, preparation of data by local partners
7. **Final presentation and discussion of results** (60 minutes)
8. **Conclusion by the regional task force**
How to follow up upon the technical workshop and introducing the next workshop (“Organization and Financing” in most cases).