SOLAR DISTRICT HEATING

Jan-Olof Dalenbäck
Professor
Chalmers University of Technology
CIT Energy Management AB

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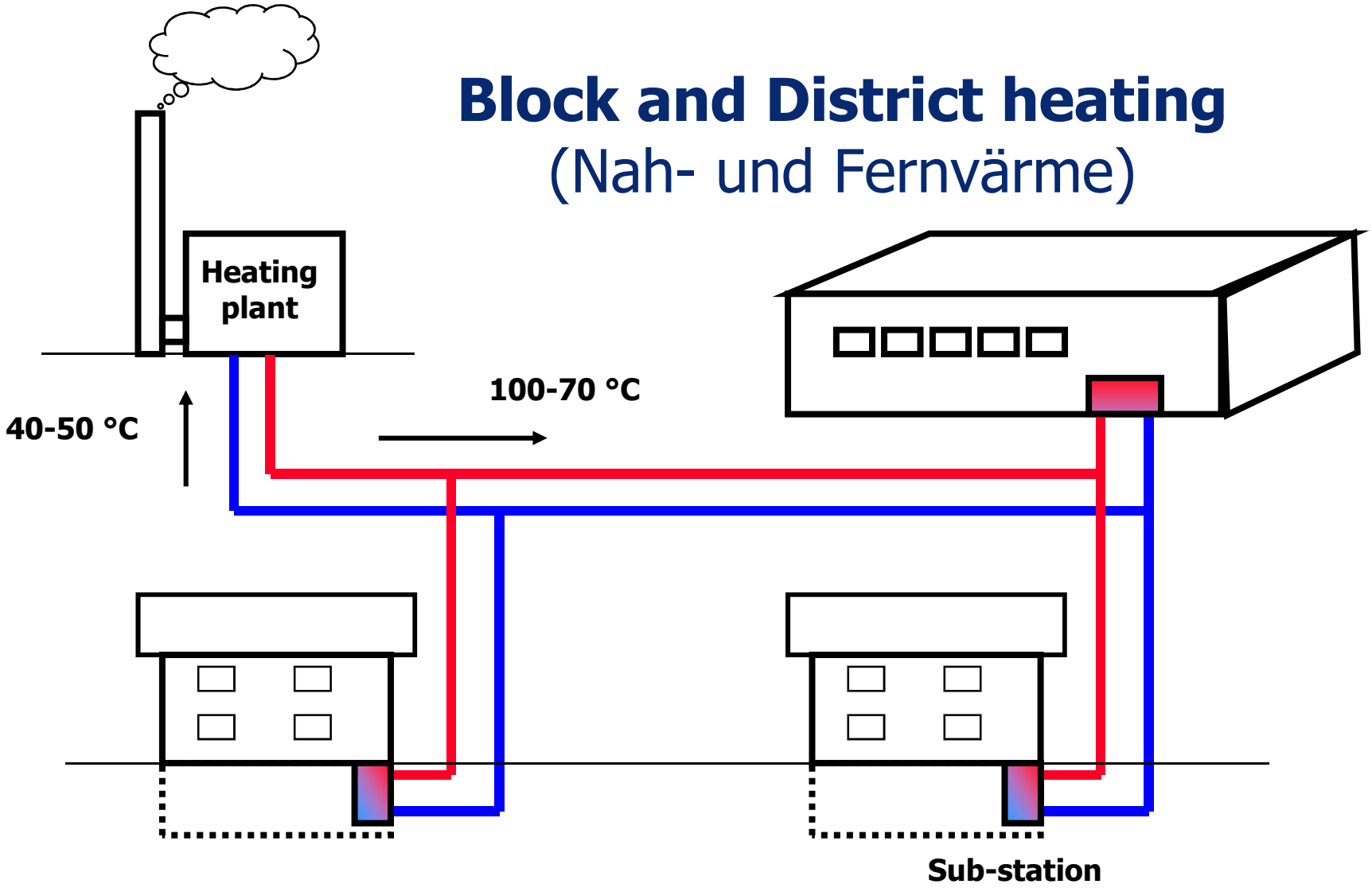
DISTRICT HEATING

- Dense building area, town or village
- Heating plant + distribution system
- Hot water 70-120 °C is supplied, cold water 30-60 °C is returned, and heated to be supplied again

Block and District heating
(Nah- und Fernvärme)

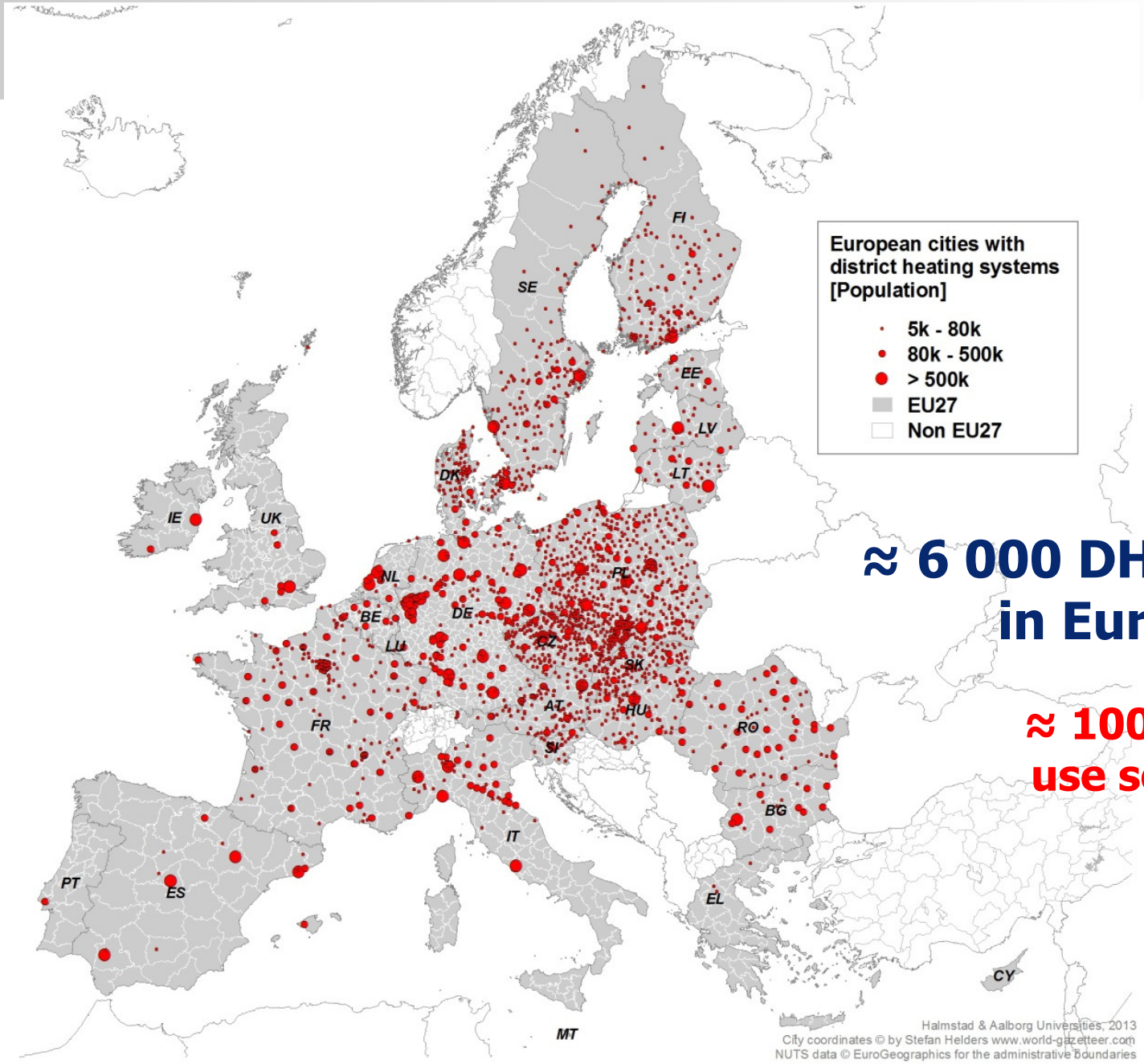


SDH
solar district heating

DISTRICT HEATING

- Flexible to use different and change heat sources
- Combined heat & power (CHP)
- Heat only boilers (HOB)
- Waste heat from industries
- Waste incineration
- Large heat pumps, etc.
- Solar heat !?

Sample: City of Stockholm, Sweden



SDH
solar district heating

≈ 6 000 DH systems in Europe

≈ 100 systems use solar heat

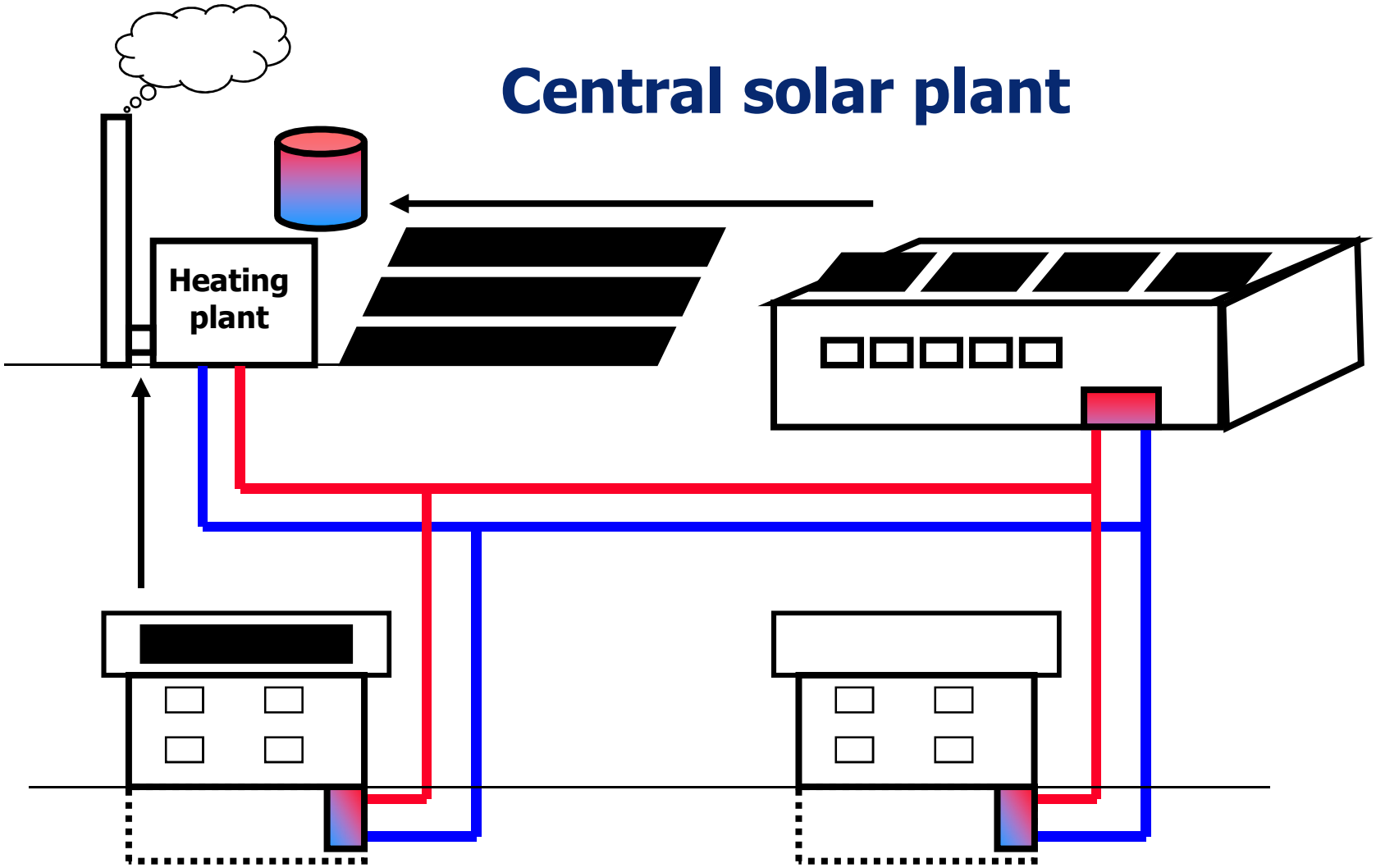
DISTRICT HEATING

- Denmark - 60% of heat demand
- Sweden - 50% of heat demand
- About 12% of heat demands in Germany and Austria
- About 12% of heat demands in Europe
- Common in Russia and China, called DISTRICT ENERGY in US

SOLAR DISTRICT HEATING

- (Large) solar collector array(s)
- Connected in the heating plant
- Or to the heat distribution system
- Combined with a storage to increase the use of solar heat

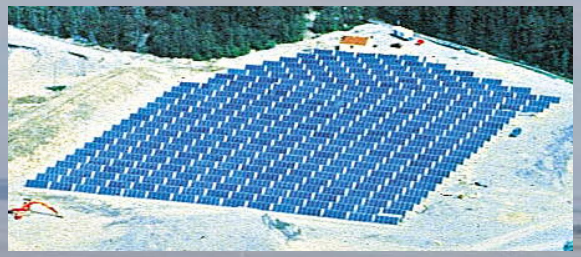
Central solar plant



SDH
solar district heating


New building area in
Neckarsulm - 1997
Germany

SDH
solar district heating



SE - Lyckebo 1983

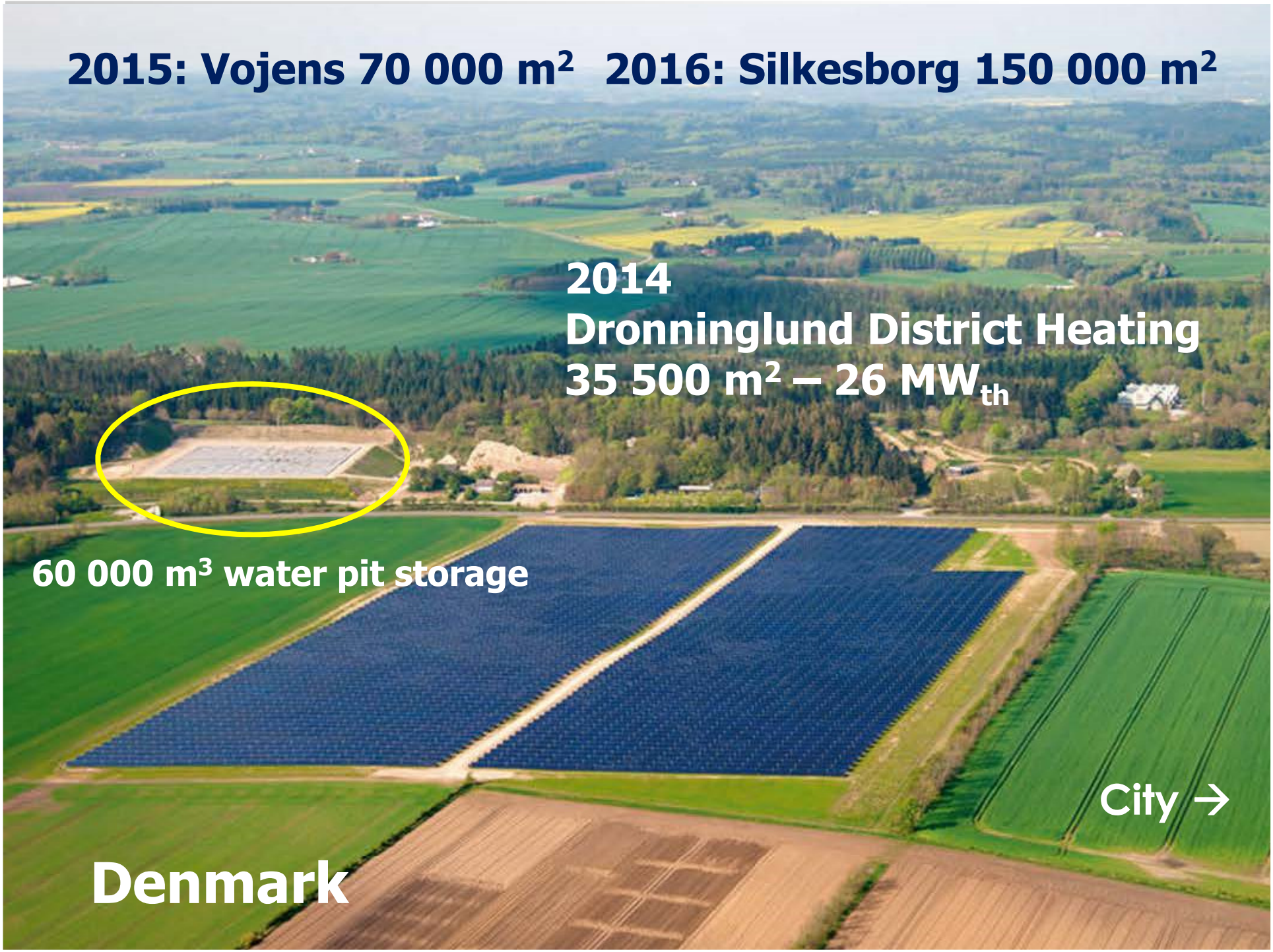
2013
Marstal District Heating
33 000 m² – 23 MW_{th}

75 000 m³ water pit storage

≈ 17 000 m² – 1996-2003

≈ 15 000 m² - 2013

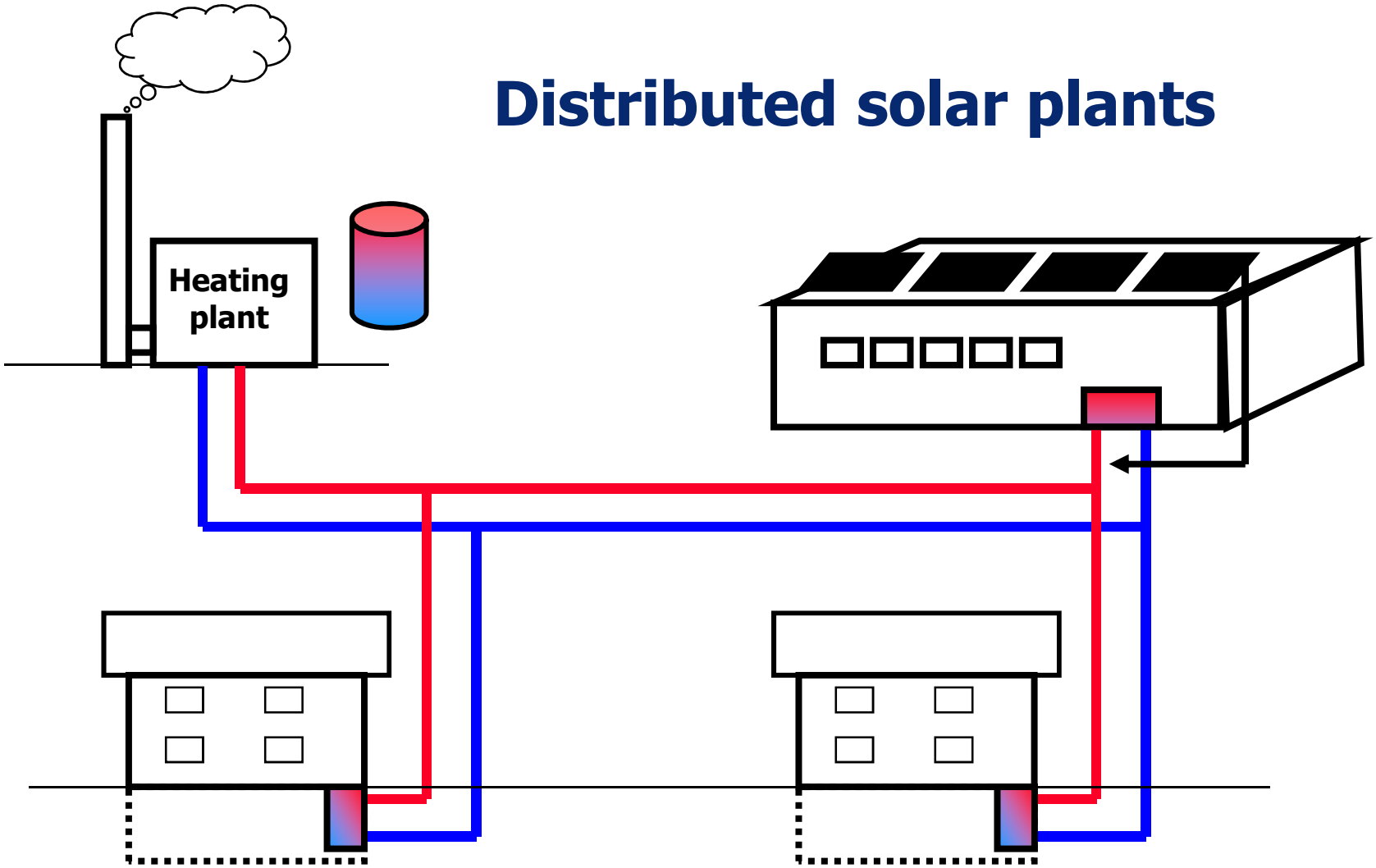
Denmark


2015: Vojens 70 000 m² 2016: Silkesborg 150 000 m²
2014
Dronninglund District Heating
35 500 m² – 26 MWth
60 000 m³ water pit storage
City →
Denmark

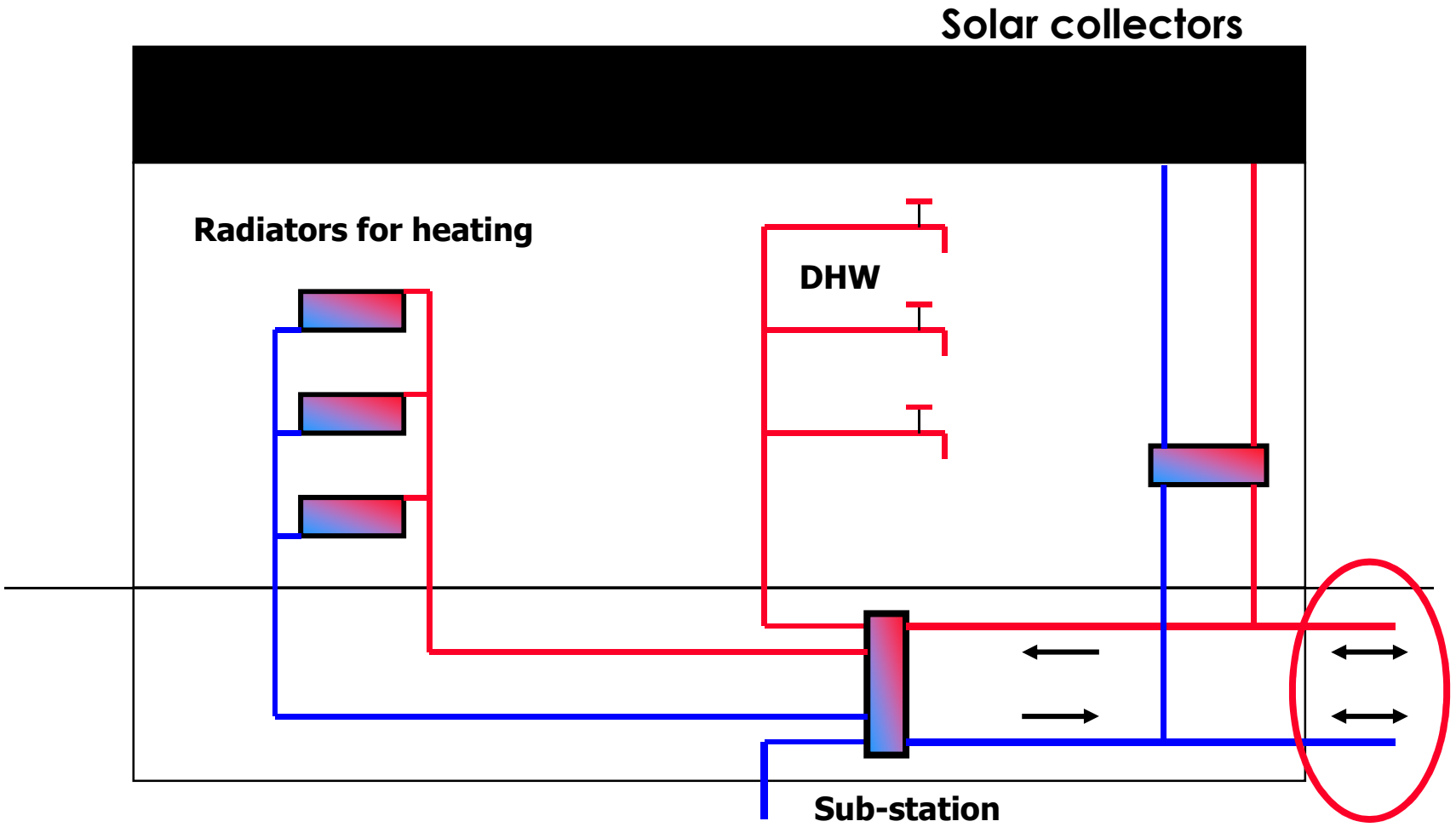
.. in large DH systems

SDH solar district heating

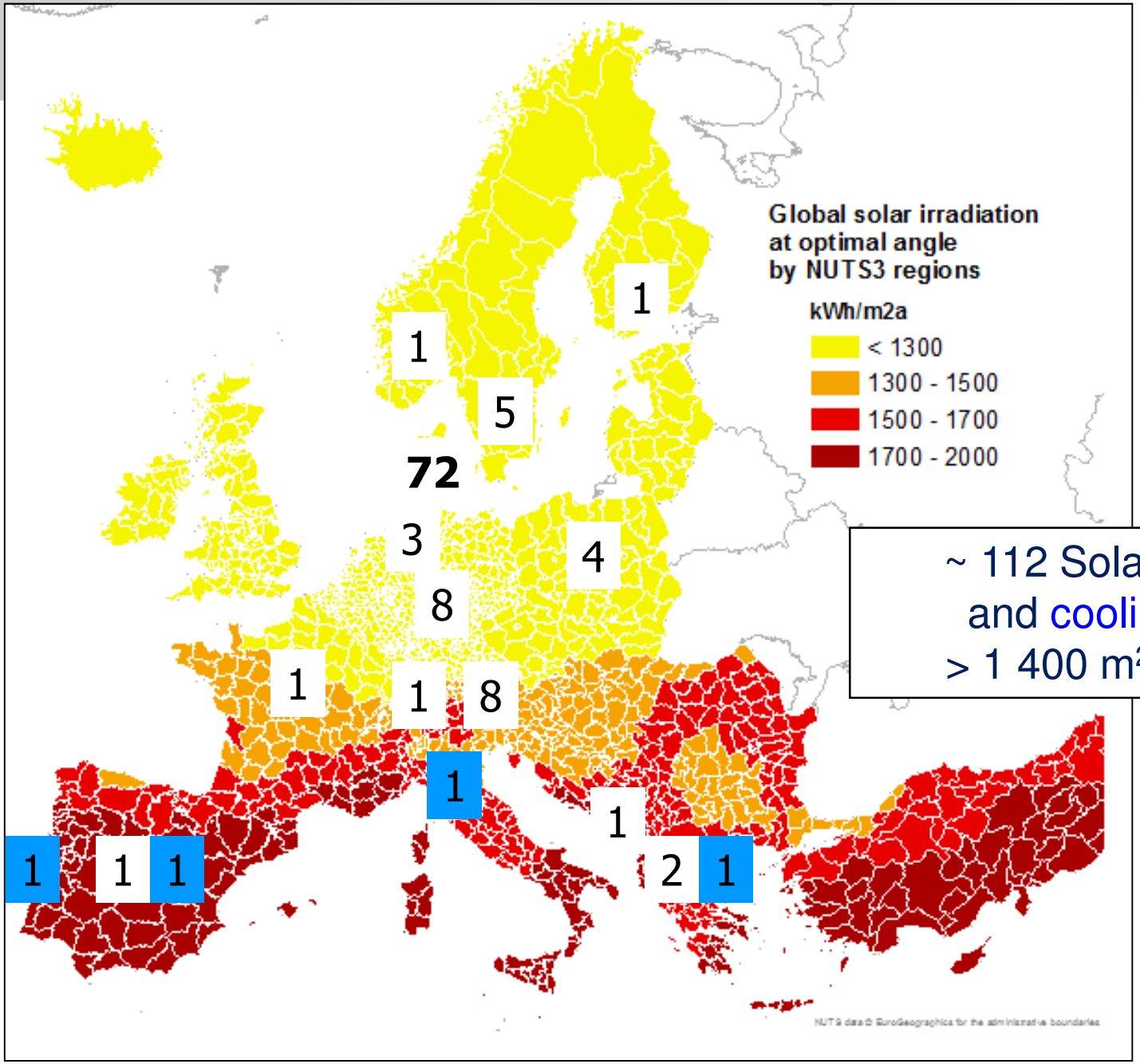
Distributed solar plants



Distributed plant (Feed-in)

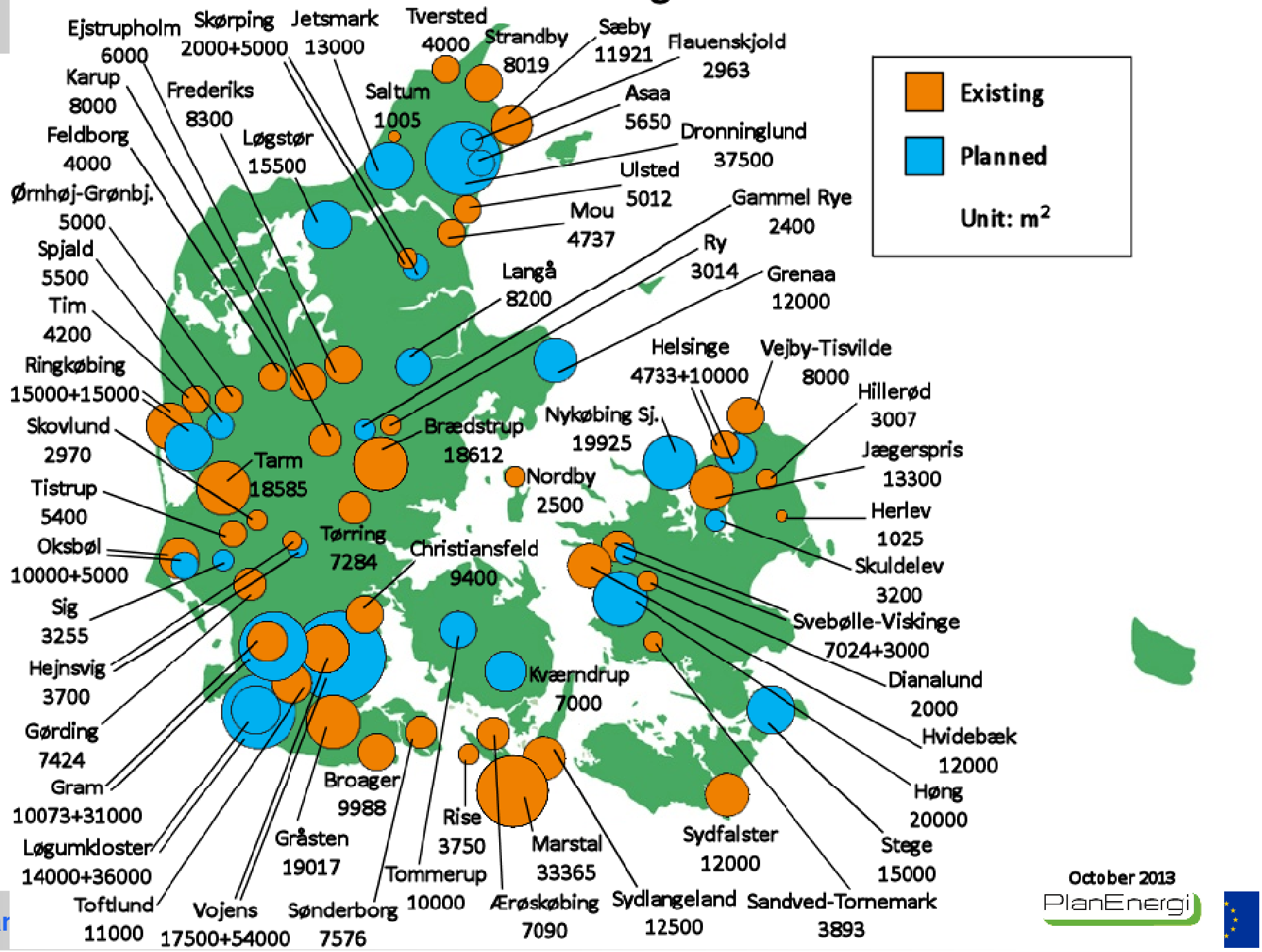



Austria
AEVG
Graz



~ 112 Solar heating and cooling plants
> 1 400 m² / 1 MW_{th}

Solar district heating in Denmark



October 2013

PlanEnergi

WHY DENMARK ?

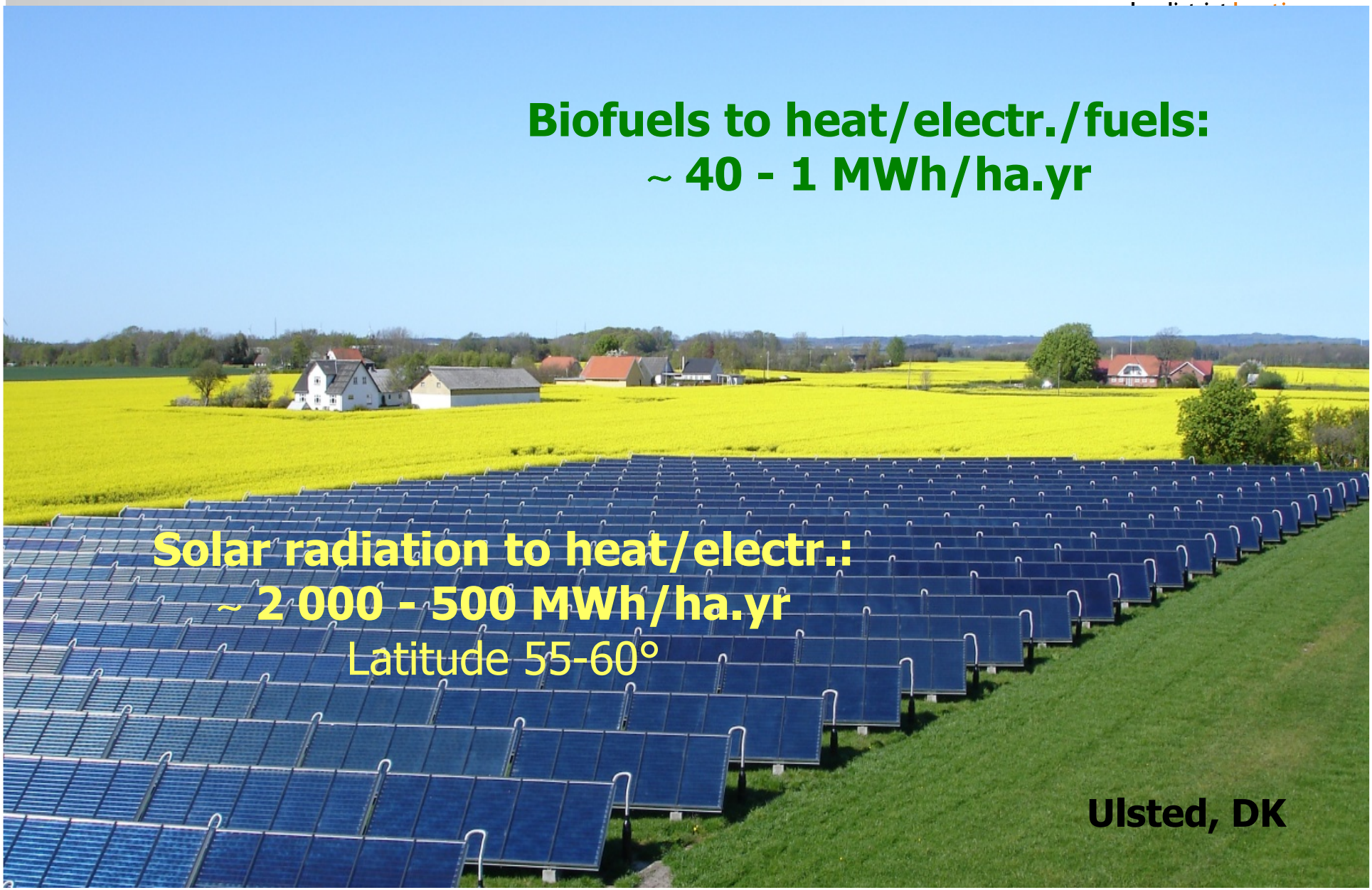
- Large share wind power
- Variable electricity prices
- District heating is common and can be used to balance prices
- CHP, heat pumps, storage
- High tax on natural gas
- Solar district heating is feasible !

RENEWABLE ENERGY

- **Small and large**
  - Bioenergy, hydro power, wind power, PV power, CSP plants
- **Small solar heating systems**
- **We need to develop large solar heating systems, i.e. SDH ..**
- **If we want to utilize the potential !**

SDH - SWOT

- **S: Renewable heat ... everywhere ...**
  (Fixed heat cost .. !)
- **W: Low energy density (& utilization time) ..**
  (Bio fuels 30-50 times the land area !!)
- **O: RE district heat in villages and cities ....**
  New business opportunities to sell heat ...
  RE district cooling ...
- **T: Lack of incentives, interest and knowledge**
  (Policy, desision makers, utilities, etc.)
  Gas networks ... waste heat ...


Biofuels to heat/electr./fuels:
~ 40 - 1 MWh/ha.yr
Solar radiation to heat/electr.:
~ 2 000 - 500 MWh/ha.yr
Latitude 55-60°
Ulsted, DK

OPPORTUNITIES

- Mature and operational technology !
- EU and city planners can (should) consider DH and SDH ..
- DH developers can (should) use solar heat as driver / complement ..
- Solar heating developers can (should) increase their market by developing DH applications .. !

EUROSUN 2016

- Lack of policy - Needs R&D on system integration
- Well adapted collector arrays - Needs further development
- Storage a key factor - Needs R&D on technologies and integration
- Come and listen to the latest SDH developments !

QUESTIONS ?

Jan-Olof.Dalenback@chalmers.se

www.solar-district-heating.eu

www.solvarmedata.dk

www.rhc-platform.org

www.solarthermalworld.org