



# Barriers and Opportunities for Large-Scale Heat Pumps in Austrian District Heating and Cooling Networks

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#SES4DH2018



**AALBORG UNIVERSITY**  
DENMARK

**4DH**  
4th Generation District Heating  
Technologies and Systems



# CONTENT BASED ON IEA HPT ANNEX 47

## **Presentation overview**

- District heating (DH) in Austria at a glance
- Motivation for heat pump (HP) integration
- Barriers / challenges
- Possible solutions and opportunities
- Success factors

## DH IN AUSTRIA AT A GLANCE

**26%**

of residential heat demand  
covered by DH

**24 TWh**

DH generation in 2017  
(14 TWh from CHP or 60%)

up to  
**52 TWh**

total economic potential for DH  
(in best case, depending on  
scenario, e.g. energy prices,  
connection rate, etc.)

**5,500 km**

DH network length  
(42 km/a growth in next 10 years)

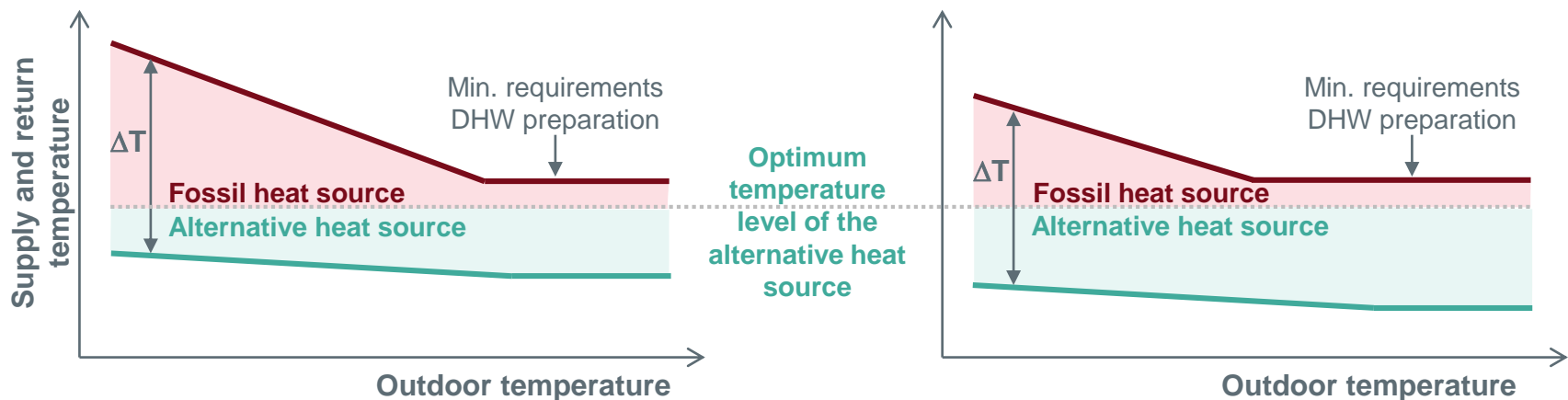
**54%**

based on biomass and  
combustible waste  
(gas 36%, oil 6%, coal 4%)

# MOTIVATION FOR HP INTEGRATION

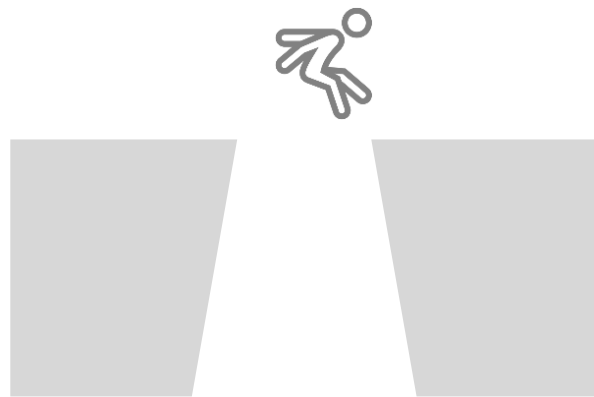
The motivation to use HPs in DHC can be divided into the following areas:

- **usage / capture** of low temperature alternative heat sources
- **enabler** for other alternative energy sources
- link to **electricity** grid (balance of energy domains)
- **reduction** of the network temperatures
- increasing transport **capacities** by using the return line as a source

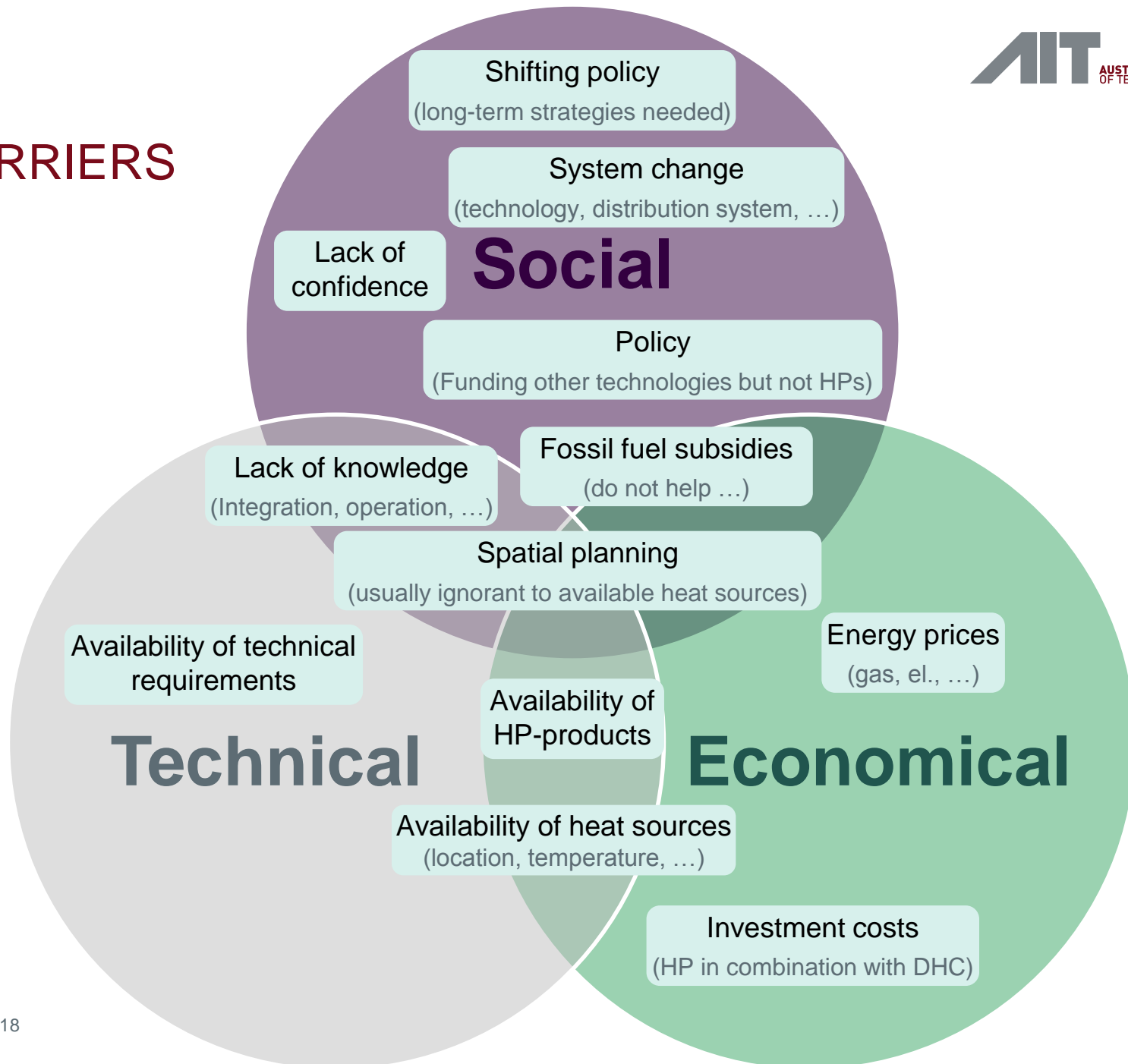


# BARRIERS / CHALLENGES

Social-, economical- and technical barriers



# BARRIERS



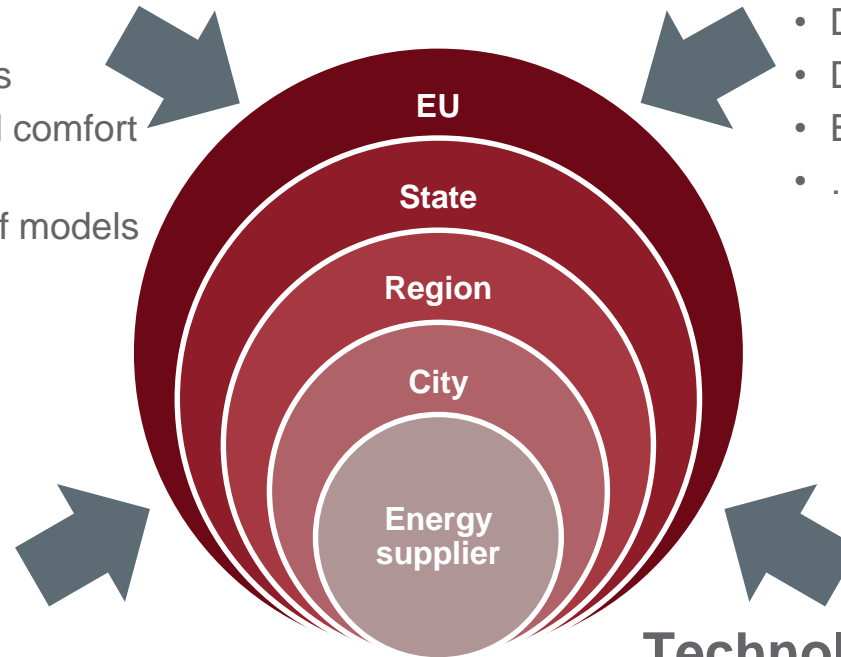
# CHALLENGES

## Customers

- Prosumer
- Citizens' power stations
- Service orientation and comfort (cooling requirements)
- New business and tariff models
- Security supply
- ...

## Society & Politics

- Demographic developments
- Decarbonization / COP21
- Energy efficiency act
- ...



## Market

- High volatility, pooling of flexibilities/ balancing energy markets
- Copper plate or electric fences? (e.g. electricity price zone DE/AT)
- Energy price developments (oil, gas, ...)
- ...

## Technology & Innovation

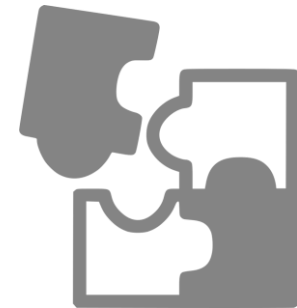
- Digitization & Smart Home
- Energy efficiency & storage
- Electric mobility
- ...

# POSSIBLE SOLUTIONS AND OPPORTUNITIES

Holistic heat supply strategies

Sector coupling/ hybrid energy systems

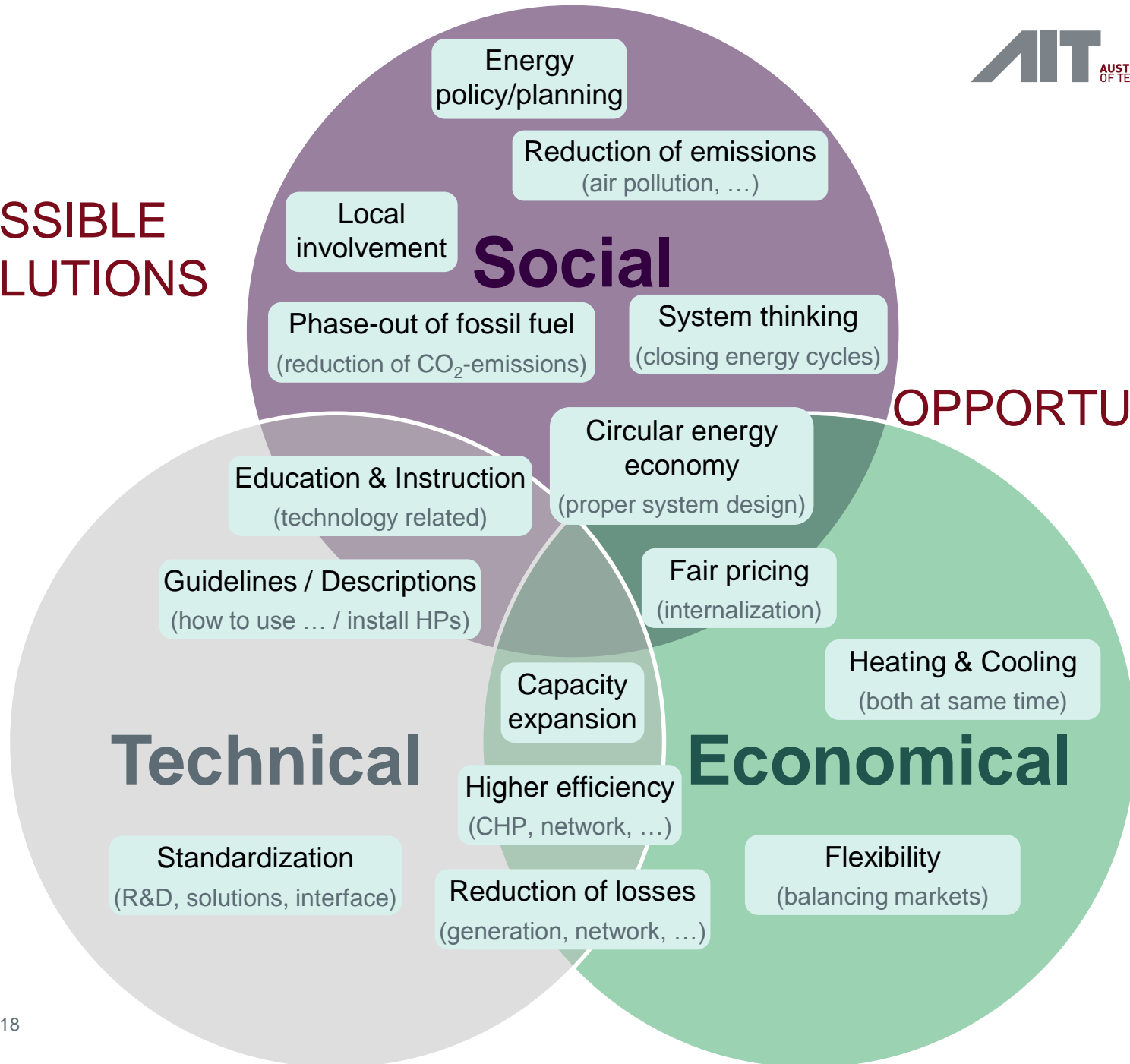
Business models



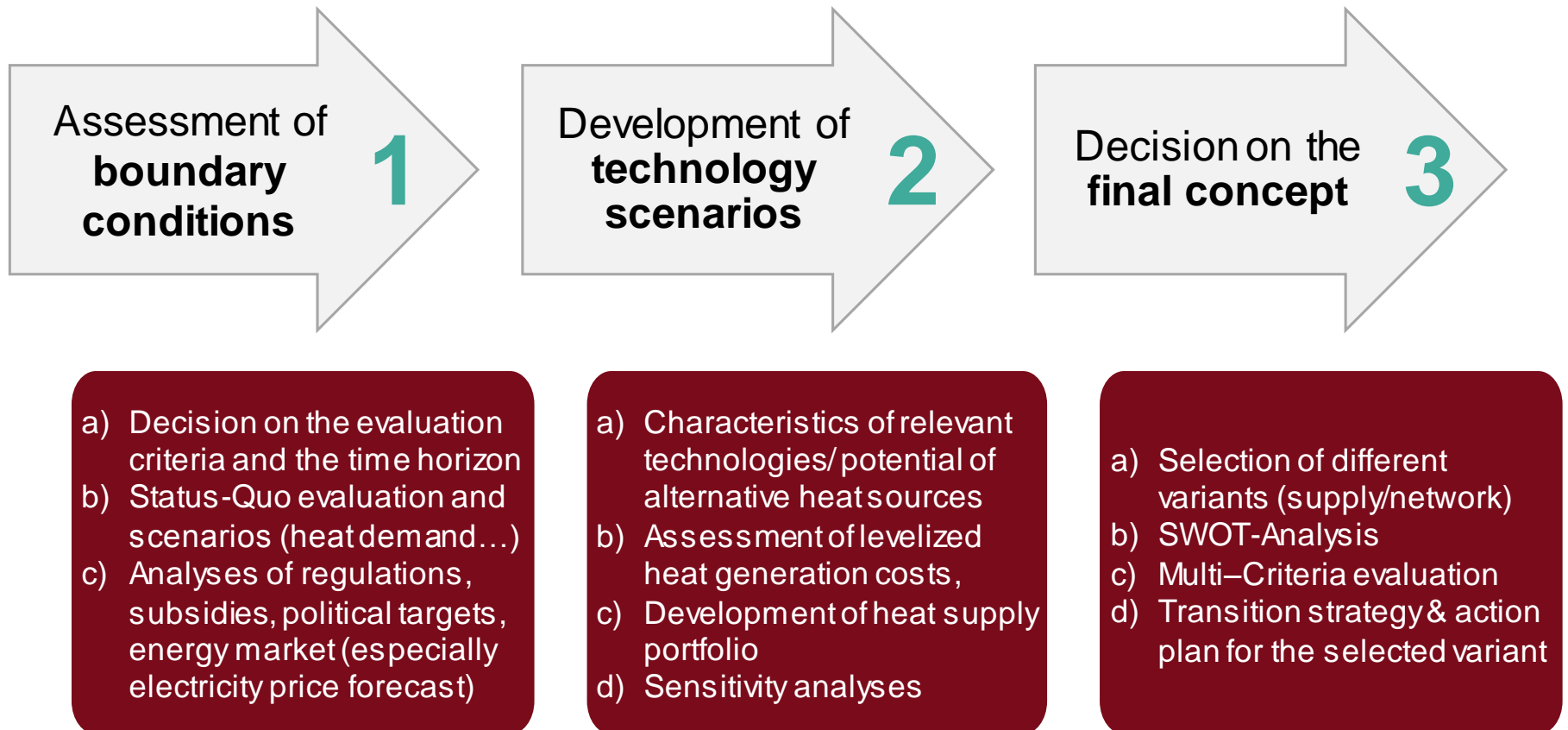


# POSSIBLE SOLUTIONS

# ... AND OPPORTUNITIES



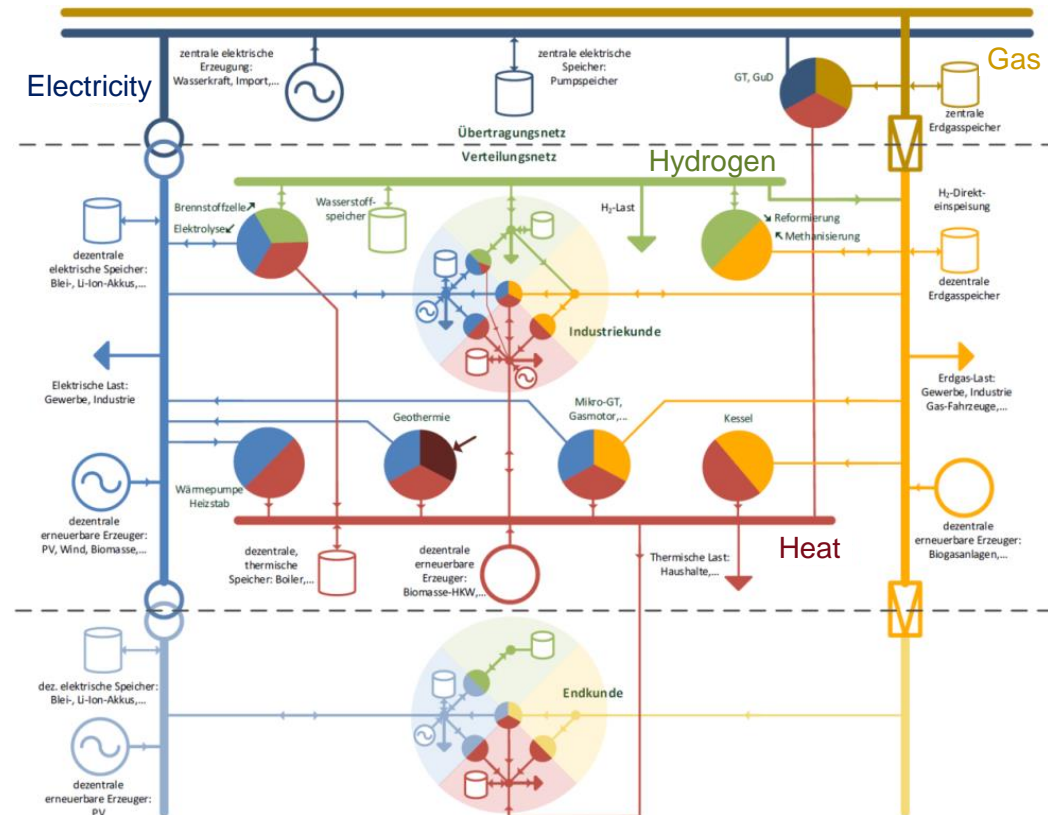
# HOLISTIC HEAT SUPPLY STRATEGIES



# SECTOR COUPLING / HYBRID ENERGY SYSTEMS

The use of HPs in times of favorable electricity prices can increase the:

- **share** of renewable energy sources and the **security of supply** in the heating grid and
- technical **capacity** and **own consumption** in areas with a high degree of local electricity production from PV and wind energy
- **services** for power grid / energy markets

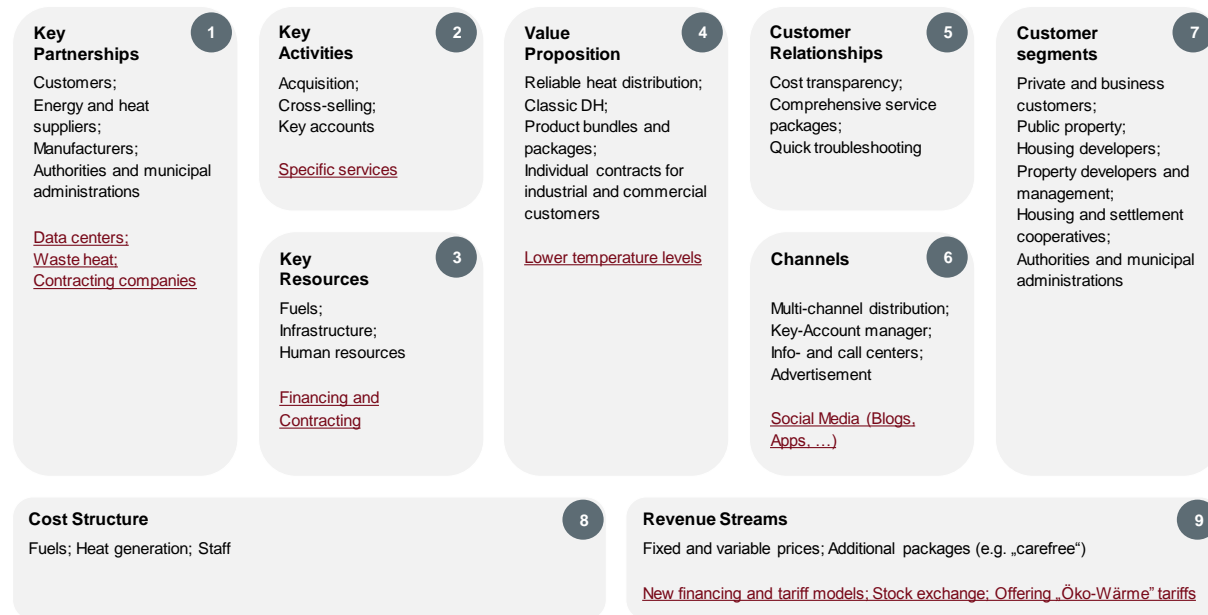


Source: W. H. M. Gawlik, M. Heimberger, R.-R. Schmidt, D. Basciotti, W. Böhme, G. Bachmann, R. Puntigam, K. Haider und E. Arenholz, „OPEN HEAT GRID - Offene Wärmenetze in urbanen Hybridsystemen,“ Bundesministerium für Verkehr, Innovation und Technologie, Wien, 2016.

# BUSINESS MODELS

Innovative approaches are needed

- Digitization
- Regionality
- Fuel substitution
- Specific services
- System optimization
- Flexible tariff models
- Holistic system concept
- Financing and contracting
- Waste heat / cooling energy
- Set up “heat stock exchange”
- Reduction of system temperatures



# SUCCESS FACTORS



## WHAT DO WE NEED?

- Strong partners
  - companies, institutes, start-ups, etc.
- Projects
  - demo, best practice, experiences, motivation
- Learning by doing
  - requires pioneers who are willing to "pay its dues"
- Energy spatial planning
  - localizing waste heat, avoiding double infrastructure
- Standardized solutions
  - R&D, degression of costs, economy of scale
- Price signals
  - to the use of fossil fuel, reduce the burden from tax and levy on clean energy

# THANK YOU!

Roman Geyer

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 Federal Ministry  
Republic of Austria  
Transport, Innovation  
and Technology

**IEA** RESEARCH  
COOPERATION

 **FFG**  
Promoting Innovation.



ANNEX  
**47**

HEAT PUMPS IN  
DISTRICT HEATING  
AND COOLING  
SYSTEMS

The **IEA HPT Annex 47** project (FFG No. 853.039) is carried out as part of the IEA research cooperation on behalf of the Austrian Federal Ministry of Transport, Innovation and Technology.

 <http://heatpumpingtechnologies.org/annex47/>