

# Solar district heating

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AGFW | Energy efficiency association for heating, cooling and CHP

Germany, Frankfurt am Main

- **AGFW** is the independent and impartial association in Germany promoting energy efficiency, (district) heating, cooling and CHP at national and international levels
- **AGFW** reunites round about 500 (regional and municipal) district energy suppliers, consultants and industrial operators of this industry (component and system manufacturers, manufacturing and assembling companies, testing institutes, ...) in Germany and Europe
- **AGFW** represents over 95 % of the heat load connected to German district heating systems – the largest scale in Western Europe.
- **AGFW** means over 40 years of experience in this field. Established 1971 we have a long and distinguished track record of delivering energy efficiency solutions to our members and to the society



- Project *SDHplus*
- Integration of solar plants in district heating grids
- Multifunction thermal energy storage
- Munich – storage construction
- Smart District Heating
- Project results

## Project *SDHplus*

- Business models for solar district heating
- Case studies for ‘first-of-its-kind’-plants and innovative DH net integrations
- Marketing approaches for district heating with solar heat
- One-to-one coaching of learning countries ES, FR, HR, LT, PL, SI
- International SDH conferences and workshops

Duration: July 2012 – June 2015  
Implementation in 12 EU-countries

German partner (coordination):

**solites**

**AGFW**



Supported by:



Intelligent Energy Europe Programme  
of the European Union



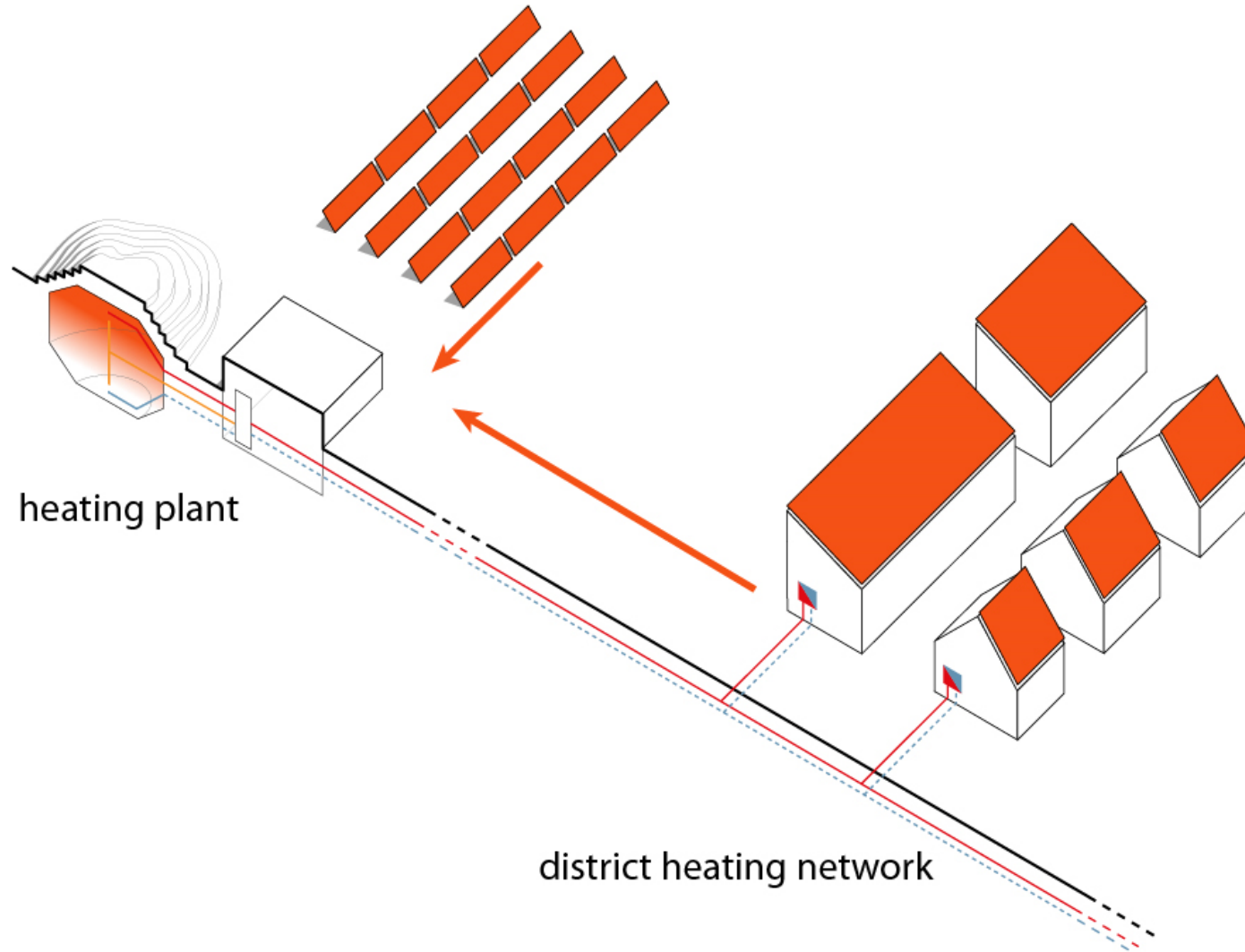
Bundesministerium  
für Wirtschaft  
und Energie



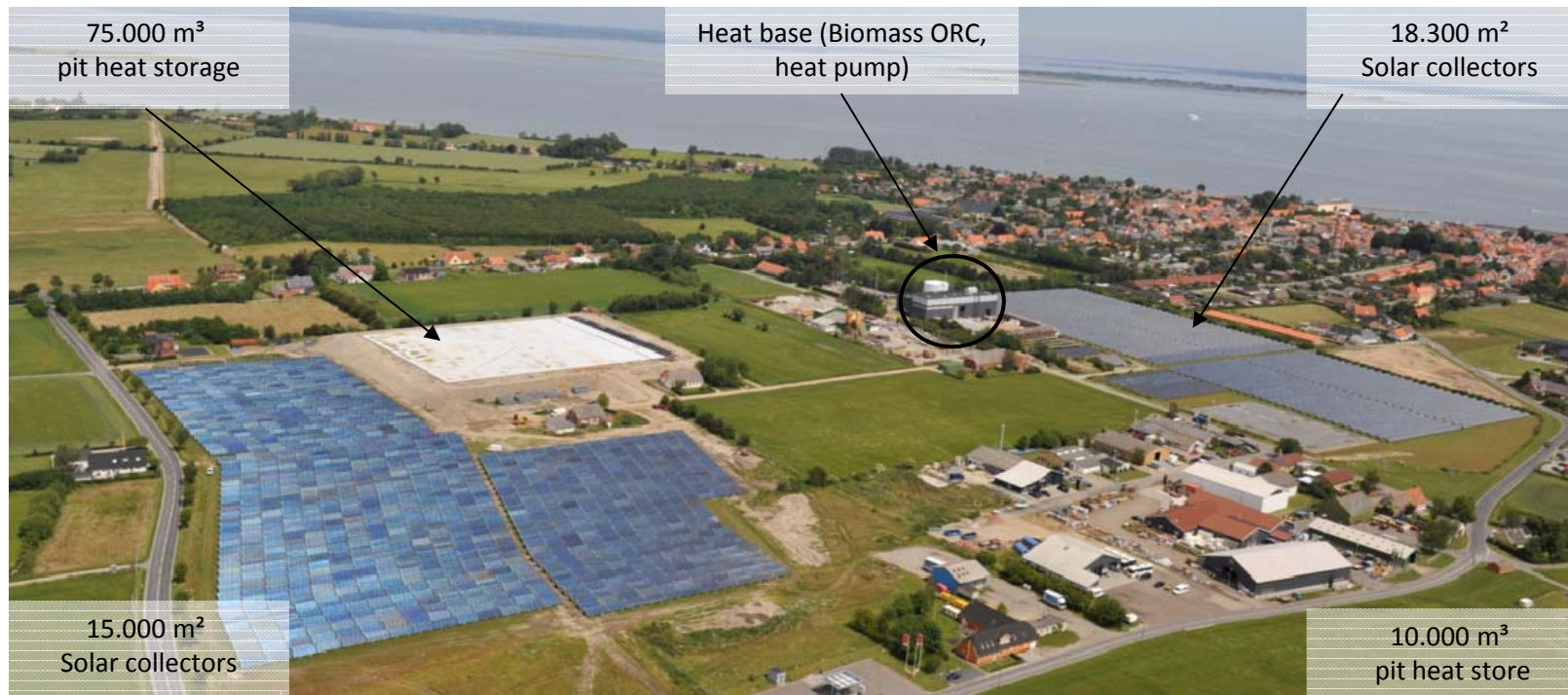
## Integration of solar plants in district heating grids



# Central solar district heating plant



# Centralised solar district heating in Denmark



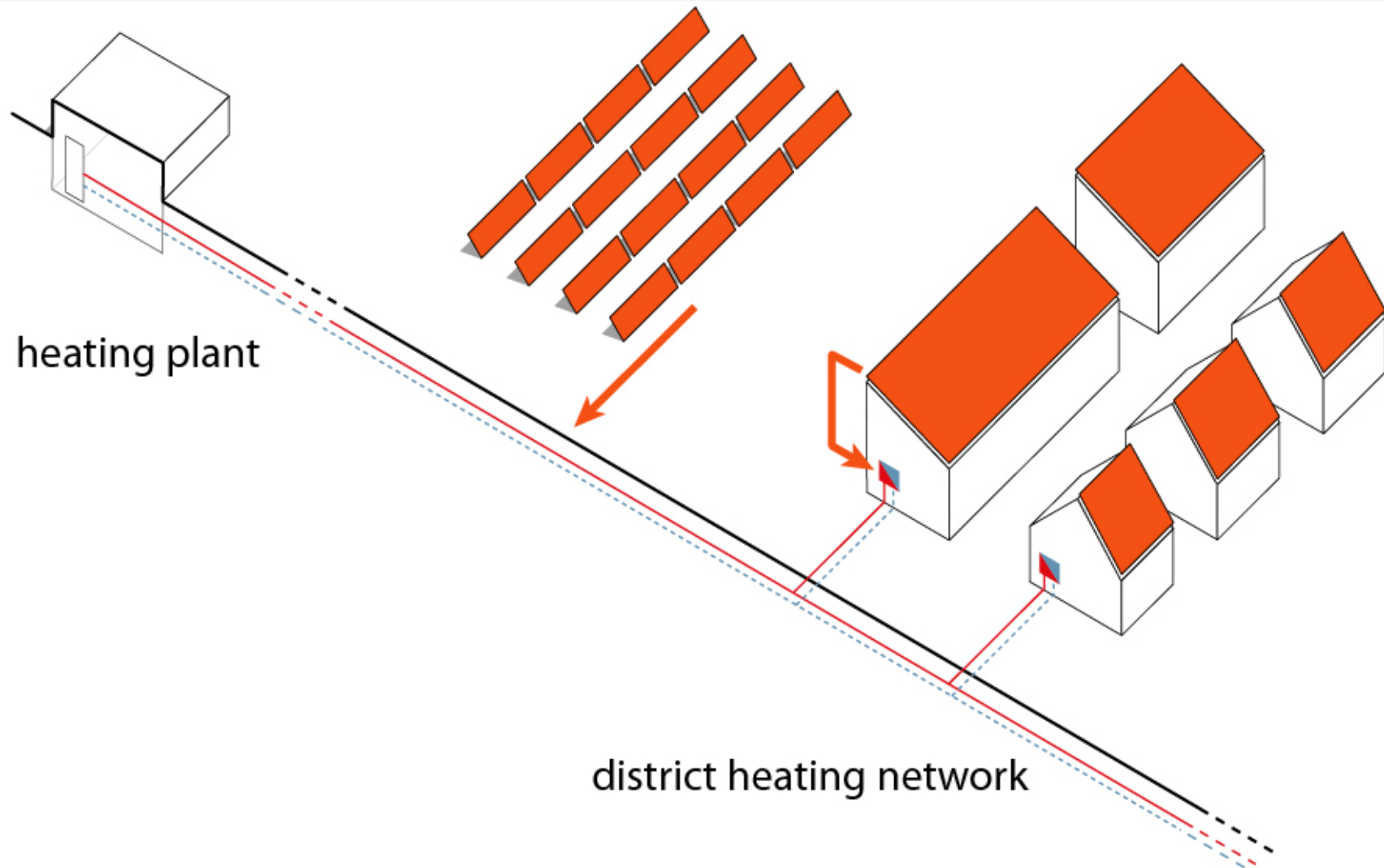
## Marstal District Heating, DK (2012)

Solar collector area:	33.300 m <sup>2</sup>
Storage type:	85.000 m <sup>3</sup> pit heat store
Heat output:	31.996 MWh/a
Heat load:	32 GWh/a
Solar fraction:	55 %

# Central feed-in in district heating nets in Denmark

Marstal District Heating, DK (2012), storage construction



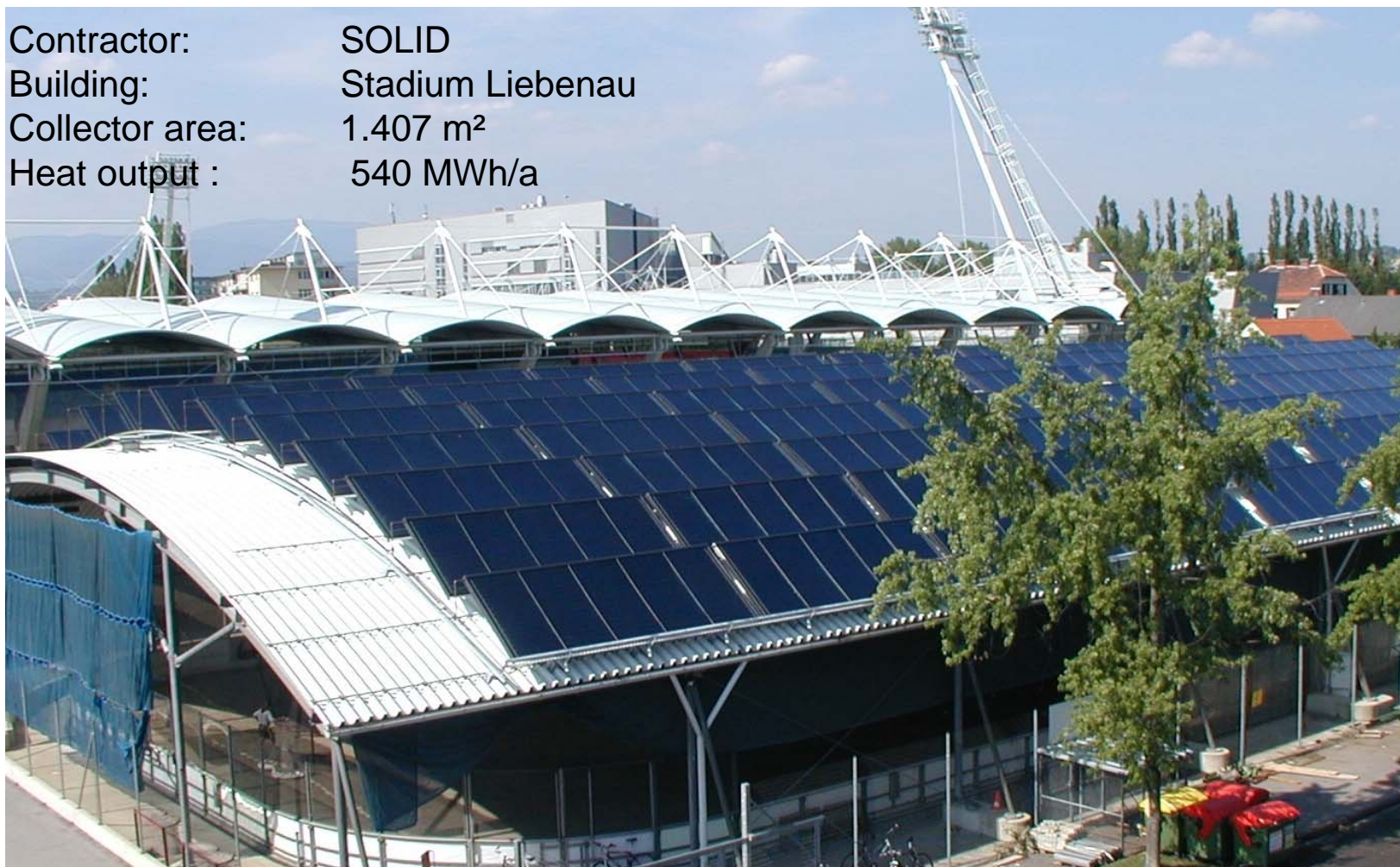


## Distributed Solar District Heating in Austria



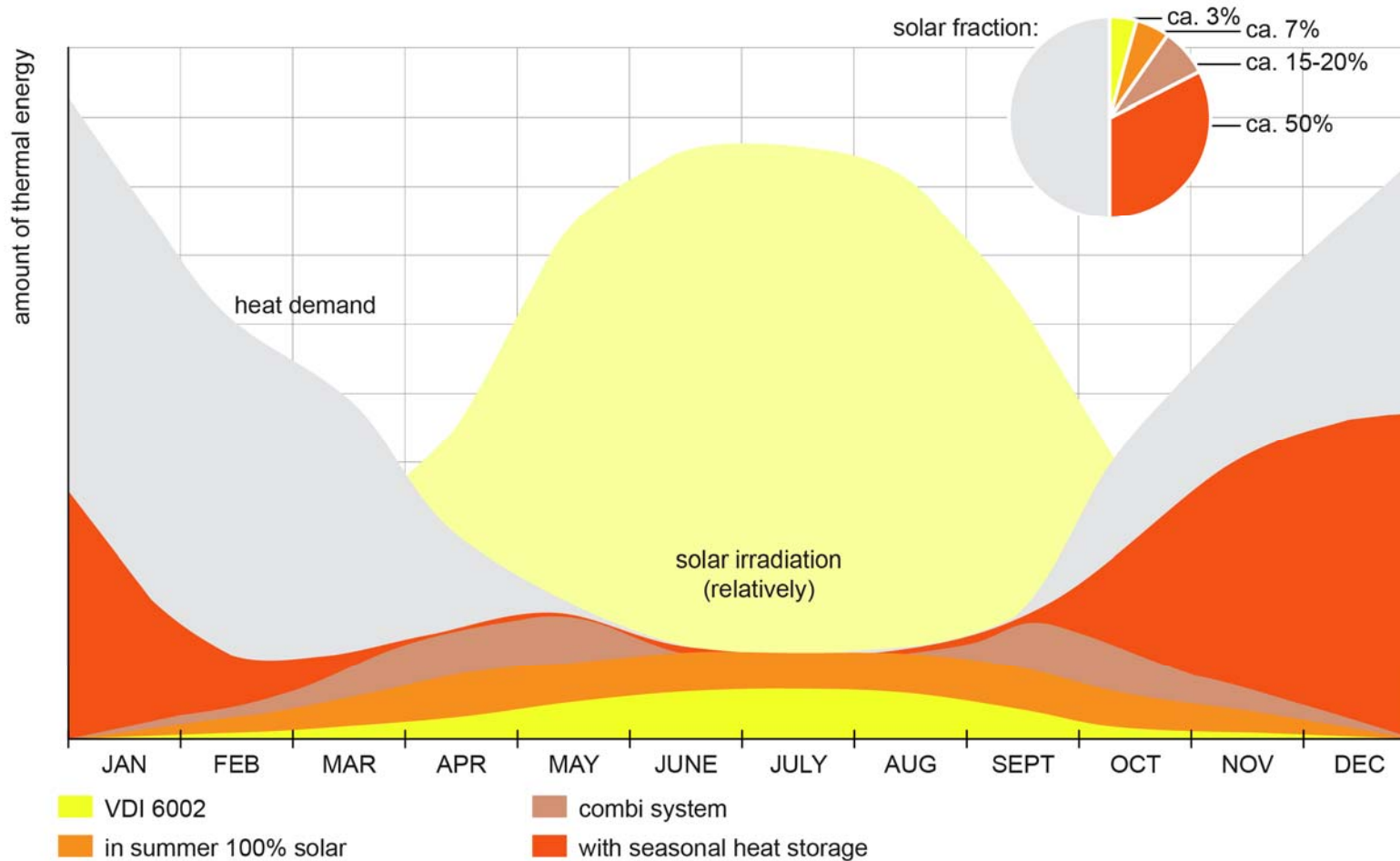
# Decentral feed-in in the district heating net in Graz, Austria

Contractor: SOLID  
Building: Stadium Liebenau  
Collector area: 1.407 m<sup>2</sup>  
Heat output : 540 MWh/a



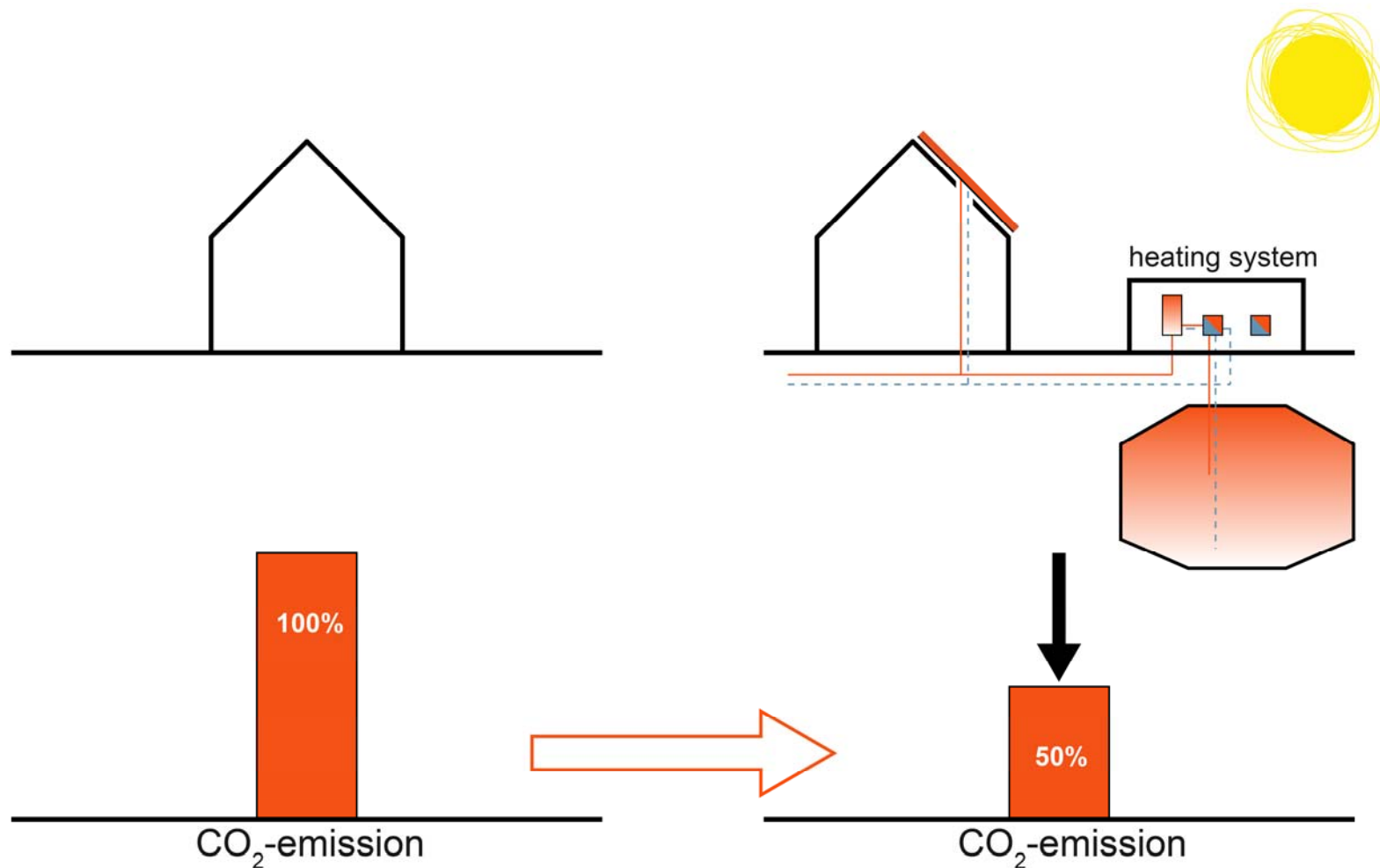
## Multifunction thermal energy storage

# Heat demand and possible solar systems

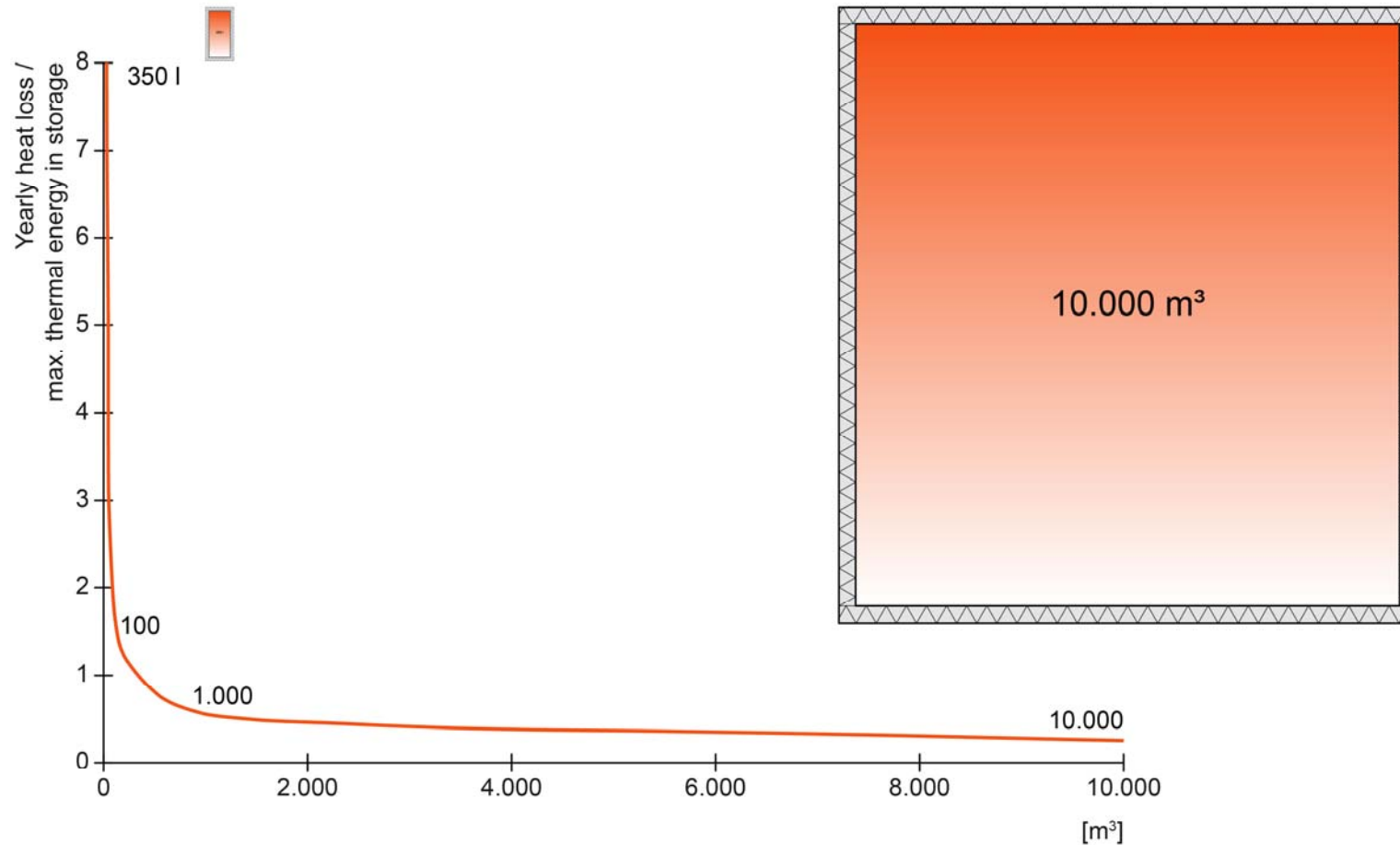




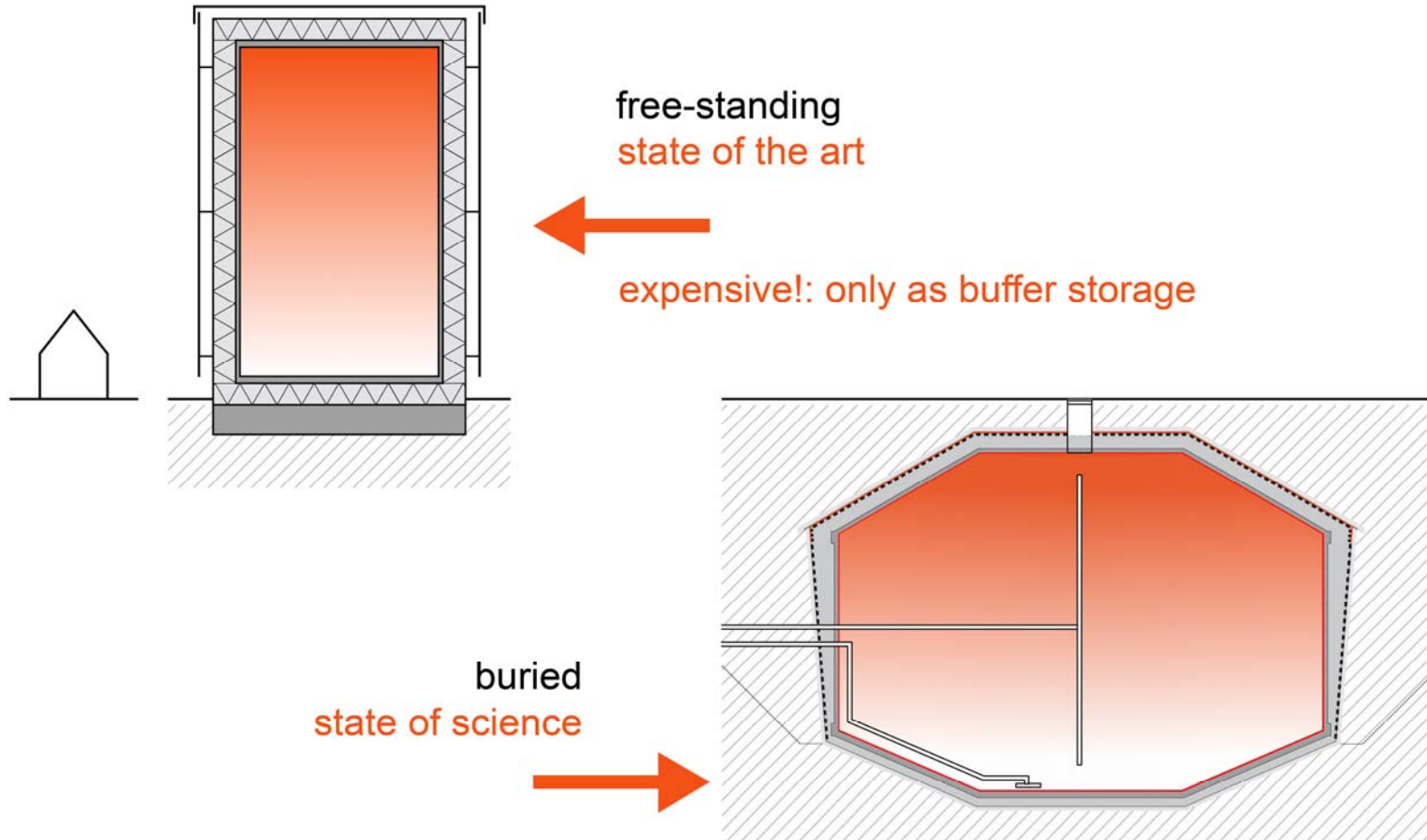
# Solar local heating with seasonal heat storage



# Seasonal thermal energy storages (STES) are big!

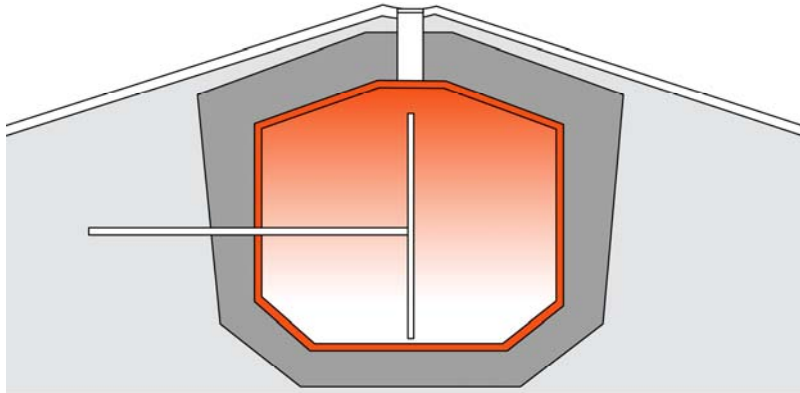


# Basic typology of long-term heat storages

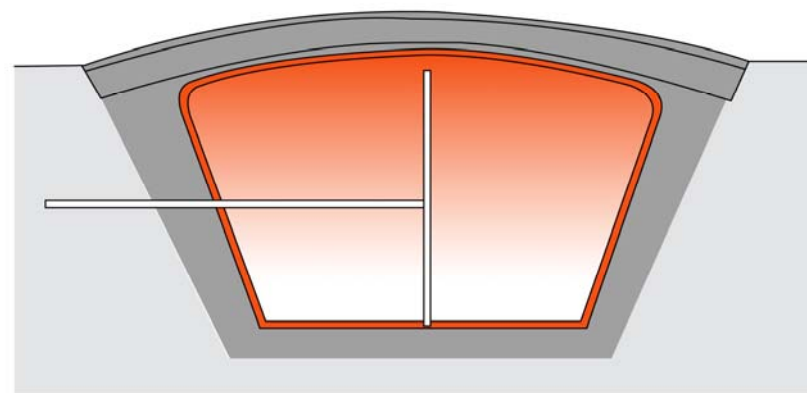


# Seasonal thermal energy storage (STES) - typology

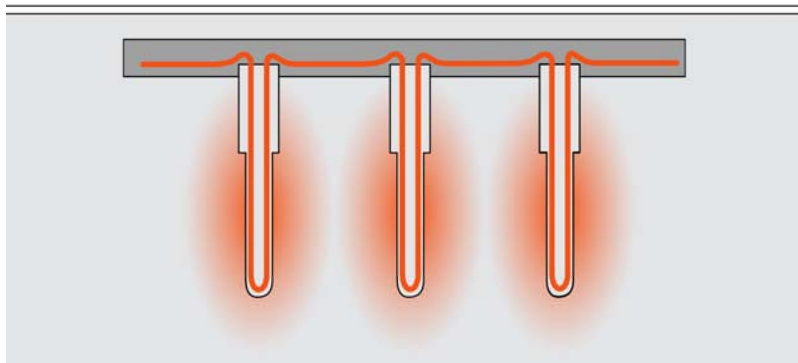
Tank thermal energy storage (TTES)  
(60 to 80 kWh/m<sup>3</sup>)



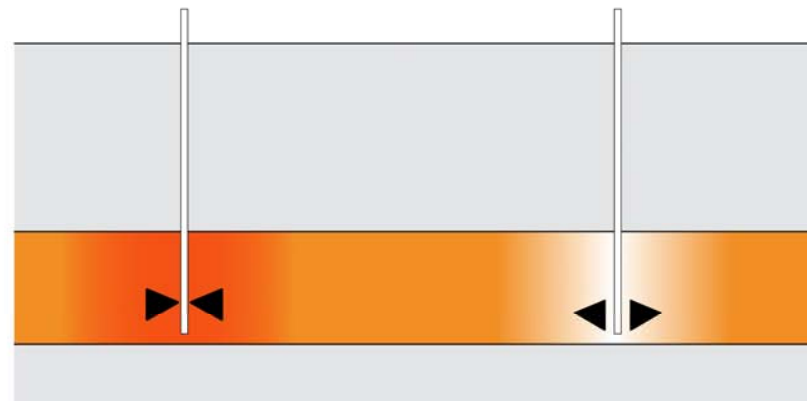
Pit thermal energy storage (PTES)  
(60 to 80 kWh/m<sup>3</sup>)



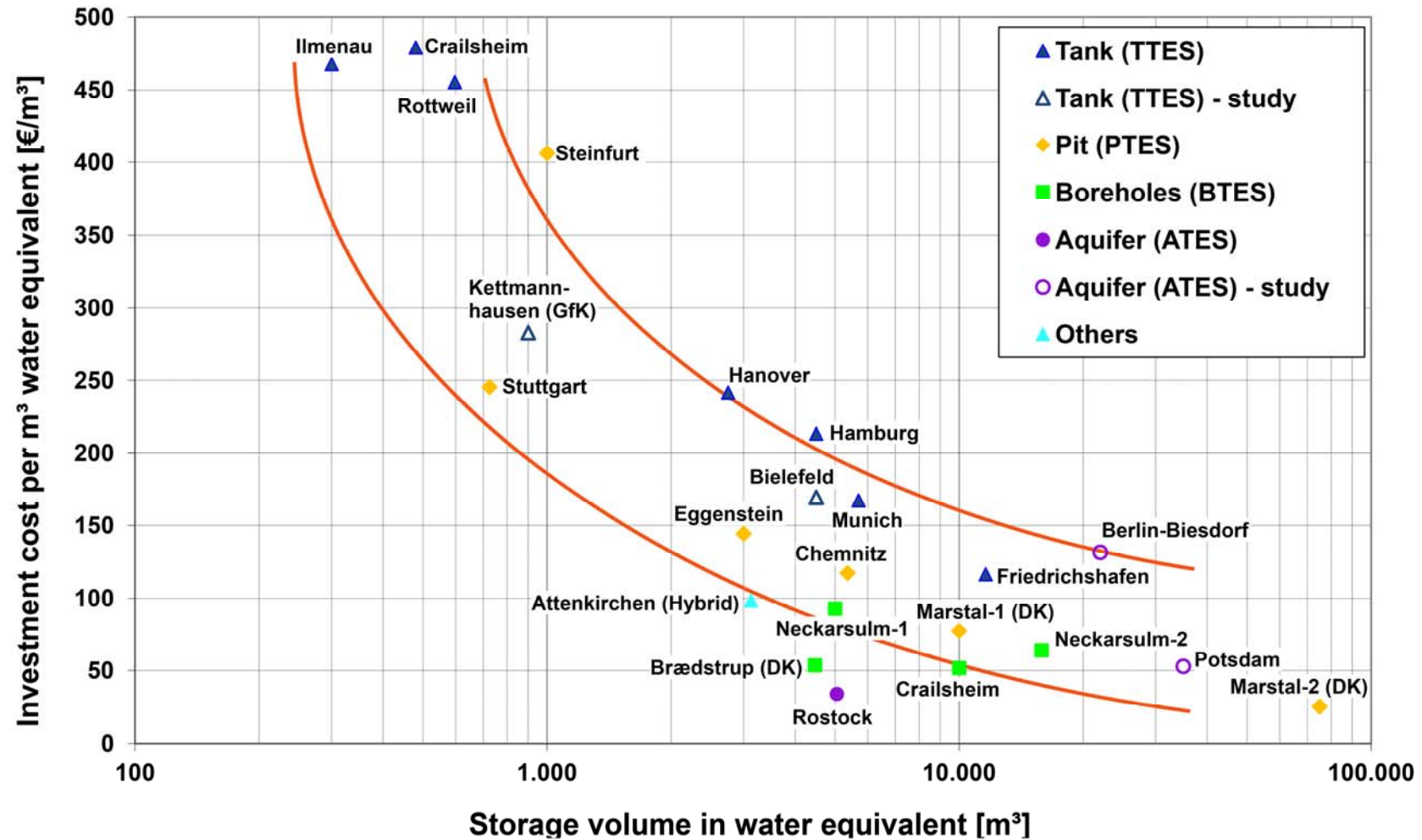
Borehole thermal energy storage (BTES)  
(15 to 30 kWh/m<sup>3</sup>)



Aquifer thermal energy storage (ATES)  
(30 to 40 kWh/m<sup>3</sup>)



# Investment cost of seasonal thermal energy storages



## Munich – storage construction

# Munich – storage construction













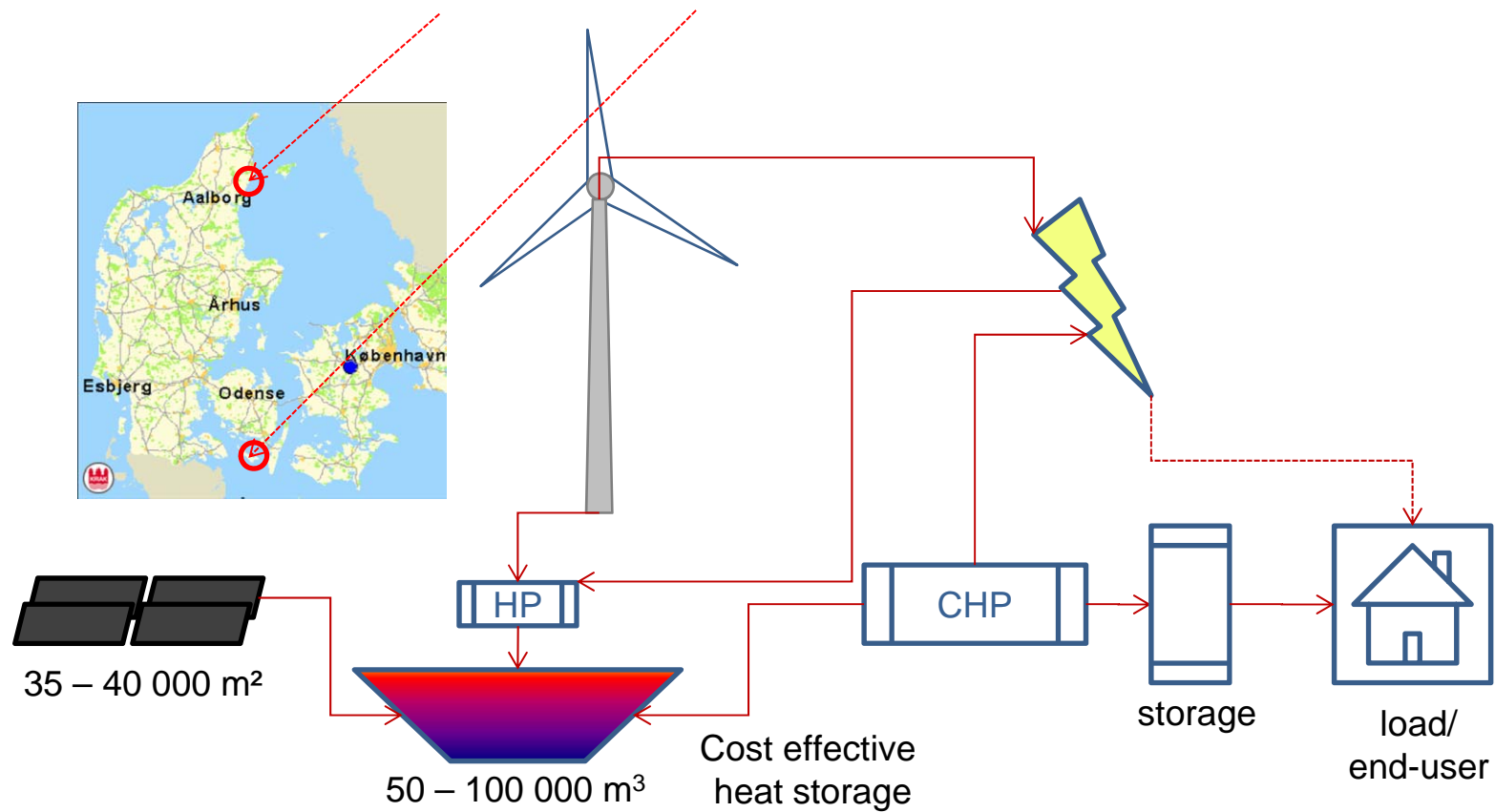






## Smart District Heating

Examples: Dronninglund and Marstal



Quelle: PlanEnergi, DK



## Project results

- Up-to-date news
- Market studies
- Plant data base
- SDH guidelines
- Workshops & training courses
- 'Find professionals'
- Contact points

The screenshot displays the SDH website homepage. At the top left is the SDH logo. A navigation menu on the left lists: Home, SDH, News & Events, Documents, Services, About SDH Projects, Partner Extranet, and Imprint. Below the menu is a search bar and a list of countries where the project is represented, including Europe, Austria, Czech Republic, Germany, Denmark, Croatia, Spain, France, Hungary, Italy, Lithuania, Poland, Romania, Sweden, and Slovenia. The main content area features a 'Welcome to our SDH platform!' section with links for 'District heat suppliers, utilities and contractors', 'Component suppliers, service providers and professionals', 'Local communities, housing and industry enterprises', and 'Policy makers and support scheme managers'. A 'Solar District Heating Update' section highlights a project in France: 'The first R&D project about Solar District Heating in France: Smart Grid Solaire Thermique'. On the right, there are several promotional boxes: 'NEW Brochure and Project Leaflets', 'Download all SDH guidelines in one file', 'Contact our helpdesk!', 'Ranking List of European Large Scale Solar Heating Plants', 'Find professionals', and 'Participate in the upcoming SDH events'. The website also mentions support from the Intelligent Energy Europe program.

"A key success factor is the involvement of one or more local actors with know-how and interest in the implementation and demonstration of this technology. These are usually a municipality, local utilities, based manufacturer, or a combination of these actors. "

Project website: [www.solar-district-heating.eu](http://www.solar-district-heating.eu)

Coordinator: Solites  
Steinbeis Research Institute for  
Solar and Sustainable  
Thermal Energy Systems  
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solites

In cooperation with: AGFW  
Der Energieeffizienzverband für  
Wärme, Kälte und KWK

AGFW

Supported by:



Intelligent Energy Europe Programme  
of the European Union



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für Wirtschaft  
und Energie

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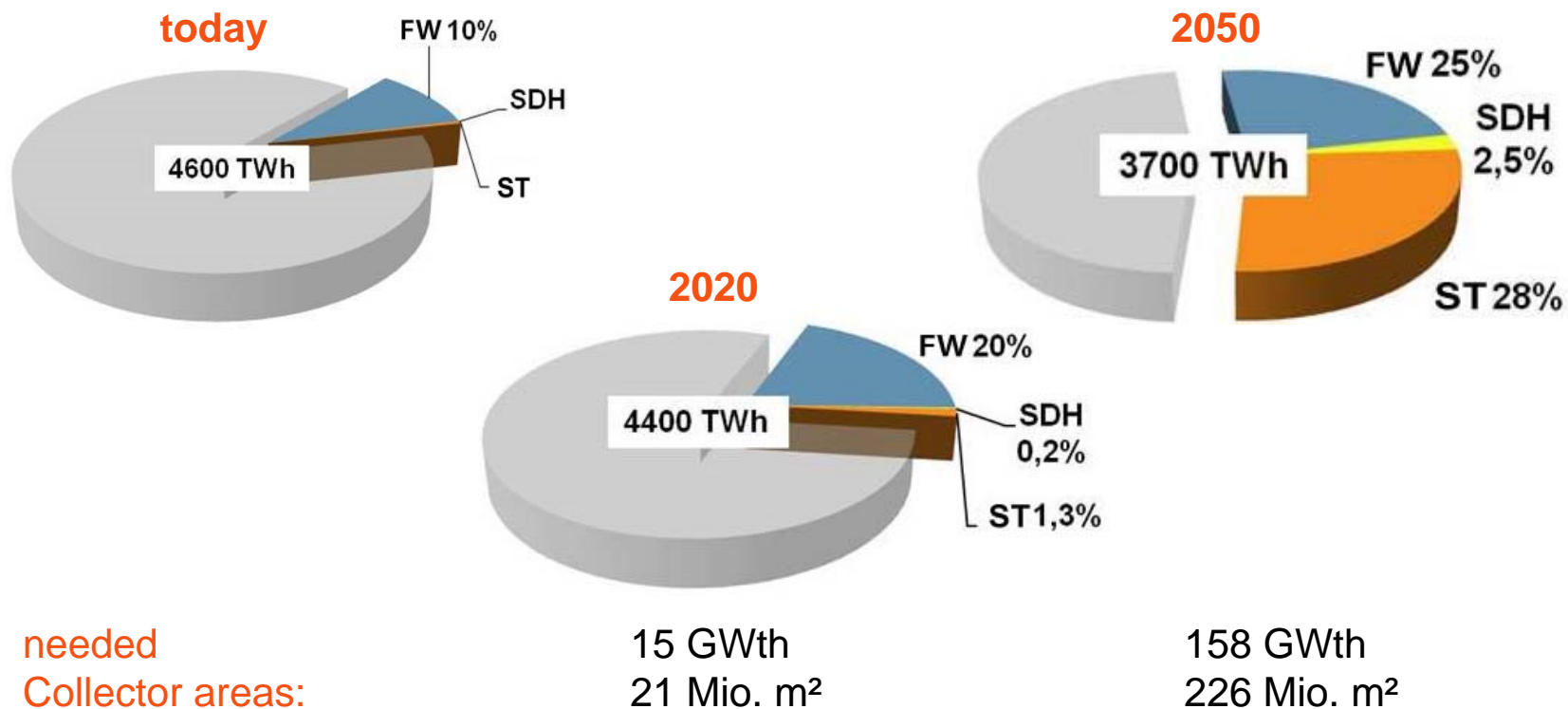
## Questions and Answers



thank you.

## Market potentials

# Market potentials of the solar local and district heating (EU)



sources:

- Potential of Solar Thermal in Europe, AMD scenario, Weiss and Biermayr, 2009, [www.estif.org](http://www.estif.org)
- District Heating and Cooling – a vision towards 2020 – 2030 – 2050, DHC+ Platform, [www.dhcplus.eu](http://www.dhcplus.eu)
- 2010: Solar Thermal Markets in Europe, [www.estif.org](http://www.estif.org)
- 2020, 2050: Potential of Solar Thermal in Europe, AMD scenario, Weiss and Biermayr, 2009, [www.estif.org](http://www.estif.org)
- 2010: Success Stories in Solar District Heating, [www.solar-district-heating.eu](http://www.solar-district-heating.eu)



In many cases replacing heat from CHP is neither economically nor ecologically recommendable or feasible!

A useful integration of solar thermal into district heating is given for cases where

- heating-only plants or peak load heating plants are replaced
- CHP is no more competitive as base load
- the CHP share is increased by using large heat stores for both CHP and solar
- specific RES heat shares or primary energy factors are required/requested
- new business models are applied
- CHP capacity limits are reached, e.g. with heating net extension or compression
- other CHP control strategies are relevant in the future .
- ...