



## The Danish model for the development of the large-scale SDH sector

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## Danish District Heating Association

- Lobbying organisation towards
- Organizing co-operation between members
- Service to members
- Promoting district heating



**Danish District Heating Association**  
Danish DH companies  
Lobbying, cooperation, training etc



**Danish Board of District Heating**  
Suppliers of DH equipment, services etc.  
Export of Danish DH/CHP Technology



**Danish District Heating IT-Company**  
Software specific for district heating companies



**FIF Marketing**  
Advertising and promotion agency for DH companies



**DFP**  
Engineering & consulting



## Membership base

- 405 members representing 99% of national DH-sale
  - From 100 consumers in villages – 3 GWh/y
  - To 100.000 consumers in towns – 3.000 GWh/y
- 40 members are public utilities
  - Supplying 50 % of district heating
- 355 members are private cooperatives
  - Supplying 50 % of district heating
- 10 private companies
  - Very little heat
- 3 transmission companies
- 11 associated members



**I'm not an expert..**



**..on solar DH!**

But I know a little about Danish district heating!



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## My point of departure:

District heating is poor in technology –  
but very rich in context!



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## DK DH before the 70'ties

- Long national tradition of cooperatives
- Decentralised electricity sector
  - Partly cooperative
  - Partly municipal
- 30 % district heating
  - Partly cooperative
  - Partly municipal
- Municipal utilities under some regulation
- "Grass-root-entrepreneurs" common in energy sector
- No commercial stakeholders



## The burning platform

- Huge increase in energy prices
- Insecurity of oil supply (>90 % dependent)
- High inflation
- Balance of payments deficit
- Unemployment

**Crisis!**



*"I'm the biggest fool in Denmark!"*

*"Yes, I really am! I'm one of those Sunday drivers from the other day. You know, those that hadn't figured out, that you should WALK to the bakery for bread rolls. That's why I've kept the four rolls. They are the most expensive rolls in Denmark!"*

*Alfred Meyer, Ringkøbing after his €200 fine for driving in spite of ban on driving on Sundays.*

Source:  
Billed-Bladet no. 49,  
7. December 1973  
Photo and text: Steen Friis

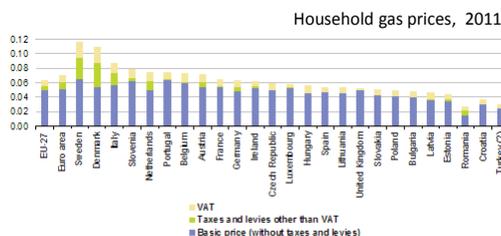
WARM  
FREM

Danish District  
Heating Association

Fjernvarme

## The regulatory framework

- Strategic energy planning  
- Mostly political agreements
- Heat regulation
- Energy taxation
- Regulation on building energy performance
- Initially subsidies



(1) Annual consumption: 5 600 kWh < consumption < 56 000 kWh (between 20 and 200 GJ);  
Greece and Finland, not available, Cyprus and Malta, not applicable.

(2) Provisional

Source: Eurostat (online data code: nrg\_pc\_202)

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## The DH regulation

### On prices

- Ex ante notification of prices to regulator
- Prices can only include "necessary cost" (cost+)
- Covers whole DH chain (production to sale)

### Planning

- Heat planning municipal obligation
  - No DH/gas competition
- Socio-economic CBA
- Enforceable on households (municipal option)

Incentives are consumer, environmentally and socioeconomic oriented. Not commercial.

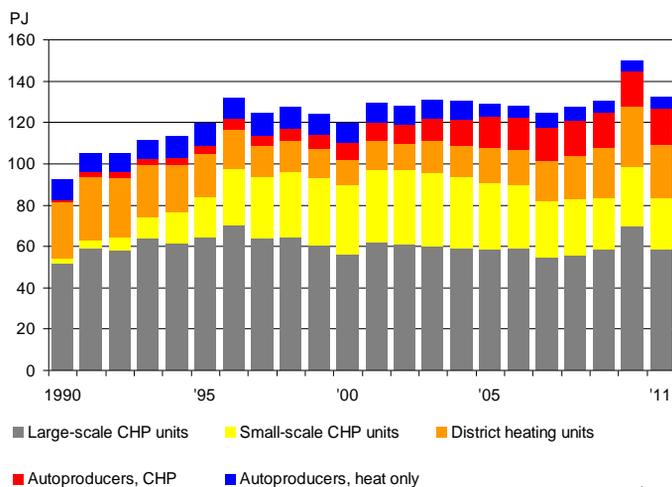


## District heating history

- 70'ties
    - Energy ministry
    - Heating Commission
    - Shift to surplus heat & coal boilers
  - 80'ties
    - Heat law
    - Increased CHP and other surplus heat sources
    - Expansion of networks
    - No more oil
  - 90'ties
    - Localised CHP
    - Natural gas/biomass
  - 00's
    - Consolidation
    - Looking for sustainable heat
  - 10's
    - Expansion
    - Renewables
    - Integration
- Diagram illustrating the history of district heating with three main trends:
- Fuel shift** (Red lines): Connects 'Shift to surplus heat & coal boilers' (70's), 'Increased CHP and other surplus heat sources' (80's), and 'Localised CHP' (90's).
  - Technology shift** (Blue lines): Connects 'Expansion of networks' (80's) and 'Looking for sustainable heat' (00's).
  - Investment boom** (Green lines): Connects 'Expansion of networks' (80's) and 'Expansion' (10's).



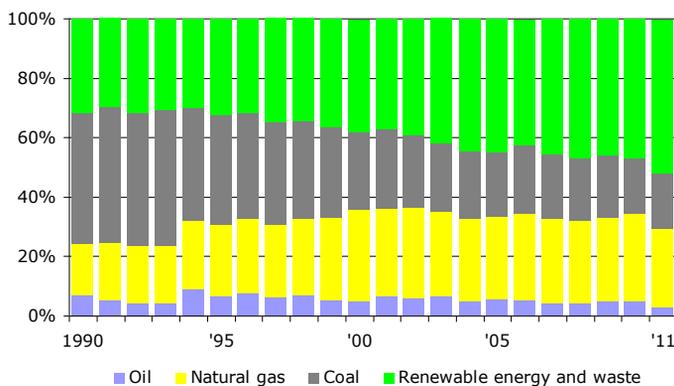
## Production of District Heating by Type of Producer



Danish Energy Agency, 2011



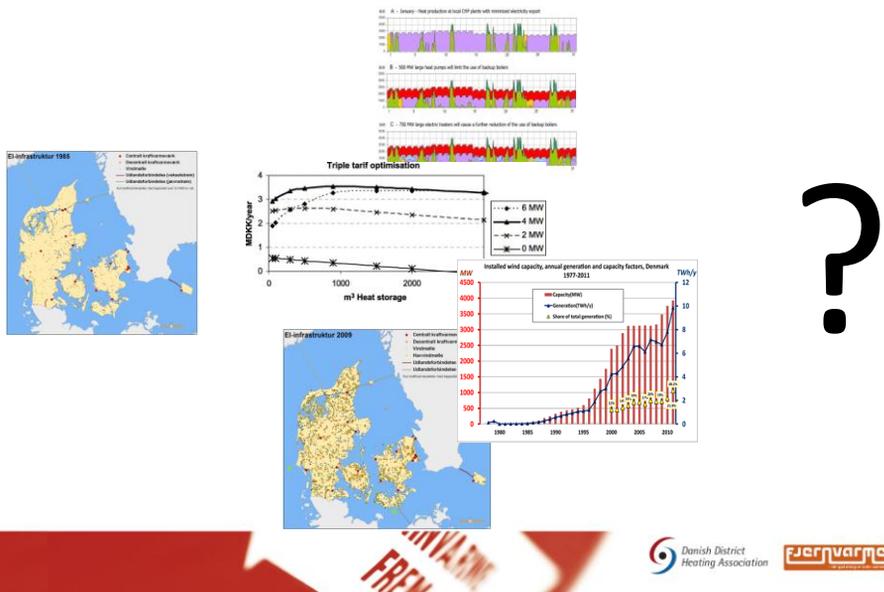
## Fuels composition for district heating production, percentage distribution



Danish Energy Agency, 2011



## 1985.. ..now.. ..and beyond..



## Contributing factors

- Funding available - bond backed loans
- Energy savings obligation - solar heat counts (still)
- Industrial basis is there  
Manufacturers, engineering, operators
- The “ketchup” effect!

Rule of “thumb”:

- 10.000 m2 gives you
- 5.000 MWh and takes
- 20 mill. DKK (€2.6 mill.) and
- 20 sheep to get!



## A perfect match?



1. Available land
2. Existing heat storage
3. Investment needed in production
  1. CHP out?
  2. Diversity
4. Sustainability drive
5. Generally high price on the "competition"
6. Active "grass root" operator
7. Credible borrower
8. Available, simple and reliable technology
9. The "ketchup effect"
10. Energy saving obligation



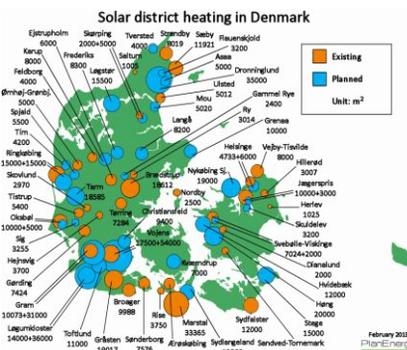
## Conclusion

The growth in Solar DH in Denmark is not a deliberate national project neither is it just a happy coincidence.

It took some initiative and dedicated effort plus a little support.

It exploits some of the best features of district heating in Denmark.

It is a natural continuation of developments over many years, it is an excellent example of the flexibility of DH and it demonstrates the ability of DH to integrate RES in our buildings.



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## Challenges

The solar

1. The dense urban areas ,  
where land is unavailable  
an/or expensive



The model

1. How to use our  
experience elsewhere?

