The story of
Braedstrup District Heating Company

Per Kristensen
kristensen consult aps

Former director of Braedstrup District Heating Company
Where is Braedstrup Heating Company?

Where is Denmark?
Denmark

Per Kristensen
kristensen consult aps
The municipality of Horsens

Per Kristensen
kristensen consult aps
DENMARK’s PROGRESS OVER THE PAST TWO DECADES

- Small CHP (Combined Heat & Power)
- Large CHP (Combined Heat & Power)
- Wind

Centralized System of the mid 1980’s

More Decentralized System of Today

Per Kristensen
kristensen consult aps
An example from Denmark: Braedstrup District Heating

- A cooperative owned by 1,550 consumers
- The consumer, the customer and the owner is one and the same person
- Annual production:
  Approx. 50,000 MWh heat – 22,000 MWh electricity
- Administration of approx. 5,000 water consumers

Per Kristensen
kristensen consult aps
All costumers

The General Assembly
All costumers have access

The Board
(4 members are elected by the General Assembly 1 from the municipality)

Management and staff

Per Kristensen
kristensen consult aps
An example from Denmark: Braedstrup District Heating

- The highest authority: The General Meeting (all consumers have access and the right to vote)
- A General Meeting at least once a year
- Information meetings through the introduction of new technologies
- Example:
  The approval of the first solar plant from 2007:
  122 votes for the proposal - 5 against
- The approval of the next solar plant from 2010 (Braedstrup SolarPark):
  199 votes for the proposal - 0 against

Per Kristensen
kristensen consult aps
Braedstrup District Heating

199 votes for the proposal - 0 against!!!
Braedstrup District Heating
- The 2006-strategy

The costs must be kept down

Production costs:
Natural gas and other fossil fuels must be phased out - also due environmental concerns

Long-term investments in renewable energy technologies, linking the electricity and the district heating technologies (Smart Grids)

The Braedstrup-plans:
50.000 m2 solar which corresponds to 50% of the heat production

Rest: For example biogas

Per Kristensen
kristensen consult aps
Braedstrup 2007
8.012 m² solar

The first Solar plant connected to a CHP

Per Kristensen
kristensen consult aps
Braedstrup "in bricks" Legoland

Per Kristensen
kristensen consult aps
Data - the 2007-project

Production: 3,600 MWh heat/year
(9 % of the production demand)

Invest: 1,6 mill. Euro
Grants: 0,4 mill. Euro
Nt. invest: 1,1 mill. Euro

Pay back time: 6,5 years
Braedstrup District Heating 2012

Per Kristensen
kristensen consult aps
Braedstrup BTES

Per Kristensen
kristensen consult aps
Borehole thermal energy storage (BTES)
(15 to 30 kWh/m³)
25 m

48 holes – 45 m deep

19,000 m³ soil = 4,750 m³ water

Per Kristensen
kristensen consult aps
Design and implementation, Braedstrup

Per Kristensen
kristensen consult aps
Data - the 2012-project

Production: 4,800 MWh heat/year
(Total: 20 % of the production demand)

Invest: 3,6 mill. Euro
Grants: 0,9 mill. Euro
Nt. invest: 2,7 mill. Euro

Pay back time: 10 years
Final extension:
50,000 m² solar thermal
- And an expansion of the borehole storage system

Per Kristensen
kristensen consult aps
Business - models

Typical example (DK): Solar Area: 10.000 m²

- Purchase of land (30.000 m²): 50.000 Euro
- Solar modules, pipes, heat exchangers, pumps, heat transfer fluid, etc.: 1.850.000 Euro
- Fencing, soil processing, etc.: 50.000 Euro
- Transmission pipe (1.000 m): 300.000 Euro
- Control-systems: 100.000 Euro
- Counseling, case processing, etc.: 40.000 Euro
- **Total:** 2.390.000 Euro

Calculated production: 5.000 MWh/year
Annual capital costs: 2.375.000 Euro x 5%/year: 119.000 Euro/year
Maintenance: 1,0 Euro/MWh: 5.000 Euro/year

**Total production costs:** 124.000 Euro/year = 24,8 Euro/MWh

5.000 MWh/year

Per Kristensen
kristensen consult aps
Very important with local/regional planning and coordination

A strategic energy plan is a very valuable tool

Conversion from natural gas and oil to district heating
Thank you for your attention
Per Kristensen
p.kristensen@outlook.dk

Per Kristensen
kristensen consult aps