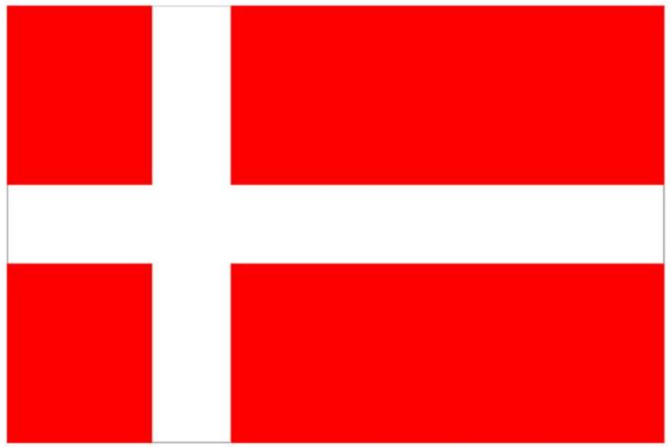

DBDH

Lars Hummelmose,

Managing Director, DBDH



Promote District Energy for a Sustainable City Transformation

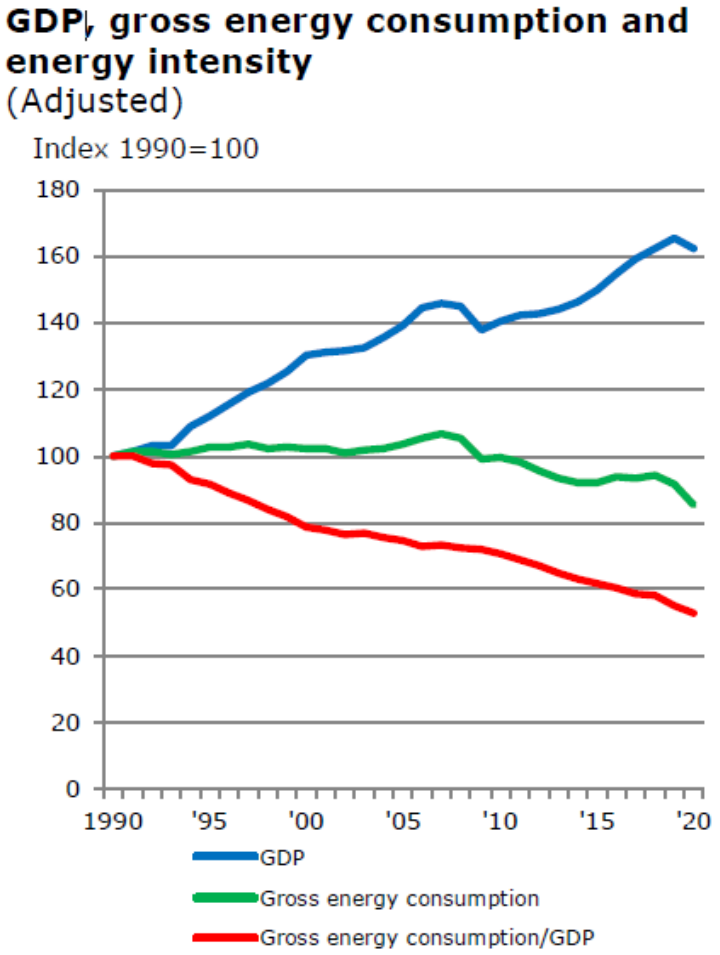
- The Go-To-Platform for district energy
- 1978
- 75+ members
- Magazine HOT|COOL
- Seminars, training, exchanges of know-how

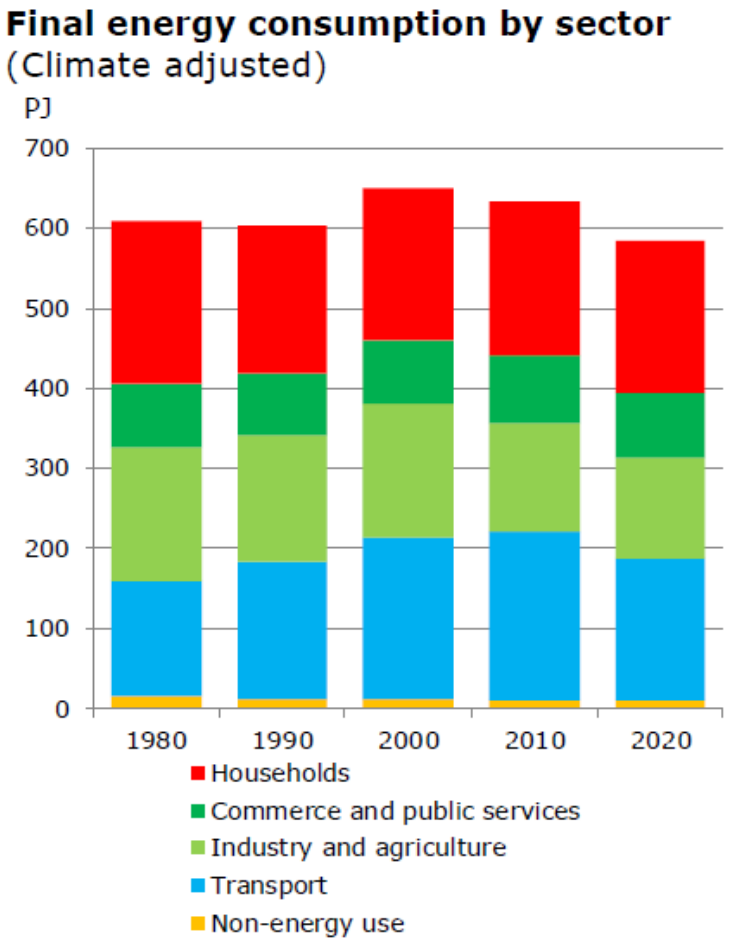
Case Denmark:

The role of District Heating to become CO2 neutral in 2030

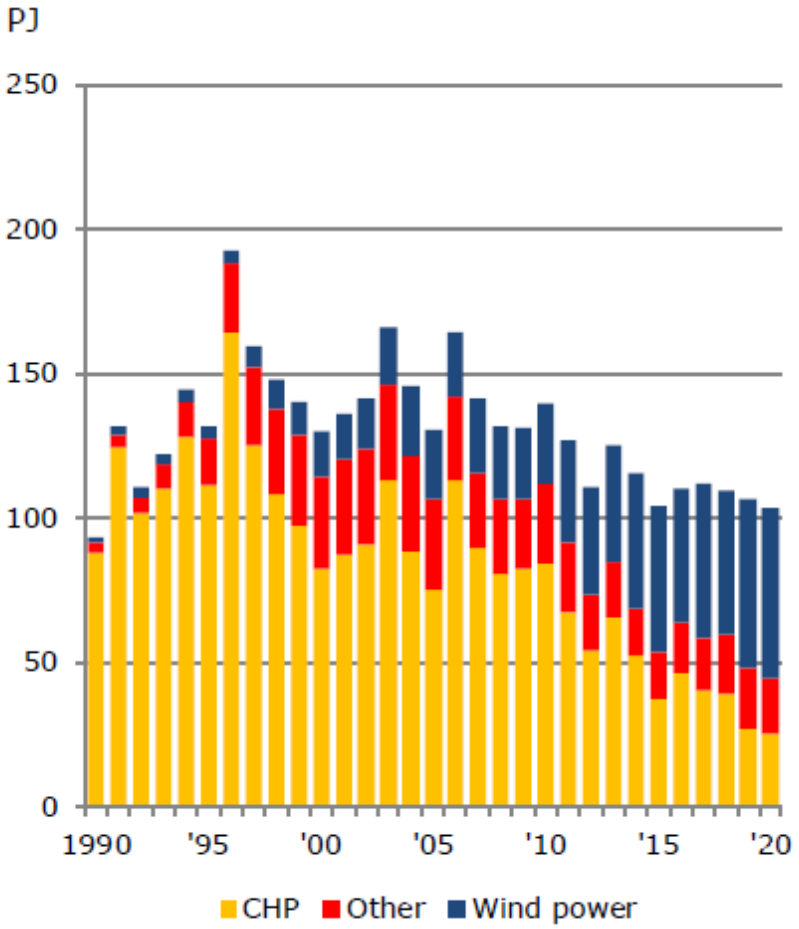
- *The Danish Fairytale*
- *The role of DH today*
- *How did Denmark get there?*
- *The future role of DH*

THE DANISH FAIRYTALE

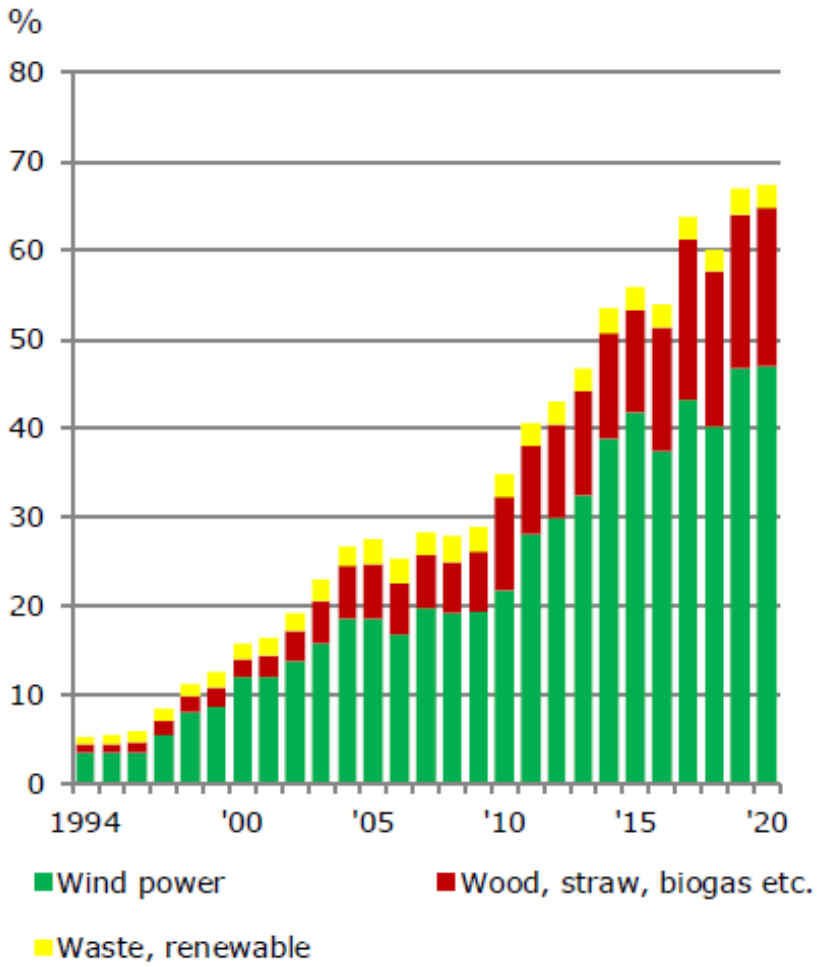




POWER PRODUCTION



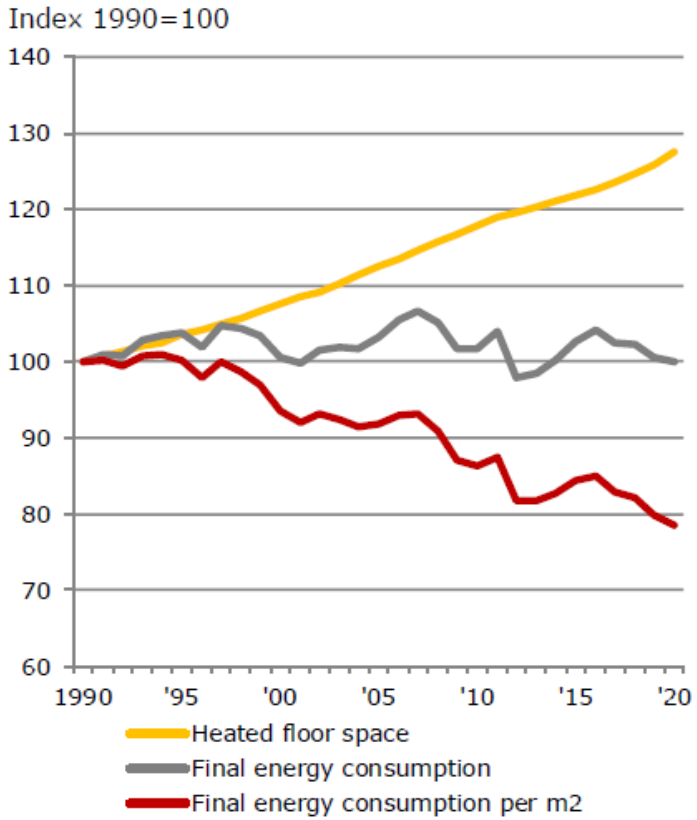
PROCENT GENERATED BY RE



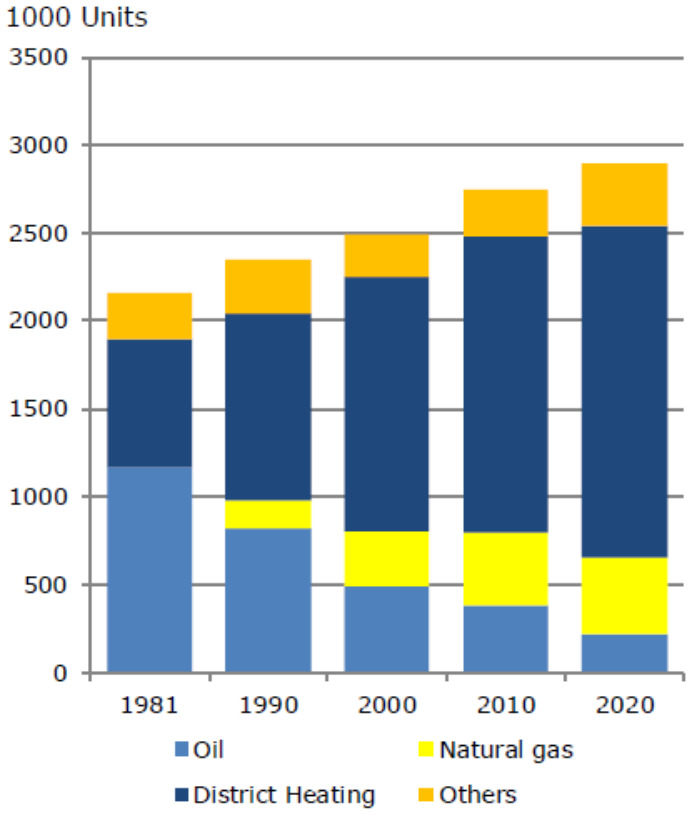
DH in Denmark

ENERGY CONSUMPTION HEATING

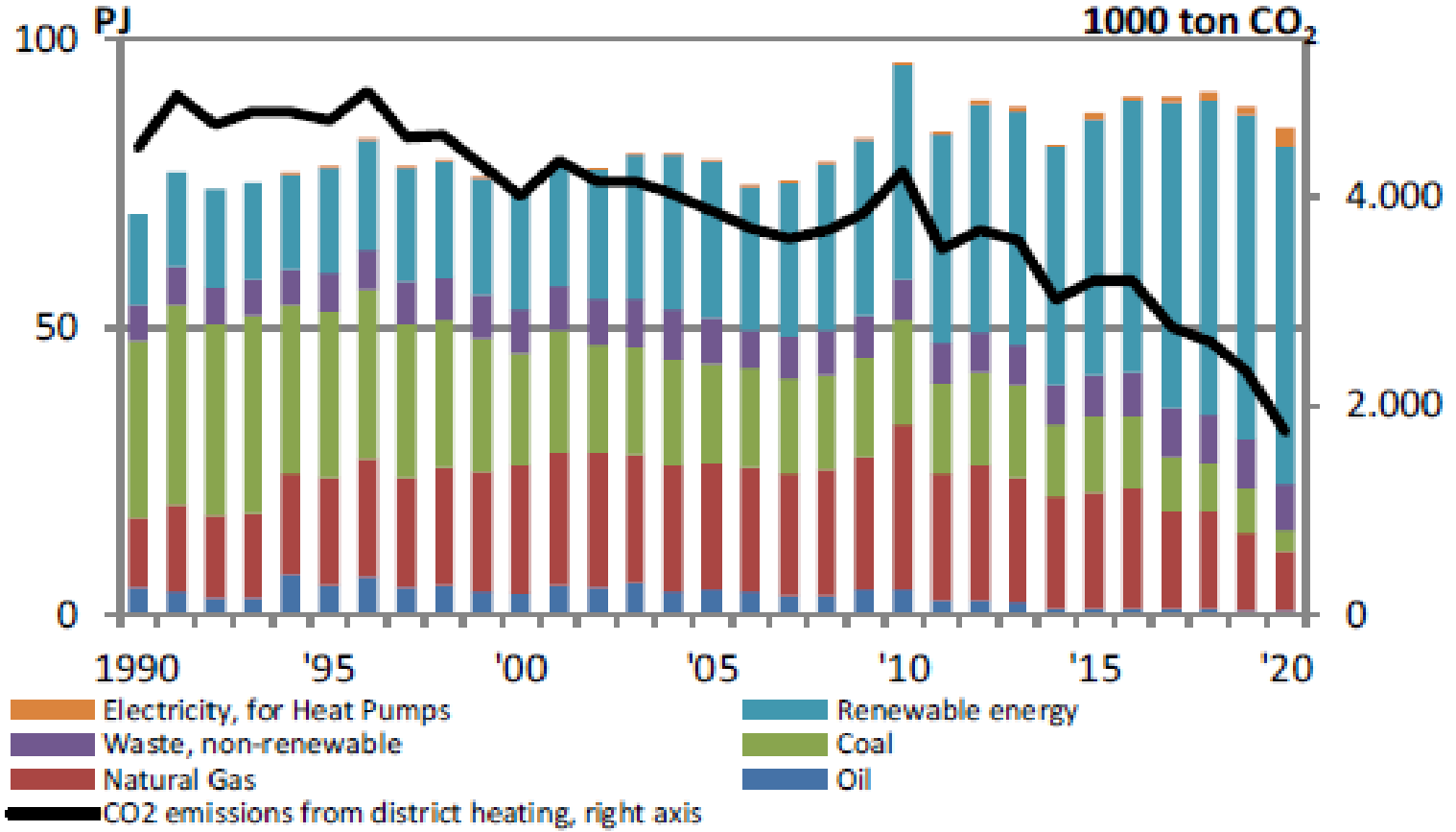
Energy consumption for space heating in households
(Climate adjusted)



Heating installations in households

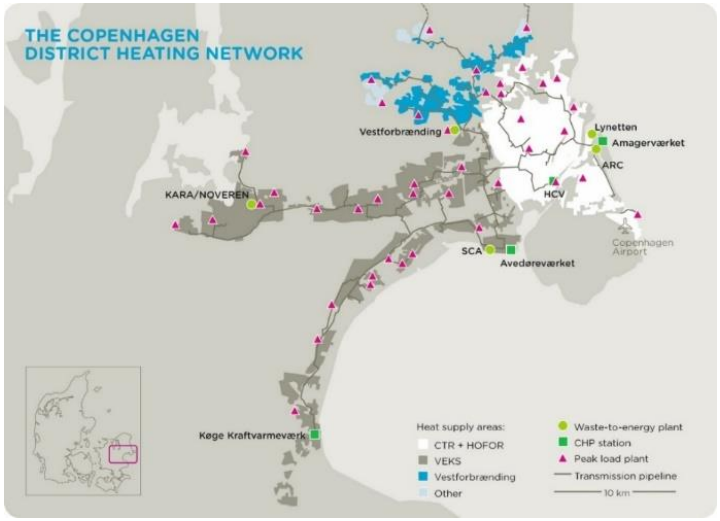


District heating CO2 emissions and consumption by fuel



District Heating in Denmark

- Half of heat demand (50%+)
- 2/3 of all households (app 1.695.000 / 64%)
- All homes in Copenhagen (98%)
- Today ~450 networks
- 68% RE



Technically DH is NOT Complicated

Constant technical developments and energy efficiency!

DH is fuel agnostic!

- Like your own boiler – a lot bigger and a lot smarter!!
- Moving “free” heat to a useful place
- Extremely well proven technology/system!!

Why do customers like district heating?

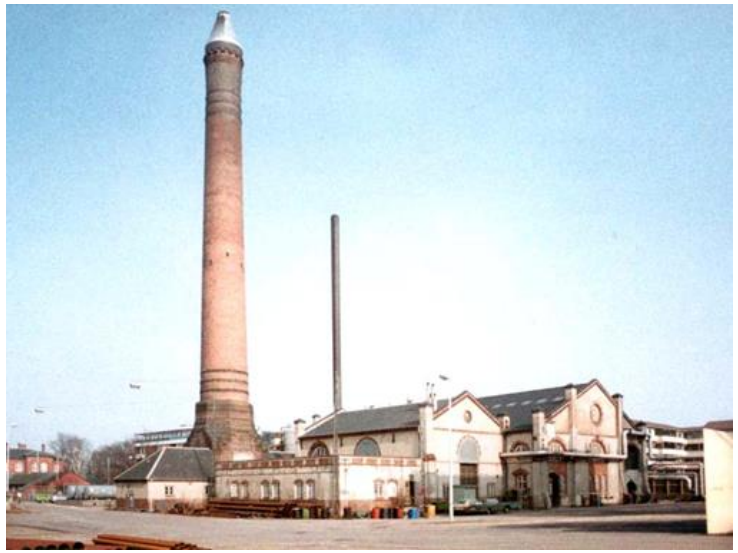
- What's not to like?
- Well informed customers
- It works!
- Trusted utility – not for profit
- Cost less and no price fluctations
- Easy: fuel, carbon, green, safe…

How did Denmark get there?

Remarks

- Danish district heating is a complex structure developed over 100+ years

- *"The Danish Model"*
  - Works well …. in Denmark
  - Can inspire others
  - A solution to the natural monopoly



Plan – Coordinate – Legislate - Support

Timeline of district heating in Denmark

1976: Electricity Act
1979: Heat Act

- **CHP,** Cost efficiency
- Heat supply zoning in all municipalities 80's
- Obligations

1990's

- Heat supply zones established incl. natural gas compensation
- Heat planning and project proposals → EE and greener solutions (**NG/biomass instead of oil/coal**)
- CHP contributed with ¾ of new power capacity from 90-97

2010 and 2012

- 2010: Biomass incentives → biomass in CHP's
- 2012: Danish conversion policy endorsed to promote district heating

2018 and 2020

- Electrification incentives
- **Natural gas is not an option**
- Natural gas compensation subsidized by the state
- Subsidies for phasing out oil and natural gas boilers
- Subsidy to roll-out green district heating
- Etc.

2021 and 2022

- Heating package to lower the impact of rising energy prices.
- Heat grant for low income families
- Investigating a ban on new gas boilers
- Increase amount of green gas
- Roll-out of district heating to natural gas areas by 2028, where feasible

Consistent Energy Policy
Long Term planning

Legislation

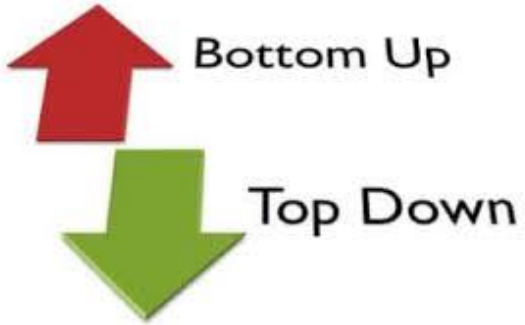
- 1976 – Electricity Act (CHP, Cost Eff)
- 1979 – Heat Supply Act + RES + WtE
- 1986 – Decentralized CHP
- 1990, 1993, 2008 – Increased biomass (new CHP and conversion)

Incentives

- 1981 – Investment grants for biomass DH/CHP
- 1984, 1992 – Subsidies for CHP
- 1994 – Financial support to establish DH on biomass or natural gas
- 1991 – High energy tax and CO_2 tax on fossil fuels

Clear business model

- Co-op or municipal
- Non-for-profit
- Long term perspective
- Municipal guaranteed loans
- Planning and zoning



Toolbox – National Government

Reaching 64 pct. district heating requires a toolbox of serious tools

- A strong legislation which promotes socio-economic infrastructures
- Cheap financing options
- Centralised data (technology catalogue, socio-economic assumptions, etc.)
- Heat supply zoning and natural gas compensation
- Obligations for a regular consumer to connect, stay connected, etc.
- Obligations for large consumers to be connected and supplied by DH
- Feasibility studies to ensure the most feasible heat solution
- Subsidies to incentivize a technology or fuel
- Making fossil fuels a non-alternative
- Etc.

Local Government

Local government – fill out the framework

- Local conditions and planning
- Create the zones
- Plan and/or approve projects
- Coordinate/guarantee connectability
- Project proposals

Trust

- made DH a succes in Denmark

- Democratic ownership
- Consumer protection
- Strong control of the natural monopoly
- Transparency
- Not-for-profit

Clear objectives

- made DH a succes in Denmark

- Only one: Lowest possible price – by law
- Green, job, import, fuel poverty – only later and local decision
- Social policy and energy policy is not merged

The structure of the DHC

- made DH a succes in Denmark

- End-user/Customer owned
  - Co-operative or Municipal
- Responsible for the whole value chain
- Goal: Provide green heat at lowest possible price
- Create professional, *commercially acting* organisation

Planning

- made DH a succes in Denmark

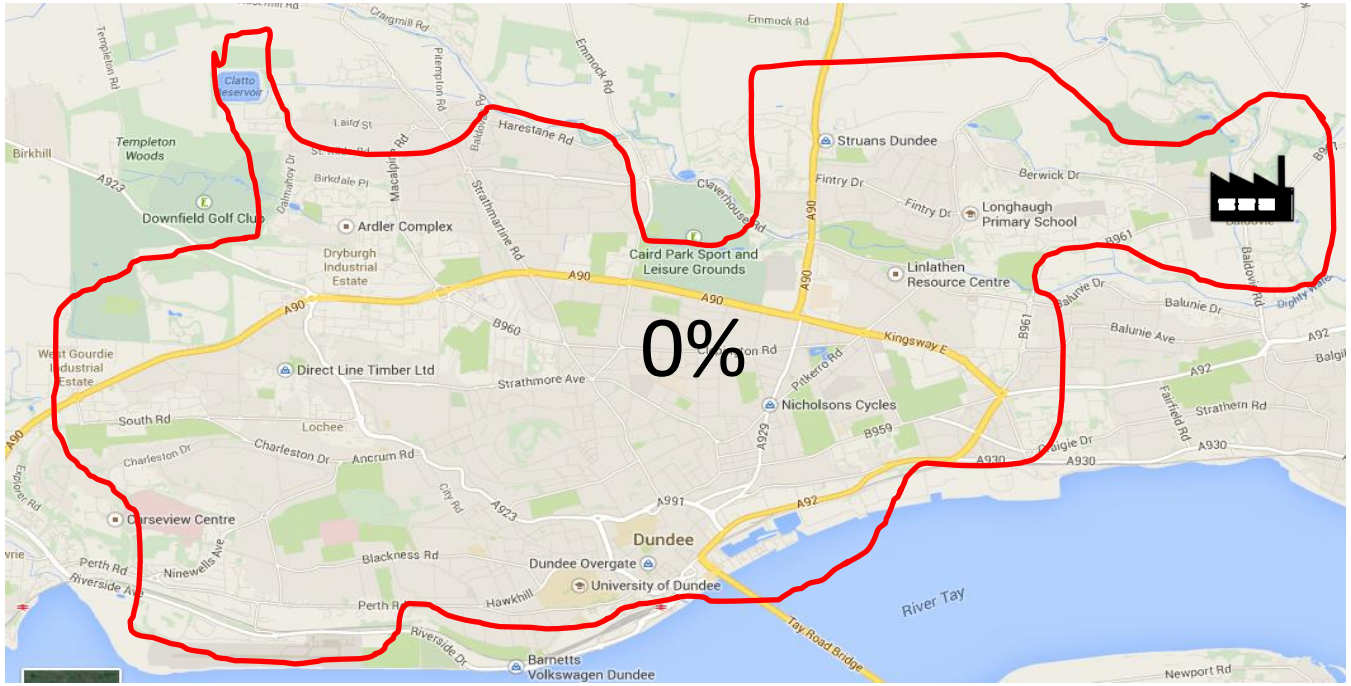
- City wide approach
- Local leadership
- Zoning
  - Long term perspective
  - Flexible development speed
  - Provide the security needed
- Investor protection
- Consumer protection

Low hanging fruits?

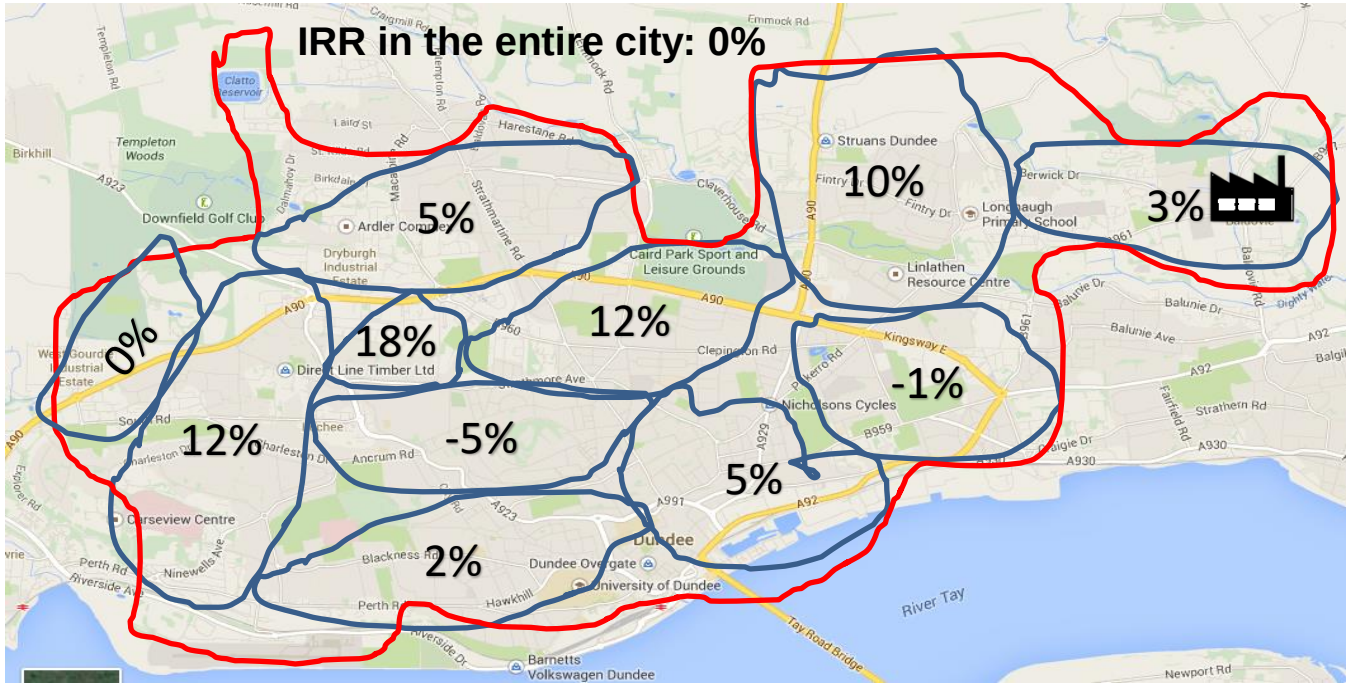
IRR and different types of ESCO

14%	*IRR for a commercial ESCO (assumed)*
?%	Climbing the learning curve step by step
?%	Create council lead ESCO
?%	Build in extra network capacity to support future expansions
?%	Build equity to support future developments
?%	Improve quality to minimise operation and maintenance
?%	Build a surplus to balance income from year to year
	Lower prices Not relevant here!
0%	Is that the lowest acceptable IRR for a project?

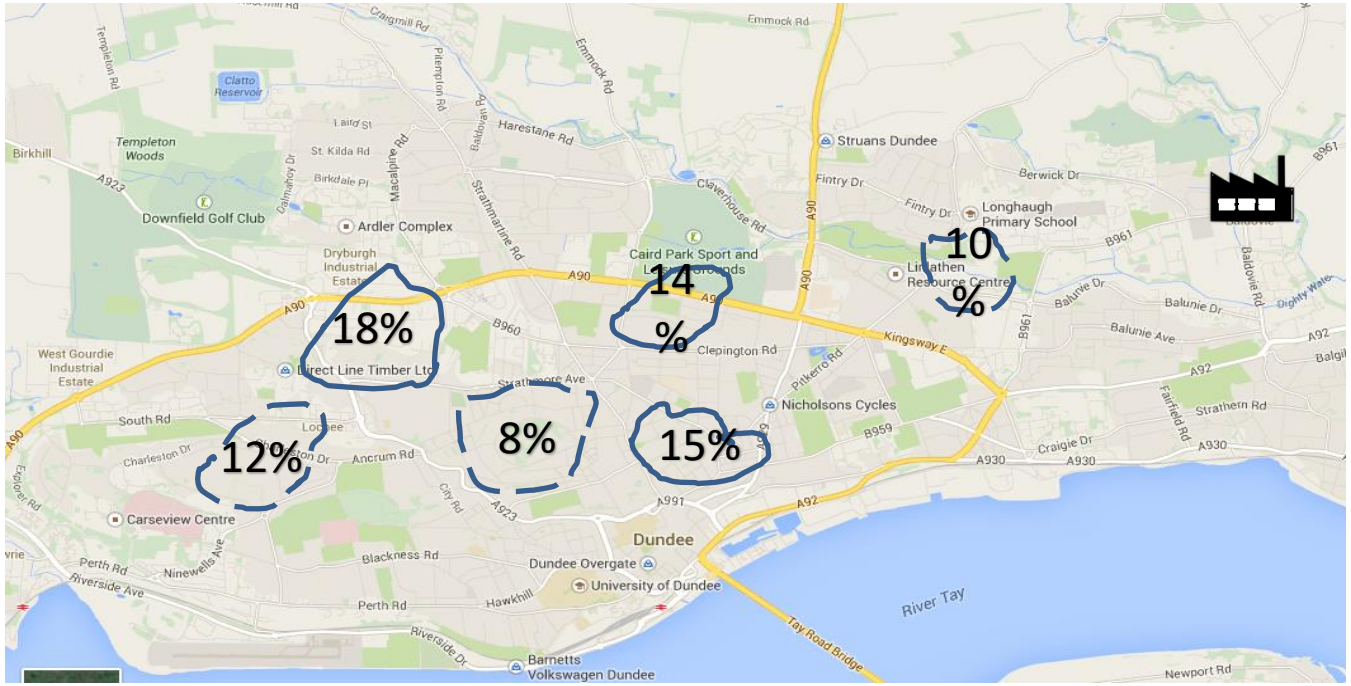
Calculated IRR for the Entire city



Several projects with different IRR



If not planned, zoned and controlled



Background for a Danish DH company II

- All contracts in open market competition – e.g. financial services, metering, billing, welding, maintenance….
- Competition to alternatives and among peers
- In Denmark no double systems
- Municipal guaranteed loans
- IRR calculations for new projects = 4% (safety margin)
- Long depreciation periods (20 – 30 years)

“The business model we use in Denmark has been the prime driver for our industry”

Managing director, large DH company in Denmark

My thoughts - good ideas

Think	Think city wide solution – not small projects. Or some will be left with fossile solutions
Benefit	Be careful to ”save” benefits from the first projects so it benefits the entire system
Balance	Balance top-down and buttom-up
Create	Create a national DH Support Entity “Swiss DH Delivery Unit”

Developments today and tomorrow

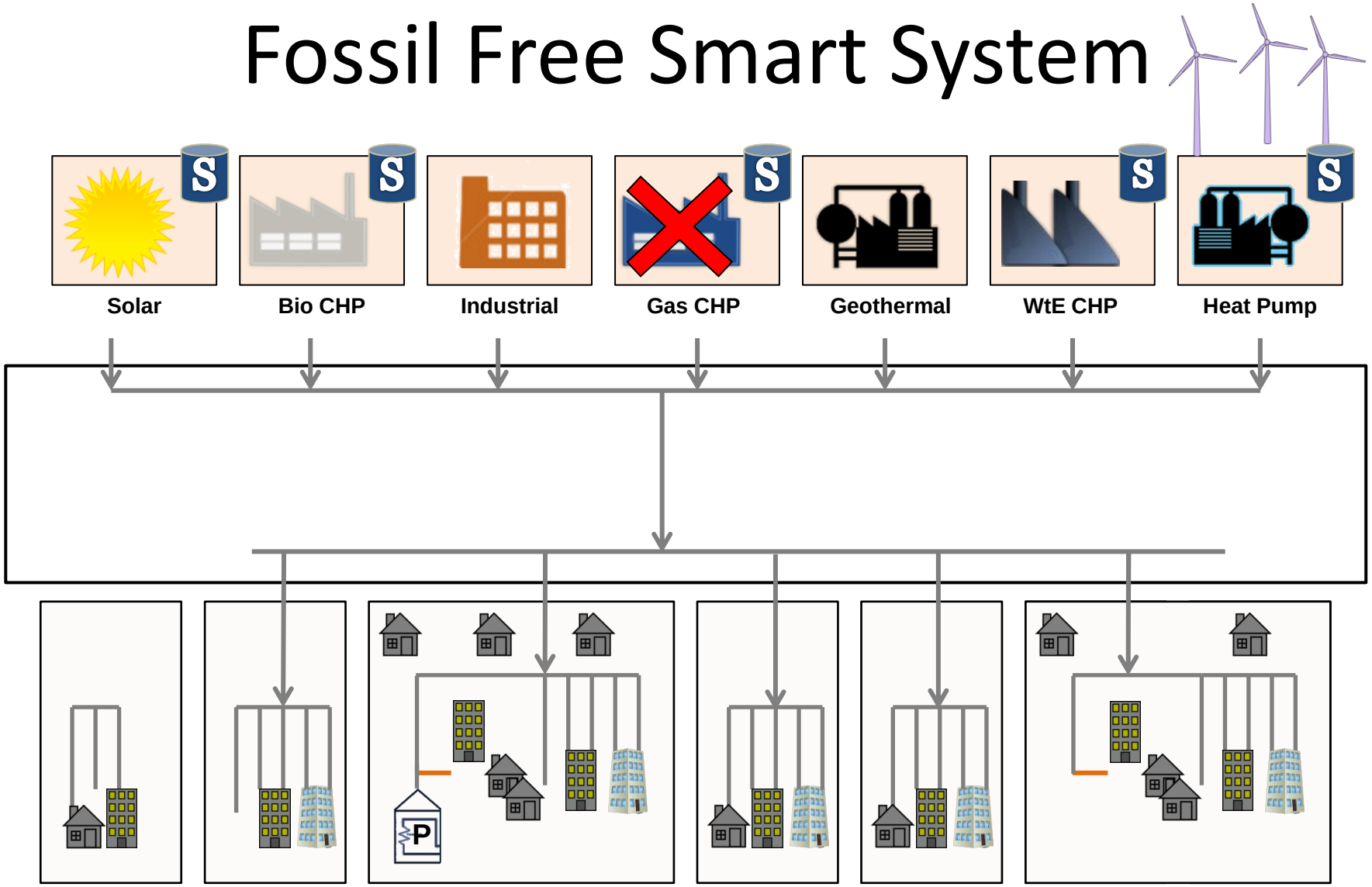
- Gas is an obsolete technology!
- Carbon agenda:
  - NO NG
  - 70% reduction by 2030
  - Heat: 0% carbon

- PtX / Hydrogen
- Electrifiction – Heat pumps
- Digitalisation
- Storage
- Industrial surplus heat
- Efficiency !!!

The future is district heating!

- Carbon agenda: 70% reduction by 2030……
- Heating 2030: de facto 0% carbon or less
- 500.000 more homes connected to DH

Fossil Free Smart System



Thank you

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Read out magazine
HOT COOL!!