Heat Roadmap Europe 2050
A low-carbon heating and cooling strategy

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4th INTERNATIONAL CONFERENCE ON

SMART ENERGY SYSTEMS AND 4TH GENERATION DISTRICT HEATING

AALBORG, 13–14 NOVEMBER 2018

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HEAT ROADMAP EUROPE RESULTS

ROADMAPS AND THE PAN-EUROPEAN THERMAL ATLAS

AALBORG, 13 NOVEMBER 2018

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The Team Behind

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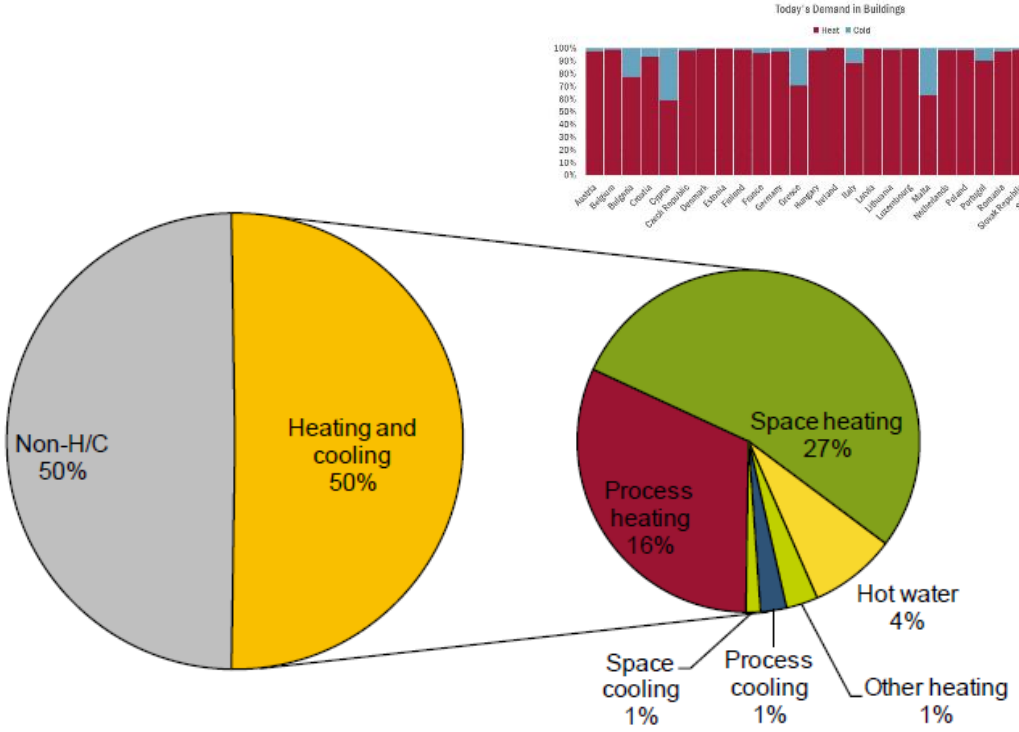
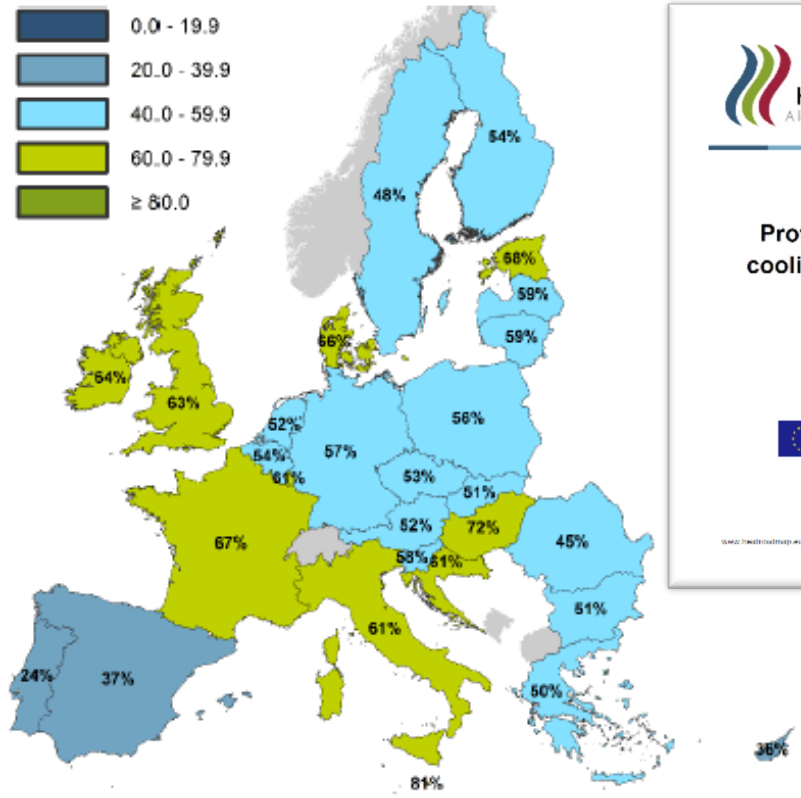
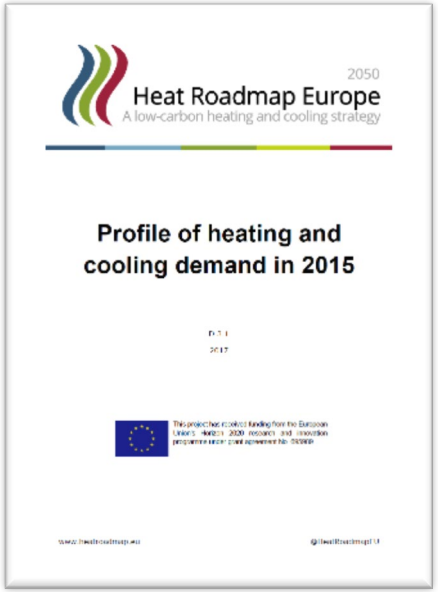
Heating vs. other sectors



Heating and cooling demand in 2015 in the EU28 by end-use compared to total final energy demand

- Large share for All Member States (not just the 'cold' North)
- Overall cooling share in general is 10-15%





Heating and cooling demand in 2015 in the EU28 by end-use compared to total final energy demand

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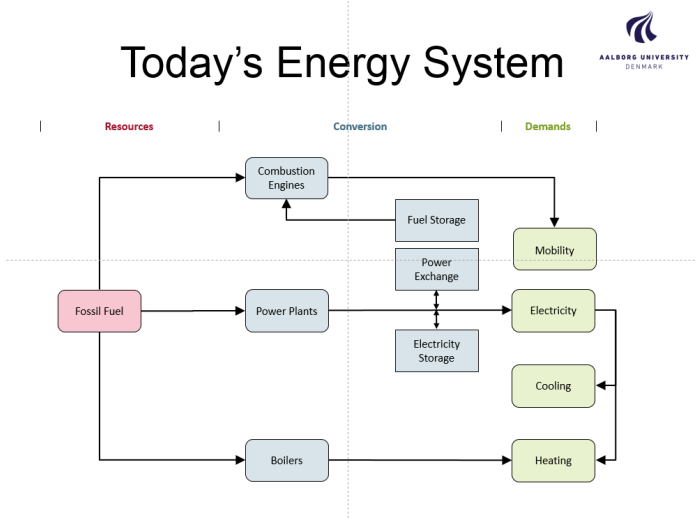
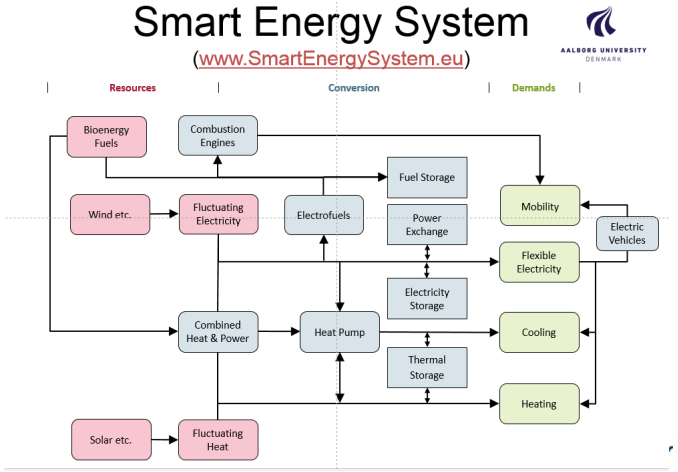
Our Purpose in HRE4

- *The overall objective in this HRE* project *is to provide* ***new capacity and skills*** *for lead-users in the heating and cooling sector, including policymakers, industry, and researchers at local, national, and EU level, by* ***developing the data, tools, methodologies, and results*** *necessary to quantify the impact of implementing more energy efficiency measures on both the* ***demand and supply*** *side of the sector.*





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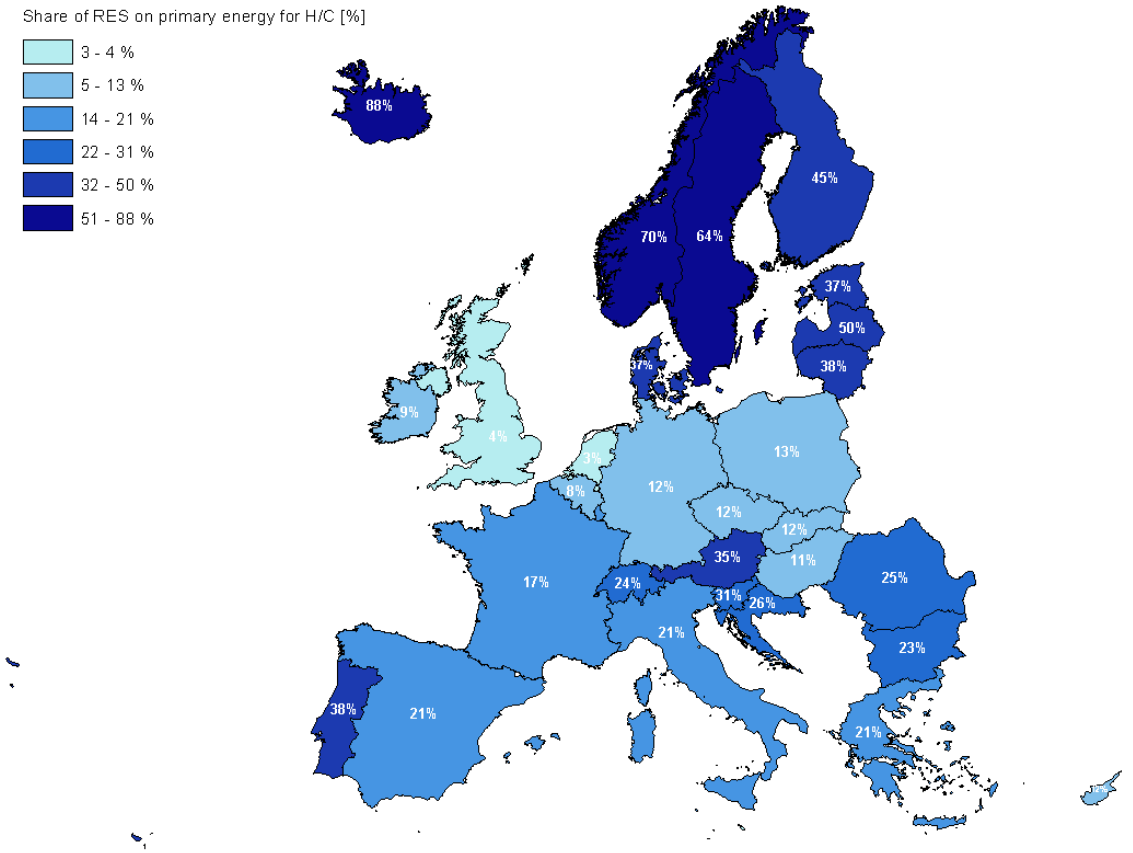
Heating and Cooling Can Have Very High Renewable Energy Penetrations



Source: Mapping and analyses of the current and future heating-cooling fuel deployment, 2016

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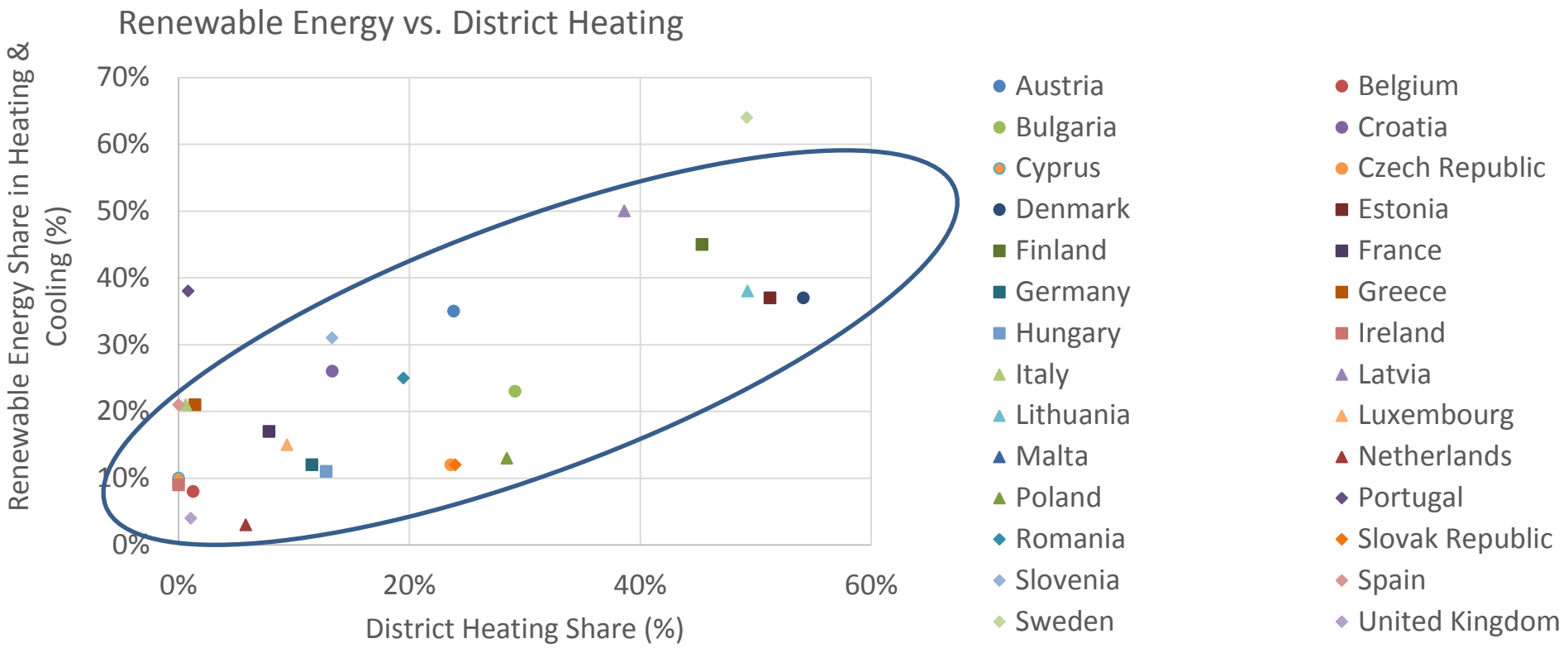
Renewable Energy vs. District Heating



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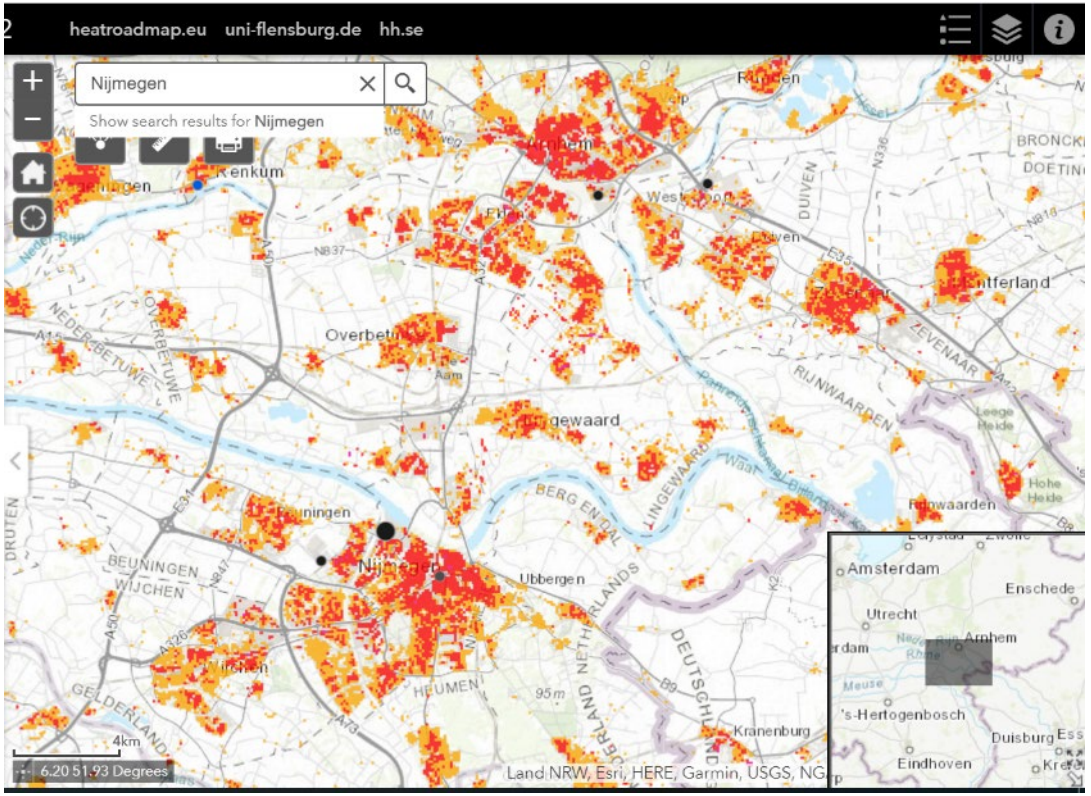
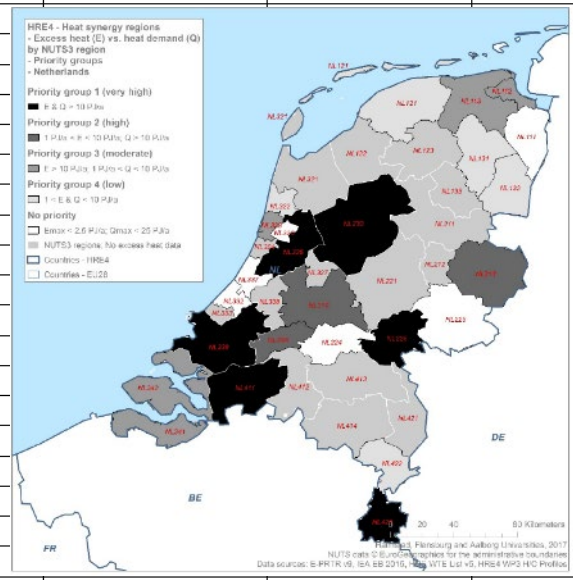
Heat synergies map in PETA4 - Netherlands



- Heat demands: 296 PJ/y
- Excess heat: 560 PJ/y
- District heating share: 6%
- Renewable energy in heating: 3%

NUTS3 Regions	Heat demand [PJ/a]	Excess heat [PJ/a]	Excess heat ratio [-]
NL111	3.83	0.20	0.05
NL112	1.22	11.32	9.28
NL113	9.90	17.30	1.75
NL121			25
NL131			92
NL132			55
NL213			48
NL224			08
NL225			09
NL226			40
NL230			99
NL310			12
NL322			16
NL323			.27
NL325			05
NL326			05
NL332			05
NL337			09
NL339			06
NL33A			39
NL341			.41
NL342			78
NL411	15.57	73.27	4.71
NL422	5.96	8.10	1.36
NL423	15.28	39.67	2.60
Grand Total	**295.84**	**559.23**	**1.89**



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Why isn't it happening?

- Heating is complex
- Heating is local
- Heating is long term
- Lack of knowledge
- Heat savings and district heating have large investment costs
- Heating is cultural, ownership problems and profit margins

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Heat Roadmap Europe Methodology

Data and mapping

FORECAST
FORecasting Energy Consumption Analysis and Simulation Tool

Peta

The JRC-EU-TIMES model

EnergyPLAN

Building Demand Savings Potential → Costs of Making Savings

District Heating Potential → District Heating Resources

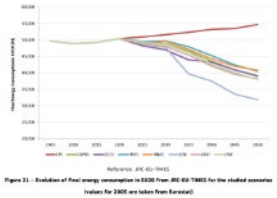
Energy System Potential → Energy System Resources

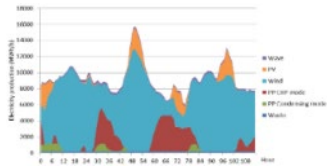
Energy System analyses

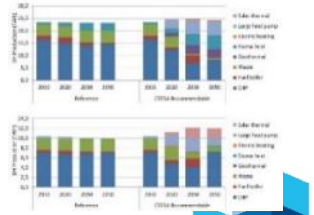
BAU (References)

Heat Roadmap Europe Alternatives

Results (PES, CO2, Costs)







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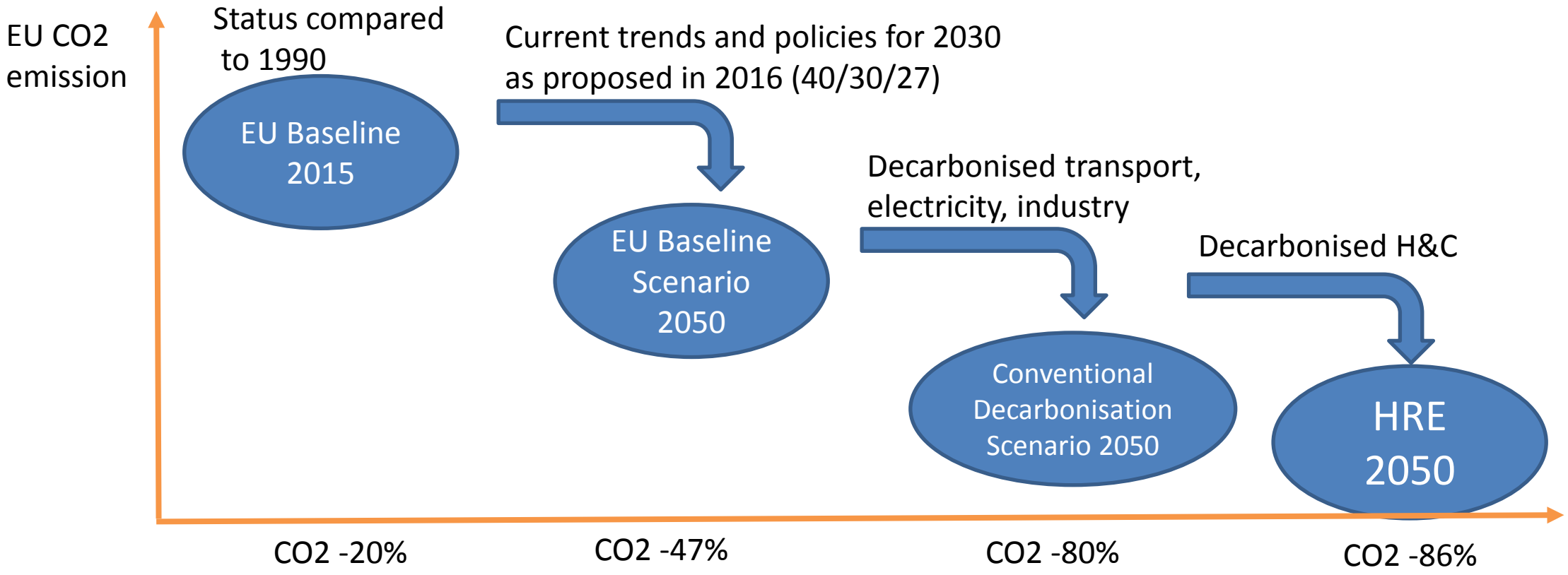
Scenario structure



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Identifying the Balance Between Supply and Savings

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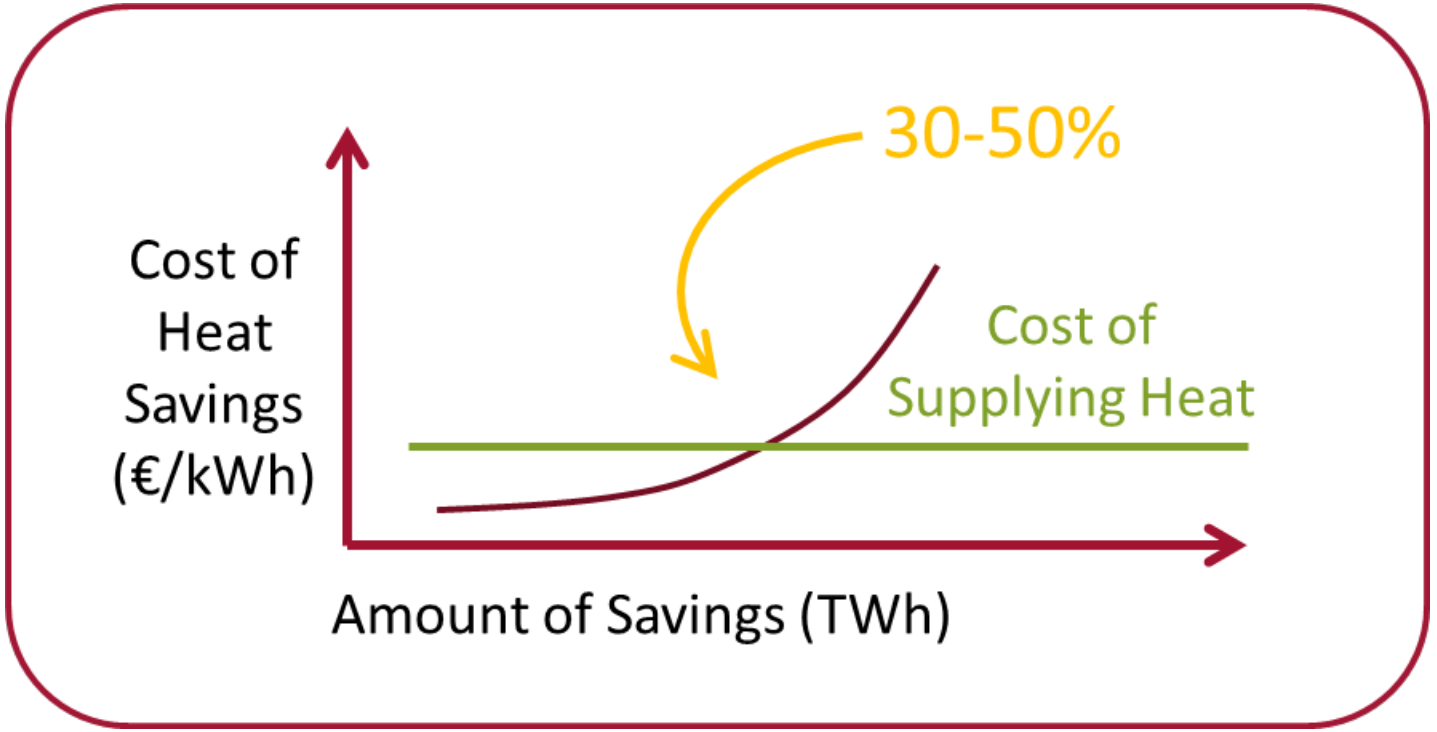
- Savings, Residential. Services and Industry
- Supply curve includes
  - DH investment (heat density)
  - Excess heat potential in specific areas
  - Fuel and other heat supply costs
- Where DH not feasible:
  - Heat pumps
- District cooling
- Introduction of RES
- Final checks
  - Saving-supply balance
  - Carbon emission level



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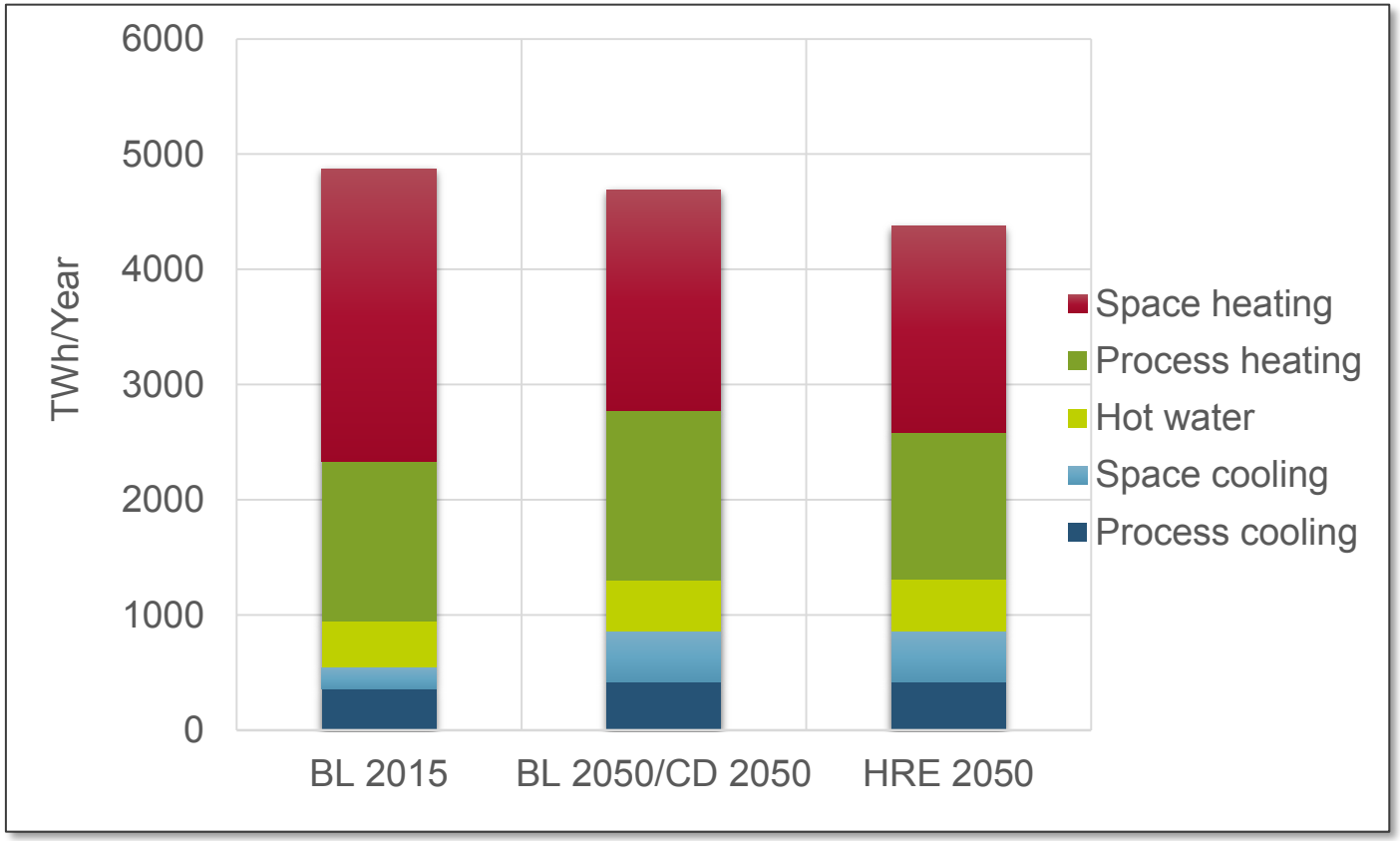
Development of thermal demands

- Total of 30% reduction in space and hot water demand
- More than current EU policy
- Combining refurbishment and new efficient buildings
- Cooling demands expected to increase



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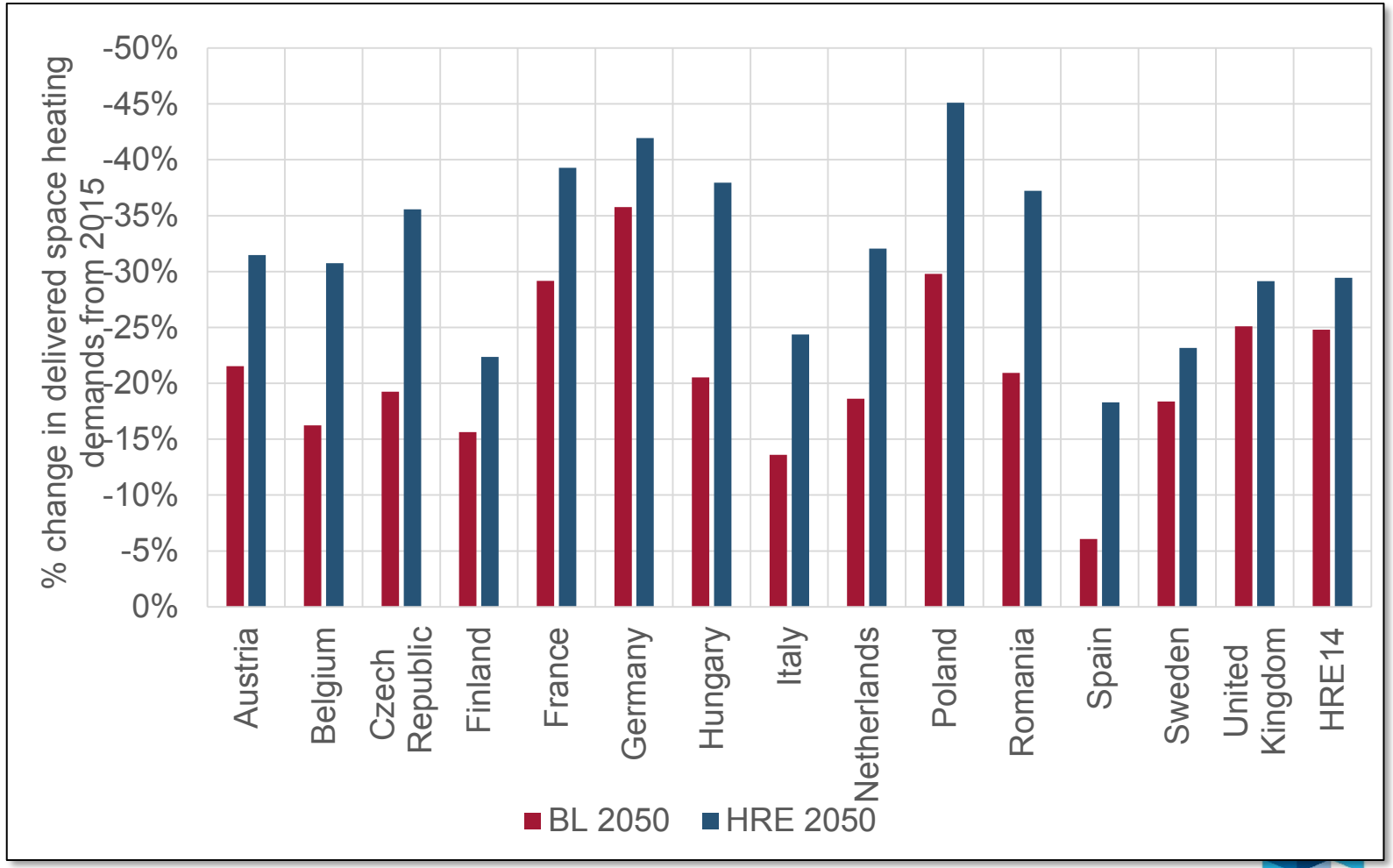
Development of thermal demands

- Current policy: annual refurbishment rate between 0,7% and 1,0% towards 2050, (requires policies are fully implemented)
- Recommended to increase the target to at least 30% savings for space heating in buildings: higher annual refurbishment rate at 1,5% to 2%, and deeper renovations when they occur



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Heat pump & district heating shares of heat market

- Building HPs
  - Increase in share from 1% to about half of the heat market mainly in rural areas
- DH supply
  - Increase from 12% to cover the other half of the heat market mainly in urban areas
- Individuel fuel boilers and electric heating for heating should be limited as far as possible
- All natural gas boilers are phased out

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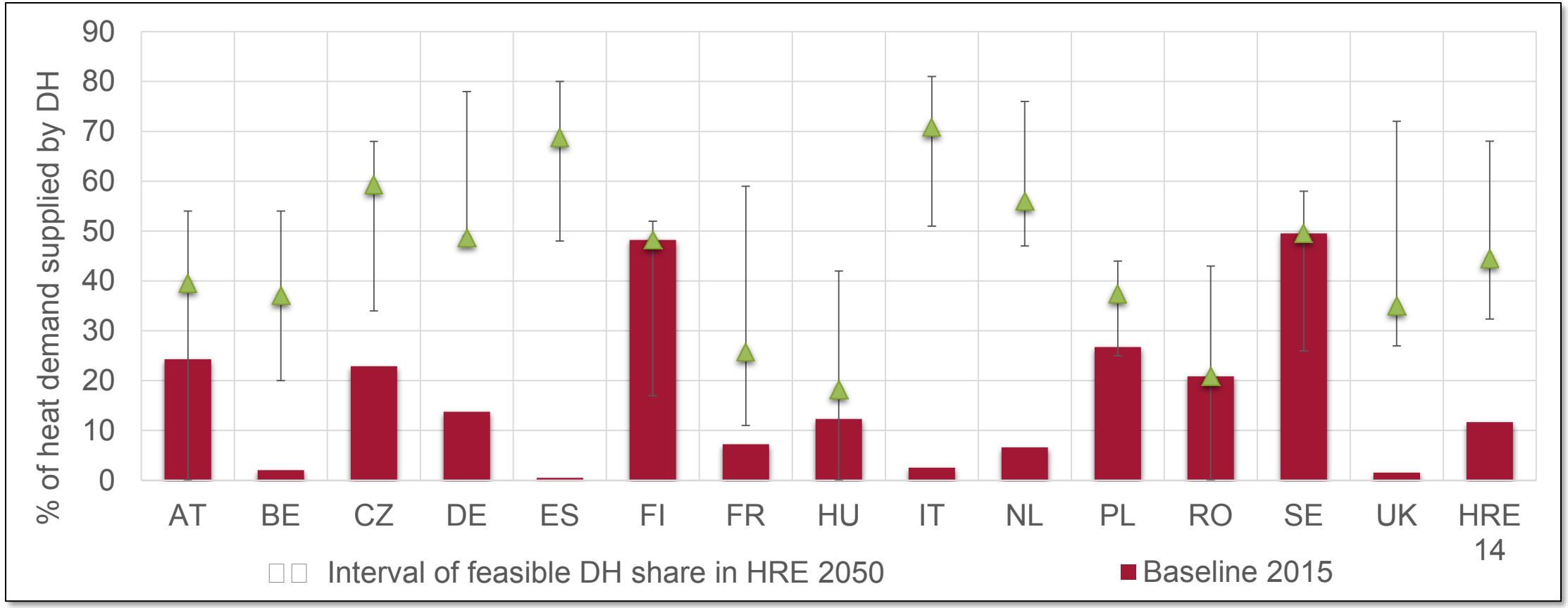
Minimum Recommended DH levels of the total heat market pr. country



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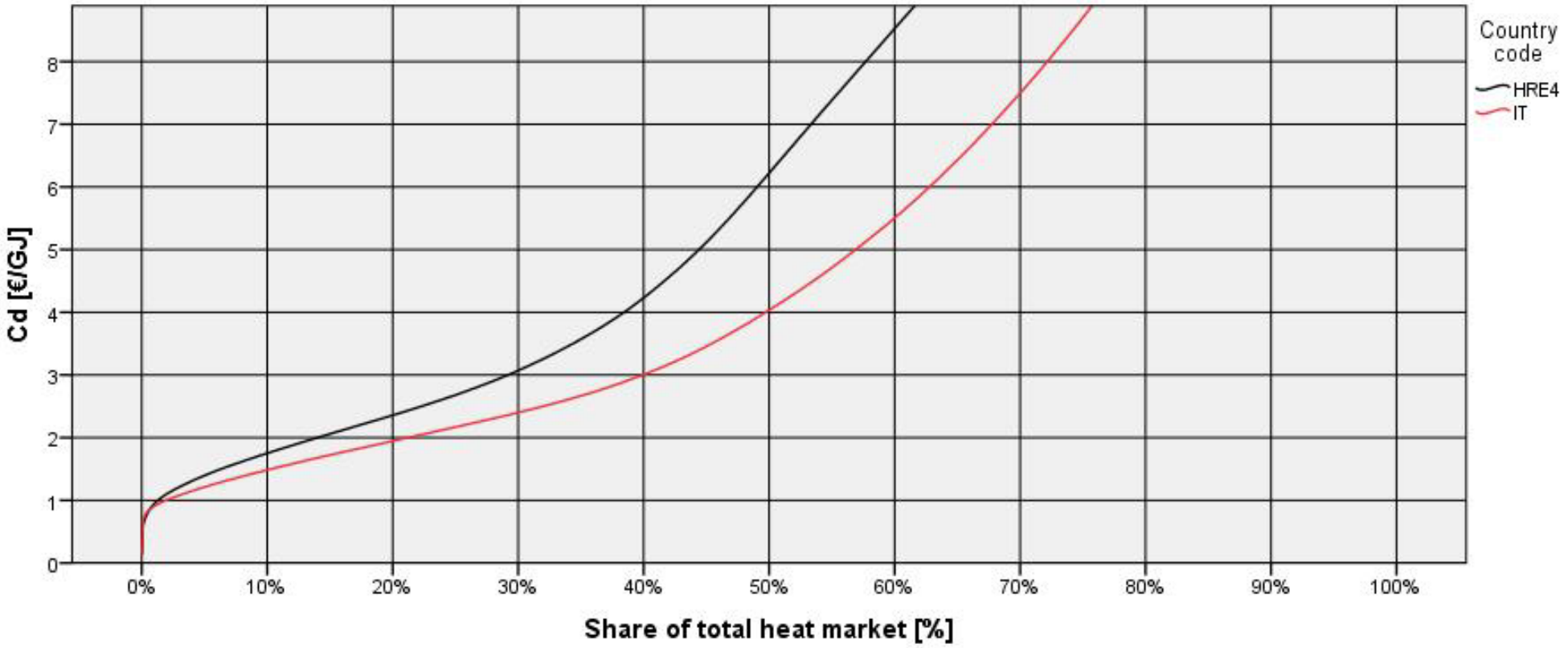
Feasible shares of DH - Italy



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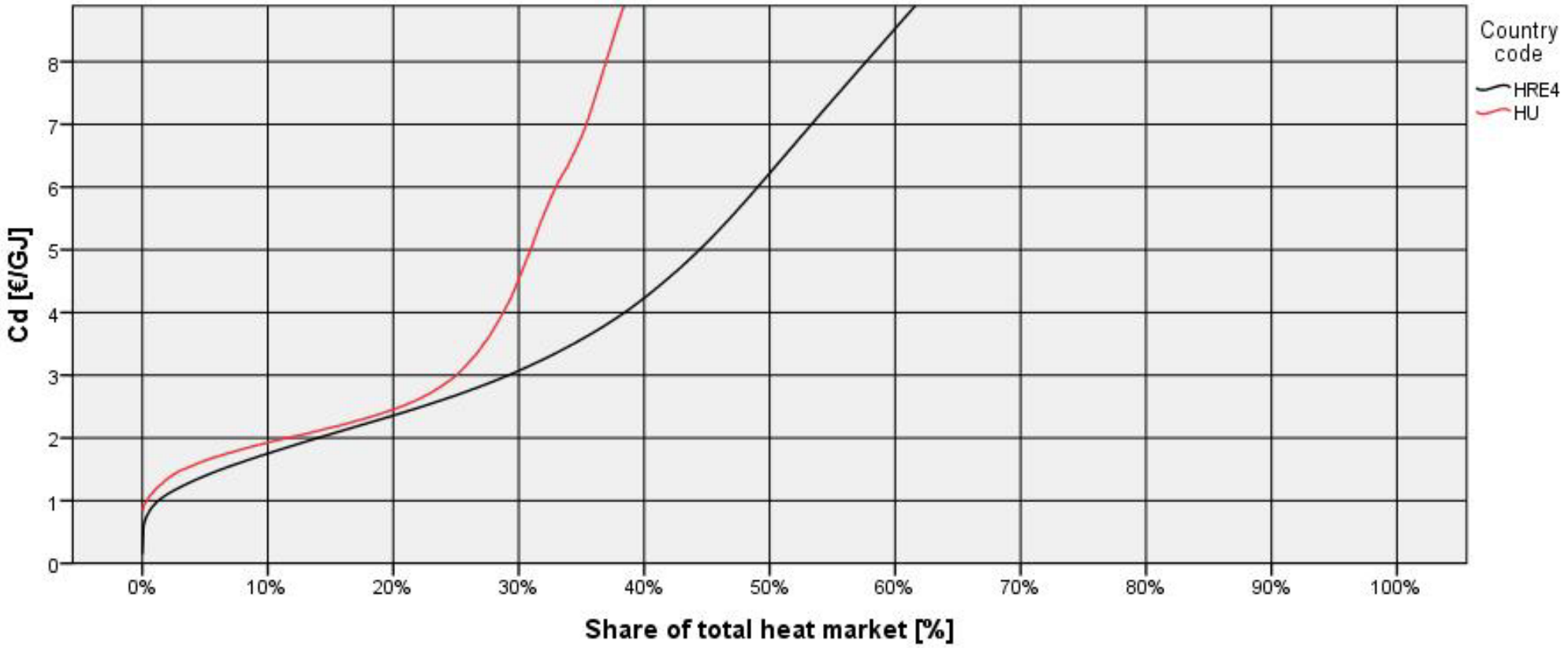
Feasible shares of DH - Hungary



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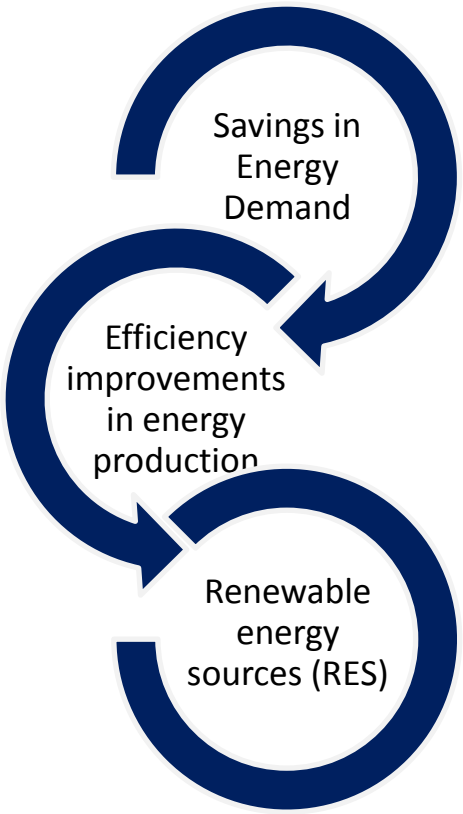
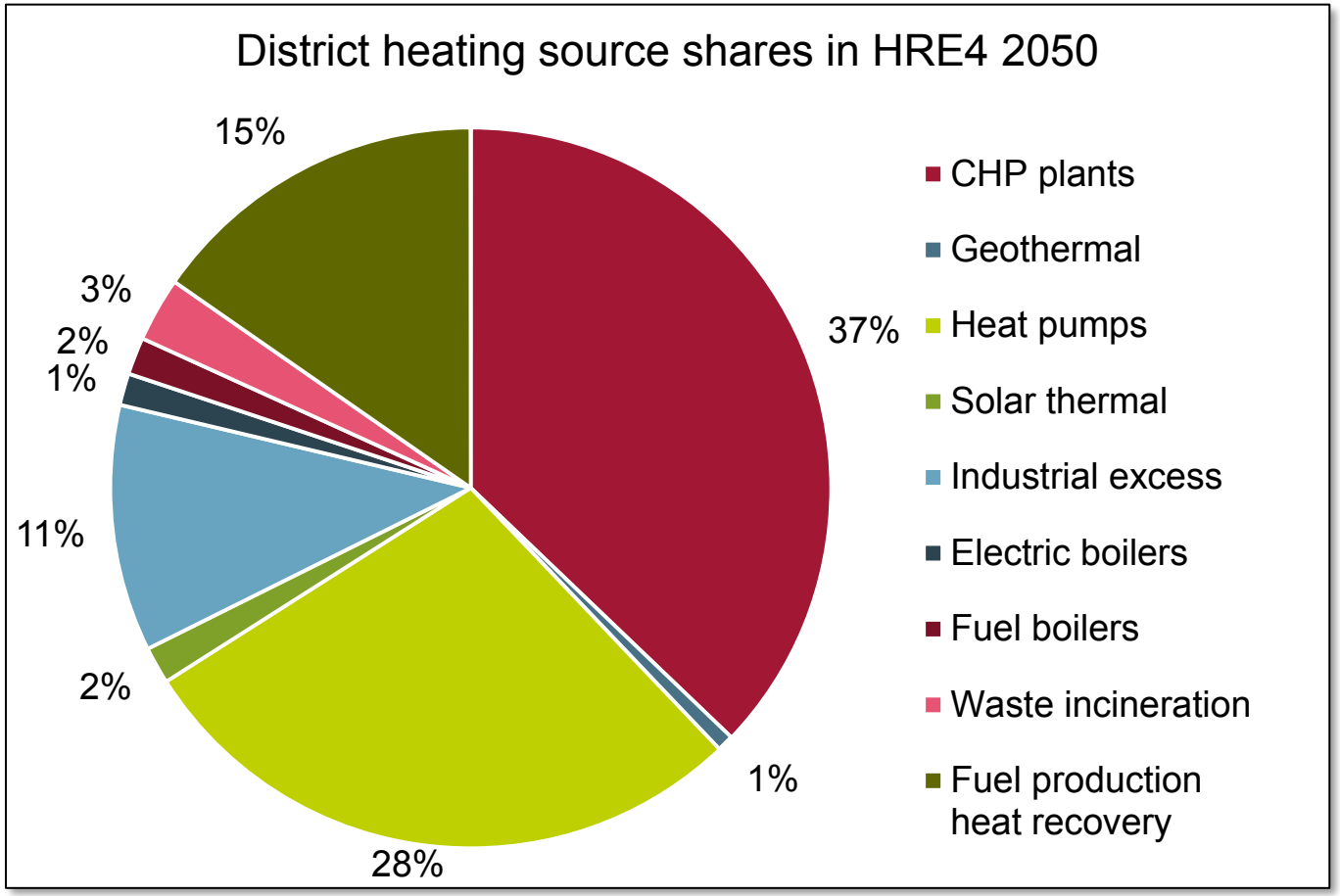
District heating production





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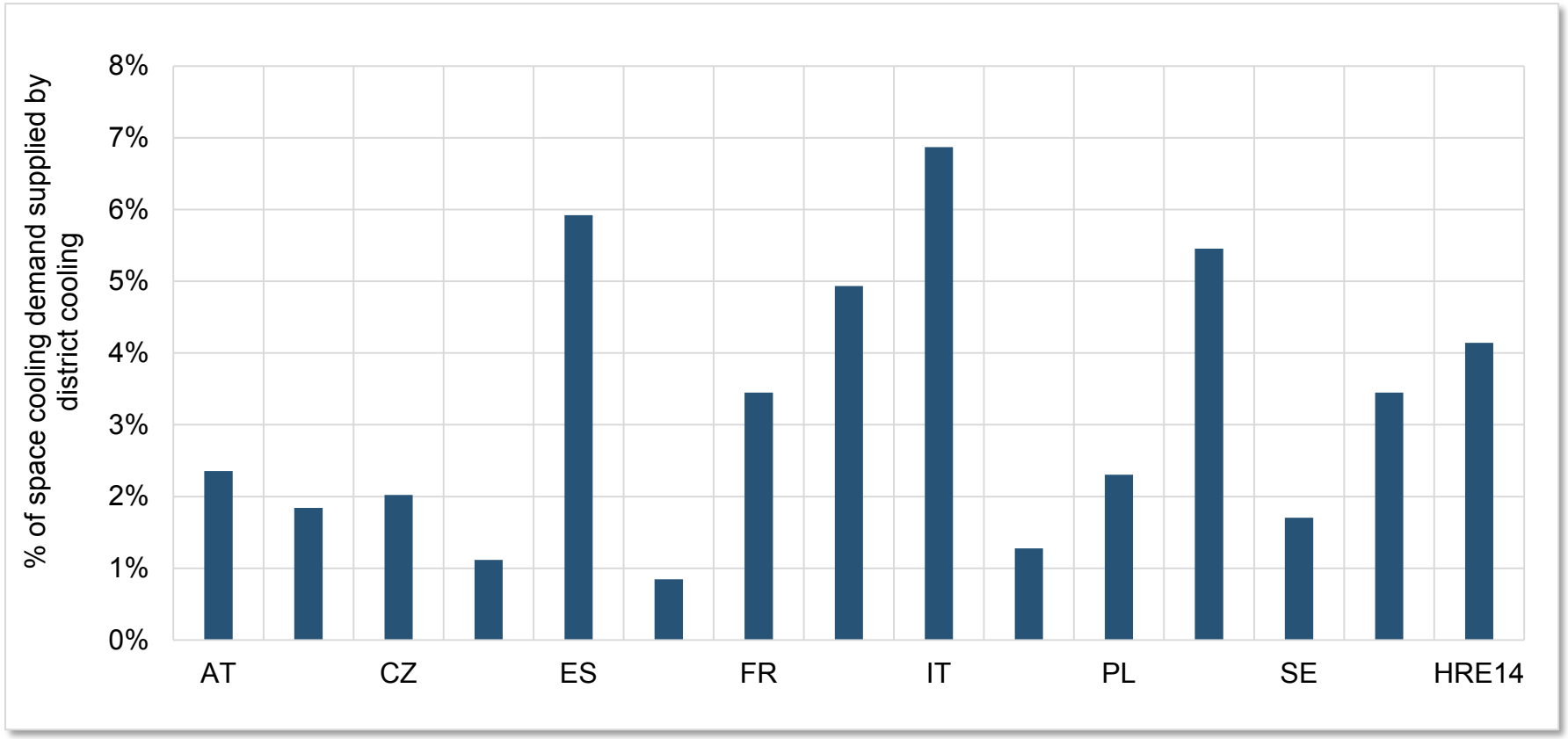
District Cooling covers 20% of the urban market



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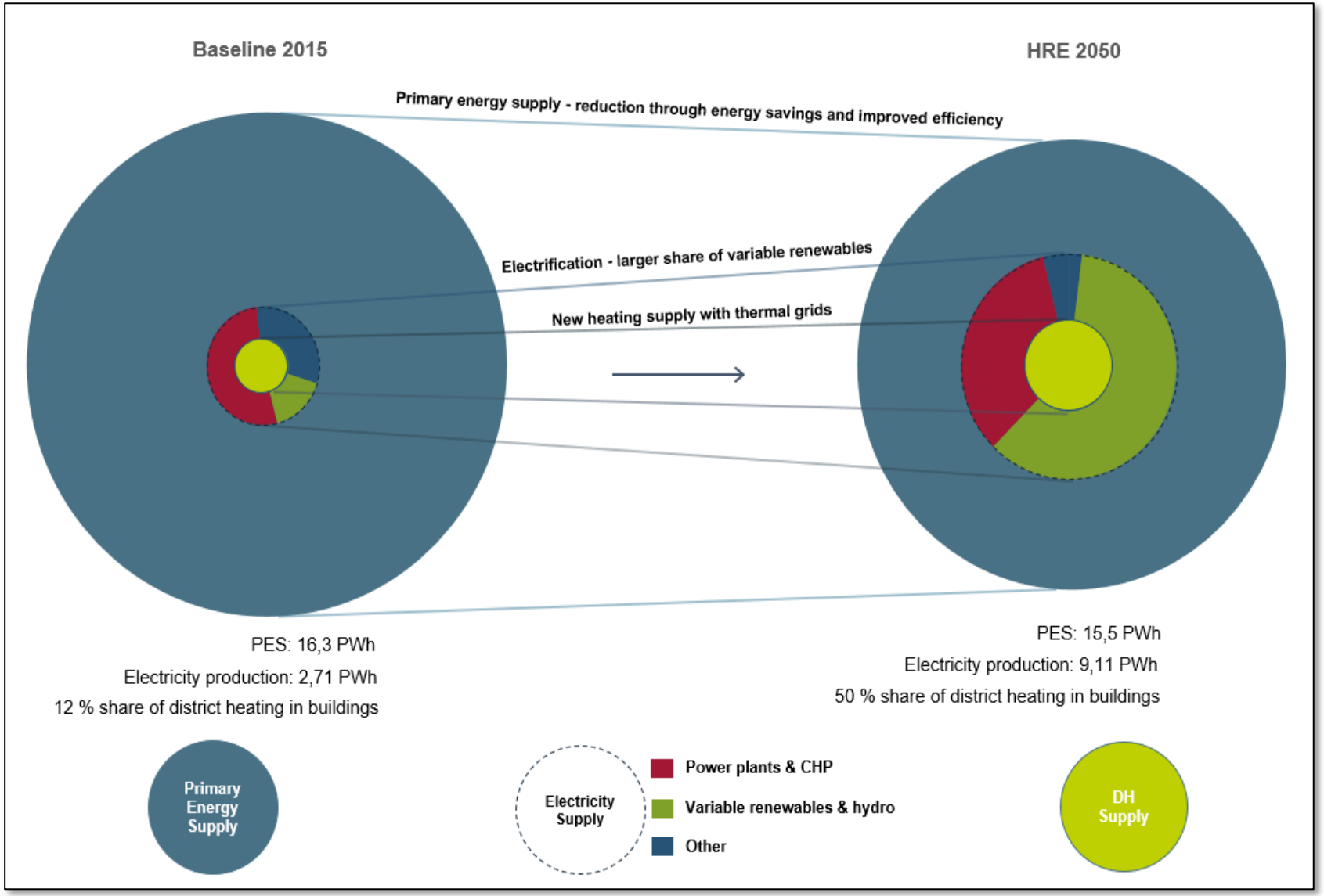
General scenario trends



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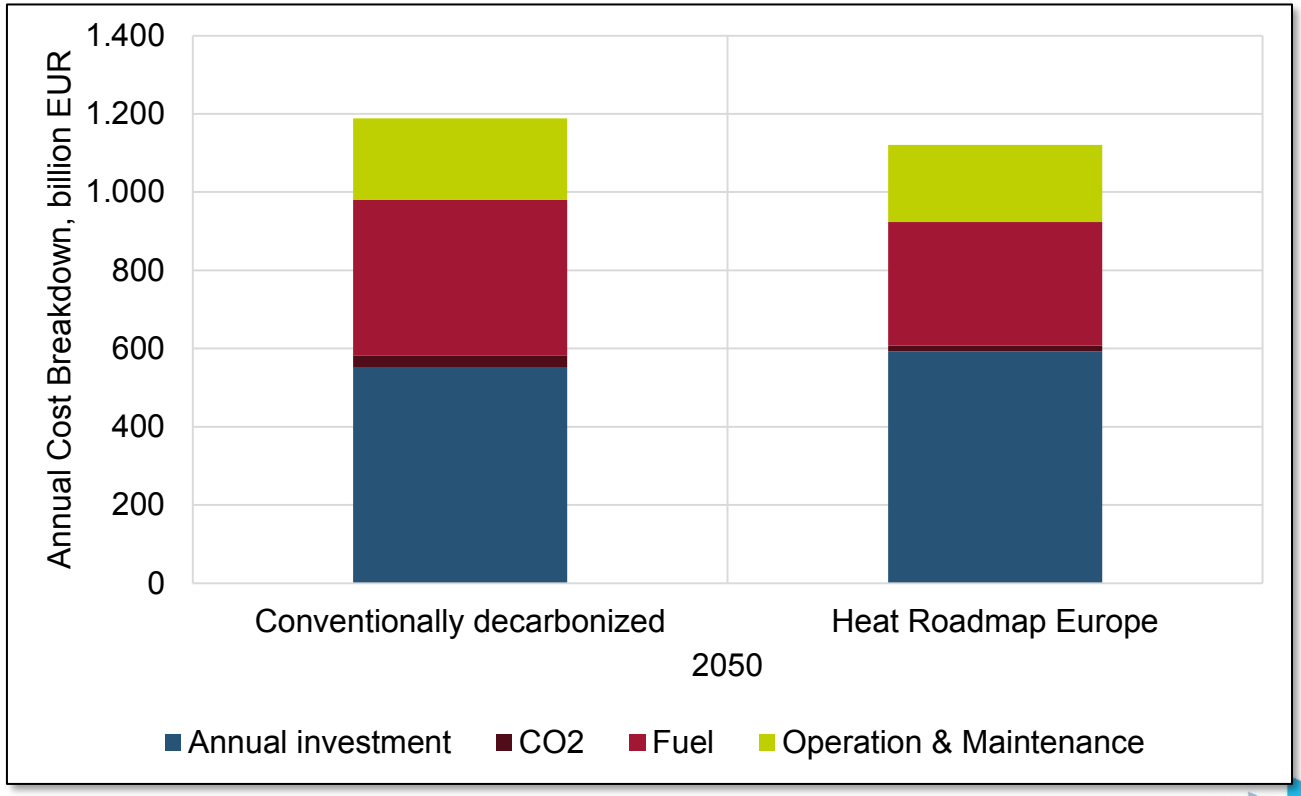
Total energy system costs

- Reduction of ~70 B€/year
- Increase in investment costs
  - Job creation
  - Reduced energy price fluctuation
- Decrease in fuel costs
  - Lower dependence on import of fossil fuels
  - No Natural gas for heating



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PETA 4.3 update

- Content and updates
  - **Operational layers**
    - Supply
    - Infrastructure
    - Demand
    - Under evaluation
  - **Web map application**
    - Editorial changes for improved user-friendliness.

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PETA 4.3 update

- Content and **updates (or new layers)**
  - **Operational layers**
    - Supply
      - **Allocated excess heat (new)**
      - **Solar thermal potential and solar fraction (update)**
      - **Excess heat from Metro stations (new, from ReUseHeat)**
      - **Excess heat from Sewage plants (new, from ReUseHeat)**
      - Heat Synergy Regions (Same as PETA 4.2)
      - Excess Heat Activities (Energy & industrial (Same as PETA 4.2))
      - Geothermal (Same as PETA 4.2, under evaluation)
      - Biomass (Same as PETA 4.2, under evaluation)

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PETA 4.3 update

- Content and **updates (or new layers)**
  - **Operational layers**
    - Infrastructure
      - **Recommended DH levels (new)**
      - ***Prospective Supply Districts* (PSD)** – New name for "Prospective DH areas" (same as PETA 4.2)
      - Existing DH areas (same as PETA 4.2)
      - Marginal heat distribution capital costs (same as PETA 4.2)
    - Demands:
      - **Cold demand density (CDD 2015) (update)**
      - Heat demand density (HDD 2015) (Same as PETA 4.2)

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PETA 4.3 update

- Content and **updates (or new layers)**
  - **Operational layers**
    - Under evaluation
      - **Geothermal** (new update planned for early 2019)
      - **Biomass** (new update planned for early 2019: allocation PSD)
      - **Excess heat from Data centres** (new layer, ReUseHeat)
      - **Excess heat from Service sector buildings** (new layer, ReUseHeat)
  - **Web map application**
    - Several editorial changes for improved usability and user-friendliness implemented at the web map application
  - **Summary**
    - Six new or updated operational layers plus editorial changes

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HEAT ROADMAP EUROPE RESULTS

CHECK OUT THE PETA 4.3 STAND!

AALBORG, 13 NOVEMBER 2018

Webinar series

Heat Roadmap Europe

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