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State of GSHP market and policies in Europe

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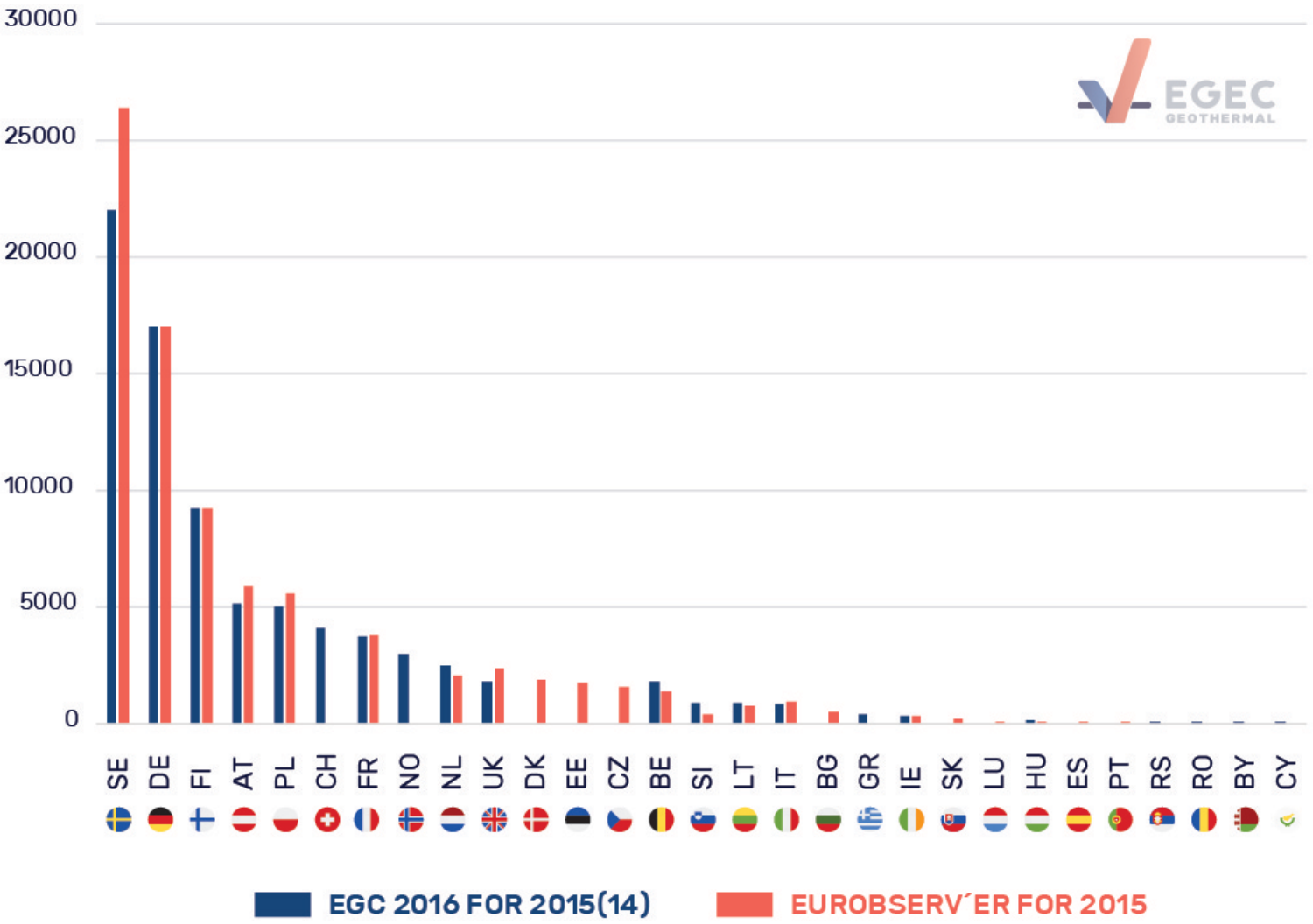
Summary of Key Conclusions Shallow geothermal

State of Play in 2015

- **Total Installed Capacity in Europe: ca. 22.900 MWth**
- **1.7 million units**

GROUND SOURCE HEAT PUMPS: NUMBER OF NEW UNITS INSTALLED NEW IN 2015(14)



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Largest BHE-fields in Europe

Country	City, Name	No. BHE	Depth BHE (m)	Total BHE (m)	Year
RO	Magurele near Bucharest, ELI-NP	1080	125	135000	2015
CH	*Zurich, FGZ Wohnquartier Friesenberg*	*500*	*250*	*125000*	*constr.*
CH	*Zurich, ETH-Campus Hönggerberg*	*425*	*200*	*85000*	*constr.*
FI	*?, Shopping centre*			*50000*	*constr.*
CH	Wallisellen, Richti-Areal	220	225	49500	2012
SE	Karlstad, Campus Karlstad	204	240	48240	2014
NO	Lørenskog, Nye Ahus hospital	228	200	45600	
FI	Sipoo, SOK Logistics Centre	150	300	45000	2012
SE	Lund, IKDC / Chemical Inst.	165	230	37950	
CH	Basel, Novartis Campus	170	220	37400	2012
NO	Oslo, office/flats Nydalen	180	200	36000	
SE	Stockholm Saltsjöbaden, flats	156	230	35880	
SE	Stockholm, office Skanska Lustgården	144	230	33120	2014
CH	Rotkreuz, Suurstoffi	220	150	33000	2014
NO	Bergen, Sartor	162	200	32400	2014
DE	Lübeck, IKEA Dänischburg	215	150	32250	2013

Geothermal heat pumps in Europe

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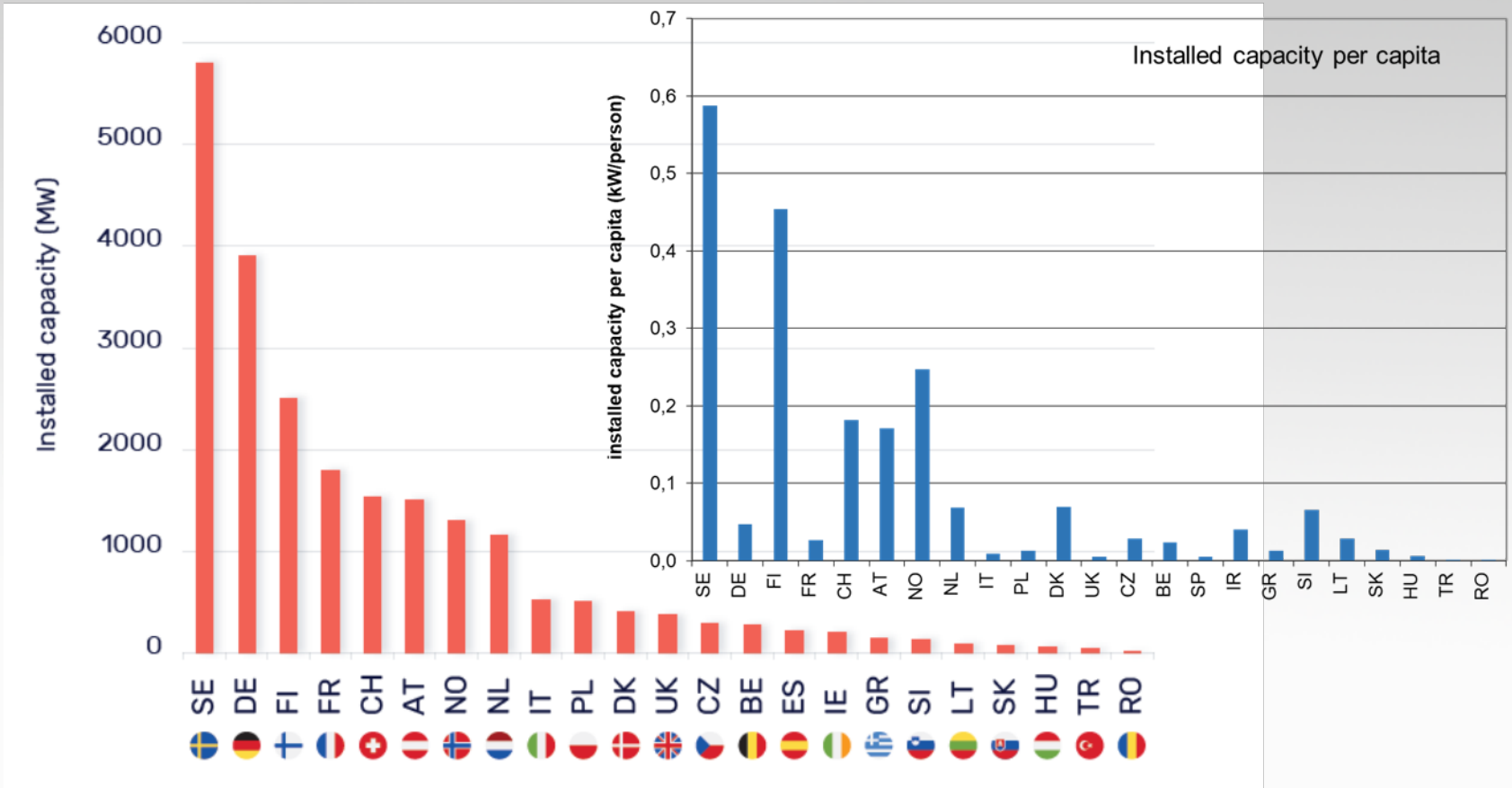

Geothermal heat pumps in Europe

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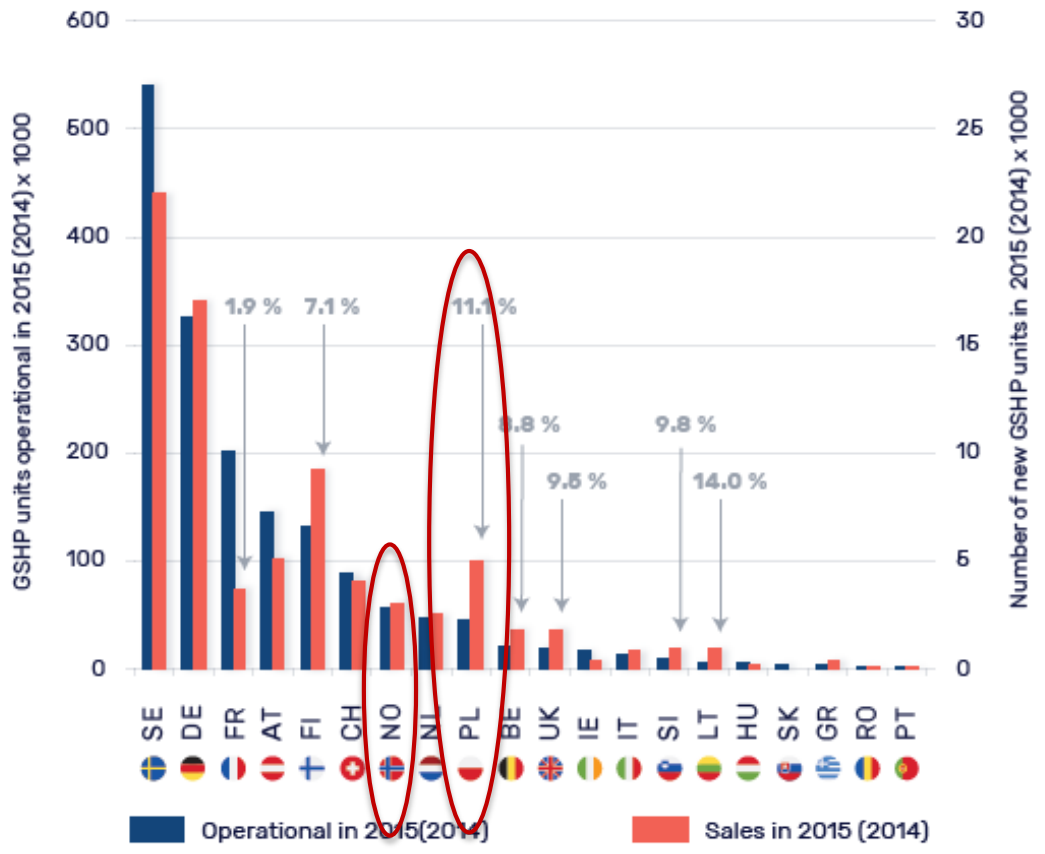
FIG. 20 - GSHP / **NUMBER OF INSTALLED GSHP UNITS AND ANNUAL NEW INSTALLATIONS IN 2015; NUMBERS SHOW THE RATIO OF NEW UNITS IN RELATION TO EXISTING GSHP STOCK**



A market dominated by a small number of countries:

- Sweden is the dominant market;
- France and Germany are big players but penetration is small;
- Lithuania, Poland, UK and Slovenia are the most dynamic markets (in terms of growth).

Poland:

- Heat pumps: > 45 000 units (GSHPs);
- Installed capacity: ~ 705 MWth (~ 500 MWth GSHPs)
- Heat production: ~ 3670 TJ (incl. ~ 2 500 TJ heat pumps, GSHP)

Business models, the challenge

Geothermal is a competitive H&C solution

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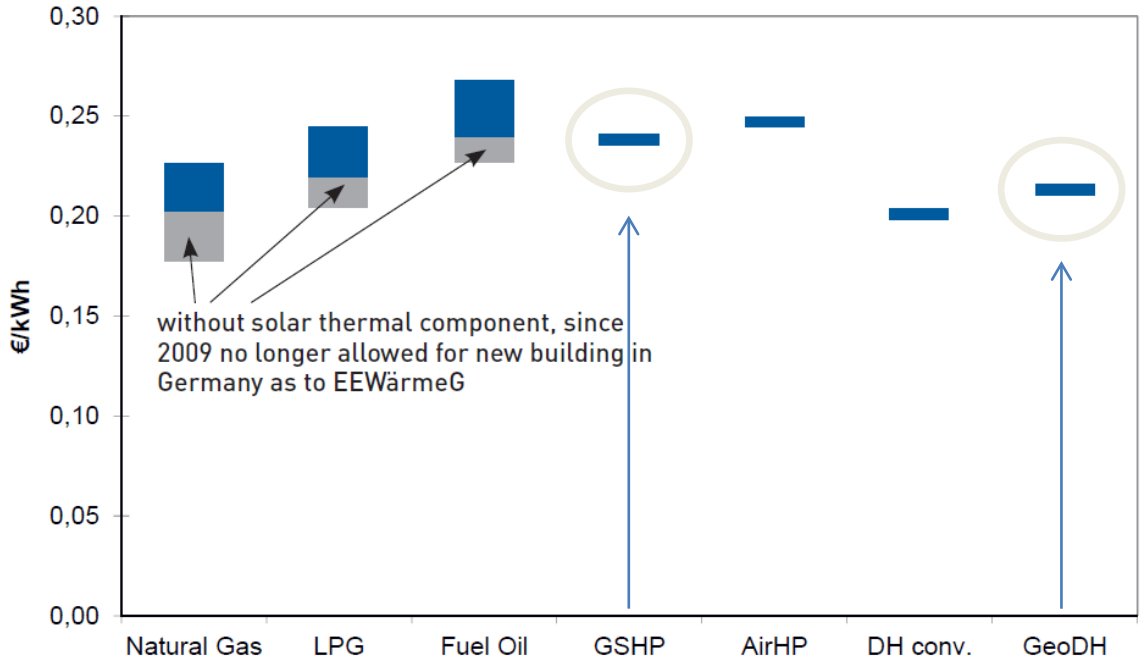
Full heat cost of a residential house in Germany



Graph 6: Heat full cost in a modern residential house with 150 m^2 floor area in Germany in 2011, including all taxes and comprising the heat distribution in the building, after values from ASUE (see text for details)

But the cost structure makes its financing more difficult...

Next generation of technologies

- Towards **low temperature** GeoDH systems with HP
- **Large versus Small** GeoDH installations
- **Increase operational time**: from doublet to triplet
- GeoDH from CHP: **new opportunities with EGS**
- EGS purely for **industrial heating**: case of ECOGI project
- Geothermal District **Cooling**
- **Combination** with other sources: Biomass, solar etc.

Towards smart thermal grids

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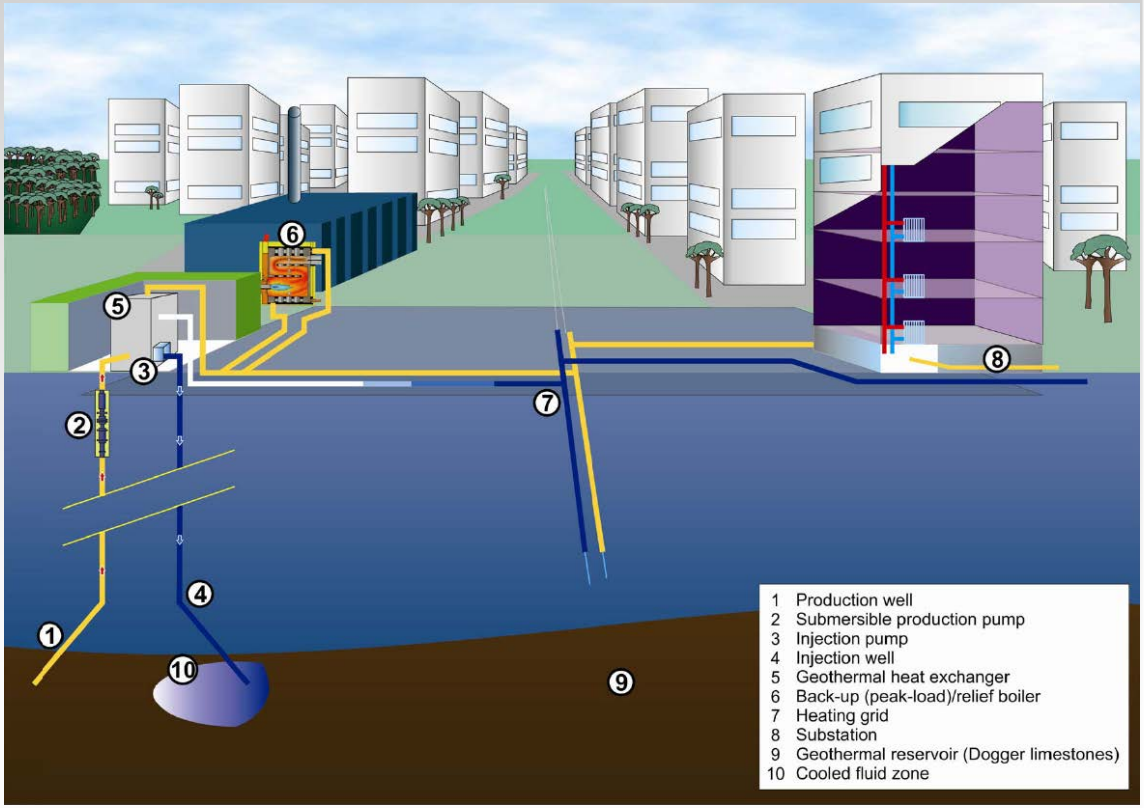
Development of smart thermal grids:

- 1st generation: **Retrofit and decarbonise** DHC, develop **off-grid RES systems**
- 2nd generation: **deploy intelligent thermal grids, interconnected**



Towards smart thermal grids

Towards the 2nd generation of Small Thermal Grids using Geothermal Energy

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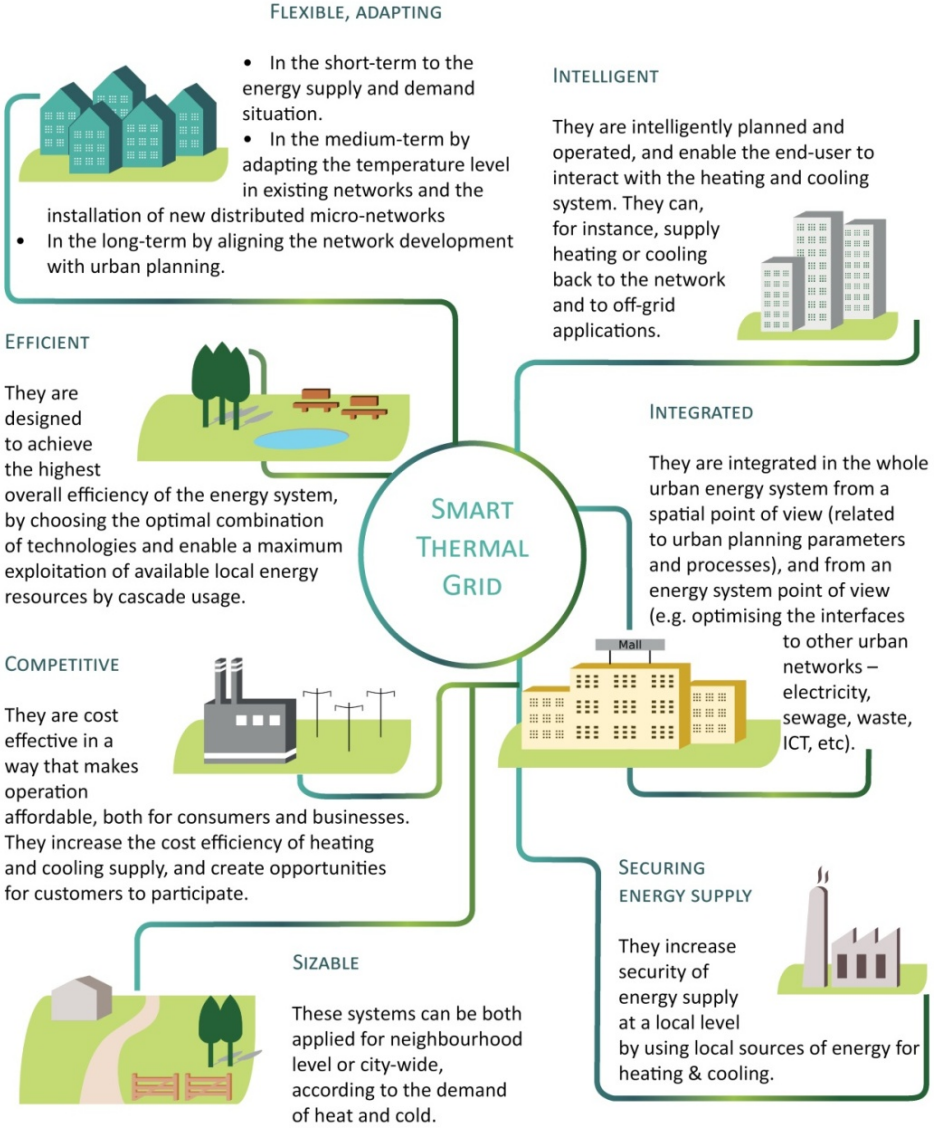
- Flexible and adapting
- Intelligent
- Efficient
- Integrated
- Competitive
- Sizable
- Securing Energy Supply



Thank you for your attention!

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