



Stratego



STRATEGO WP2

Enhanced National Heating and Cooling Strategies

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Heat Roadmap Europe 2050

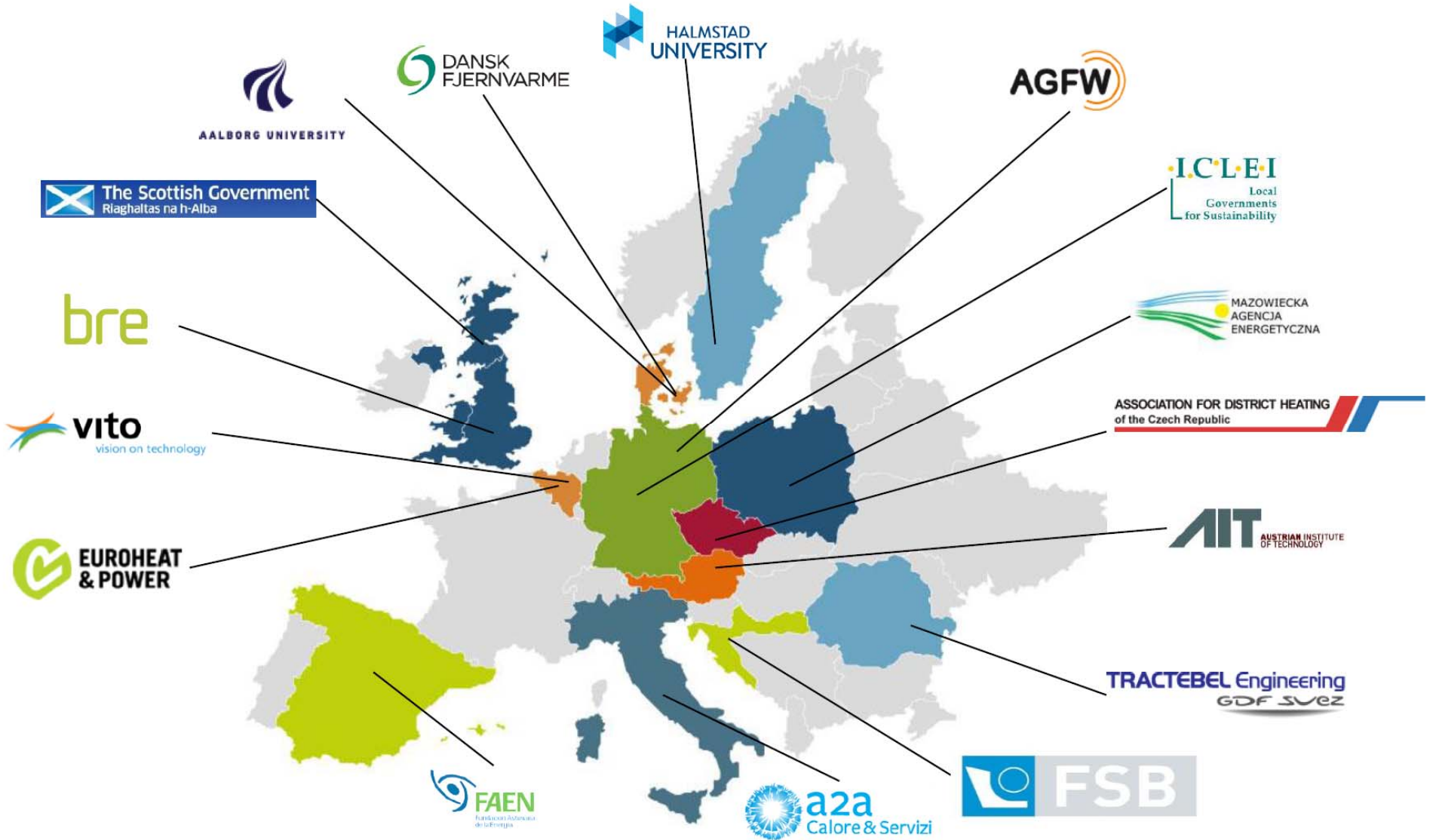
Three HRE Studies to Date:

-  Study 1 (2012): will district heating play a role in the decarbonisation of the European energy system?

-  Study 2 (2013): what is the balance between heat savings and heat supply at an EU level?

-  Study 3 (2015, STRATEGO WP2): what is the balance between heat savings and heat supply for 5 member states?



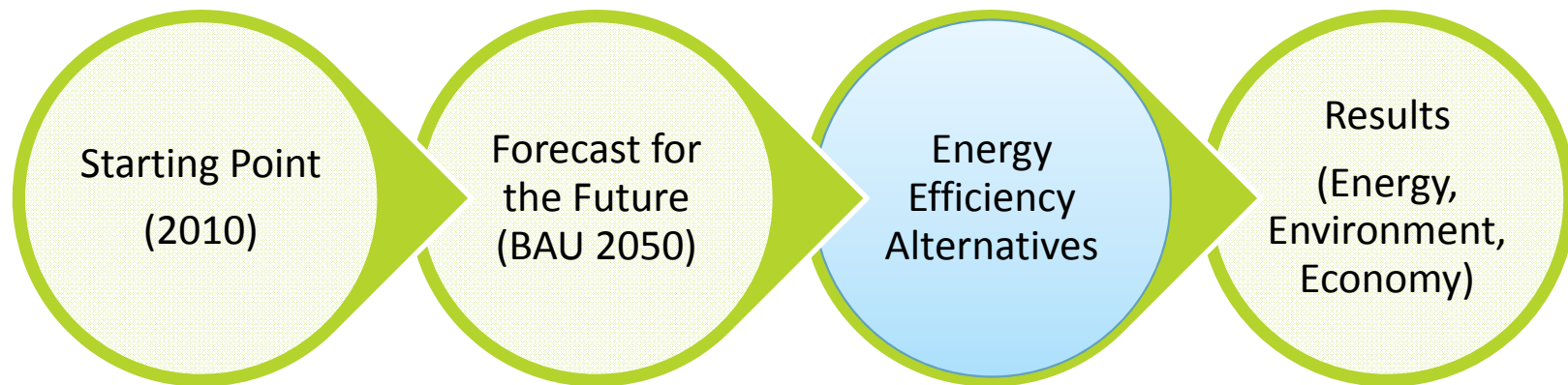


Our Purpose in STRATEGO WP2

- Quantify the impact of energy efficiency at national level in the heating and cooling sectors:
 - Czech Republic, Croatia, Italy, Romania, and the United Kingdom
 - What heating and cooling technologies do we need?
 - How much of each technology and how do these technologies fit with the rest of the energy system?
 - Quantify** what the impact will be

The overall aim in STRATEGO WP2 is to develop low-carbon heating and cooling strategies, which are called Heat Roadmaps, and subsequently to quantify the impact of implementing them at a national level for five EU Member States, which are Czech Republic, Croatia, Italy, Romania, and the United Kingdom.

Modelling Steps



- Extra Heat Savings
- Extra District Heating
- Different Individual Heating Options

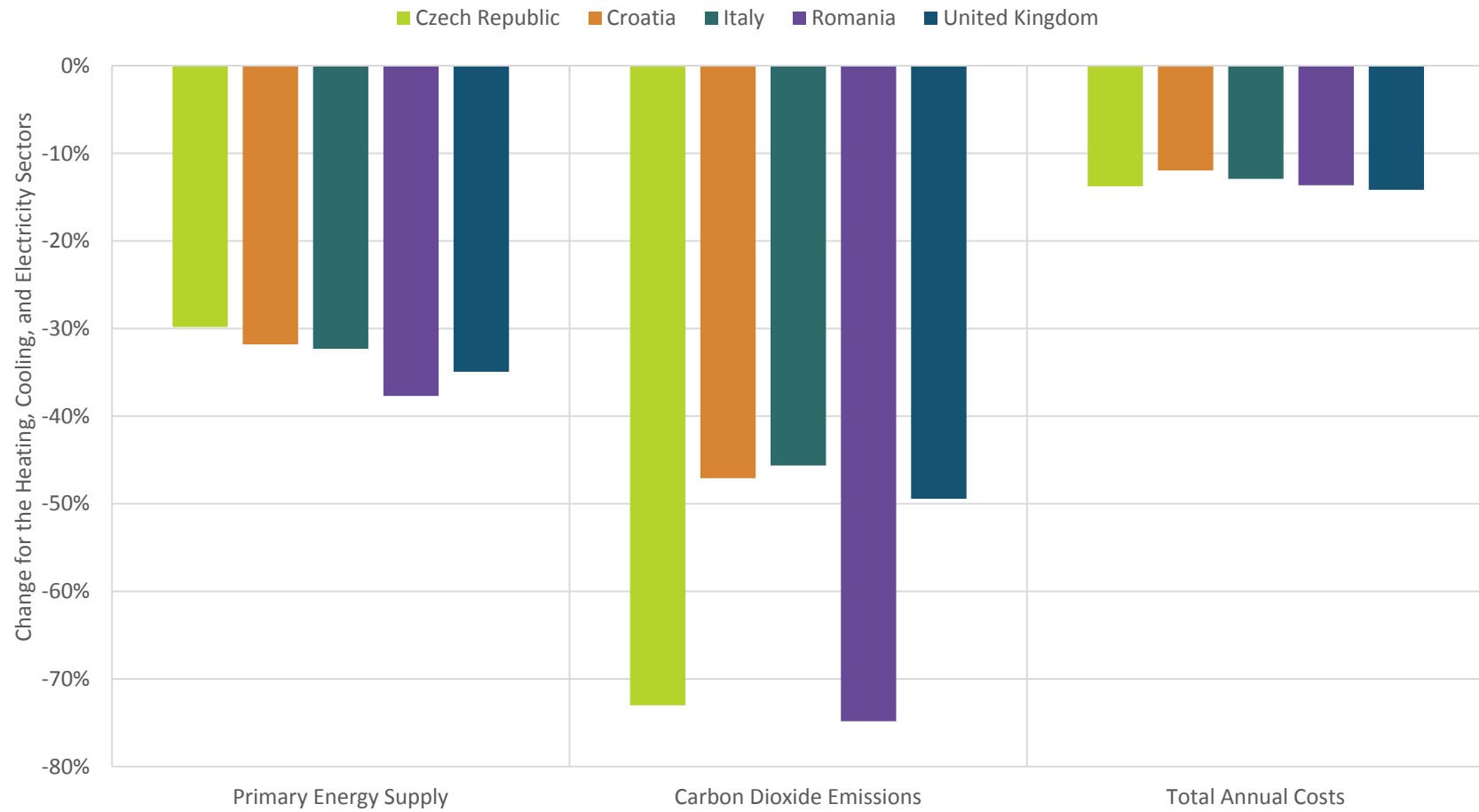
HEATING

Final Levels of Each Energy Efficiency Measure in the Low-Carbon Heating and Cooling Strategies

Heat Roadmaps	Heat Savings	District Heating	Individual Heating Technology	District Heat Supply from Renewable Heat & Excess Heat*
	Reduction as a Percentage of the BAU 2050 Heat Demand	% of Total Heat Demand after Heat Savings (vs. % today)	Primary Technology	% of District Heat Production
Czech Republic	40%	40% (25%)	Heat pumps are recommended as the primary technology with small shares for biomass boilers, and solar thermal. The exact mix of each technology is not optimised.	65%
Croatia	40%	40% (15%)		45%
Italy	30%	60% (<5%)		40%
Romania	50%	40% (20%)		50%
United Kingdom	40%	70% (<5%)		45%

*Does not include excess heat from thermal power plants or thermal boilers.

Heat Roadmap Scenario in 2050 Compared to a Business-As-Usual Energy System for the Year 2050

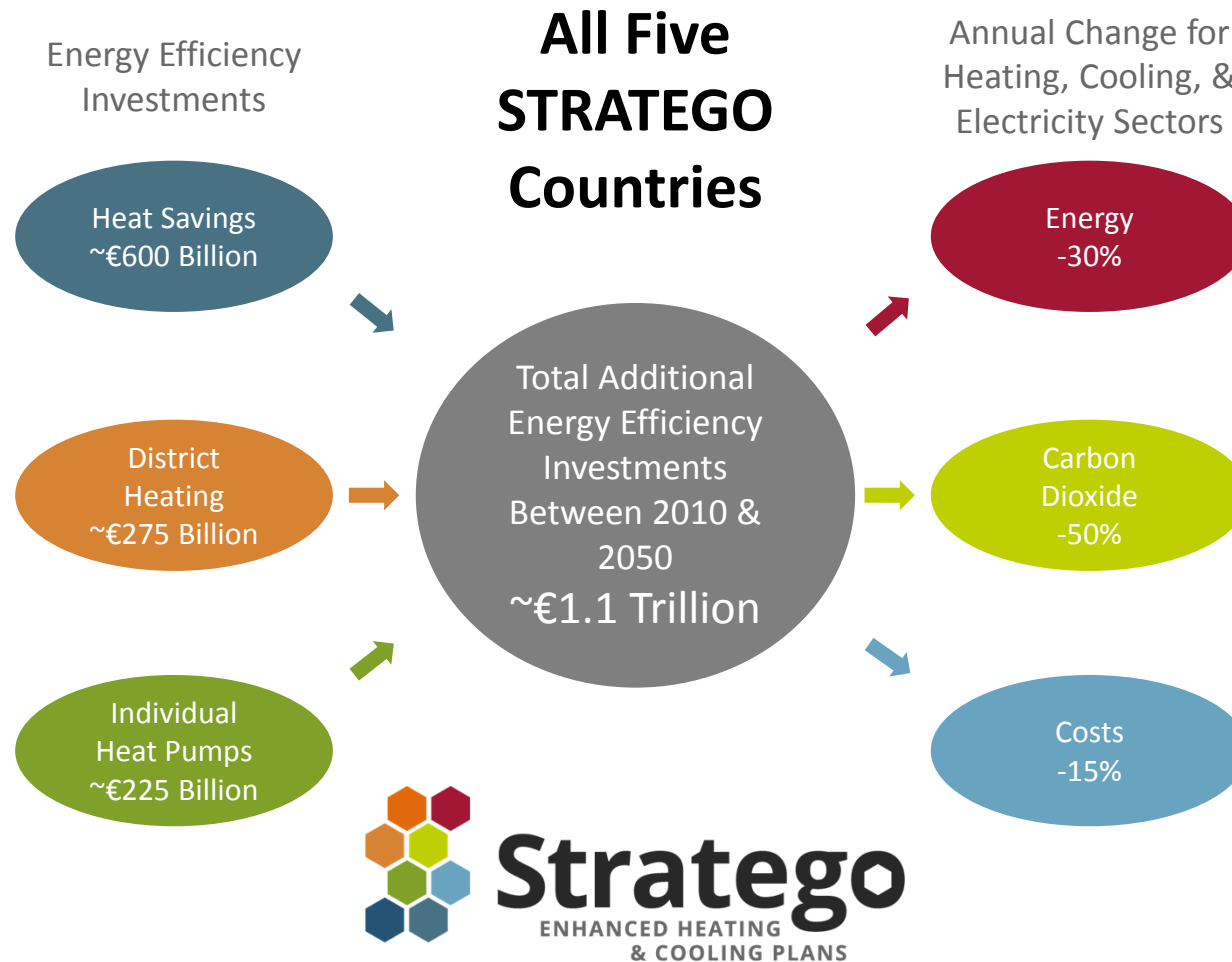


Heating, Cooling and Electricity Sectors Only	Energy		Environment		Economy	
Heat Roadmap vs. BAU 2050	Change in Primary Energy Supply		Change in Carbon Dioxide		Change in Energy System Costs (excludes vehicle costs)	
Unit	TWh/year	%	Mt/year	%	Billion €/year	%
Czech Republic	-109	-30%	-35	-73%	-3	-14%
Croatia	-18	-32%	-5	-47%	-1	-12%
Italy	-380	-32%	-101	-46%	-13	-13%
Romania	-118	-38%	-36	-75%	-3	-14%
United Kingdom	-444	-35%	-109	-49%	-15	-14%
All Five Countries	-1069	-34%	-286	-52%	-35	-14% ¹⁰



In total, the energy demand is reduced by ~1000 TWh/year if the Heat Roadmap scenarios are implemented in all five STRATEGO countries, which is the same as all of the energy required today in the Czech Republic, Croatia, and Romania combined.

Similarly, the combined reductions in carbon dioxide emissions of almost 300 Mt/year is more than all of the carbon dioxide emissions emitted from the Czech Republic, Croatia, and Romania today (which is ~225 Mt/year).



Everywhere

Heat Savings

Balance Savings vs.
Supply

30-50% Total
Reduction

Urban Areas

District Heating
Networks

High Heat Density
Areas

Supply 40-70% of
the Heat Demand

Rural Areas

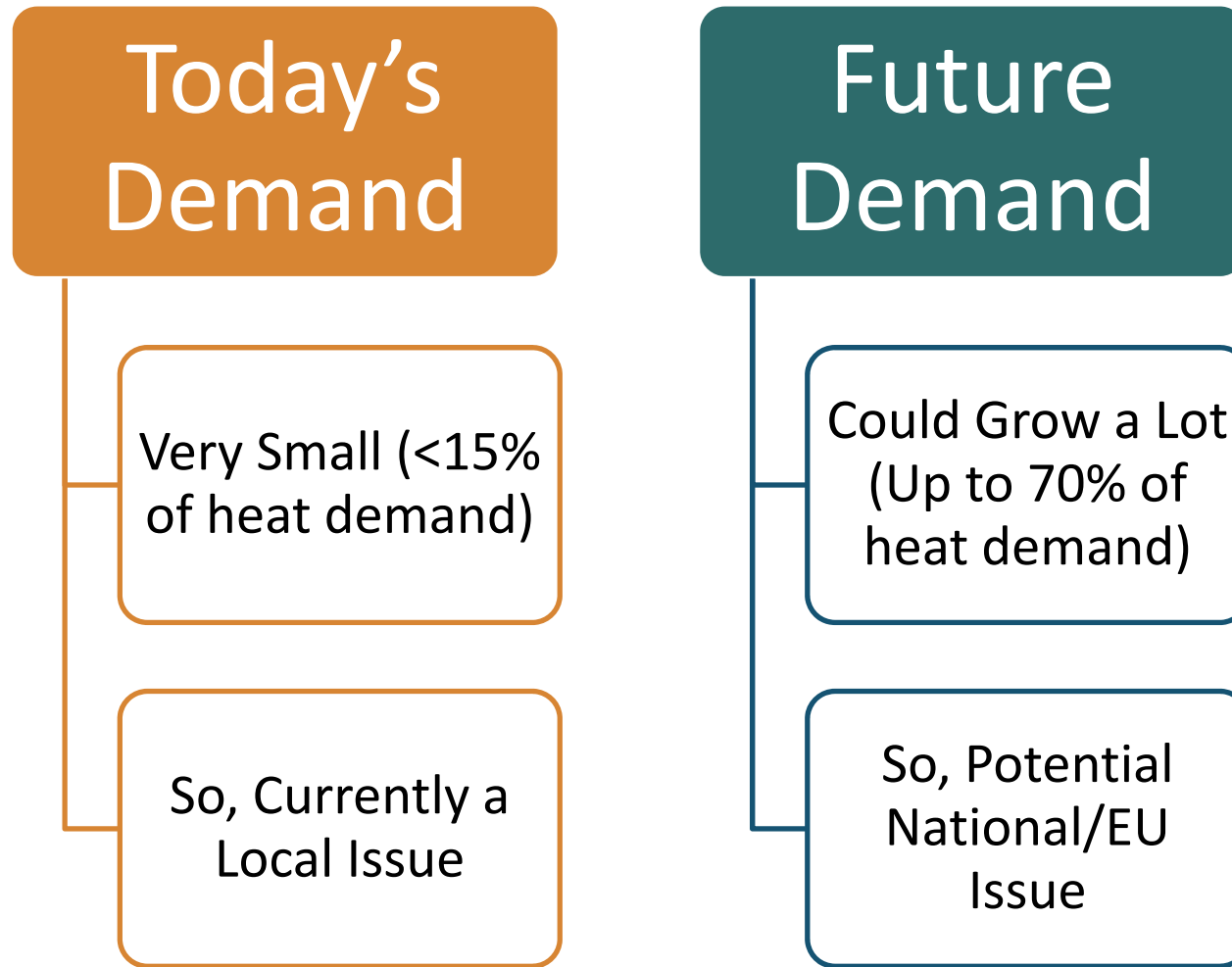
Primarily Electric
Heat Pumps

Smaller Shares of
Solar Thermal &
Biomass Boilers

Remaining 30-60%
of the Heat
Demand

Option	Clear Message: We need to implement a lot of each one, not choose between them	Grey Area	Recommendation: The exact end point will become clearer over the next 30 years
Heat Savings	We need a 30-50% reduction in the total heat demand	Should it be 35%, 40%, 45%?	Start now by aiming for one target e.g. 40% reduction
District Heating	We need to go from ~10% to ~50% of the heat demand	Where do we go from a network to an individual solution?	Start now with the city centres or beside waste heat, progress outwards to rural areas
Heat Pumps	We need to go from <10% to ~50% of the heat demand	Same as district heating and, where is biomass more suitable	Start with any building that is far away from 1) easy access to biomass and 2) an urban area, progress towards the cities

COOLING



- ◆ Today, the cooling demand is too small to have a major influence at national level
- ◆ However, implementing district cooling is likely to have a positive impact at the local level
- ◆ If buildings meet their cooling needs in the future, then the cooling sector will start influencing the national energy system
- ◆ More research is required to identify an optimal level of district cooling: mapping and local modelling is most urgent in the short term

CONCLUSIONS AND RECOMMENDATIONS

STRATEGO WP2: Aim and Conclusion

■ AIM:

The overall aim in STRATEGO WP2 is to develop low-carbon heating and cooling strategies, which are called Heat Roadmaps, and subsequently to quantify the impact of implementing them at a national level for five EU Member States, which are Czech Republic, Croatia, Italy, Romania, and the United Kingdom.

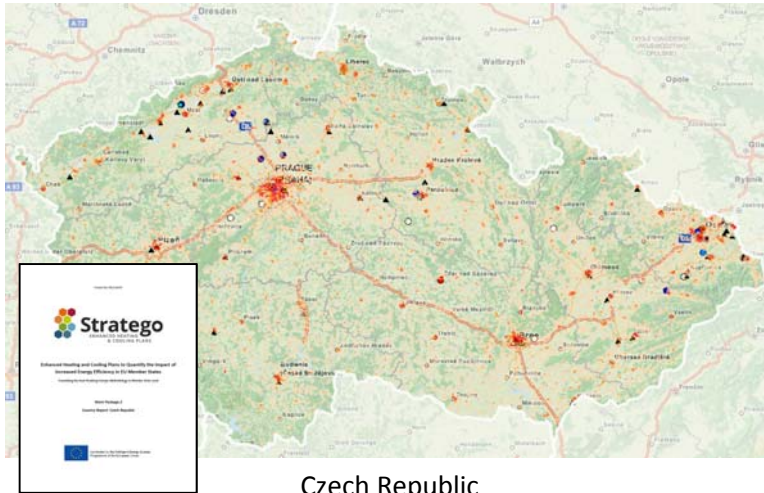
■ CONCLUSION:

The overall conclusion is that a combination of energy efficiency measures, in the form of heat savings, district heating in the urban areas, and heat pumps in the rural areas, reduces the energy system costs, energy demand, and carbon dioxide emissions in all five STRATEGO countries for the year 2050 compared to a 'Business-As-Usual' projection.

Recommendations

- ◆ 21 Recommendations in the Main Report, divided by:
 - ◆ Heat Savings
 - ◆ Heat Networks in Urban Areas
 - ◆ Individual Heating in Rural Areas
 - ◆ Cooling
 - ◆ Resources
 - ◆ Methodology and Tools

Specific Map & Summary Report Available for Each Country

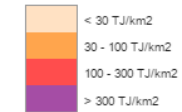


Czech Republic



Croatia

Heat Demand Classes
1 km² densities of calculated heat demand.



Excess heat facilities

Annual excess heat volumes stated refers to maximal potential, not necessarily reflecting practically recoverable volumes.

- Chemical and petrochemical
- Food and beverage
- Iron and steel
- Non-ferrous metals
- Non-metallic minerals
- Paper, pulp and printing
- ★ Fuel supply and refineries
- ▲ Thermal Power Generation - Waste-to-Energy
- ▲ Thermal Power Generation - Autoproducer
- ▲ Thermal Power Generation - Main activity



Italy



Romania



United Kingdom

How can this knowledge be used in Austria?

- ◆ The STRATEGO methodology can also be applied for Austria
- ◆ Austria not included in the STRATEGO project, but is part of our next project focusing on the heating sector
- ◆ STRATEGO results apply to many types of energy systems (Austria might be similar to Croatia or Italy) – therefore might findings also be transferred to Austria
- ◆ Local mapping and assessment of resources and costs required
- ◆ Cooling only a small fraction of heating demands in Austria



Stratego



Questions?

How can we use this knowledge?

Visit our website for more information

www.stratego-project.eu

www.heatroadmap.eu

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Heat Roadmap Europe

2050

