



# Austrian Technology and Implementation Roadmap for Heat Pumps

Thomas Fleckl

Michael Hartl

Peter Biermayr

Annemarie Schneeberger

Petra Schöfmann

Veronika Wilk

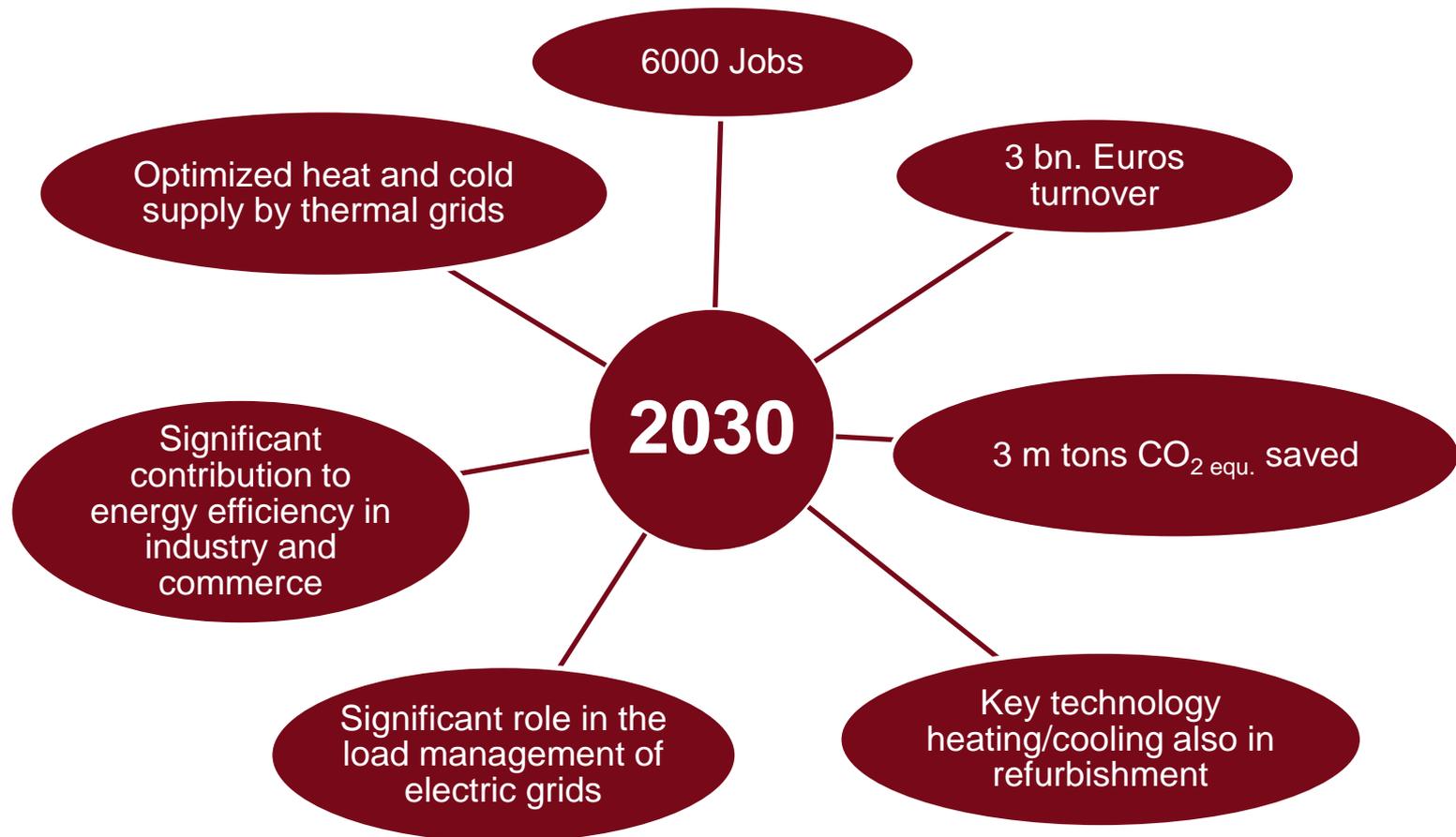


# CONTENT AND GOALS OF THE ROADMAP

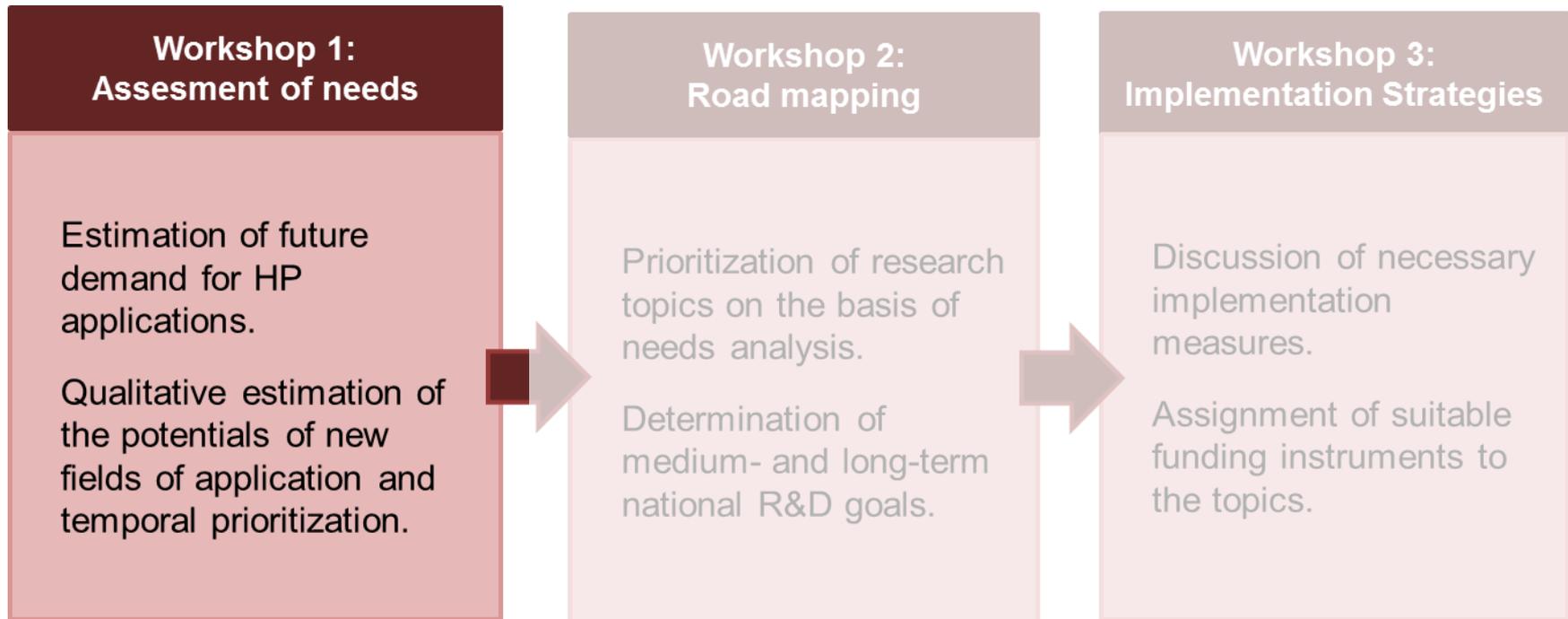
- Development of a vision
- Analysis of the driving and inhibiting factors for market diffusion
- Development of three future paths for the heat pump in Austria
- Presentation of future fields of application and R&D topics
- Derivation of recommendations

# CONTENT AND GOALS OF THE ROADMAP

- Development of a vision

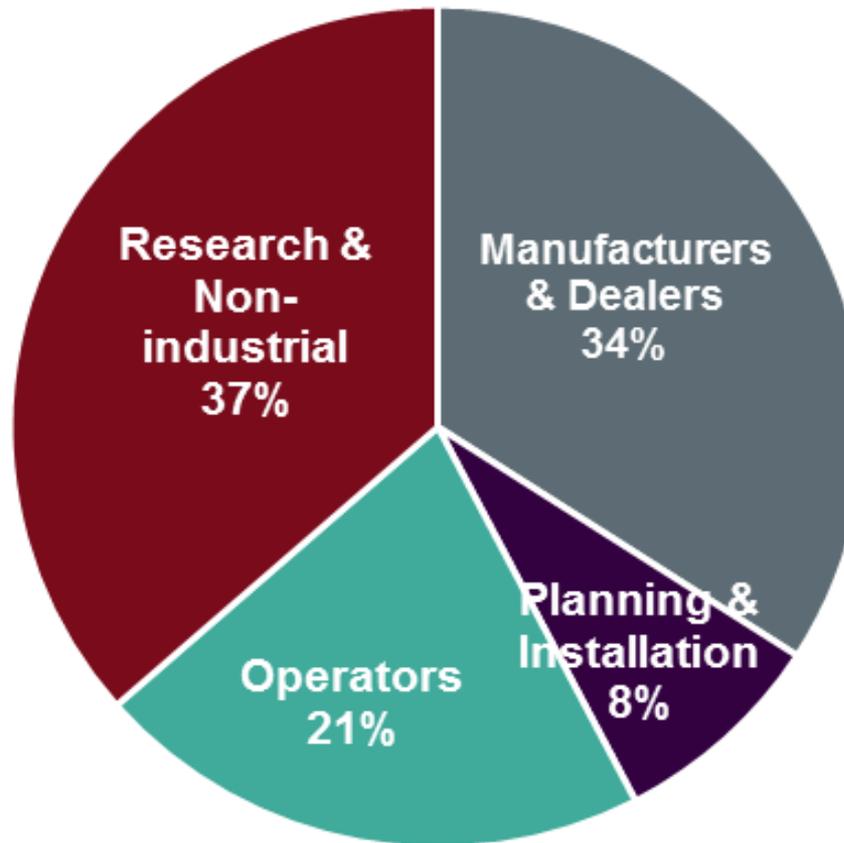


# INTEGRATED STAKEHOLDER PROCESS



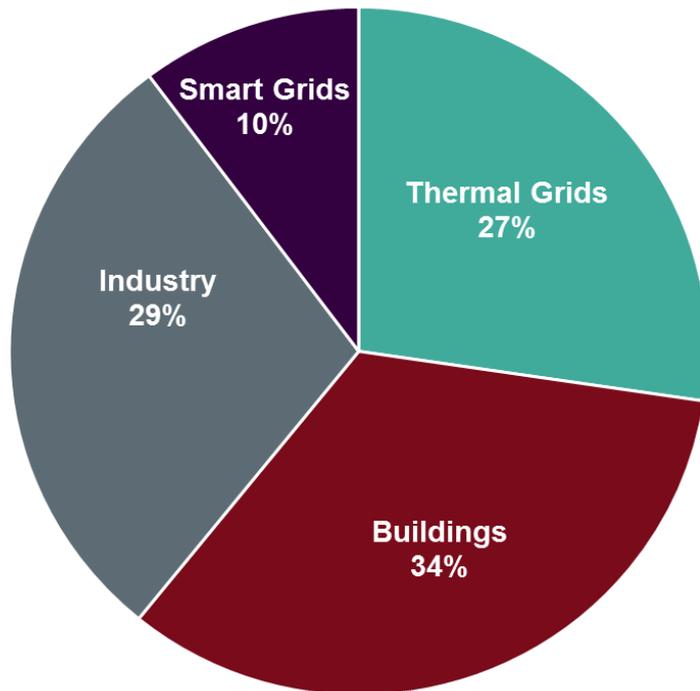
# RESULTS OF THE FIRST WORKSHOPS

- 85 Participants



# RESULTS OF THE FIRST WORKSHOPS

- 44 topics and keywords identified



## Highest individual rating:

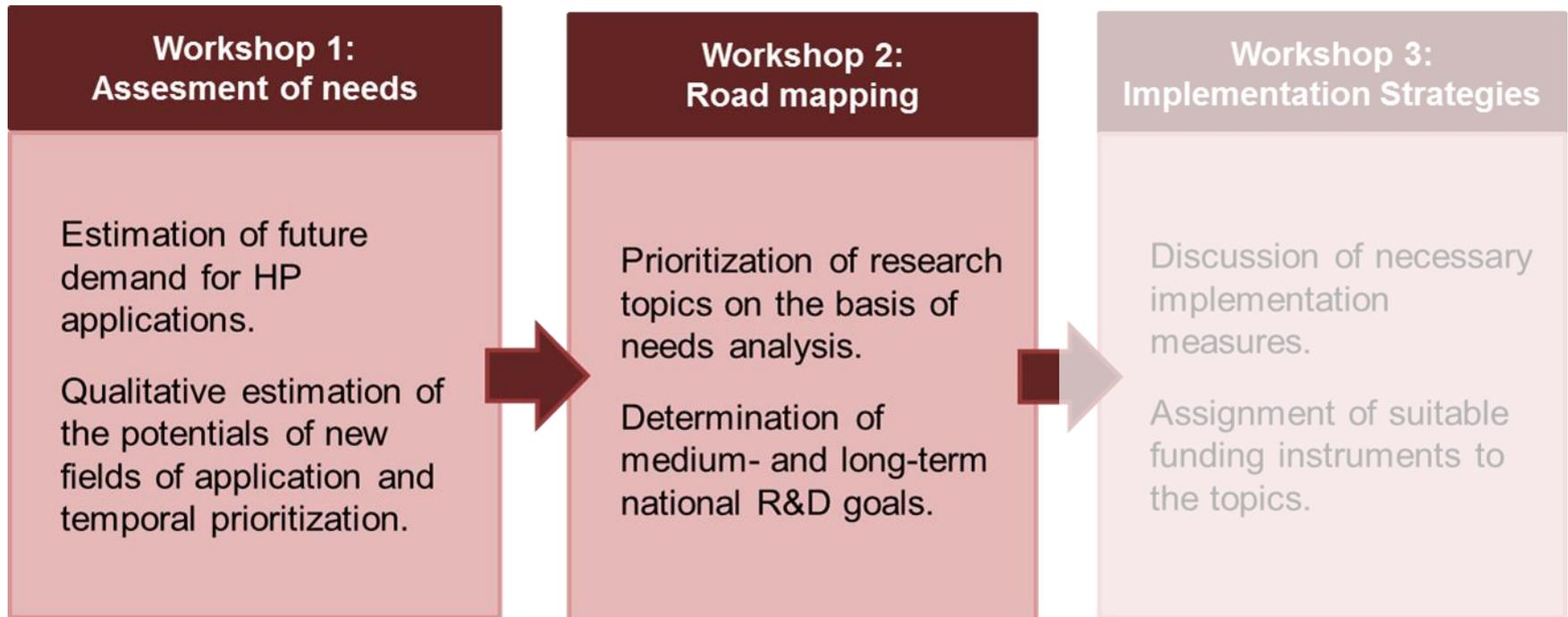
Building: 51 (Retrofitting)

Thermal Networks: 36 (Low temperature anergy networks)

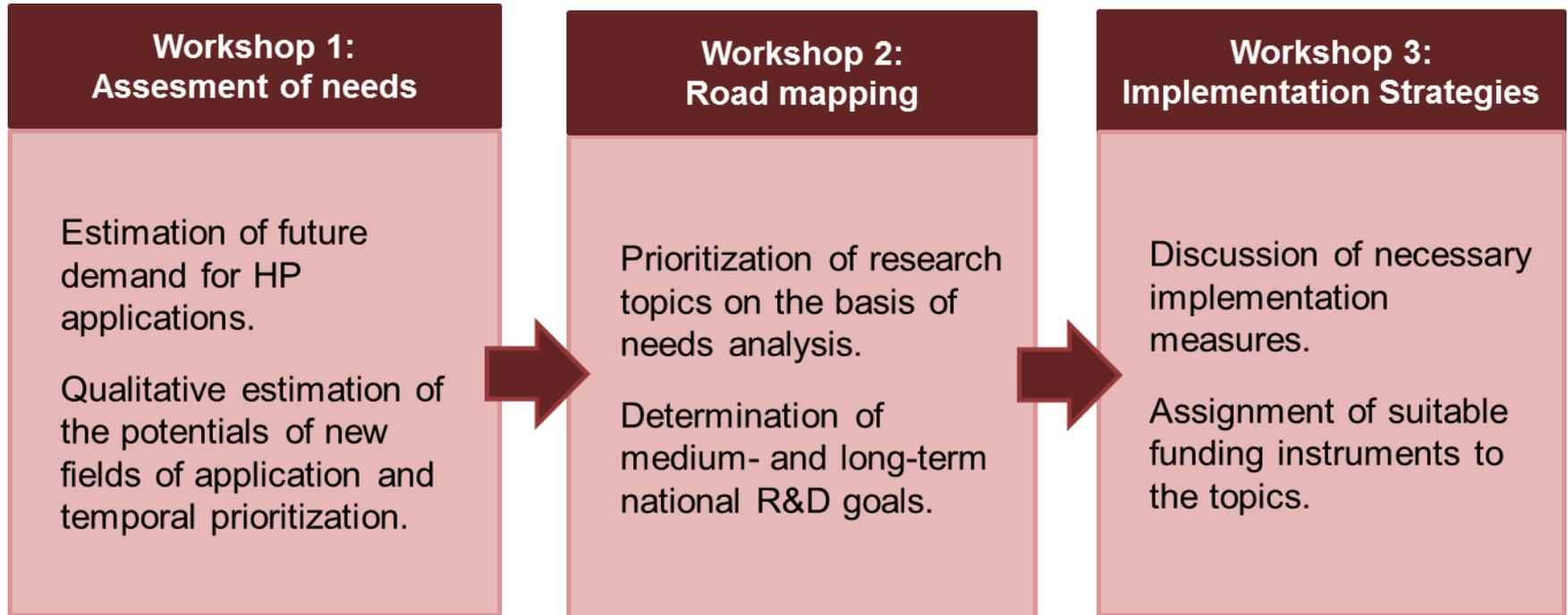
Smart Grid: 27 (Interface business models)

Industry: 26 (High temperature HP)

# INTEGRATED STAKEHOLDER PROCESS



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# RESIDENTIAL AND NON-RESIDENTIAL BUILDINGS

- Cost effective air/water heat pump in combined heating systems
- Heat pumps for simultaneous heating and cooling
- Acoustics
- Heat Pumps with high capacities
- Know-how transfer for complex heating systems with heat pumps

# RESIDENTIAL AND NON-RESIDENTIAL BUILDINGS

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- Heat pumps for simultaneous heating and cooling
- Acoustics



Industrial research and experimental development (until 2020)

- Large heat pumps
- Know-how transfer for complex heating systems with heat pumps

# RESIDENTIAL AND NON-RESIDENTIAL BUILDINGS

- Cost effective air/water heat pump in combined heating systems
- Heat pumps for simultaneous heating and cooling
- Acoustics

- Large heat pumps



Demonstration (2020 until 2030)

- Know-how transfer for complex heating systems with heat pumps

# RESIDENTIAL AND NON-RESIDENTIAL BUILDINGS

- Cost effective air/water heat pump in combined heating systems
- Heat pumps for simultaneous heating and cooling
- Acoustics
- Large heat pumps

- Know-how transfer for complex heating systems with heat pumps



Dissemination and completion of advanced training measures

# SMART ELECTRIC GRIDS

- Interface to the electrical network
- Controls
- Further development of the market model
- Business models
- Legal and regulatory framework conditions

# SMART ELECTRIC GRIDS

- Interface to the electrical network



Industrial research (2020) and experimental development (2030)

- Controls
- Further development of the market model
- Business models
- Legal and regulatory framework conditions

# SMART ELECTRIC GRIDS

- Interface to the electrical network

- Controls



Experimental development (2030)

- Further development of the market model
- Business models
- Legal and regulatory framework conditions

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- Interface to the electrical network
- Controls

- Further development of the market model
- Business models
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 Industrial research and experimental development (2020 – 2030)

# THERMAL GRIDS

- Building integration and controls of the heat pump (booster heat pumps)
- Network integration and controls of the heat pump

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Industrial research and experimental development (2020) and demonstration (2030)

- Network integration and controls of the heat pump

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Demonstration (until 2020)

# INDUSTRIAL PROCESSES

- Best practice solutions and pilot plants with available heat pumps
- Improved industrial heat pumps
- New concepts for industrial heat pumps

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Feasibility (until 2020) and demonstration (2020 to 2030)

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- Improved industrial heat pumps



Feasibility (until 2020), experimental development (2020 to 2030)  
and demonstration (until 2030)

- New concepts for industrial heat pumps

# INDUSTRIAL PROCESSES

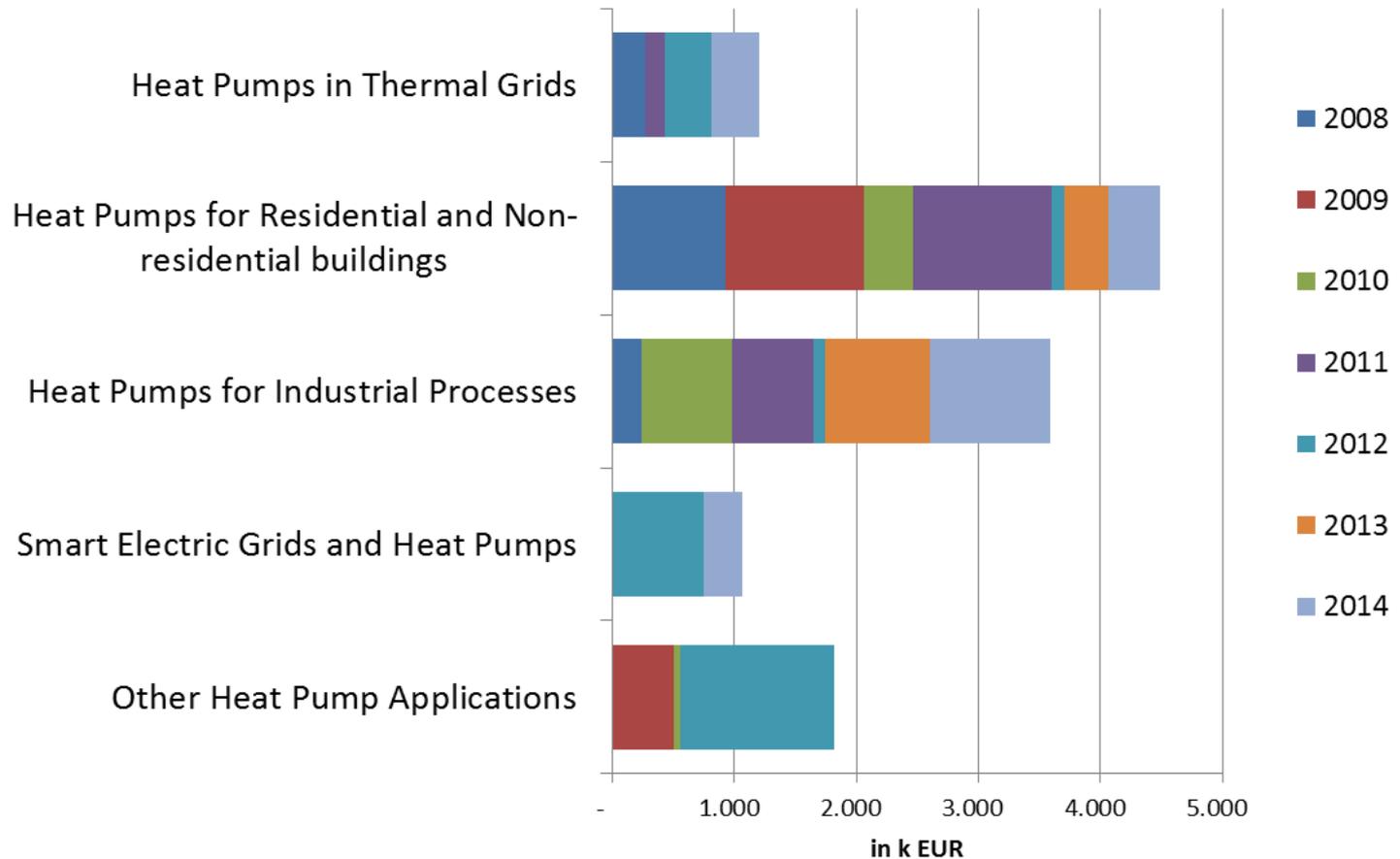
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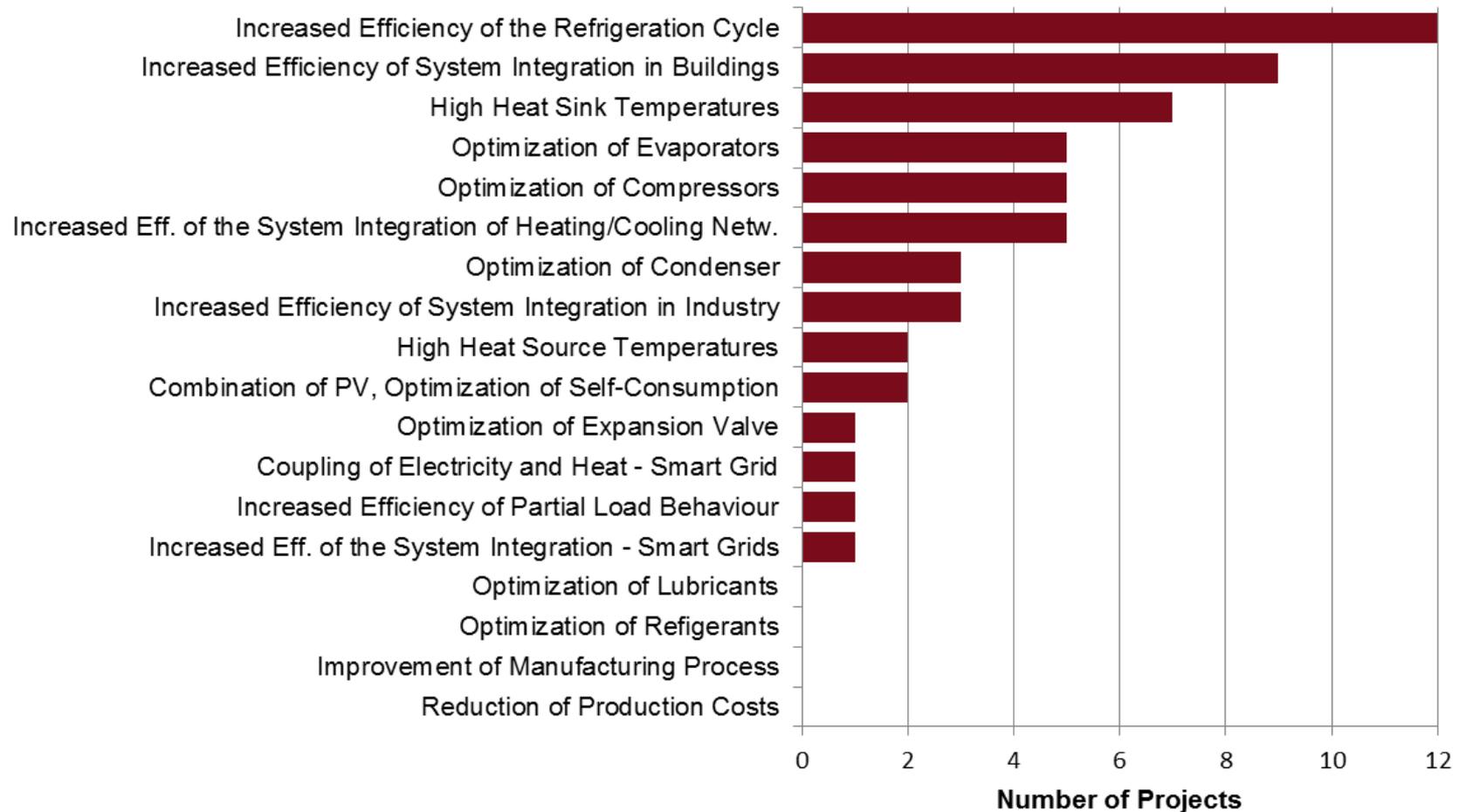


Industrial research (2020 to 2030)

# NATIONALLY FUNDED RESEARCH PROJECTS 2008 TO 2014



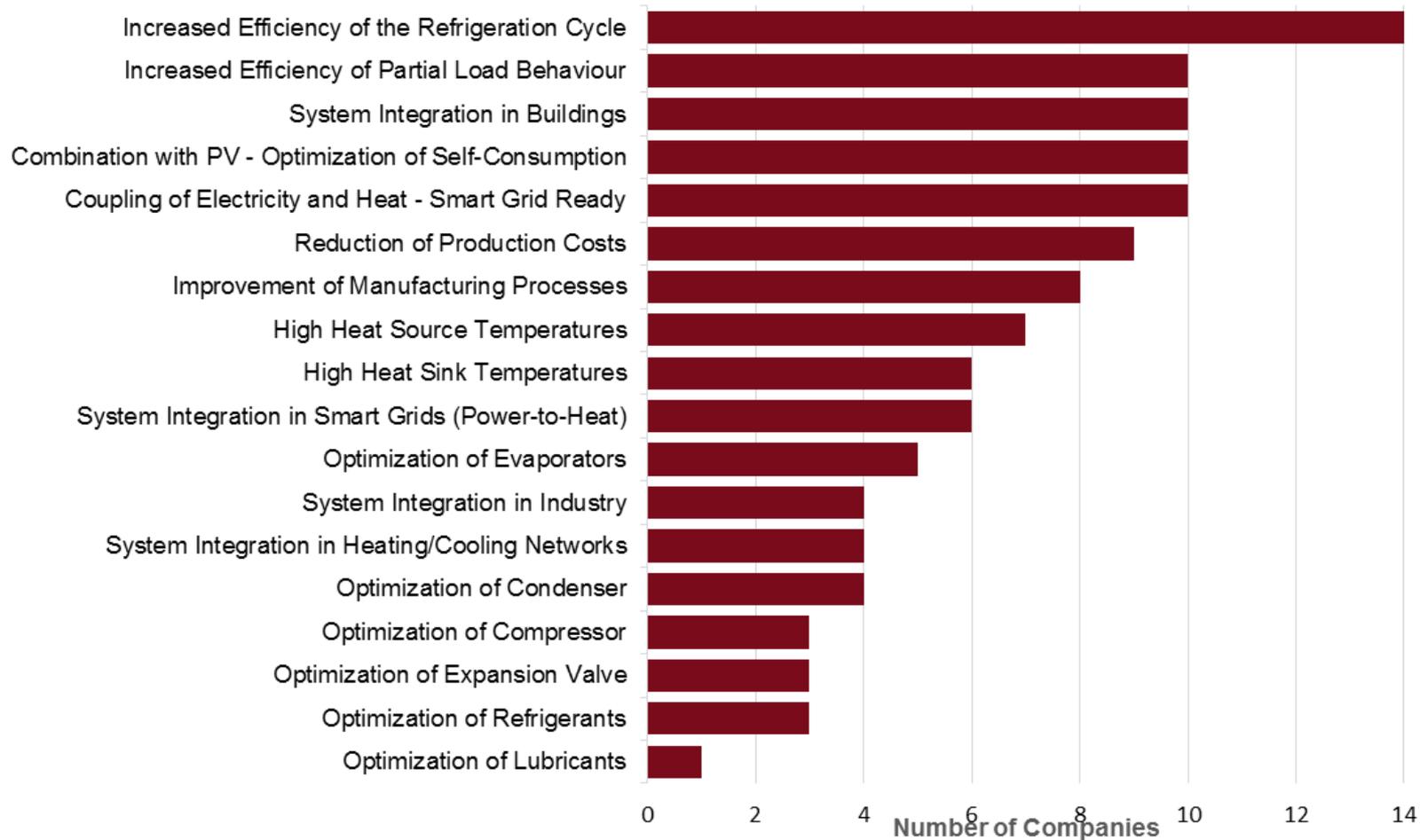
# NATIONALLY FUNDED RESEARCH PROJECTS 2008 TO 2014



## RESULTS OF THE ONLINE SURVEY

- **Target group:** Manufacturers and trading companies of heat pumps in Austria
- **Number of interviewees:** 34
- **Response rate:** 76%
- **Survey period:** February 16, 2016 – March 31, 2016

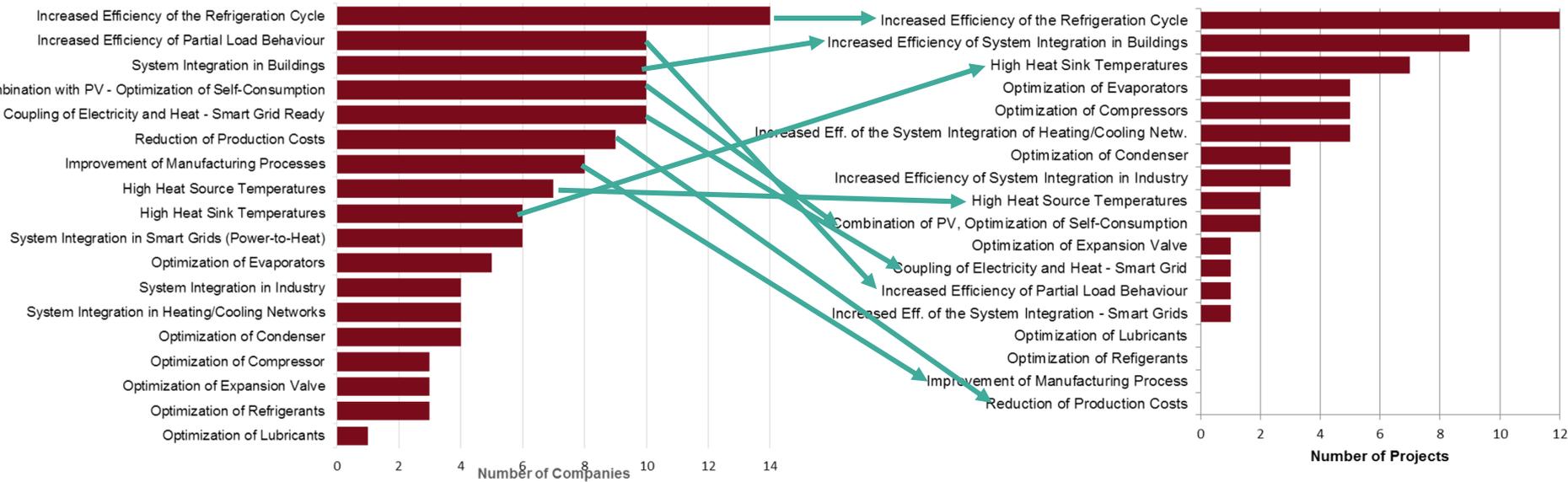
# RESEARCH TOPICS OF HEAT PUMP MANUFACTURERS



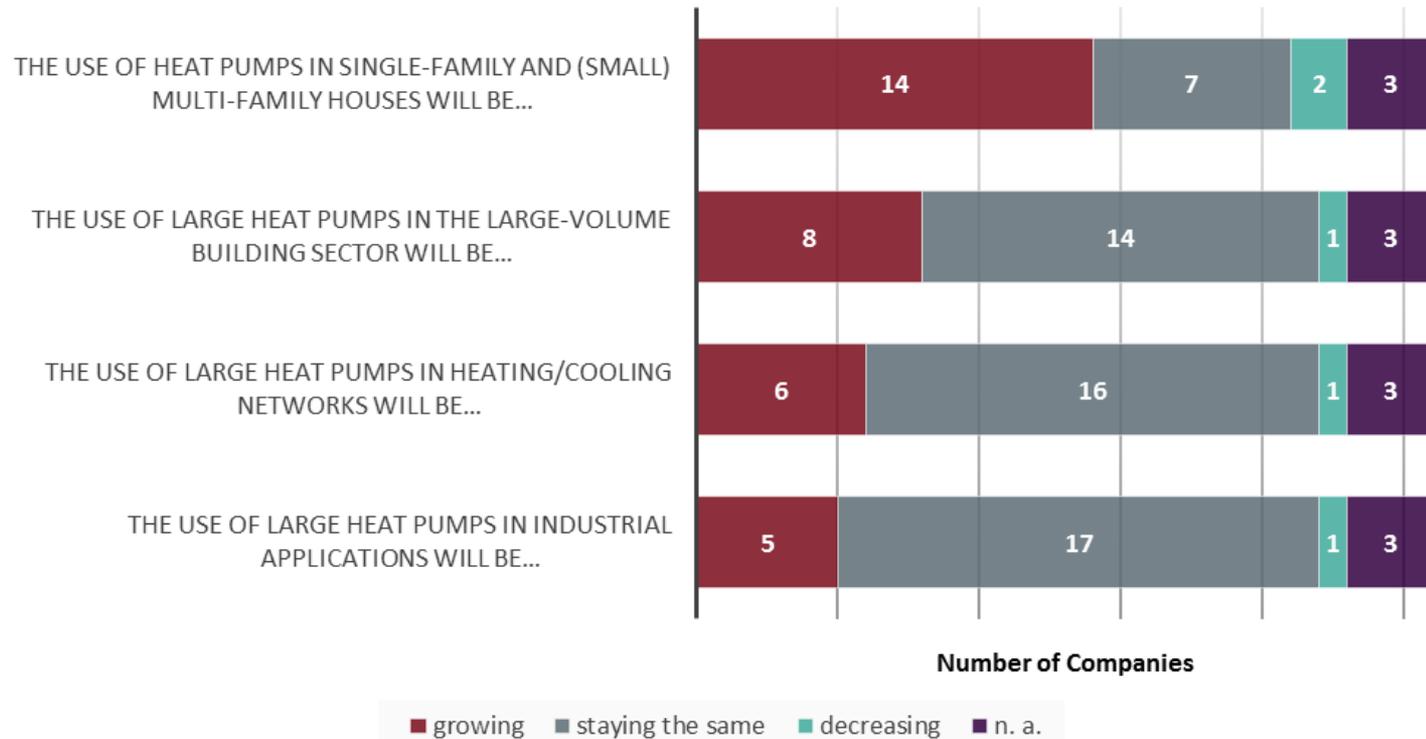
# COMPARISON OF RESEARCH TOPICS

## Producers of Heat Pumps

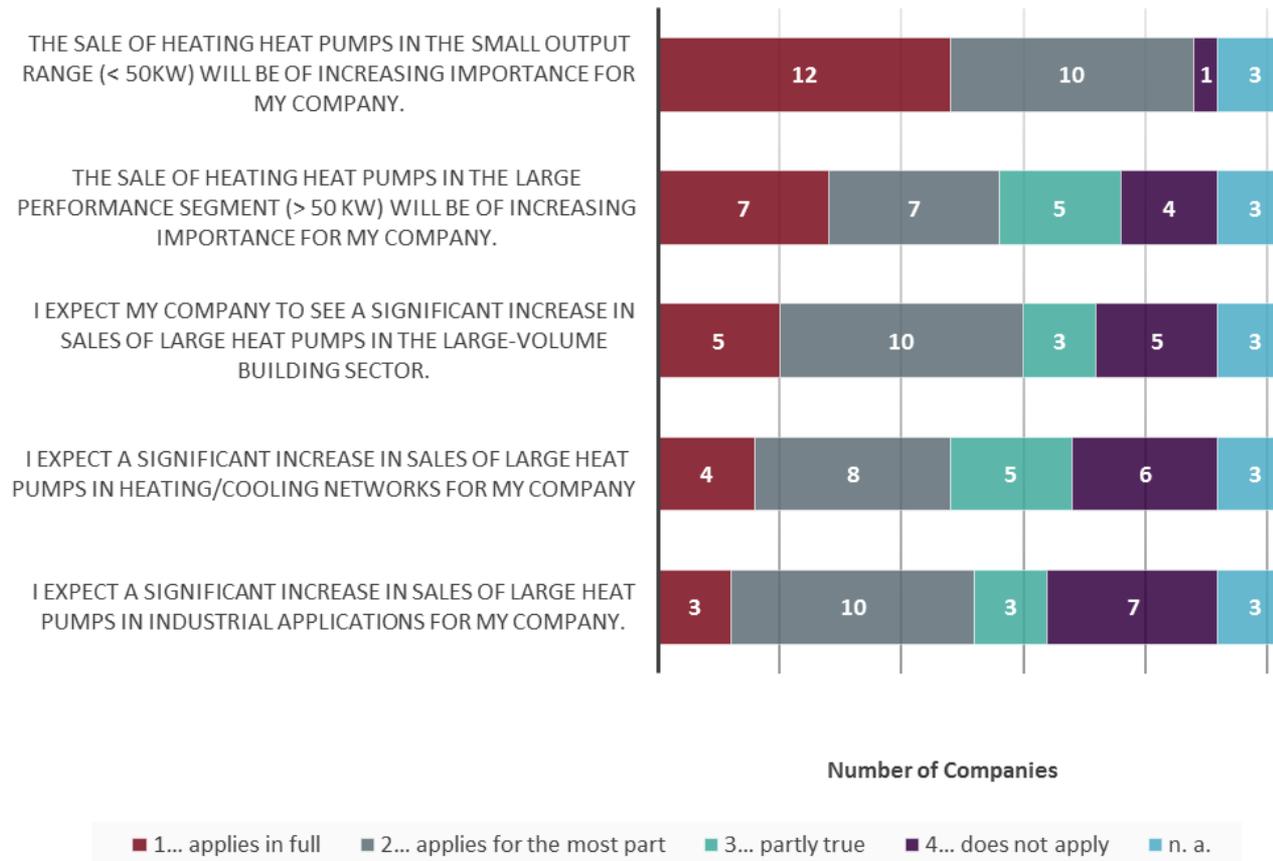
## Funded Research Projects



# POSITIONING OF THE AUSTRIAN HEAT PUMP INDUSTRY



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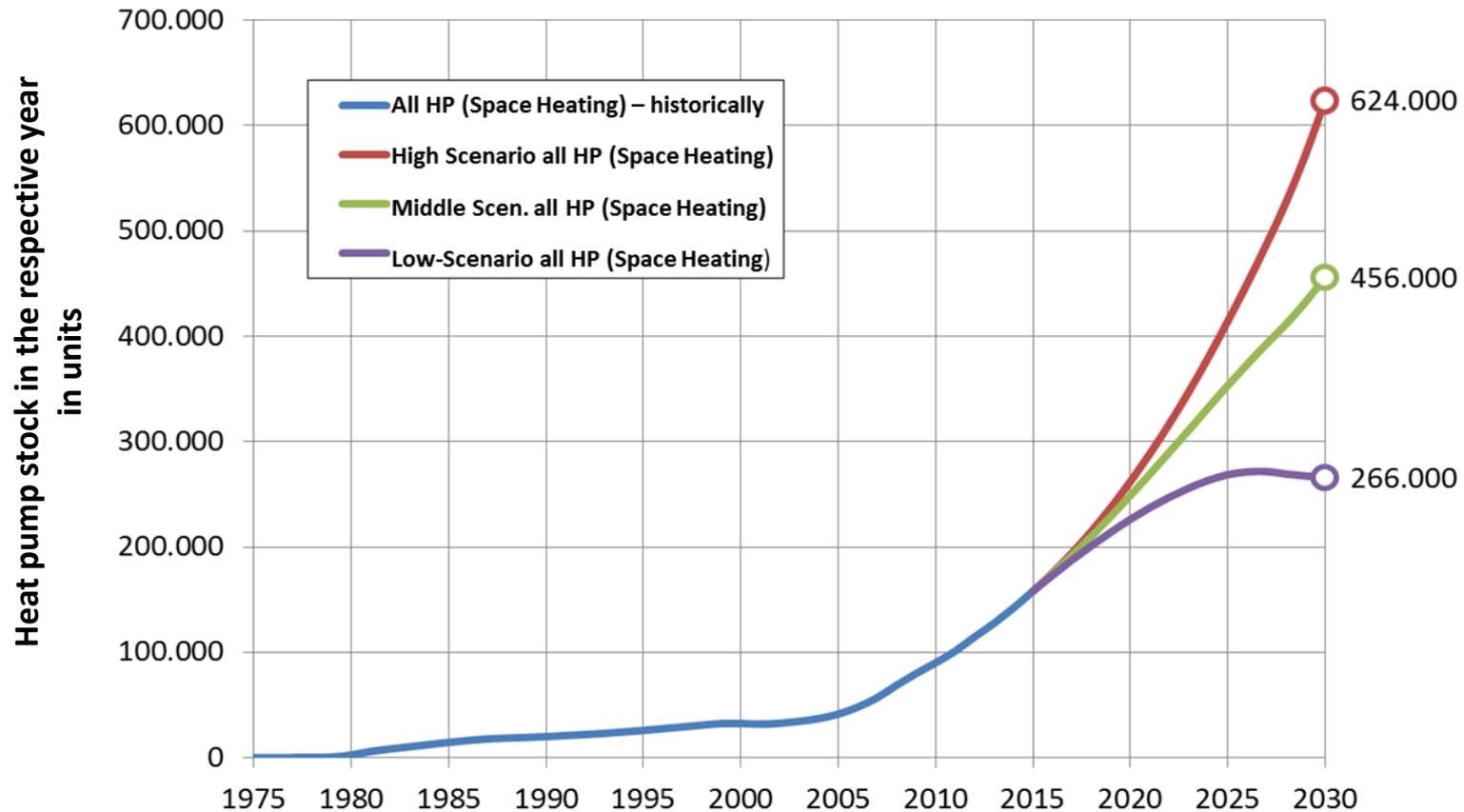


# MARKET SCENARIOS HEAT PUMP 2030

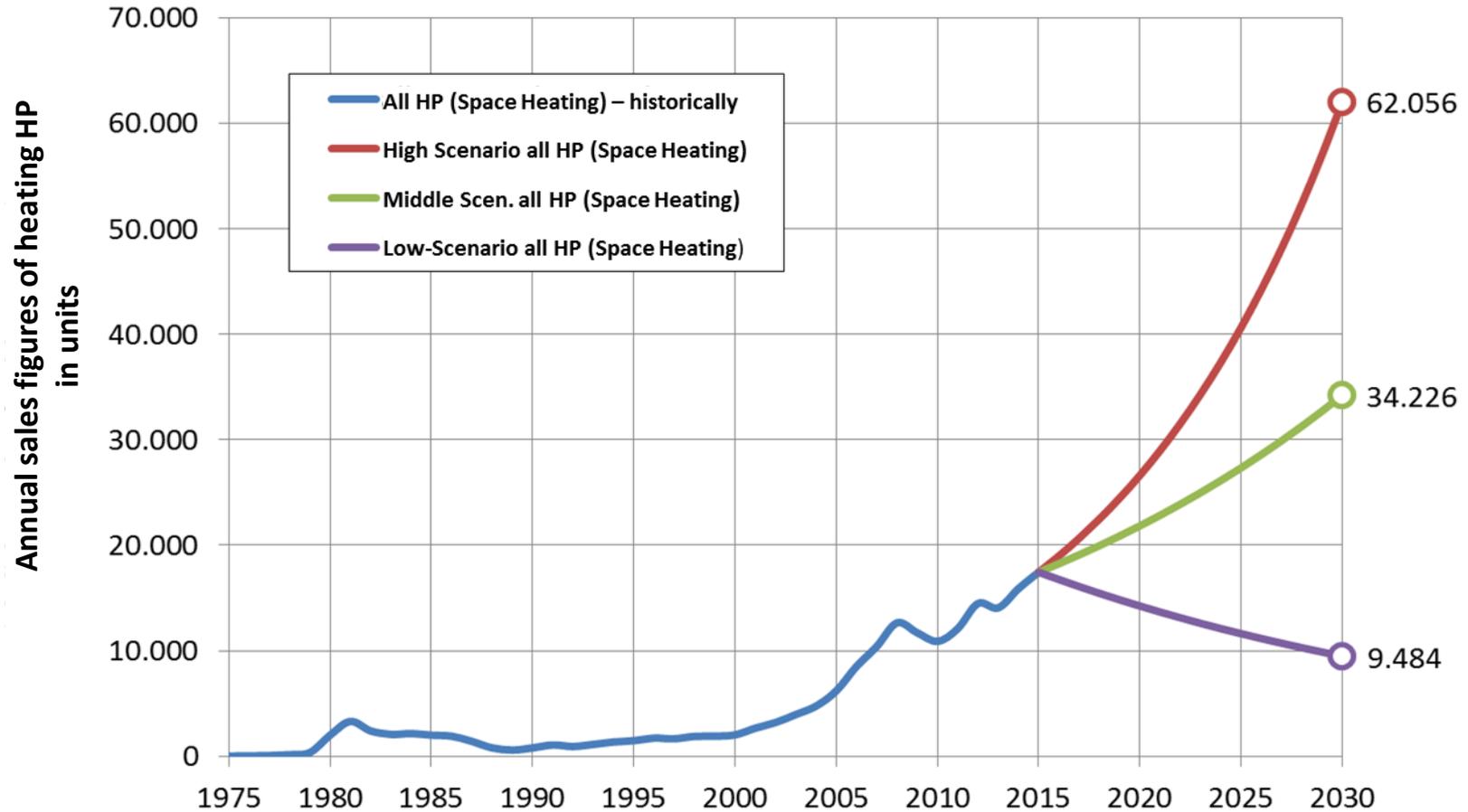
## METHODICAL APPROACH

- Analysis of historical development, updating of empirically observed trends
- Literature: Model results from the research project “Heating 2050” (status 2010)
- Results of the expert workshops

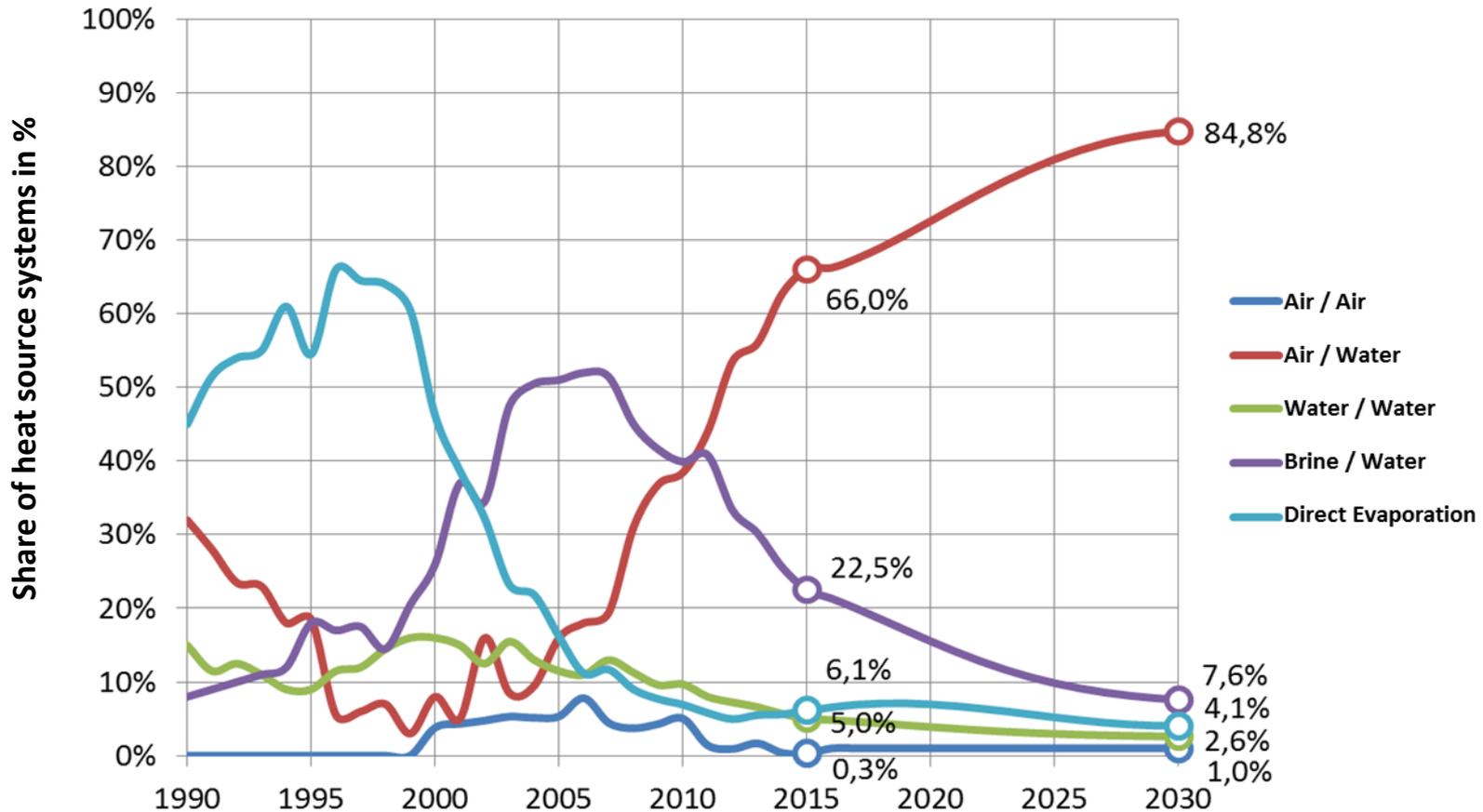
## HEAT PUMPS (SPACE HEATING) – IN OPERATION



## HEAT PUMPS (SPACE HEATING) – SALES FIGURES



## HEAT PUMPS (SPACE HEATING) – HEAT SOURCES



## ALL HEAT PUMPS – SALES FIGURES

	<b>Environmental Heat (net) GWh<sub>th</sub></b>	<b>CO<sub>2</sub><sup>equ</sup> (net) m tons</b>	<b>Sector Sales m €</b>	<b>Jobs FTE</b>
Staus quo 2015	2,300	0.6	515	1,474
All High Scenarios	13,674	3.0	3,010	6,054
All Low Scenarios	4,703	1.1	656	943

# SUMMARY

## **Residential and Non-Residential Buildings**

- Refurbishment as a market of the future
- Acoustics and sound
- Large heat pumps are available, but not widely used
- Increase of a systemic approach and combination with other technologies

## **Smart Grids**

- Interface requirements still not clear
- Legal and regulatory framework conditions not yet optimal
- Further development of the market model and business models

# SUMMARY

## Thermal Networks

- Decentralized “temperature lifting” as suitable product for the mass market
- Demonstration of large-scale systems for heat supply

## Industrial Processes

- Dissemination of existing technology, best practice solutions for different industries
- Development of heat pumps for high operating temperatures for waste heat utilization and as efficiency increase
- Download (German version):
- <https://nachhaltigwirtschaften.at/de/e2050/publikationen/oesterreichische-technologieroadmap-fuer-waermepumpen.php>

# THANK YOU!

Thomas Fleckl, November 14, 2017

