

# GEO-SOLAR DISTRICT HEATING

## - Lessons Learnt from a not Realised Project

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# The Project

Development of an innovative heat supply concept for the housing area „Zum Feldlager“ in Kassel/Germany



# The Project

## Development of an innovative heat supply concept for the housing area „Zum Feldlager“ in Kassel/Germany

### Boundaries for the project:

- “**Future save**” and innovative development, affordable prices
- Minimized primary energy use, reduction of CO<sub>2</sub> & no fine dust emissions, efficient energy use, integration of renewable energy sources.
- 130 buildings in future German building Standard (approx. 45 kWh/m<sup>2</sup>a)
- **Pre-study for the selection of technology sets**



# Analyzed Supply Variants

- De-central air/water-heat pumps, domestic hot water preparation (DHW) supported by solar thermal systems
- De-central gas-condensing boiler with solar thermal systems for domestic hot water preparation (DHW) (**Reference**)

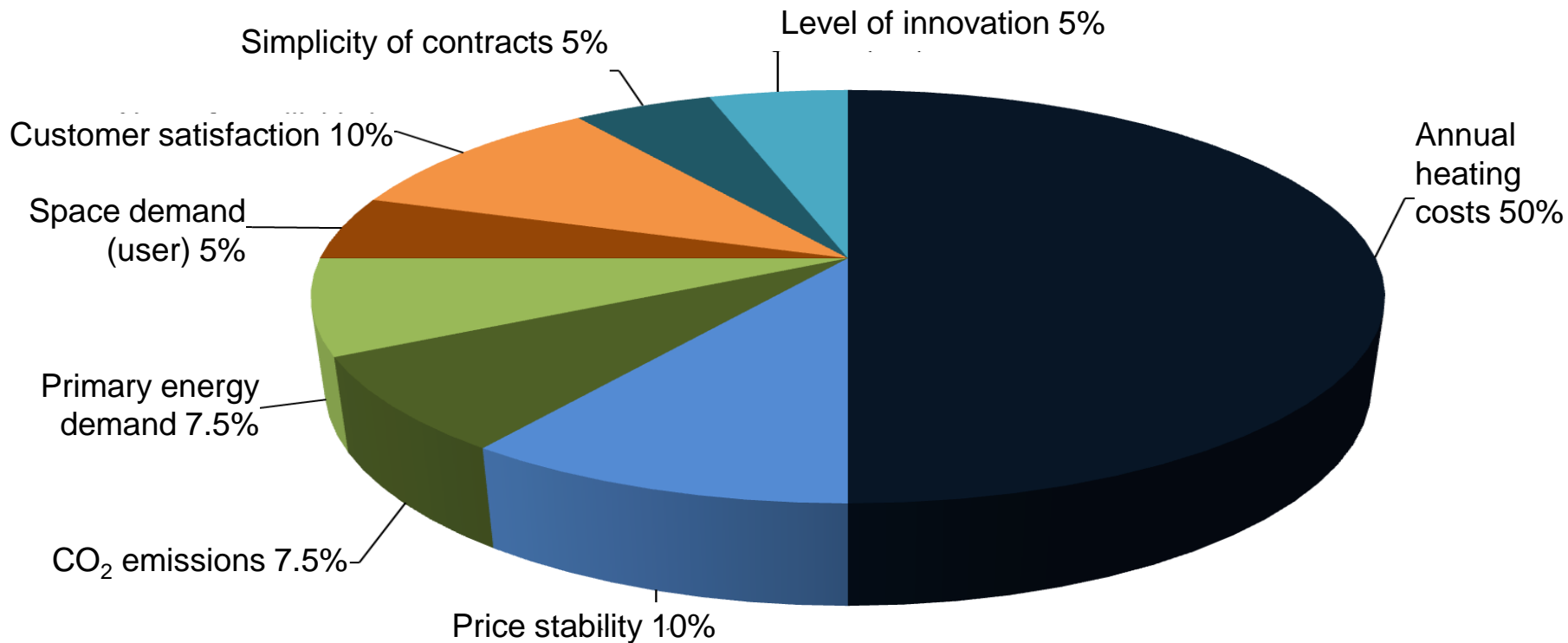
Building  
focused

- De-central water/water heat pumps connected to cold DH system (**20°C**) in combination with solar thermal systems and heating rod for DHW
- Central heat supply via heat pump and low temperature DH (**40°C**) in combination with de-central solar thermal systems and heating rod for DHW
- Gas-CHP-heat pump system with CHP unit and electric heat pump in combination with large heat storage. Operated with natural-gas or bio-gas

Community  
focused

# Assessment of the Variants

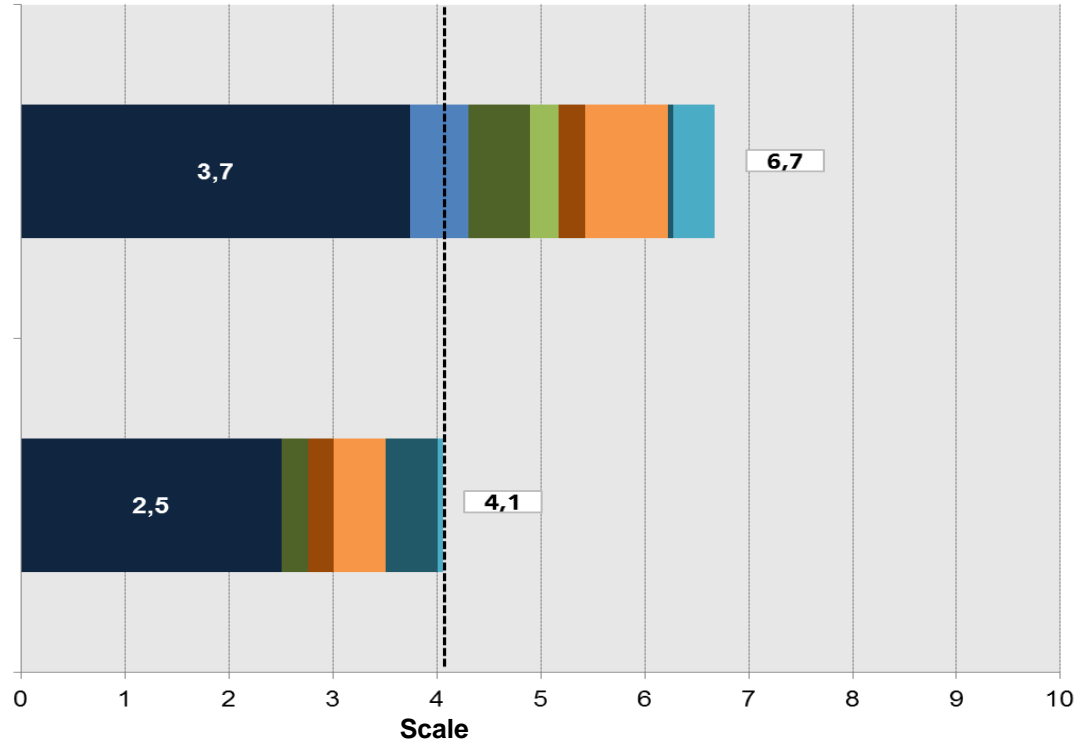
## - Parameters and Weighting Factors



# Results from the Pre-Study

Chosen Variant  
(Geo-Solar District Heating)

Reference  
(Gas Condensing Boiler)

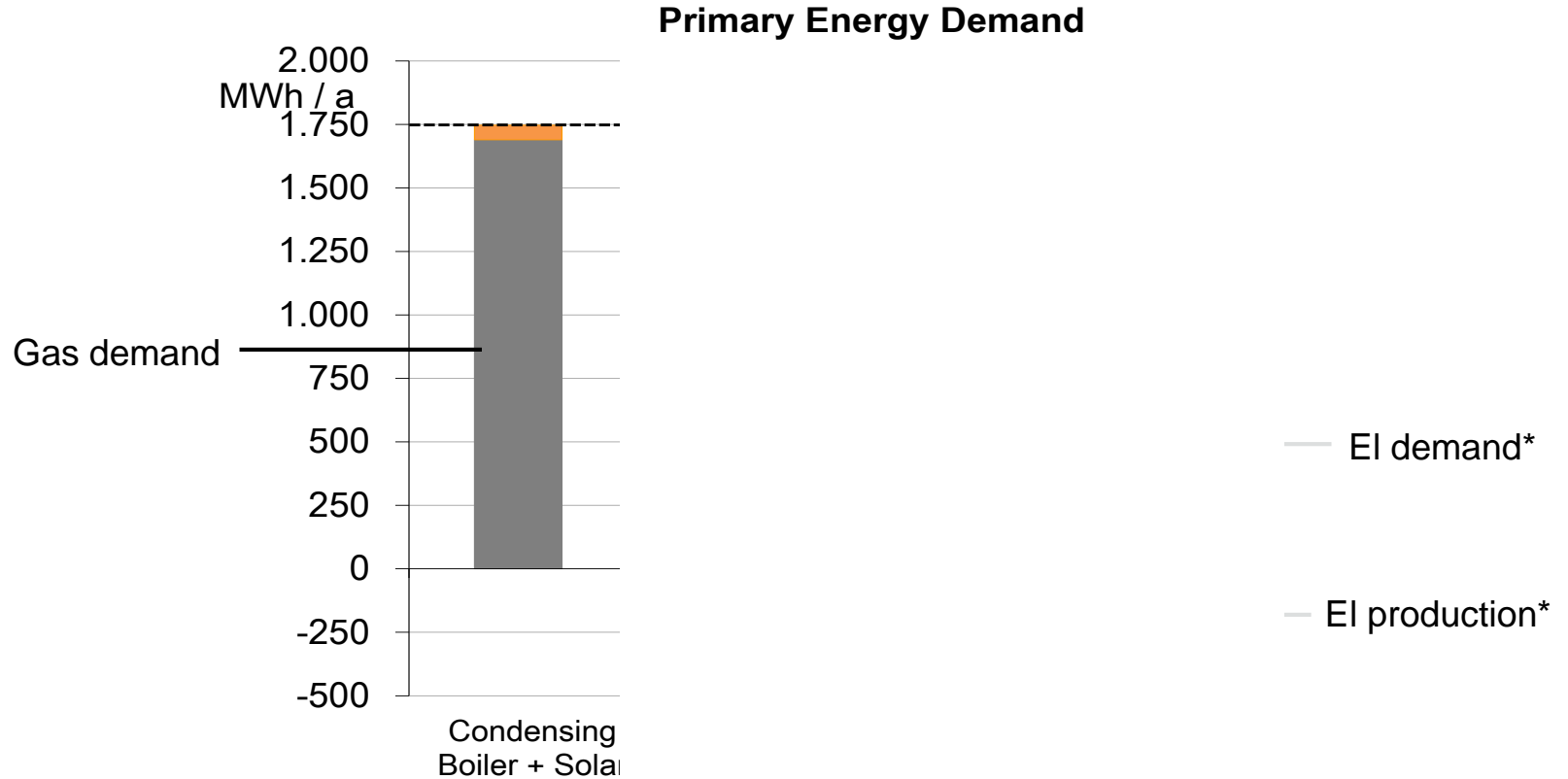


- Annual heating costs 50%
- Primary energy demand 7.5%
- Simplicity of contracts 5%

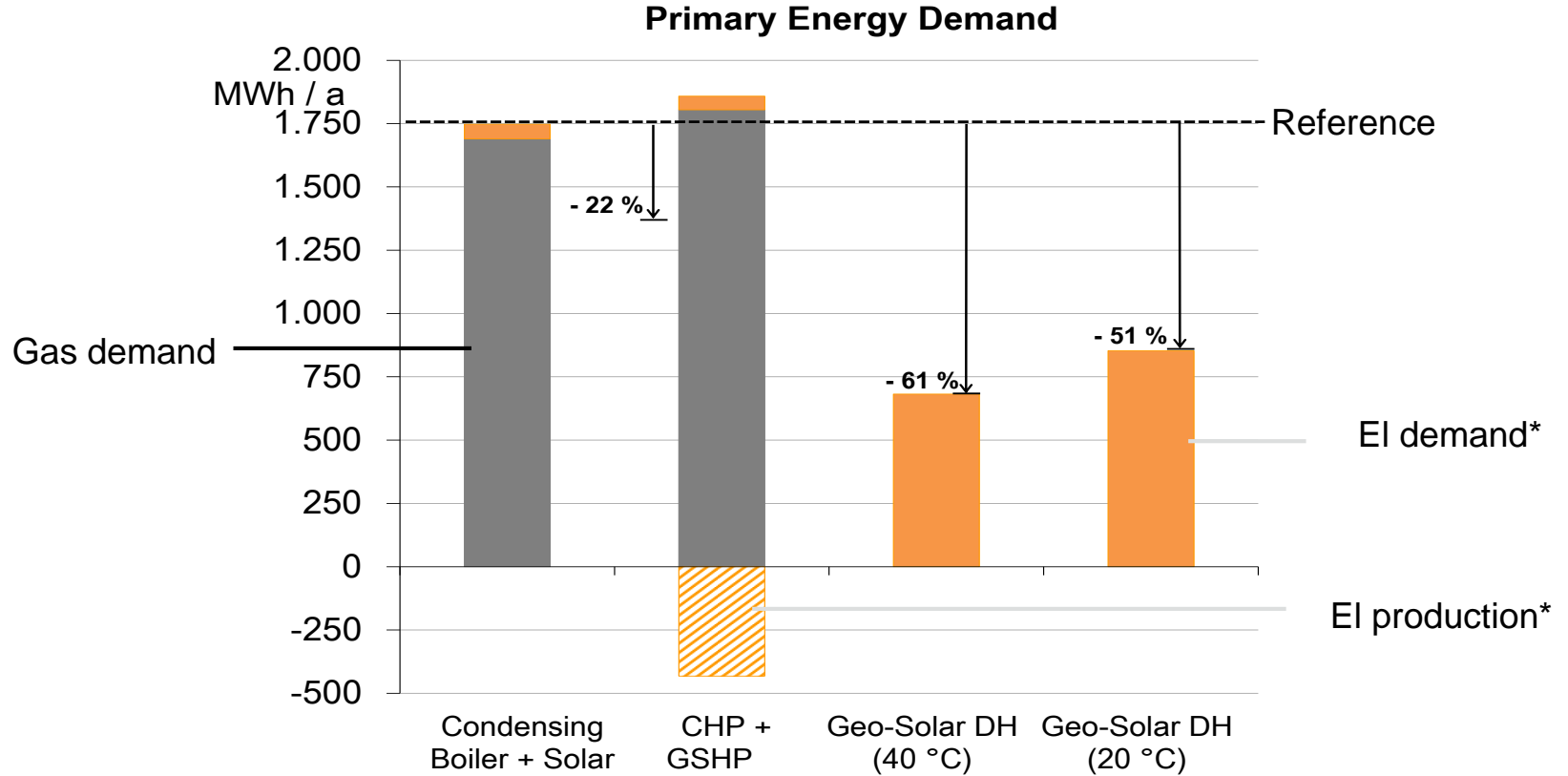
- Price stability 10%
- Space demand (user) 5%
- Level of innovation 5%

- CO<sub>2</sub> emissions 7.5%
- Customer satisfaction 10%

# Results - Ecological Assessment

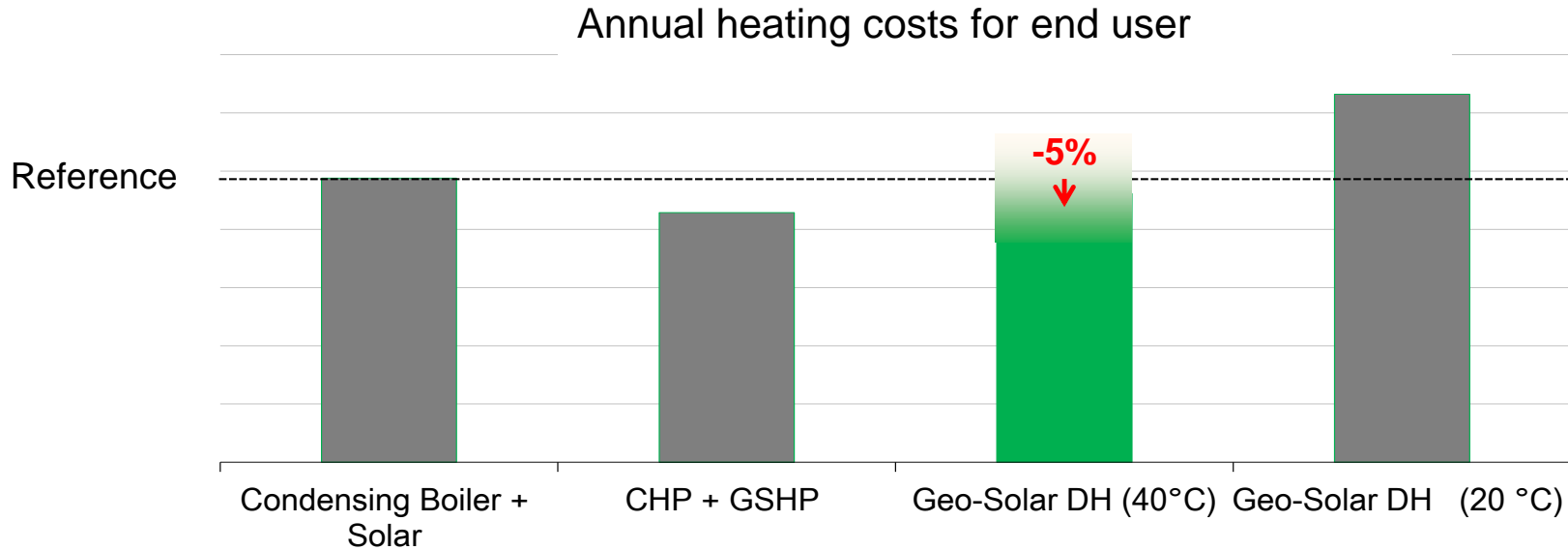


# Results - Ecological Assessment





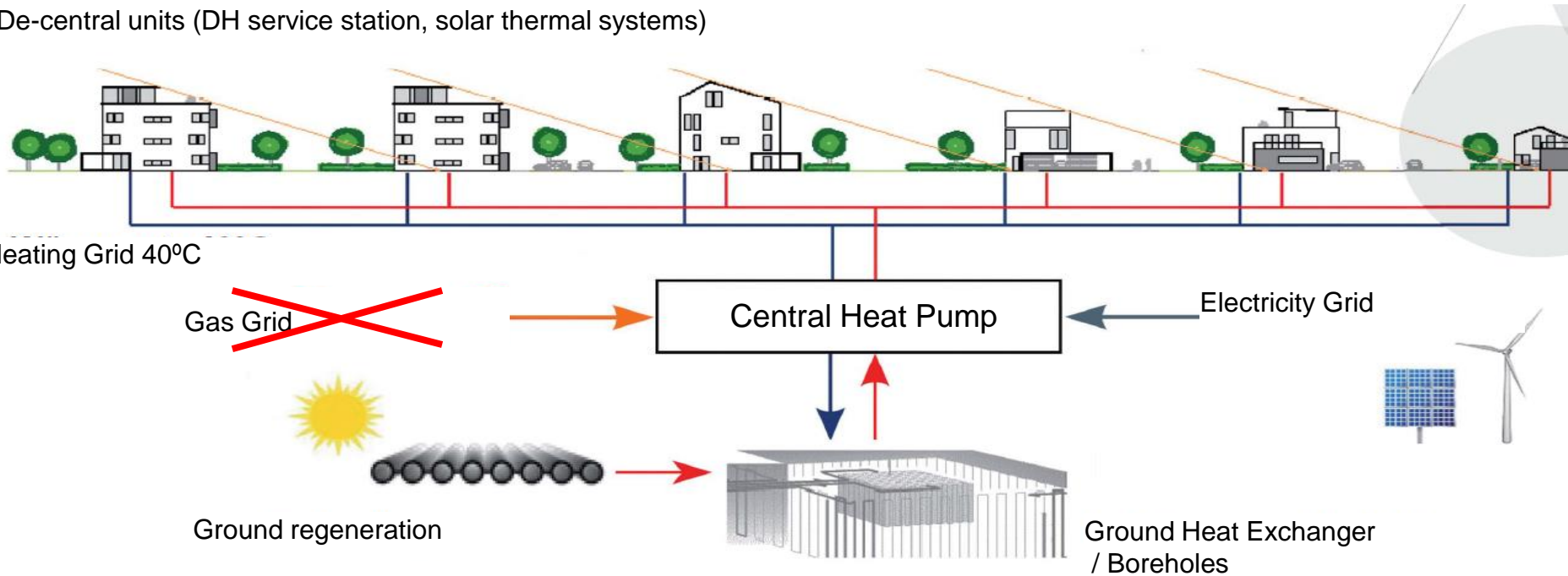
# Results - Economical Assessment



Cost estimation includes investment-/capital-, operational-, maintenance- and personal costs.  
15 years for technical equipment, 30 years for infrastructure

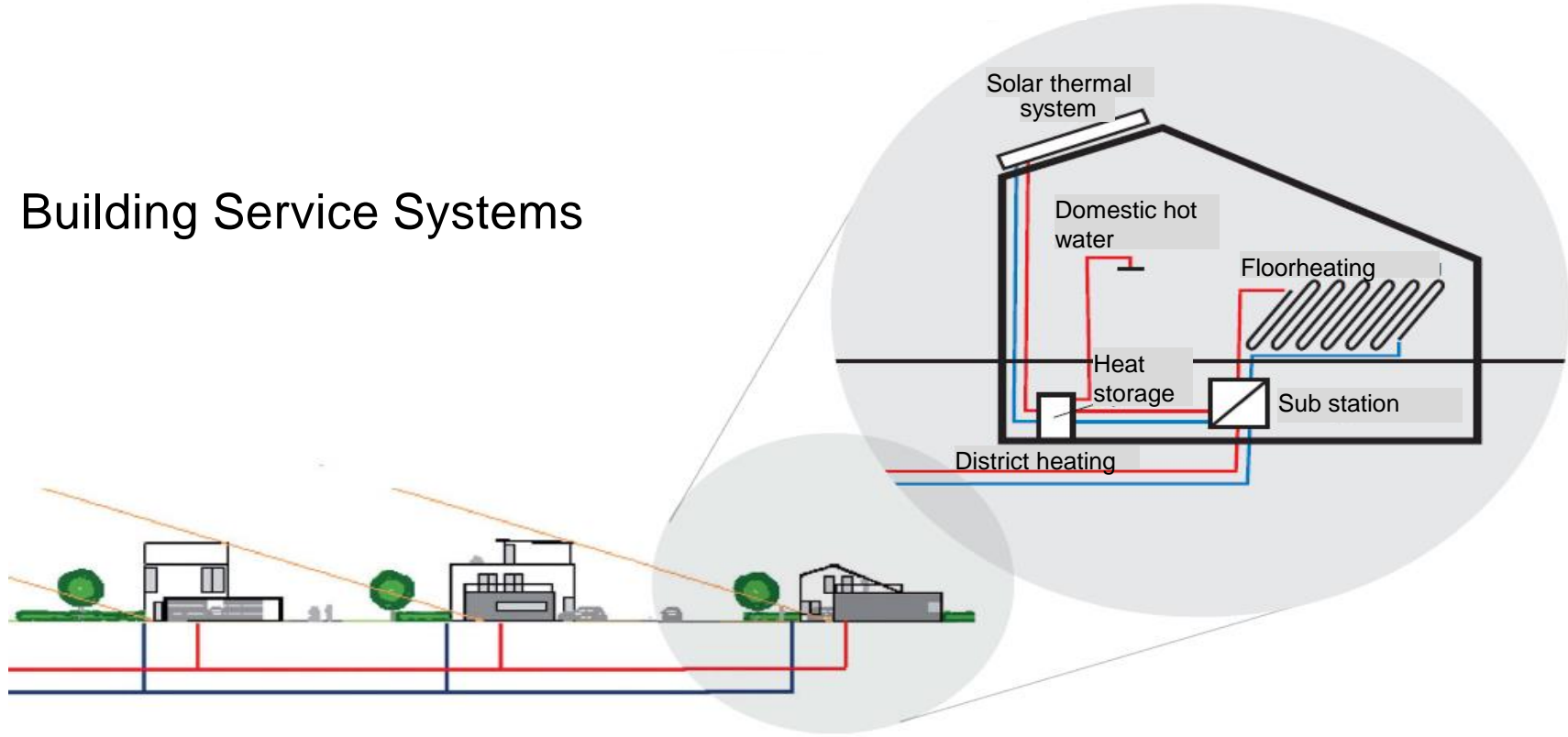
# Geo-Solar District Heating - Chosen Supply Variant

De-central units (DH service station, solar thermal systems)



# Geo-solar District Heating - Chosen Supply Variant

## Building Service Systems



# Summary

Gefördert durch:



aufgrund eines Beschlusses  
des Deutschen Bundestages

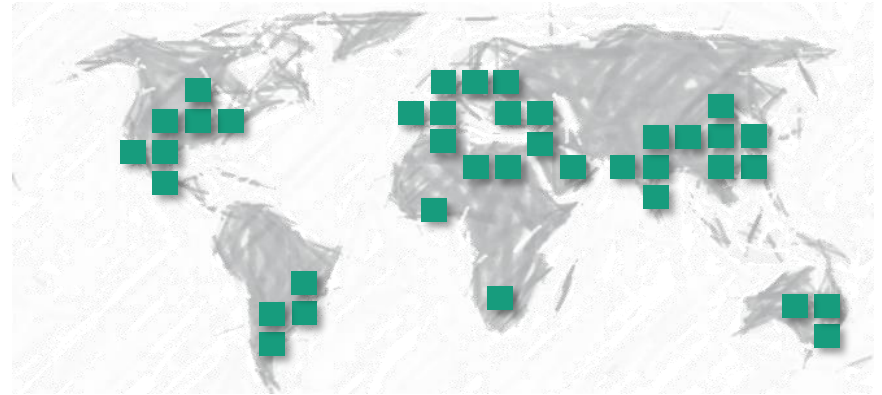
- **Renewable heating energy supply**  
Solar heat, geothermal heat, heat pump, low temperature district heating for the first time connected in a large city neighborhood
- **More cost efficient than conventional supply**  
Today already approx. 5% cheaper compared to common technology and independent from rising oil and gas prices; incl. higher energy security
- **Transferable to most new housing area developments**
- **Intelligent combination of proven technologies**  
Integration of innovative **DH & HVAC** technologies

⇒ **BUT:**

The project has ***not been*** realized because of time constrains, the drilling permit for the BHE took too long

- Innovative projects have special boundaries (beyond economics)
- Good communication crucial

# Thank you for your attention!



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