Converting Østerby area from traditional DH (85/50°C) to LTDH

Steen Gravenslund Olesen
COWI, Denmark
Høje-Taastrup municipality

Municipality with 50,000 people about 20 km west from Copenhagen

- Requirements by the Danish Society for Nature and Conservation: minimum 3% reduction of CO₂ emissions per year on a continuous basis
- Høje-Taastrup achieved more than **25% reduction** in CO₂ emissions since 2015
- Interest in COOL DH project

*The project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement no 767796-COOL DH-H2020-EE-2016-2017/H2020-EE-2017-REA-IA*
The Østerby – Demo site objectives

Create a sustainable town development in Høje-Taastrup with low energy/emission buildings at a reasonable cost

• Create a remarkable Danish showcase
• Demonstrate innovative solutions for LTDH
• Use renewable energy & ICT-based control systems
• Hands-on experience → seeing is believing
• Verify the economics

"The project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement nº 767796-COOL DH-H2020-EE-2016-2017/H2020-EE-2017-RA-IA"
Østerby area – consumers in the area

Approx. 36,000 m² building stock from the 80’ties

- 158 terraced houses
- A public kindergarten
- Social housing company

District heating network

- +35 years old
- One main heat exchanger

Organization (6 groups)

- Kindergarten
- Social housing
- 4 housing associations

[Image of Østerby area map with various labels and sections]
Østerby area – the old DH system

Heating association **(DK: Varmelaug)**
- Responsible towards the utility company
- Maintenance of heating station
- DH supply to the **6 groups of costumers**
- Billing for the groups’ consumption

Costumers (6 groups)
- Different organizations (4 ownership models)
- Pay for the supply and the internal heat losses
- Different installations in each group
- Different ways to measure consumption and pay the bills
- Different savings for renovation

*The project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement nº 767796-COOL DH- H2020-EE-2016-2017/H2020-EE-2017-RIA-IA*
How did we convince the locals to change to LTDH?

House tenants barely know what keep they warm in winter and how they get hot water!

- Necessary to make a **detailed action plan** to answer the question

Collaboration between:

- Høje Taastrup Fjernvarme (DH company)
- Høje-Taastrup Municipality
- COWI A/S

"The project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement nº 767796-COOL DH- H2020-EE-2016-2017/H2020-EE-2017-RA-IA"
Focus on your stakeholders different decision triggers

First attempt in 2010 by the utility company with traditional means

- Renovate the existing/old DH network to a traditional DH network
- Did not work since the DH association did not accept –focus on technical feasibility and a standard offer with no further explanation.

Second phase: EU support with COOL DH project

- After the presentation and decision process the tenants accepted the innovative solutions from the COOL DH project in 2018
- Focus on decision triggers combined with economic and technical feasibility studies
- Detailed calculation of micro and macro economy and numerous meetings with all stakeholders.

*The project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement nº 767796-COOL DH - H2020-EE-2016-2017/H2020-EE-2017-RA-IA*
Process - Roadmap

Step 0
Meetings with the local heating association “Varmelaug”

• Project introduction
• Macro and micro economy calculations for the heating association, housing associations and final users (with different pay schemes e.g.: subscription, upfront payment)
• Detailed total economic calculations for every sub area in Østerby with different ownership and regulatory framework

OUTPUT:
• The heating association was interested and approved the plan. External funding from EU improved the interest.
• First Q&A sessions with board

*The project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement nº 767796-COOL DH- H2020-EE-2016-2017/H2020-EE-2017-R&A-IA*
Step 1
Tenants information meetings

• Explanation and presentations of the project with special focus on the economy and detailed Q&A session

OUTPUT:

• First contact with the responsible from the different associations (groups) - Stakeholders analysis
• First acceptance from the tenants. The system is old and requires a deep renovation
• Initially, economy and environment were equally relevant for the tenants – closer to the decision they again fully focused on private investment.

Heat losses in the DH network

Old DH system

• 35% of the total delivered energy

With COOL DH project

• 11% of the total delivered energy

*The project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement n° 767796-COOL DH - H2020-EE-2016-2017/H2020-EE-2017-RIA-IA*
Step 2
Principle decision meeting for “yes” to COOL DH
• Final discussion about the detailed total economic calculations for every sub area and individual tenants in Østerby with different ownership and regulatory framework

OUTPUT:
• Acceptance from all the parts (board), anyway
• Dependent by the “yes” from the tenants/association users.
• Planning of next level decision triggers

*The project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement nº 767796-COOL DH- H2020-EE-2016-2017/H2020-EE-2017-Ra-Ia*
Process - Roadmap

Step 3

Tenants information meetings/board meetings in Østerby association and sub-associations of tenants
- 2 meetings with each housing association (2x4)

OUTPUT:
- Discussion and presentation (Q&A) about the installation process and practical procedures for the renovation.
- Necessary to be precise, to make the tenants comfortable and confident with the coming decision and support the coming individual consumers in their decision.

*The project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement nº 767796-COOL DH-H2020-EE-2016-2017/H2020-EE-2017-RA-IA*
Process - Roadmap

Step 4

“Varmelaug” meeting

- Decision of closing the local heating supply association after LTDH supply is completed

OUTPUT:

- Presentation of the next phase, and
- Planning of test installation as well as the contracts for each tenant/user.
Step 5

Preparation and signature of contracts from the coming 159 new users/houses.

*The project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement nº 767796-COOL DH-H2020-EE-2016-2017/H2020-EE-2017-RA-IA*
Step 6

Planning meeting with board members (from housing association)

- Internal meetings were held as well for coordination and planning of the strategy

**OUTPUT:**

- Presentation of the final plan for the installation/renovation phase

*Suggestion: Important to keep all the parts updated on the process as well as the interest on the that (plan/arrange meetings and show the results)*

"The project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 767796-COOL DH- H2020-EE-2016-2017/H2020-EE-2017-RA-IA"
Step 7

Høje Taastrup Fjernvarme established test dwellings and held follow-up meetings to show detailed plans of piping trace and location of the heat exchangers

- 4 series of meetings

OUTPUT:

- The installation procedure/plan was ready for the renovation to start! Oct 2018
- Implementation 2019-2020
- Monitoring started summer 2020

*The project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement nº 767796-COOL DH- H2020-EE-2016-2017/H2020-EE-2017-RRA-IA*
How to convince the locals to change to LTDH?

In short, key is to

- Carefully prepare a **stakeholder analysis**, **identify potential risks** and **design attractive decision triggers** targeted for the different stakeholders

- **Know your numbers** – be prepared to give immediate answers to your stakeholders

- Prepare a **detailed plan** for the **dialogue** with board members and tenants

- **Spend enough time** with the tenants to inform them thoroughly. Especially when the economical margin is limited

**NB:** Environmental awareness and sustainability count for long in the decision process but not in the final decision stage.
SMART integration of local RES from local shopping mall

- Integration of RES and low-temperature heat source
- The shopping Mall City2’s co-production of heat/cooling will provide LTDH to Østerby using a HFT/Utility owned heat pump
- The coming heat pump will be supplied from PV installation on the roof of the shopping Mall (2.1 MWp PV system)
- The connection-pipe between Østerby and City2 will have a zero-loss (losses will be collected with HP and reinjected)

*The project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement nº 767796-COOL DH- H2020-EE-2016-2017/H2020-EE-2017-RA-IA*
Converting Østerby area from traditional DH (85/50°C) to LTDH

Steen Gravenslund Olesen
COWI, Denmark