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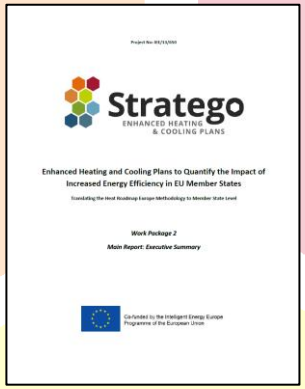
4th Generation District Heating Technologies and Systems




# Comparing Heat Supply to Heat Savings with a Levelised costs approach and an Energy systems approach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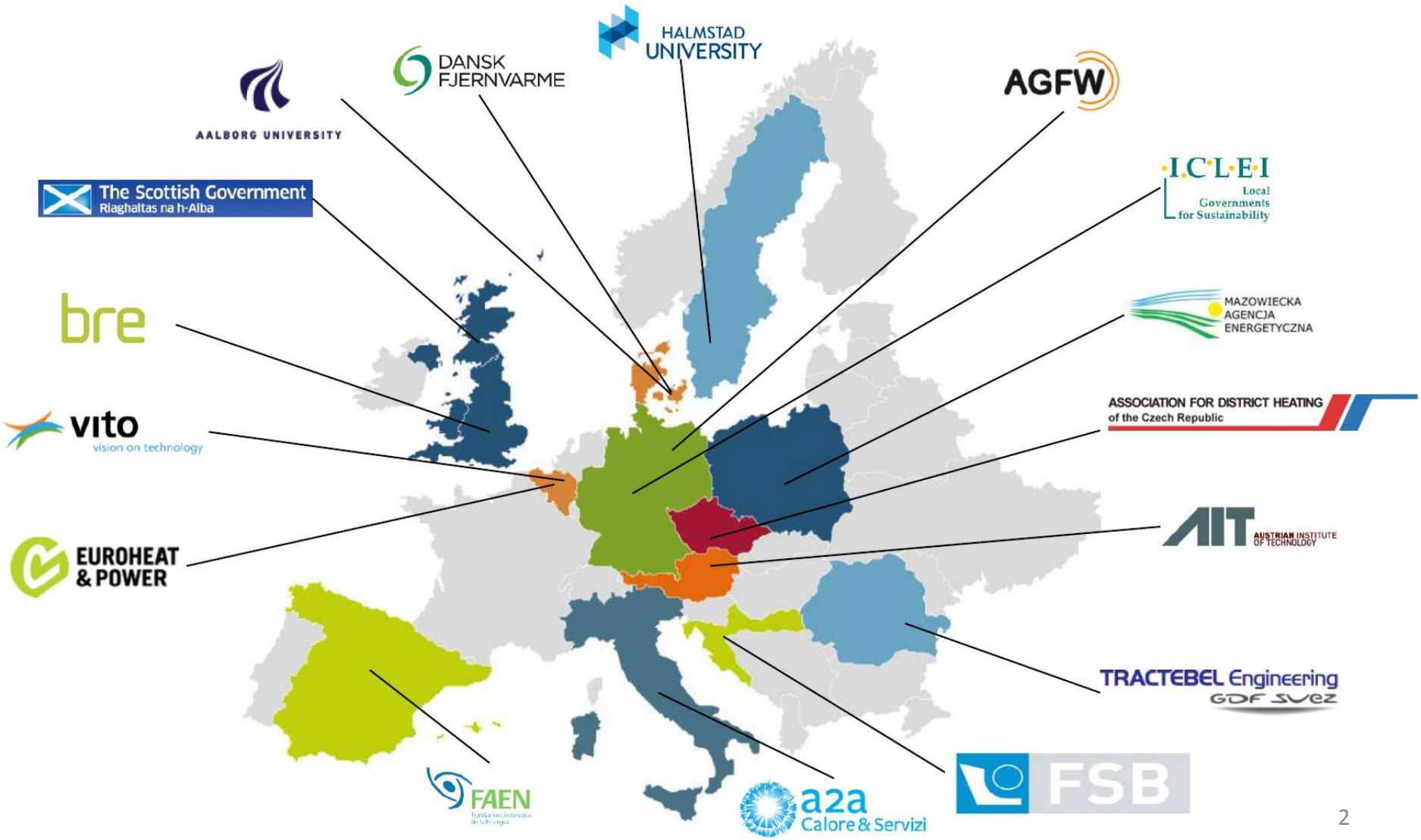
Heat Roadmap Europe 2050

# Stratego Partners



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# STRATEGO (Heat Roadmap Europe 3)

- Intelligent Energy Europe co-financed project with 16 partners from 12 countries from 2014 to 2016
- The purpose is to quantify the energy efficiency potential for heating and cooling in 5 EU countries
- Focus in this presentation is only about a small part of the analysis evolving around the hypothesis that there is a point where heat savings become more costly than supplying sustainable heat
- Analysis for four countries: Czech Republic, Croatia, Italy, Romania

# Unique Issues for Heating

## 1. Heat Savings

- Reduce our demand for heat:
  - Space heating
  - Hot water

## 2. Urban Heating

- Share a heating network:
  - Gas Grid
  - Water (i.e. district heating)

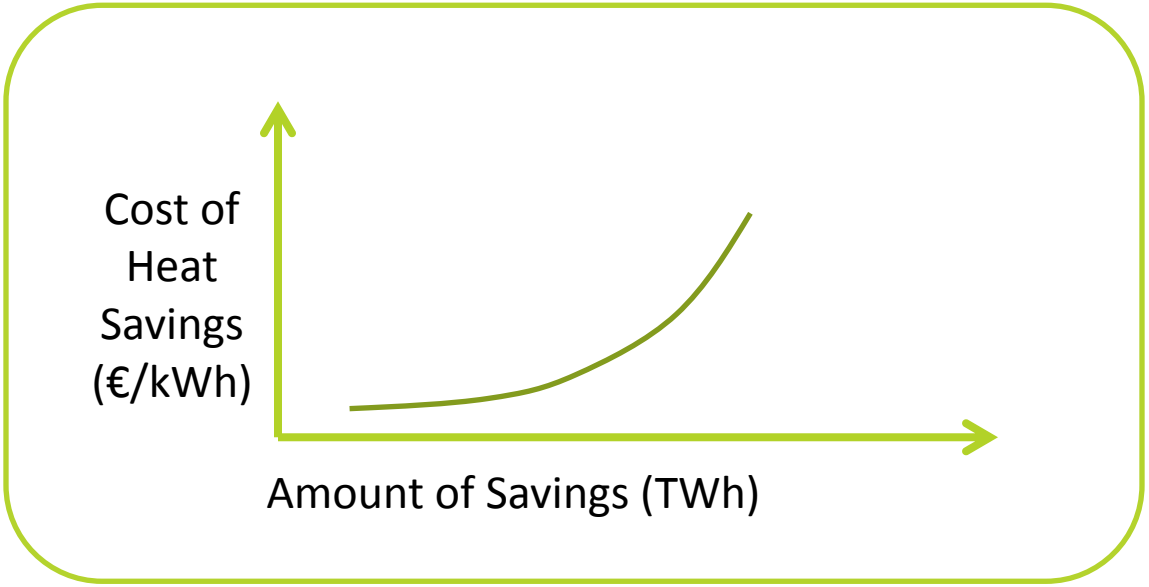
## 3. Rural Heating

- Use a heating unit in each building:
  - Boilers:
    - Oil
    - Biomass
  - Heat Pumps
  - Electric Heating

**The Decision for Each Issue will Affect the Others**

# How much Heat should we Save?

- We should implement heat savings until the price of sustainable supply is less than the marginal price of additional savings



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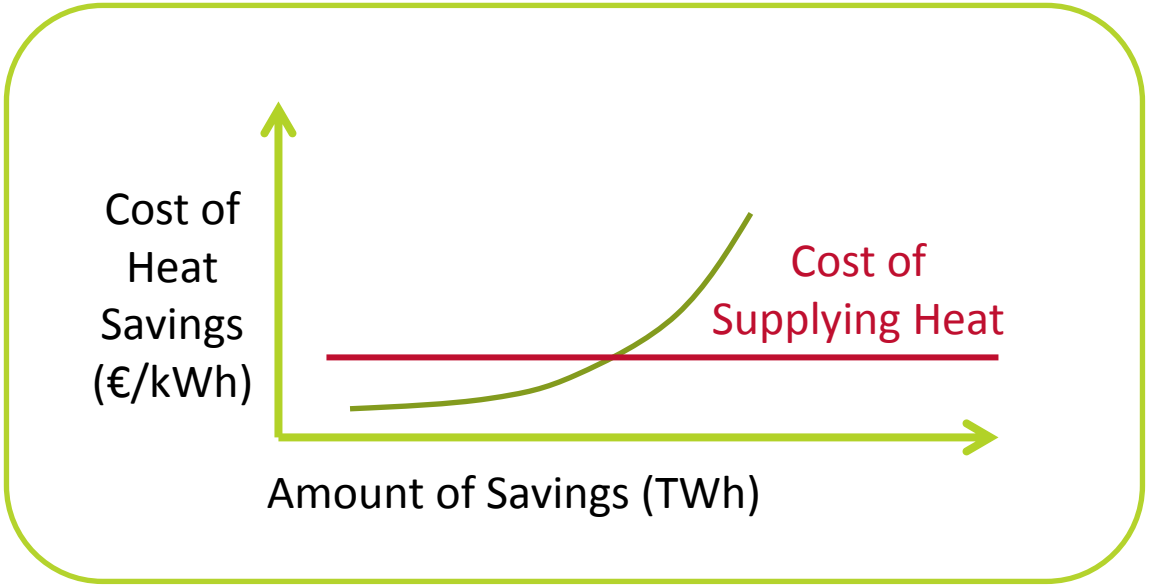
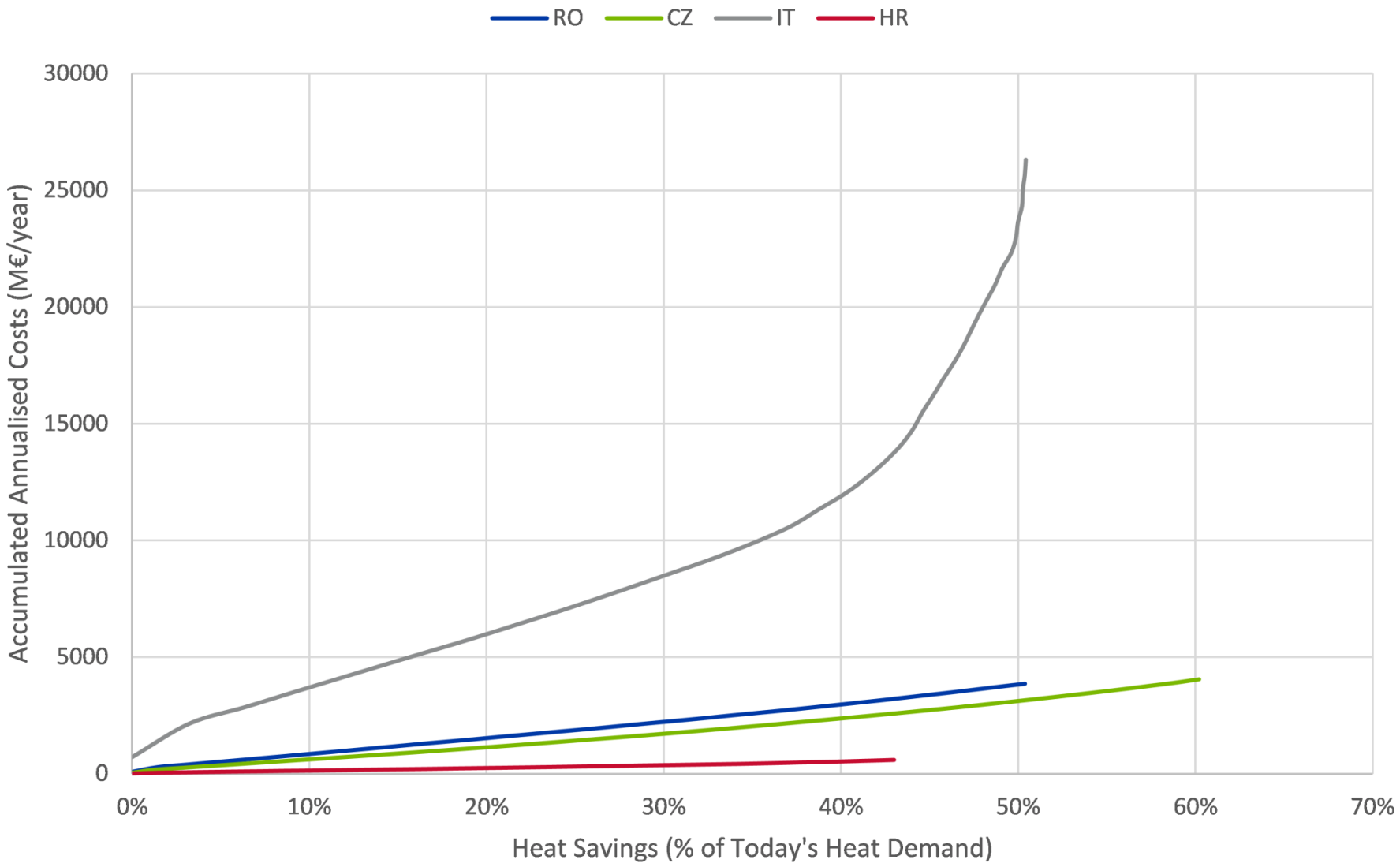


# Heat savings potentials and costs



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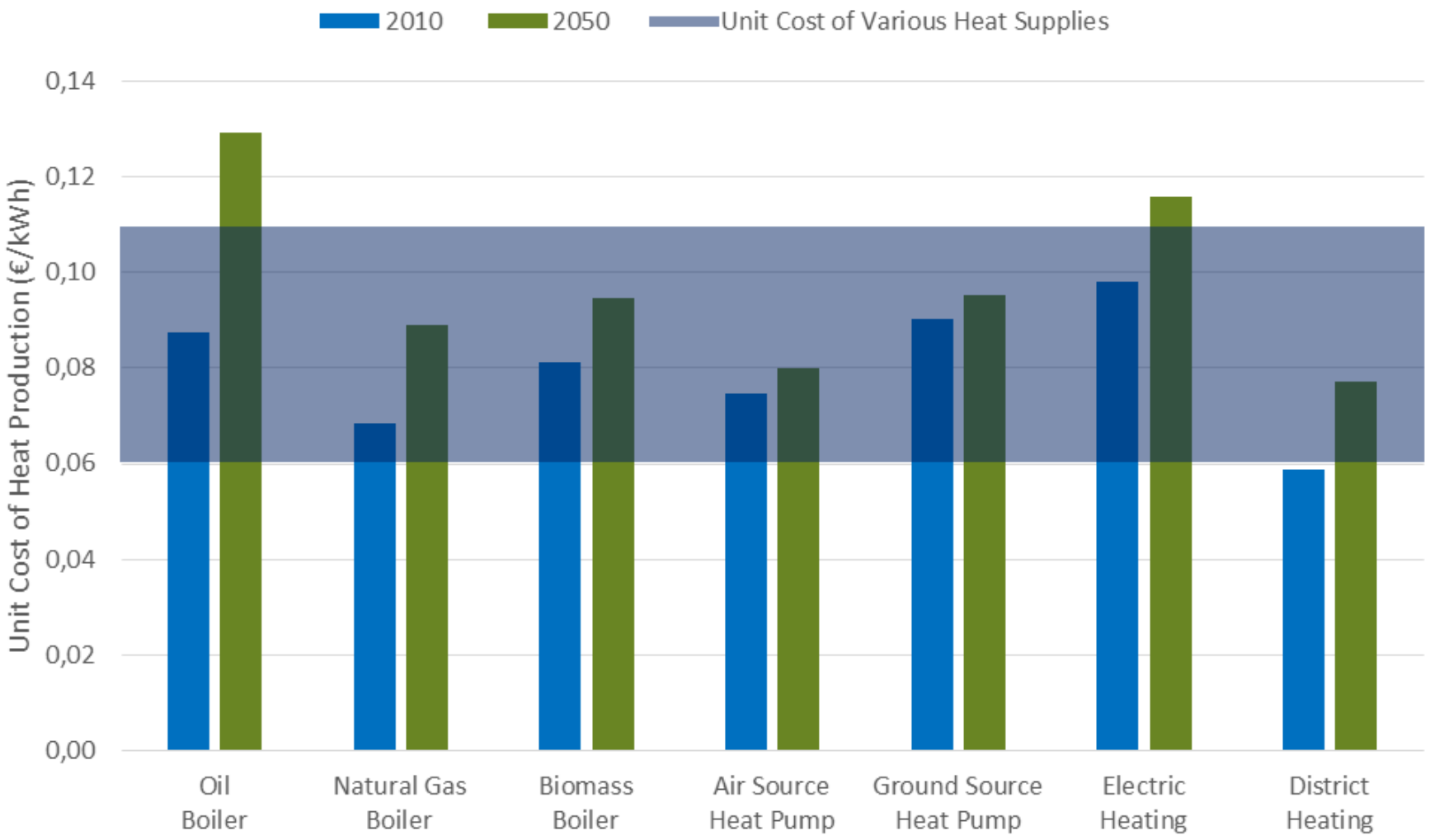
# Two different approaches

- We did not know which methodology would be preferable so we carried out both types:
  - Levelised costs approach
  - Energy systems approach

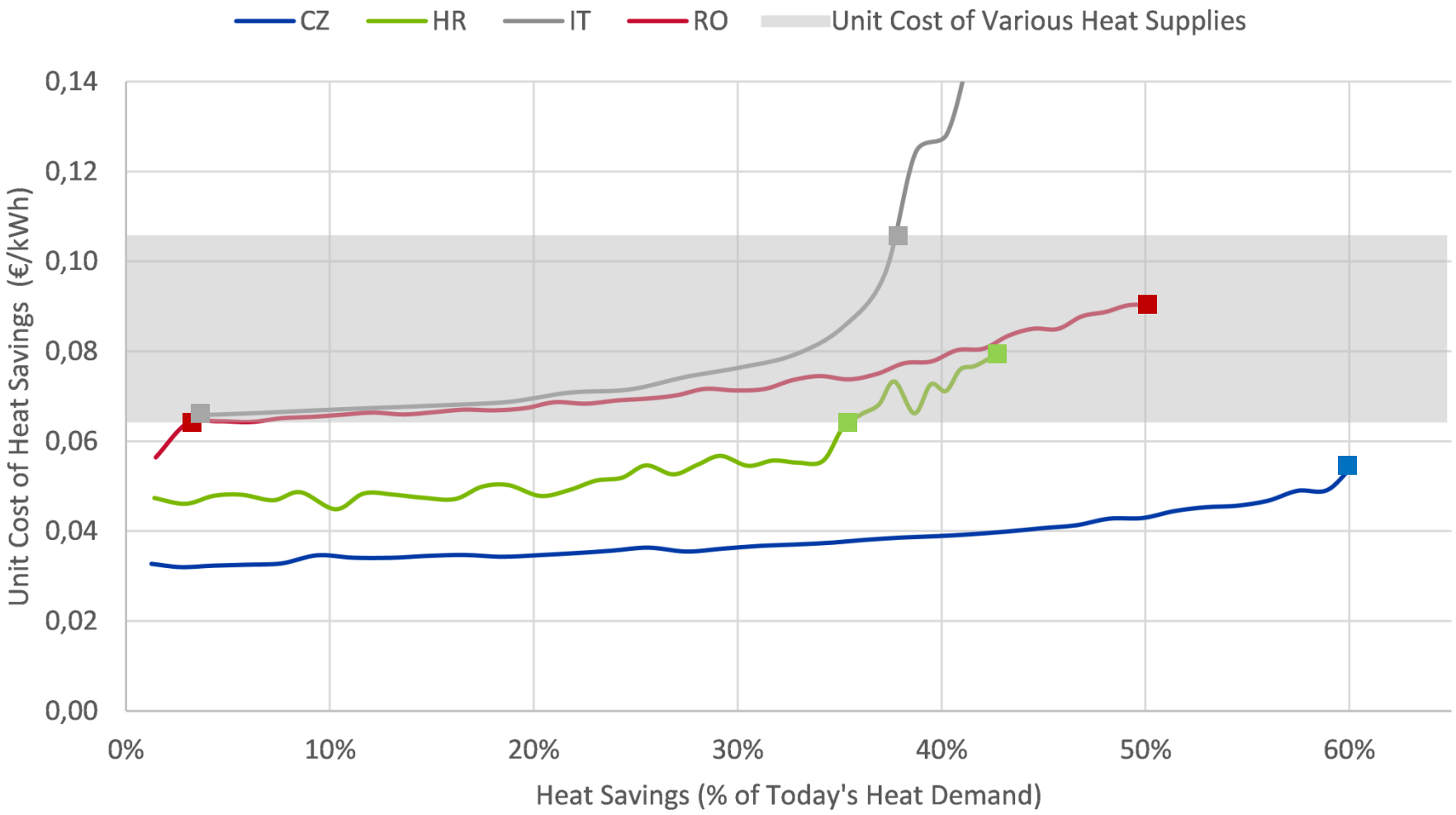
# Levelised costs approach



# Energy Systems approach

- Feasible level of heat savings are analysed when implementing heat savings in a complete energy system perspective (*EnergyPLAN*). This approach also accounts for all the potential impacts and synergies that the heating sector may impose on other sectors.
- The least cost level of heat savings is identified where more or less heat savings will increase the overall costs in each of the four countries
- Analysed heat savings in steps of 10%

# Levelised Costs approach results




CZ: 60%

HR: 35-45%

IT: 0-40%

RO: 3-50%

# Comparison of results

## Levelised costs approach

| Heat Savings Feasible (% of Today's heat demand) | Cost of Heat Supply €0.06/kWh | Cost of Heat Supply €0.11/kWh |
|---|---|---|
| Czech Republic | 60% | 60% |
| Croatia | 35% | 45% |
| Italy | 0% | 40% |
| Romania | 3% | 50% |

## Energy systems approach

| Amount of Each Energy Efficiency Measure in the Heat Roadmap Scenarios | Heat Saving level with least costs |
|---|---|
| | Reduction as % of the BAU 2050 Heat Demand |
| Czech Republic | 40% |
| Croatia | 40% |
| Italy | 30% |
| Romania | 50% |

# Characteristics of two methodologies

| Characteristics of the two methods | Levelised Costs approach | Energy System Approach |
|---|---|---|
| Calculation of heat supply unit cost | A heat supply unit costs range is calculated | Can potentially be calculated |
| Calculation of total energy system costs | Not possible | A total cost for the entire energy system |
| Identification of specific cut-off point | A cut-off range can be identified according to the heat supply unit cost assumed in the future | A specific cut-off point can be identified (in steps of 10%) |
| Impact on other sectors than heating | Not possible | Direct and indirect impacts across sectors |
| Ability to measure impacts on other metrics | Not possible | Measures impacts on both economy, energy and environment |

# Difference between methodologies

Factors that can be captured in an Energy systems approach and not in a Levelised costs approach:

1. Less heat capacity is required since the heat demand in each building is reduced
2. New heat demand distributions occurs due to lower peak demand
3. The electricity sector capacities can be reduced due to the reduced electric heating and heat pump demand
4. Excess heat can be utilised between different technologies and systems
5. Different fuel mixes are defined according to the demands and operating technologies
6. Different operation hours of various technologies (and storage)

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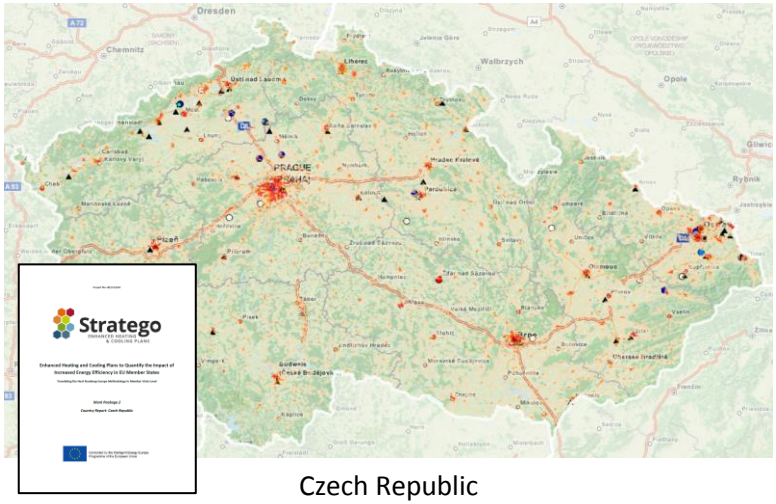
# Conclusions

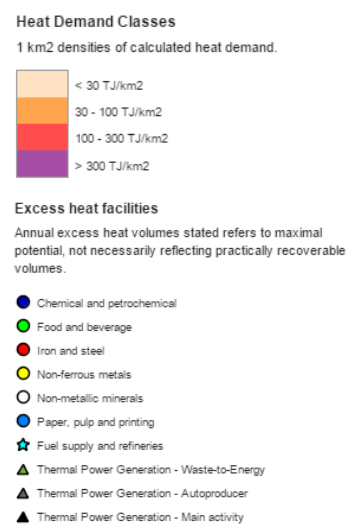
- A full Energy systems approach is recommendable as it includes impacts and synergies across sectors
- There is a certain point where it becomes more economical to supply heat rather than continuing to save heat, which is proven in both of the methodologies applied

# STRATEGO – www.stratego-project.eu



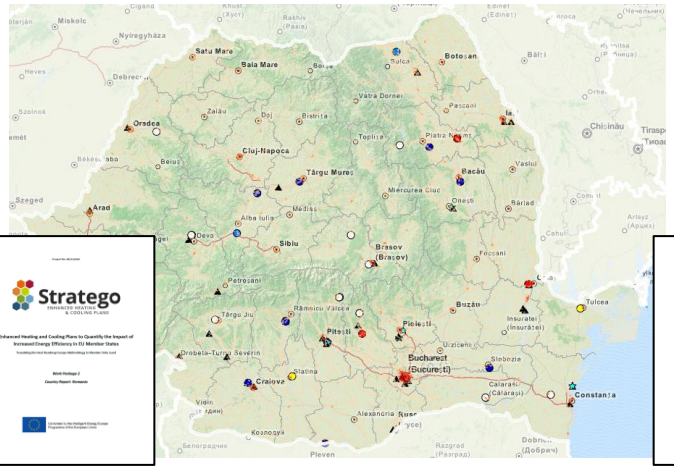

Czech Republic


Croatia

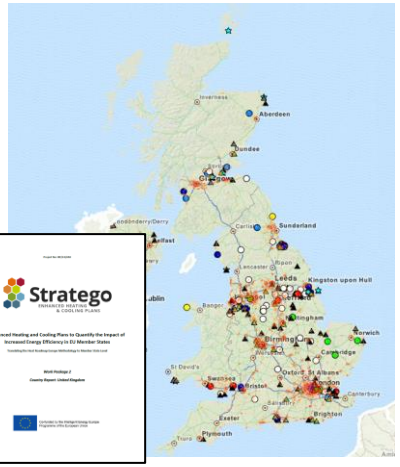




Italy




Romania




United Kingdom

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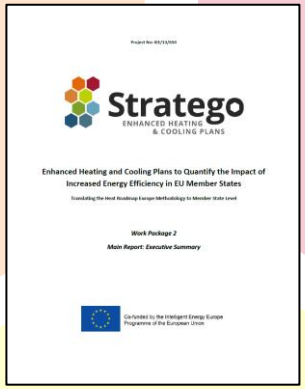


# Questions?



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