



Sustainable
District
Energy
Conference
October 23-25, 2019, Iceland

UNIVERSITÄT
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Open-Minded

Requirements for Smart District Energy Concepts

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Lehrstuhl
Energietechnik

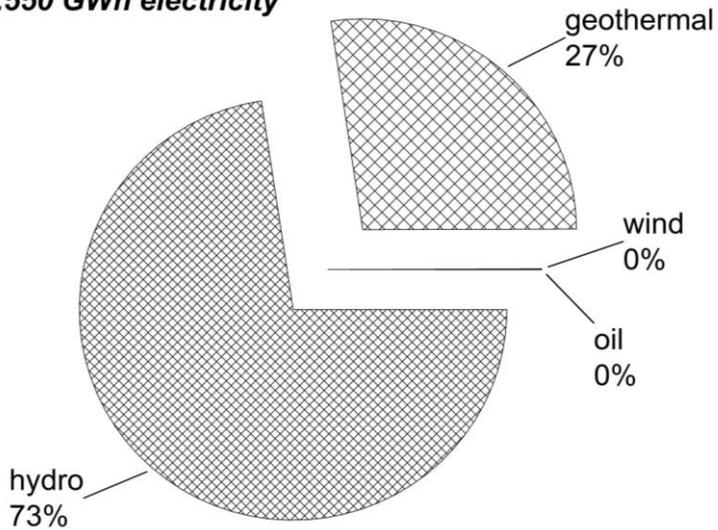
Ministry of Culture and Science
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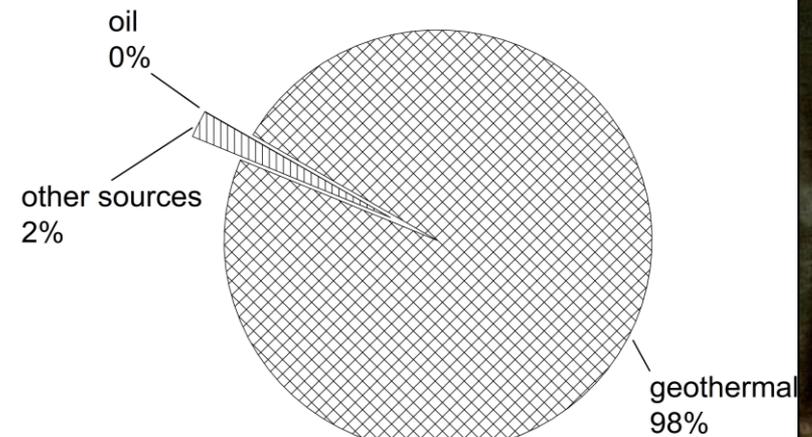
Graduate School
for Sustainable Energy Systems
in Neighbourhoods

Share of electricity and heat generation by fuel (2016)

Σ 18.550 GWh electricity



Σ 9.535 GWh heat



Iceland named the 4th happiest place in the world



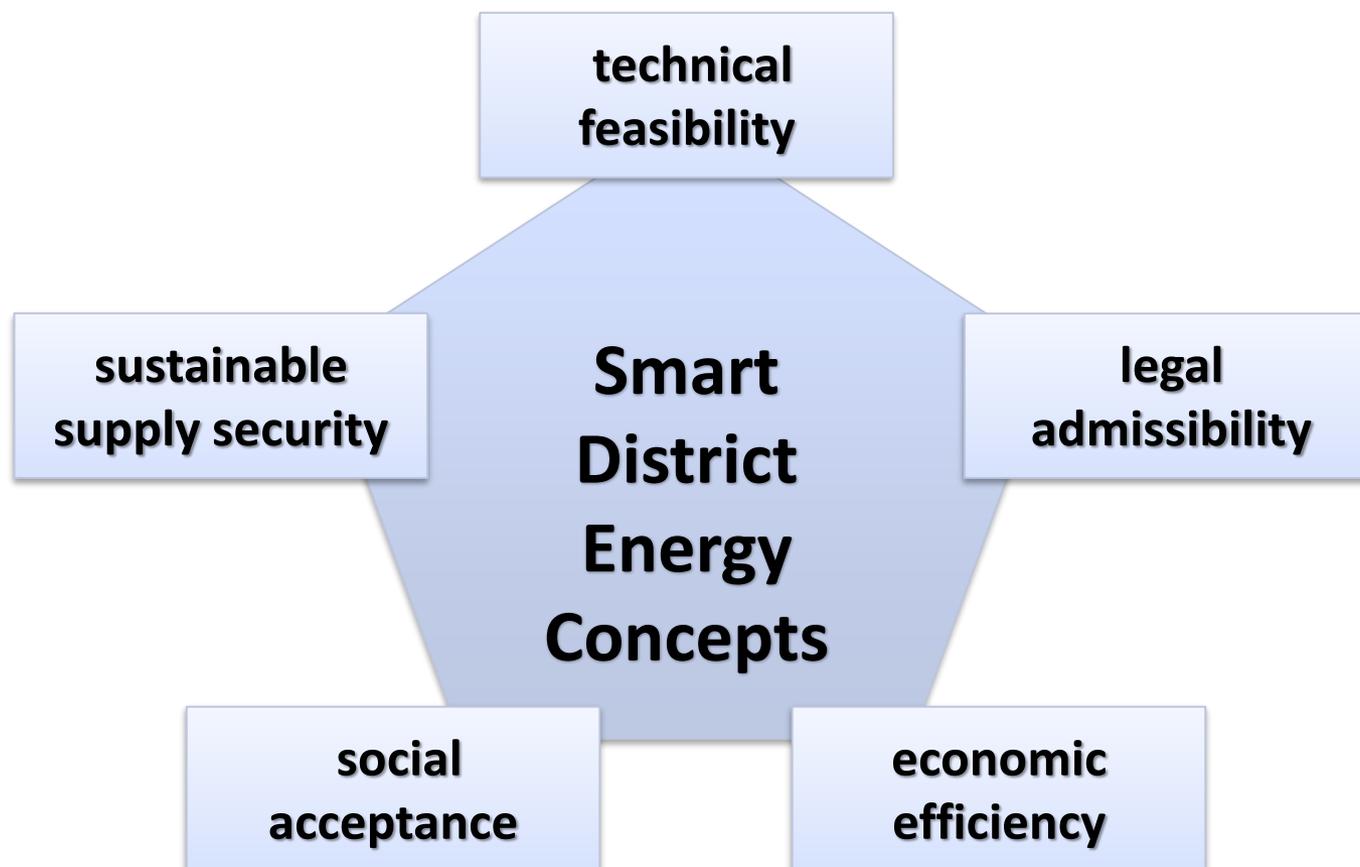
- Every concept needs people who are intensively involved with it beforehand.
- It also requires people who are willing to implement measures.
- People = planners, operators, residents, politicians ...

- People willing to take risks are more satisfied.
- The implementation of Smart District Energy Concepts is associated with high risks.
- How to break this vicious circle?!

Iceland: How much is the fish?

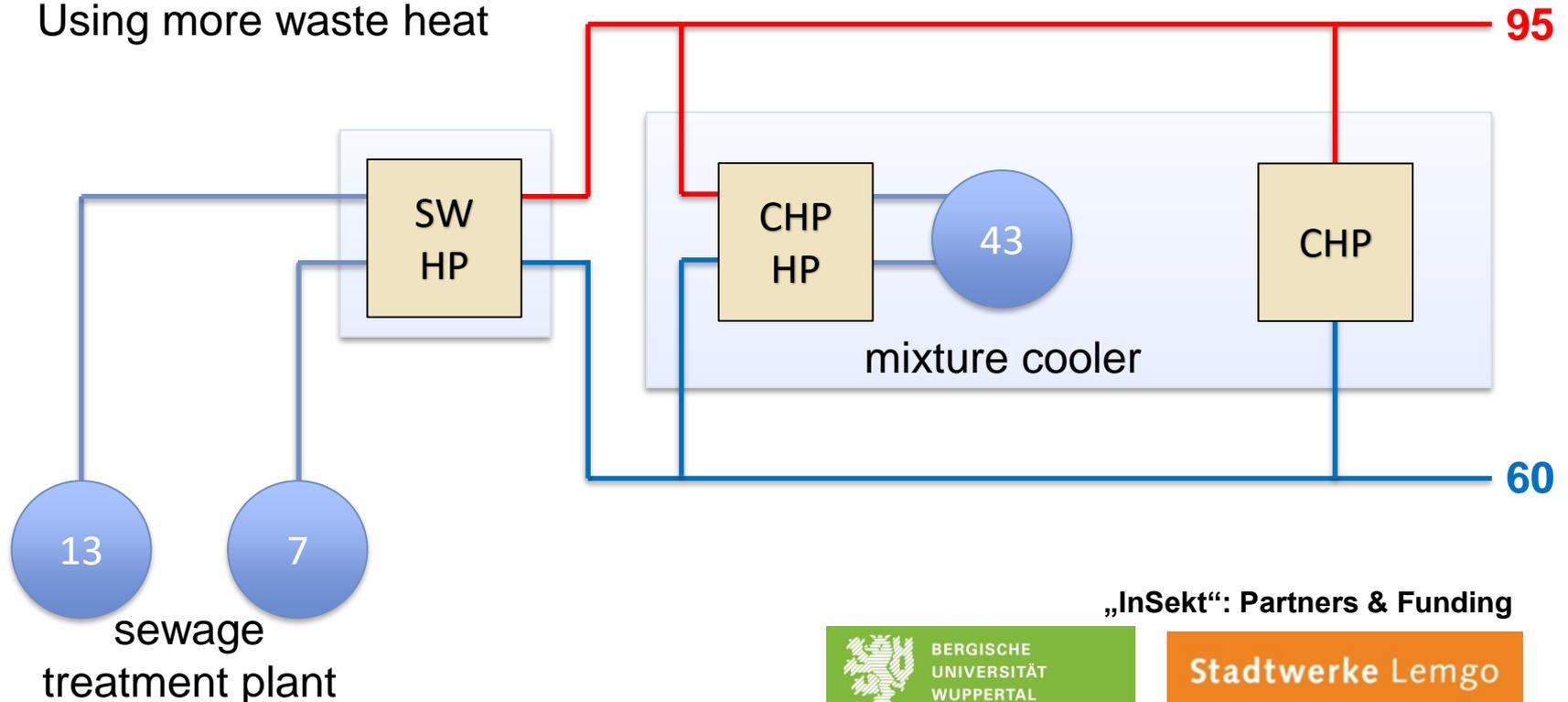


- **Smart Electricity Grids** are electricity infrastructures that can intelligently integrate the actions of all users connected to it – generators, consumers and those that do both – in order to efficiently deliver sustainable, economic and secure electricity supplies.
- **Smart Thermal Grids** are a network of pipes connecting the buildings in a neighbourhood, town centre or whole city, so that they can be served from centralised plants as well as from a number of distributed heating or cooling production units including individual contributions from the connected buildings.
- **Smart Gas Grids** are gas infrastructures that can intelligently integrate the actions of all users connected to it – supplies, consumers and those that do both – in order to efficiently deliver sustainable, economic and secure gas supplies and storage.
- A **Smart Energy System** is defined as approach in which Smart Electricity, Thermal and Gas Grids are combined and coordinated to identify synergies between them in order to achieve an optimal solution for each individual sector as well as for the overall system.



Example: Large-scale heat pumps in DHS (1/3)

- Combination of heat-pumps and CHP (**cab**le connection!)
- Using more waste heat

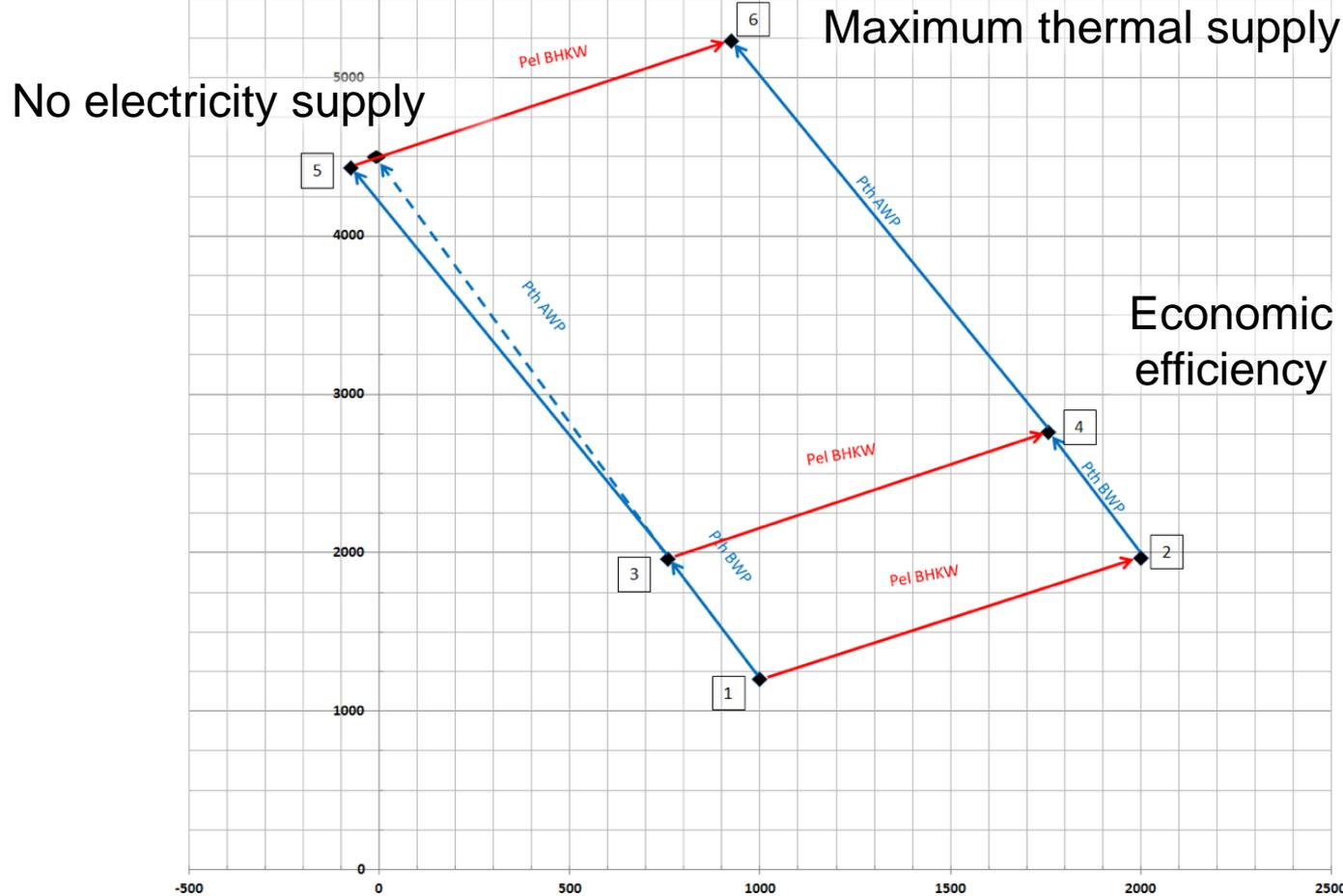


„InSekt“: Partners & Funding



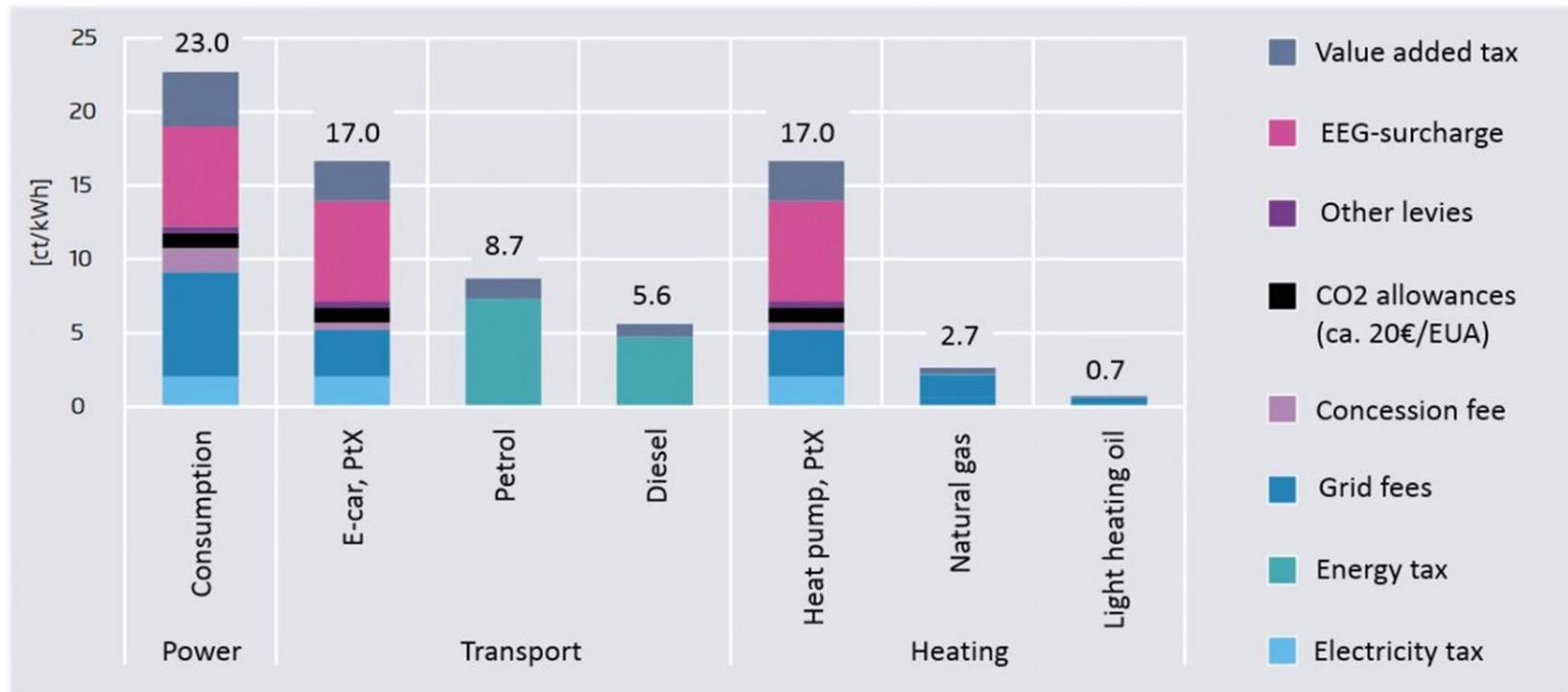
Example: Large-scale heat pumps in DHS (2/3)

Portfolio flexibility plot and operating options



Example: Large-scale heat pumps in DHS (3/3)

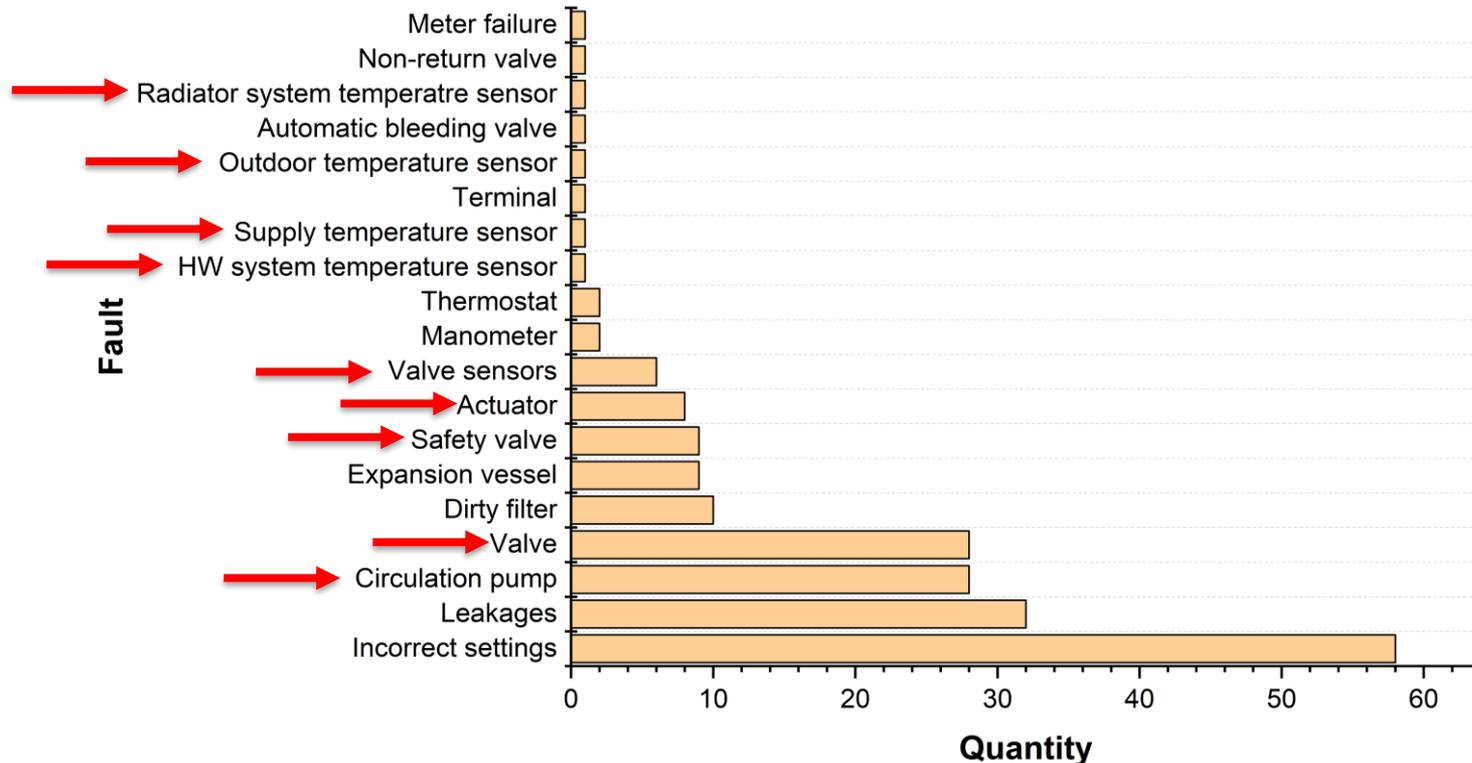
- Taxes, charges and levies on electricity, transport fuels and heating fuels 
- Large-scale heat pumps are not cost competitive with (existing) fossil-fired units because of the current regulatory and economic framework





Månsson, S., et al. "Data and known faults"

- Distribution of identified faults in a DHS
- > 40 % of faults would be possible to detect using customer data

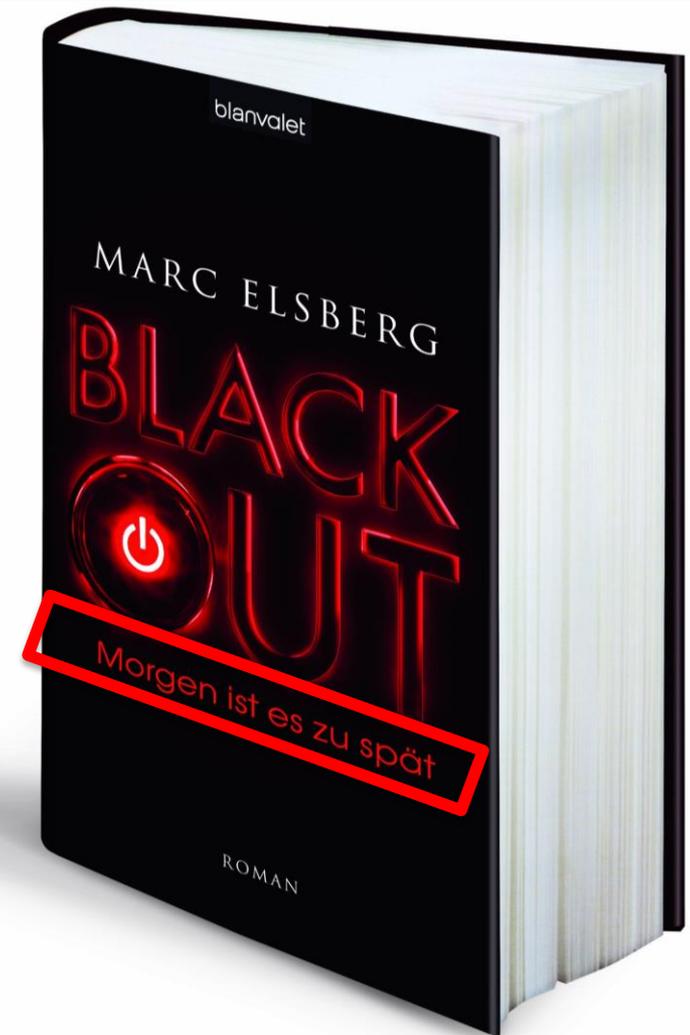


How to convince people regarding smart meter?

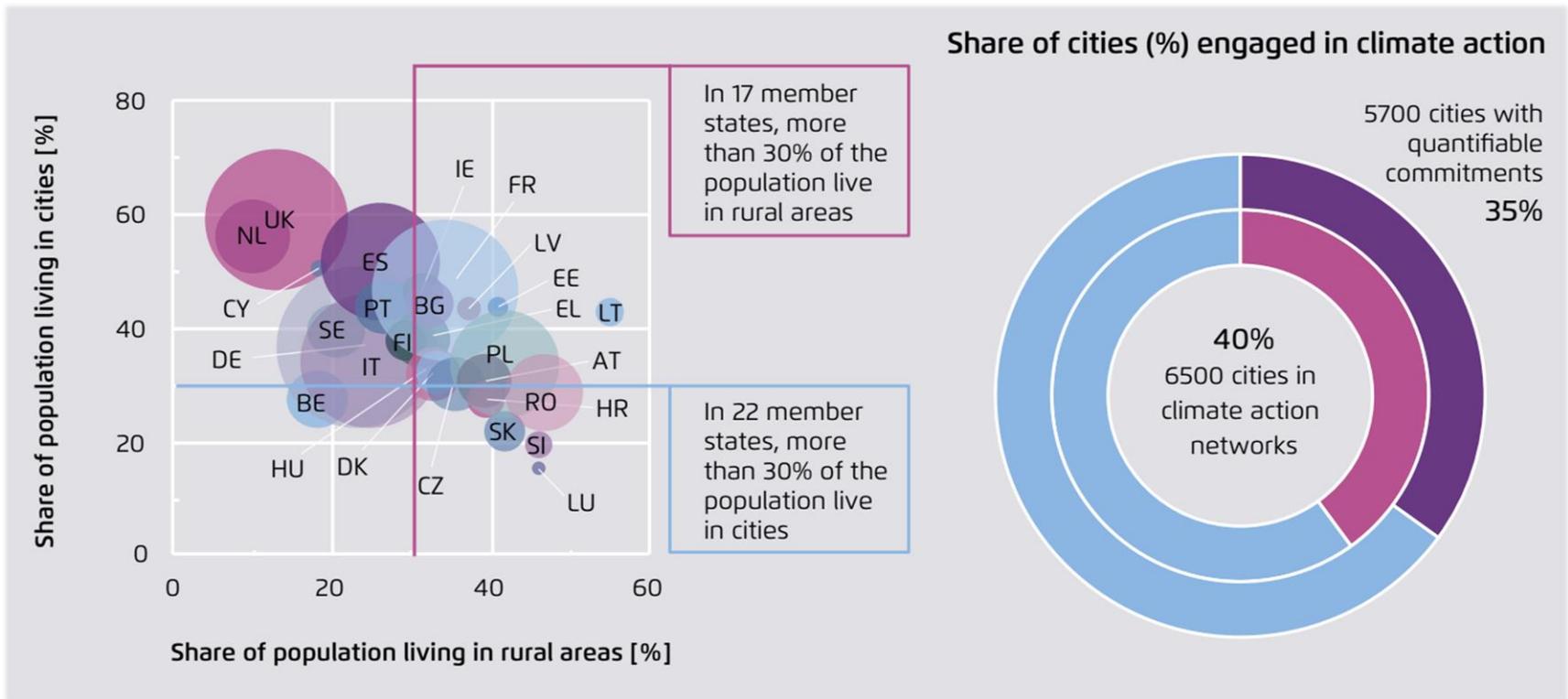
- “You should not know what I do at home.”
- “My privacy is nobody's business.”

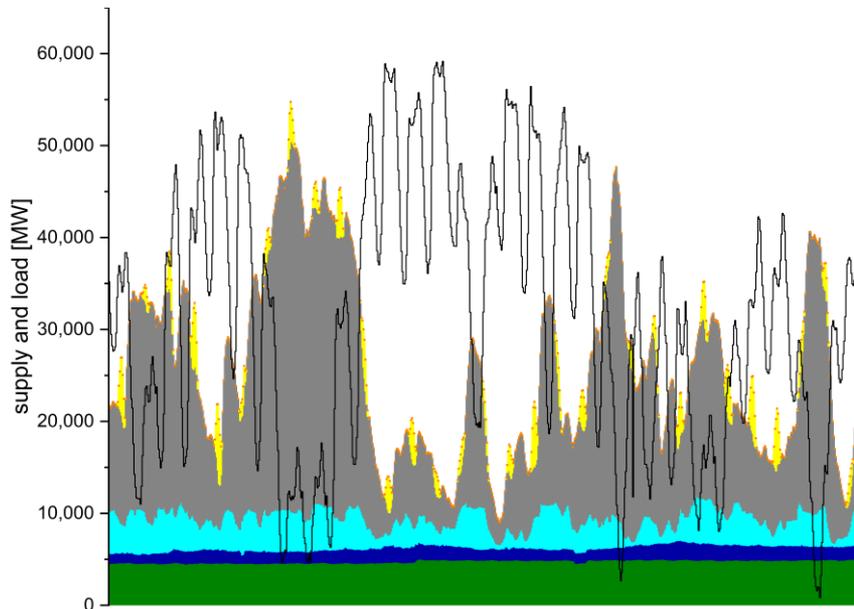
People

- planners, operators, residents, politicians ...
- The energy transition is the greatest social challenge of our time.
- Every little helps!
- It is not comfortable, doing nothing is worse.
- **“Tomorrow will be too late”**



- Cities = key player in climate action
- Cities = home to a large share of the EU population





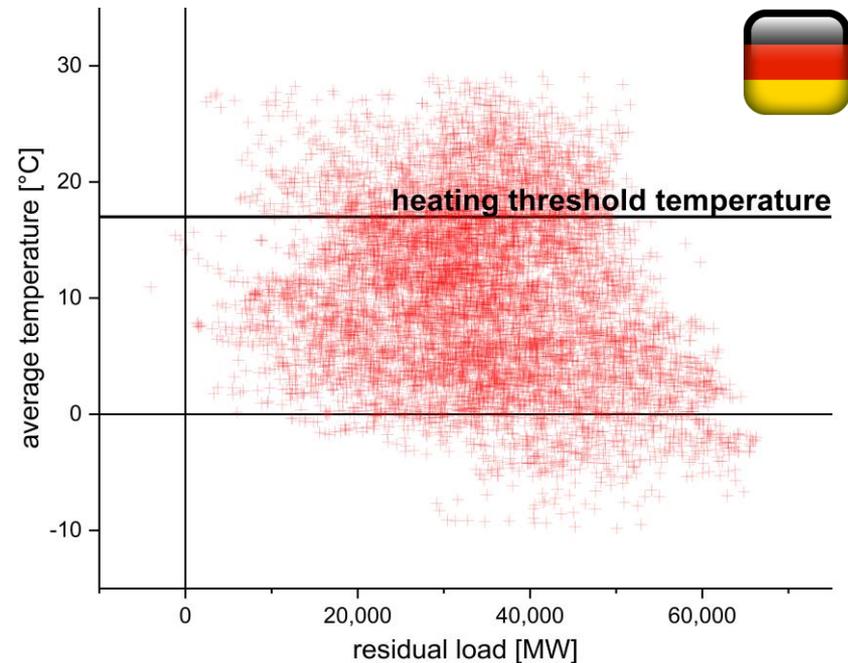
December 2018

renewable supply



load

— residual



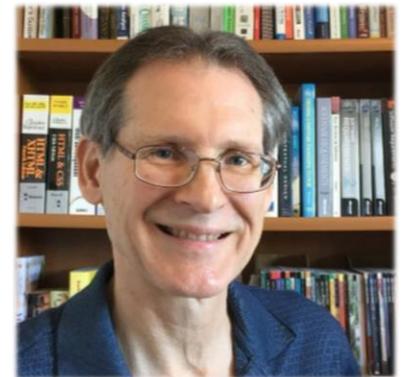
- High residual load (electricity) = high heat demand
- CHP = coverage of remaining residual load, **exploiting synergies (SES)**
- Distributed system: gas-fired CHP, wind and solar, **and heat pumps!**

Status Quo

- Profitability is the key driver for a successful implementation.
- "Energy Law Engineering"

Long-term challenge

- Cheapest energy supply = lowest carbon emissions
- Technology = usually state-of-the-art
- Legal framework = no obstacles
- Social consensus: savings = restrictions



If you don't get the requirements right, it doesn't matter how well you do anything else. (Karl Wiegiers – software engineer, consultant, and trainer)

Thank you for your attention!

Questions? Remarks? Criticism?
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