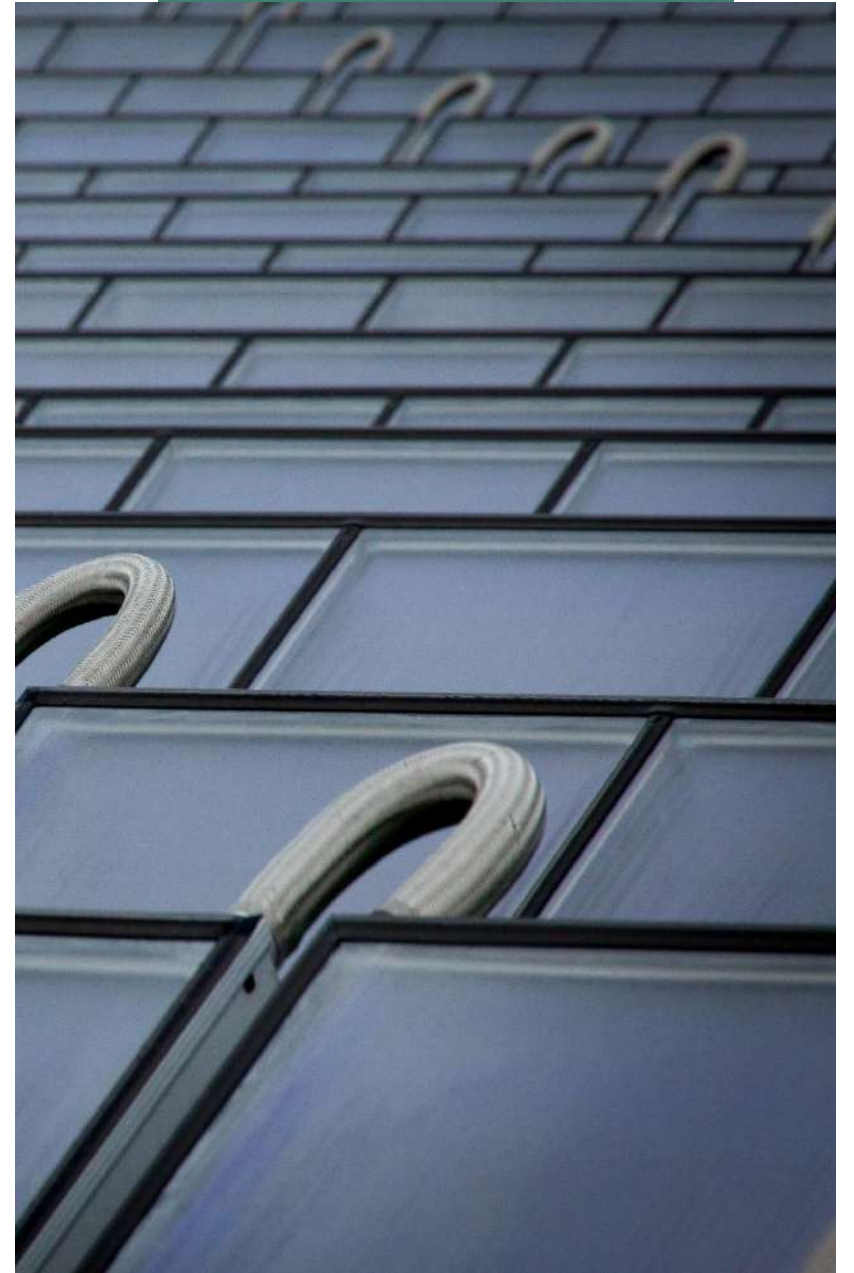


Danish solar district heating systems

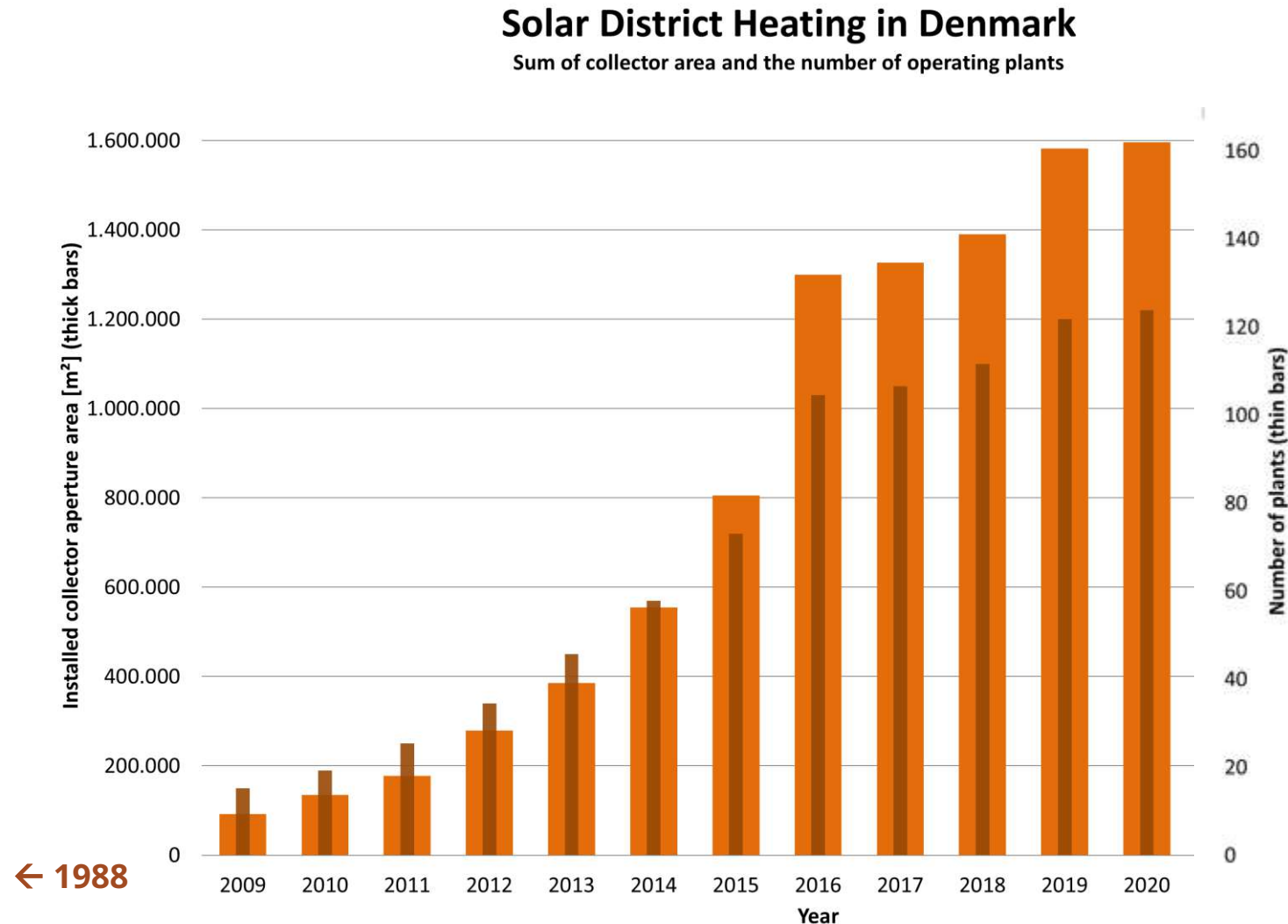


About PlanEnergi

- Independent non-profit consultancy established in 1983 with the following purpose:
To promote the use of resource-saving systems through activities in RE & energy planning
- 3 offices in Denmark: Skørping, Aarhus, Copenhagen
- Main topics:
 - Strategic energy planning
 - EIA (wind farms, large scale PV systems, biogas plants etc.)
 - Renewable energy solutions:
 - District energy
 - Heat pumps
 - Solar thermal
 - Thermal storages – mainly Pit Thermal Energy Storage (PTES) and Tank Thermal Energy Storage (TTES)
 - Biogas
 - PV
 - Wind turbines

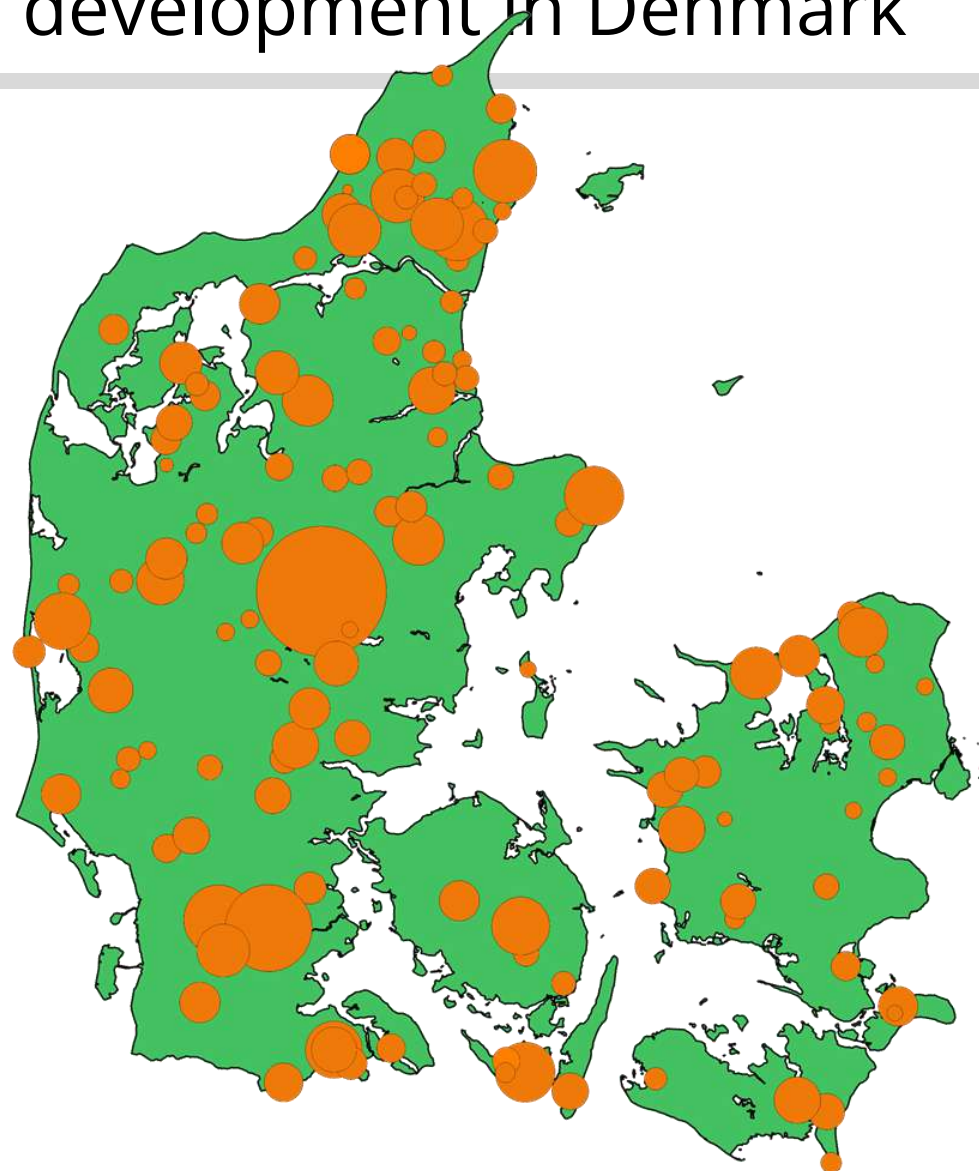
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Historical SDH development in Denmark



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Historical SDH development in Denmark



2023

Solar collector
area (aperture)

1 609 015 m²

(Not to scale)

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Historical SDH development in Denmark

- Historical main alternatives to SDH
 - Gas boiler/engine (typical decentralized DH plant in many cities/towns)
 - Biomass only allowed on a limited level
 - High tax on natural gas. Approx. same level as the gas price.
No tax on solar.
- Municipal guarantee for loans (low interest rates)
- The solar group under the Danish District Heating Association arranges workshops and capacity building courses
- Heat savings credit scheme (SDH generating bankable extra credits)
 - End date: 2016
 - Similar one initiated shortly after (slightly less attractive) with end date: 2019
- Heat pumps in DH (political priority to utilise RE electricity)
 - Financial support for investment
 - Lowered taxes for HP electricity
 - Technical improvements/maturing technical solutions



Danish district heating / energy system

- Around 2/3 of all buildings connected to DH
- The utility company is legally regarded as natural monopoly and is regulated by a principle of non-profit – heat tariff covers only the real costs
- There are circa 400 DH systems in Denmark, mostly cooperatives. Only approx. 50 district networks belongs to municipalities.

Past

Regulation of CHPs according to demands in the electricity market (flexible electricity production)

TTES to enable flexibility

Present

**Power to heat
Flexible demand of electricity for heat production by HP and electric boilers in DH**

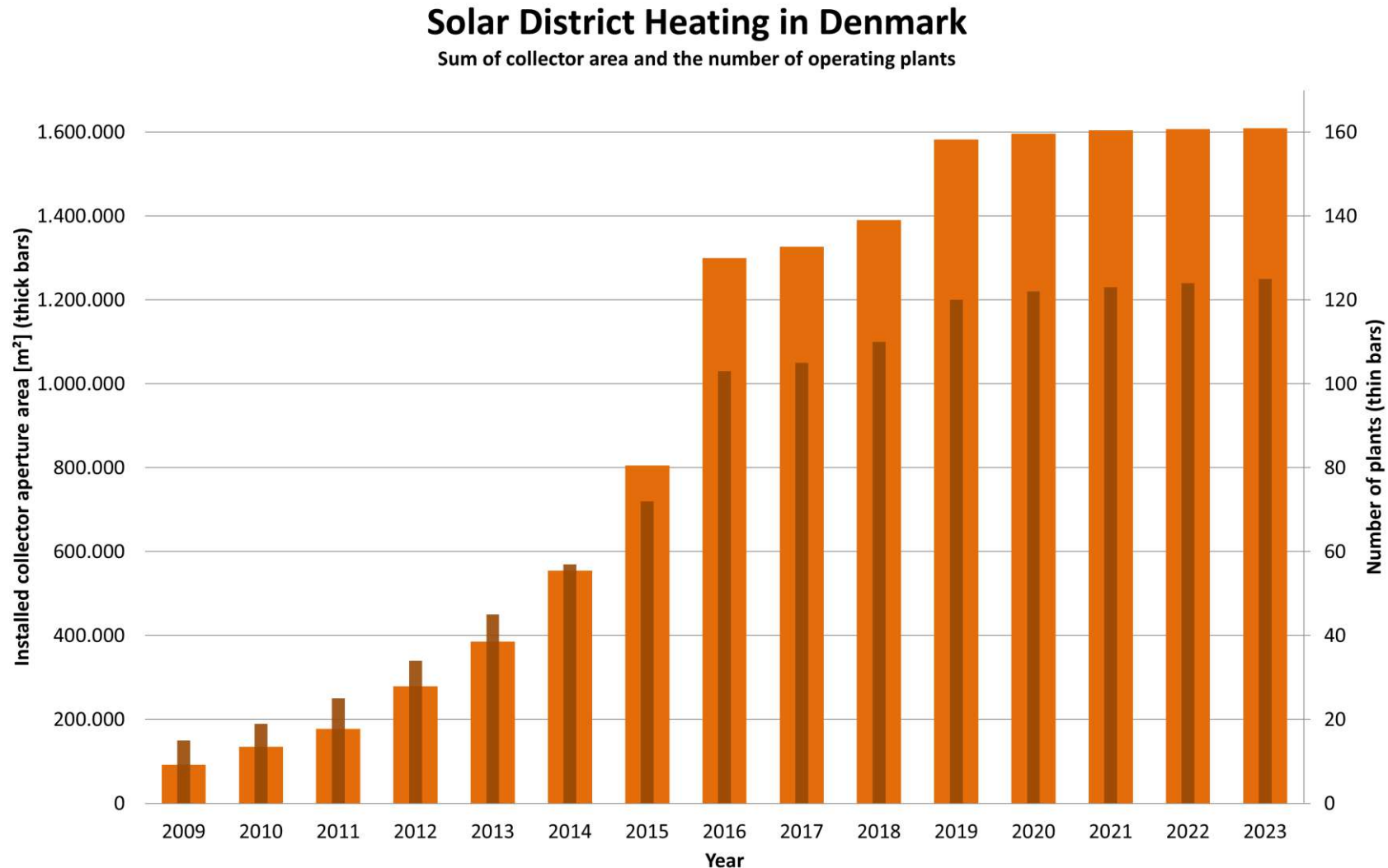
(Power to mobility.
Flexible demand of electricity to electrical cars, busses, trucks..)

Upcoming

PtX. (Flexible) demand to produce hydrogen, ammonia, methane, methanol..)

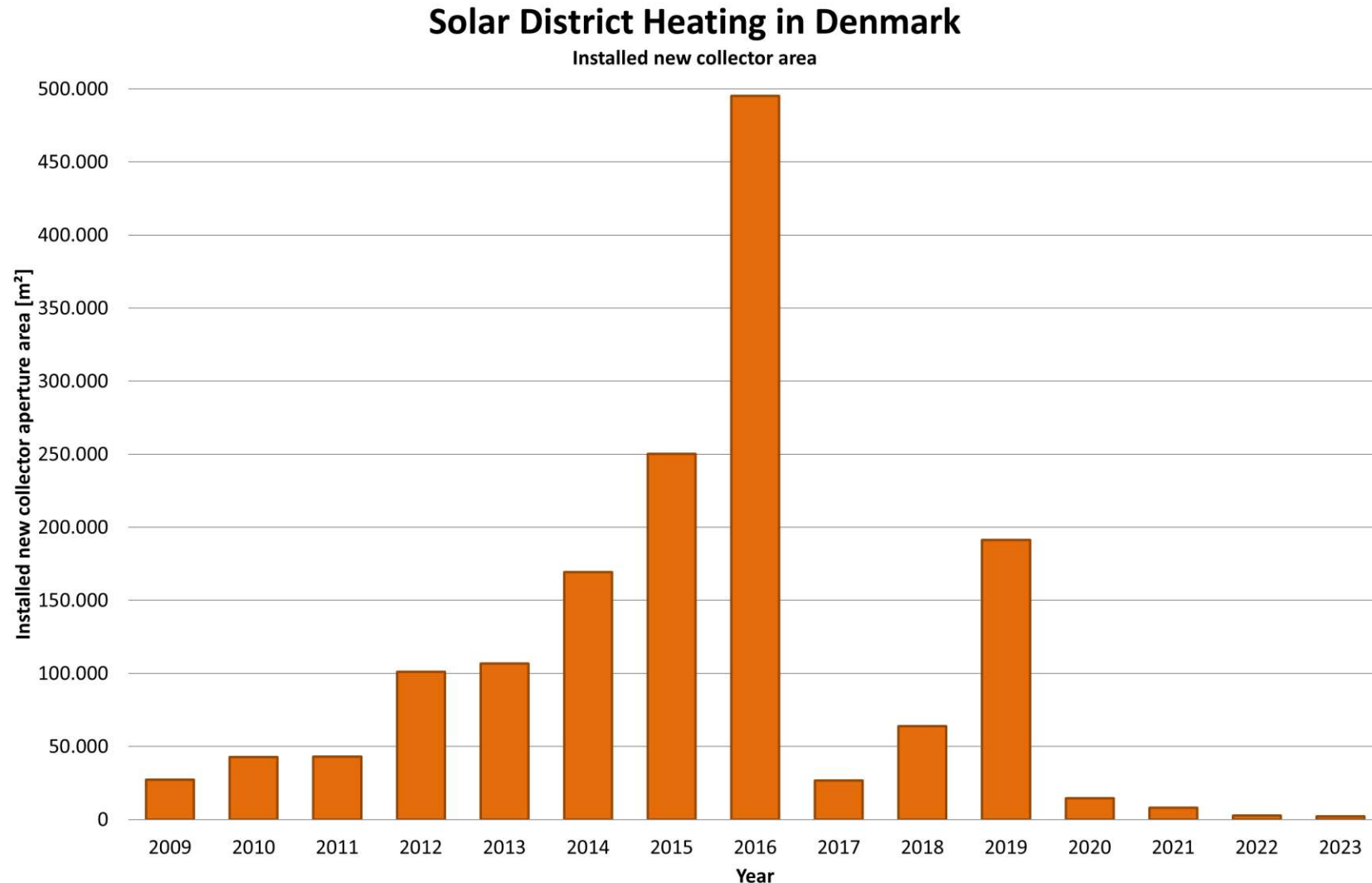
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Historical SDH development in Denmark



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Historical SDH development in Denmark



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Heat pumps and solar thermal



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Heat pumps promoted

No fossil fuels in the heating sector by 2030 (phasing out coal, oil and natural gas)

Reduction of electricity tax for heating purpose down to 1 €/MWh

Simplifying rules for applying excess heat

Support for converting individual gas-based heating to heat pumps or DH

Certification of sustainability of biomass supply

Pit heat storages (PTES)

- Solar thermal and thermal storages



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More information

- IEA SHC Task 52 report on SDH trends and possibilities (incl. background for SDH in DK)

<http://task.iea-shc.org/Data/Sites/1/publications/SDH-Trends-and-Possibilities-IEA-SHC-Task52-PlanEnergi-20180619.pdf>

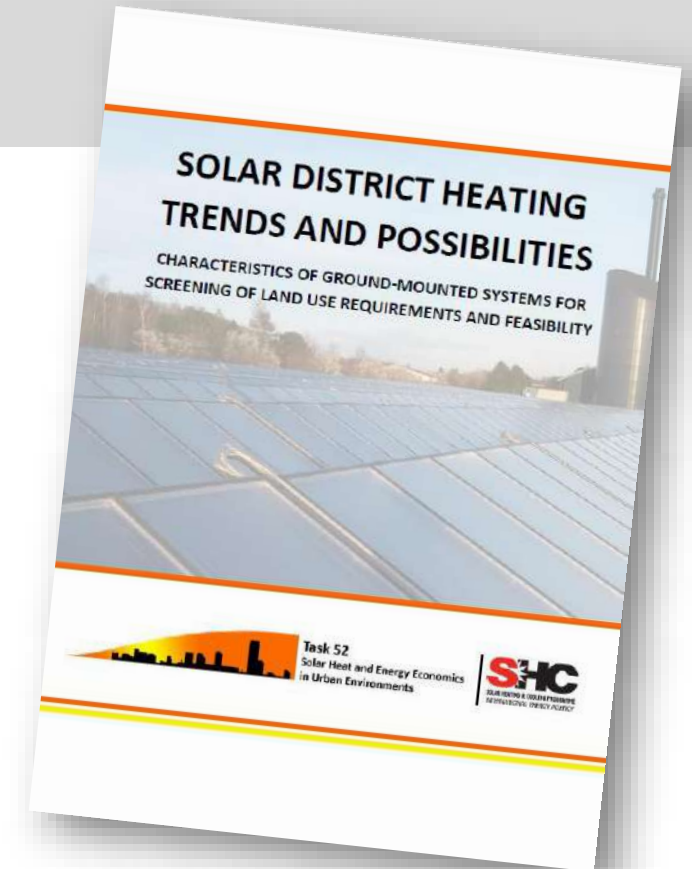
- IEA SHC Task 68: Efficient Solar District Heating Systems

<https://task68.iea-shc.org>

The project has received funding from EUDP - The Energy Technology Development and Demonstration Programme.



- Ask...



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