

# "Cooperative companies running district heating grids: The Danish experience"

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PlanEnergi:  
Consultant Engineers  
33 years years with  
renewable energy

- biomass
- biogas
- solar thermal
- heat pumps
- district heating
- energy planning

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## District heating in Denmark 2016

- **65% of all households have district heating**
- **54% of the heat demand is covered by district heating**
- **50 City owned utilities cover 70% of district heating demand**
- **340 User owned cooperatives cover 30% of district heating demand**

# "Cooperative companies running district heating grids: The Danish experience"

- 1898** Waste to heat
- 1903** Power plants. Fuel: coal
- 1960** **1<sup>st</sup> “wave” of user owned cooperatives.** Change from individual peat and coke to individual oil or district heating . Fuel: oil in district heating. From 1972 change to coal.
- 1979** Natural gas introduced. Law of heat supply and division in individual gas and district heating areas. Fuel: coal and straw in district heating.
- 1990** **2<sup>nd</sup> “wave” of user owned cooperatives.** Natural gas fired CHP-plants. Fuel: natural gas (and still coal in power plants)
- 2010** Individual gas conversion to district heating. Fuel: natural gas and renewable energy (and still coal in power plants)

## The national framework

- **Law of Heat Supply**
- **Law of (Physical) Planning**
- **Law of Environmental Protection (regulates emissions from production plants)**
- **Strategic analysis**

## Law of Heat supply

**Introduced in 1979.** Every municipality should elaborate a heat plan where heat supply was defined as individual, natural gas, or district heating for consumers in the area to secure a market for natural gas heating in stead of individual oil. There is a public phase in the planning process.

**After 1990** only few municipalities made new heat plans. Instead new projects with change of heat supply or heat production have to be accepted by the municipality. The project proposal has to show that the actual project is the best social economic option among possible alternatives.

**Since 2007** the climate agenda has initiated new heat plans in municipalities. The heat plans are now part of a strategic energy planning process.

**Includes** rules for **non profit** and economical administration of district heating utilities

**All changes** in district heating systems must follow the rules set up in Law of Heat supply and must be approved by the municipality

## Plant operation

- COOPs cover plants supplying from less than 100 to more than 10,000 customers
- Plants are normally **operated** by own employees. Employees solve normally the operation problems and use colleagues and Danish District Heating Association if they have problems, they can not solve themselves
- **Larger works** are normally carried out by entrepreneurs after a call for tender
- **Consultants** are used for elaboration of master plans for future supply, elaboration of tender documents and over all control with implementation and commissioning
- **Balance responsible companies** are used for handling of bids and payments from the electricity market
- **Financing** of projects is normally done during loans 100% guaranteed by the municipality

## Why does it work?

- COOPs are organised as companies with risk limited to a small deposit. There is a long tradition for this kind of companies from farming (dairies etc. owned by farmers), retail (consumer owned shops) and water supply (consumer owned water supply) in Denmark. Every consumer has one vote at the general assembly
- Advantages are **Transparency** since all large decisions are approved by the yearly general meeting, **confidence** since the board is elected by the consumers and consumers very often know at least one of the board members and **ownership** to for instance a new solar thermal plant because of involvement in the decision
- Because of the non profit rule there is no business case in keeping good ideas inhouse. That means **fast replication of innovative ideas**.
- Disadvantages are that some of the utilities **are too small** when framework conditions are getting more and more complicated (bids in electricity market, accept of technical changes, bench marking...)

**If we should start a new plant today  
(not very usual – most new DH areas are extensions  
of existing utilities)**

**Step 1**

**(Heat planning, where possible areas for district heating are identified)**

**Step 2**

**Preliminary contact to customers  
(A working group as soon as possible)**





## **Step 3**

### **Business plan**

**Basis for decision making for investor (and for municipality and consumers)**

## **Step 4**

### **Get customers connected**

### **General information**

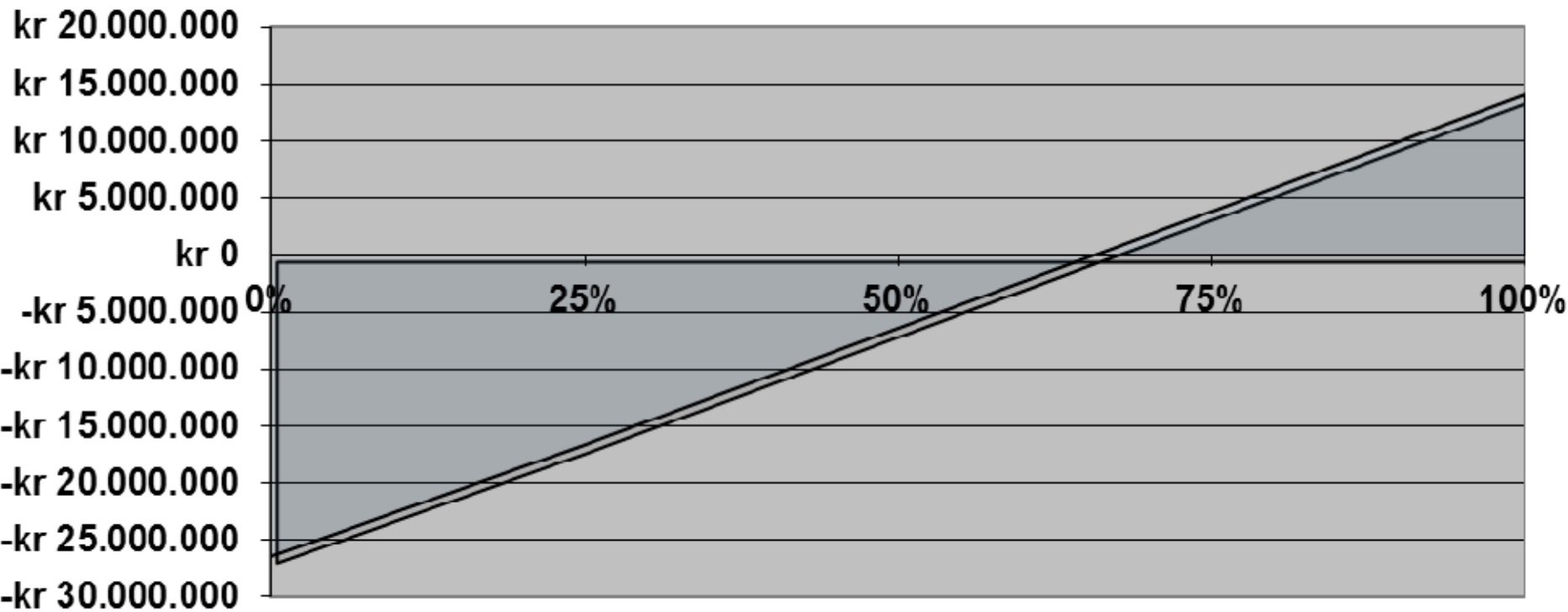
**Invitation to consumer information meeting  
signing of preliminary contracts**

## Business plan for the investor

- **Description of possible heating solutions (district heat and reference with individual heating with different fuels)**
- **Choice of district heating solution and description of access to fuel**
- **Where to place the district heating plant**
- **How to organise and finance the district heating**
- **Economical consequences for reference and project (Net Present Value, Internal Rate of Return, yearly costs for consumers). Sensibility analyses.**
- **Environmental consequences (emissions to soil, water and air)**
- **Time schedule**
- **Discussion on possible barriers for realisation of the project**
- **Draft customers contract**
- **Draft Statute for members**

# Break even for connection

Nuværdi i forhold til tilslutning



## Step 5

**Call for tender and final budget**

**Final contracts**

**Organisation of the district heating company**

**Monitoring and payment of heat supply**

**These steps was in the 60ties financed by private companies and voluntary people and in the 90ties by the natural gas companies – but who will finance today?**

**Thank you for your attention**

**More information:**

**[www.smartreflex.eu](http://www.smartreflex.eu)**

**(Workshop and site visits 24.-25.  
November 2016 in Kolding, DK)**