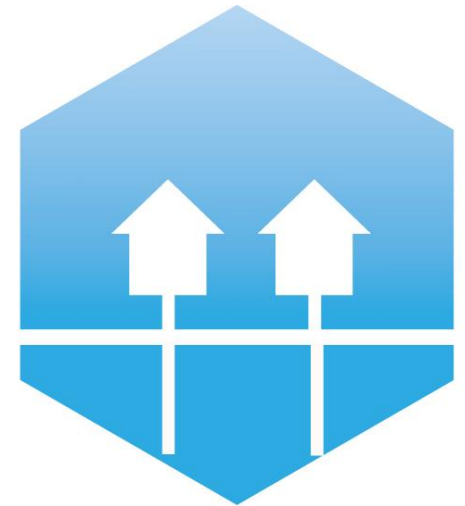
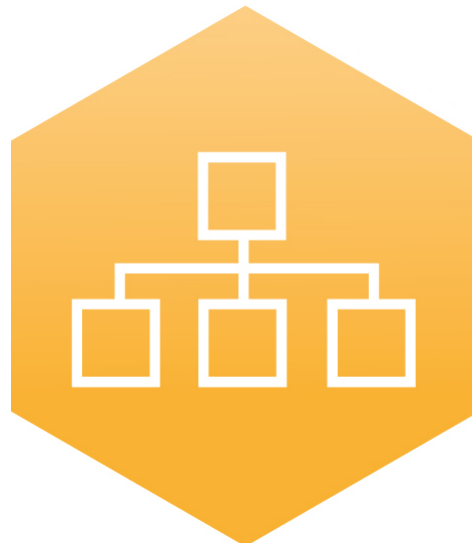


International Conference on Smart Energy Systems and 4th Generation District Heating
Copenhagen, 25-26 August 2015

Comprehensive Assessment of the Potential
for the Application of High-Efficiency
Cogeneration and Efficient District Heating
and Cooling – “The Approach and
Methodology used in Austria to Determine
the District Heating Potential”

Presenter: Richard Büchele



AALBORG UNIVERSITY
DENMARK

4DH

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

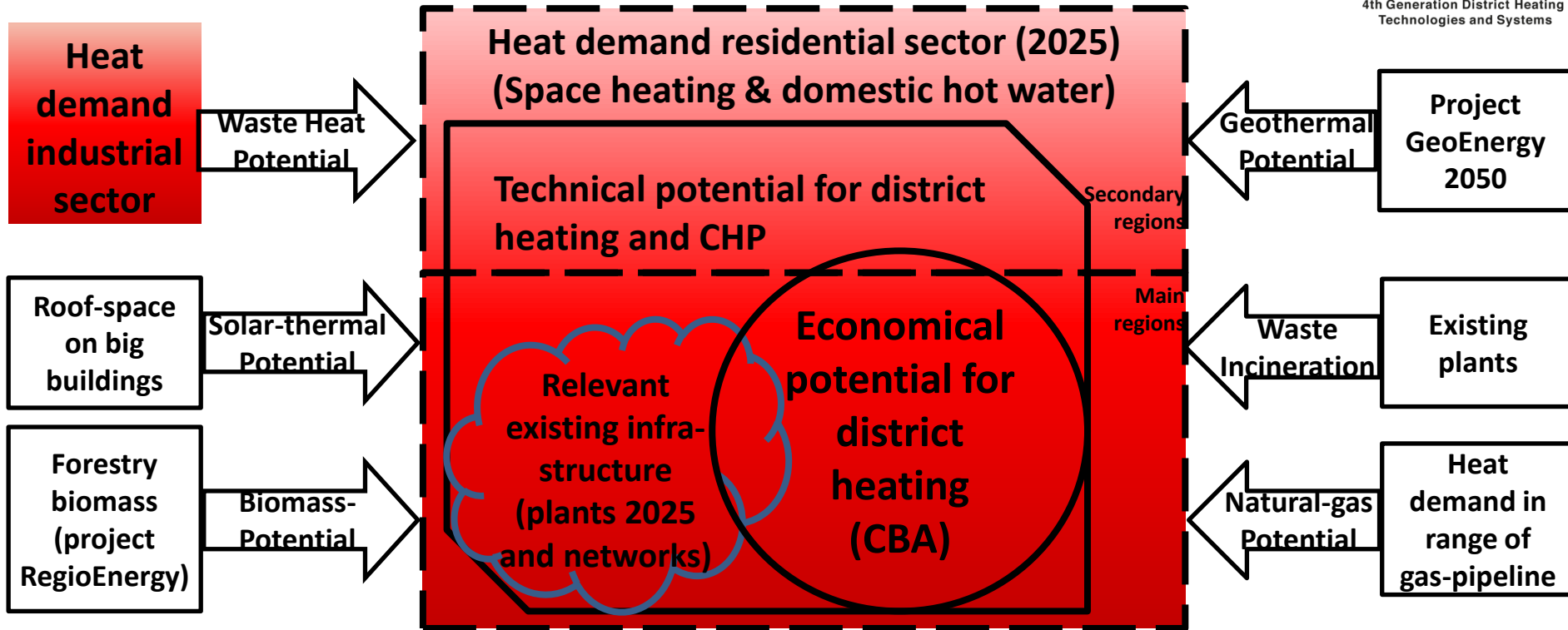
Introduction



- As part of the EU Energy Efficiency Directive (EED) (“Directive 2012/27/EU of the European Parliament”) all member states have to “develop a comprehensive assessment of the potential for the use of high-efficient combined heat and power (CHP) and efficient district heating and cooling by the end of 2015”
- Includes a country-level cost-benefit-analysis
- The directive gives suggestions on which regions have to be considered
 - Conurbations with a plot ratio of at least 0.3
(building floor area to land area)
 - Industrial sites with total annual demand >20 GWh



Methodology – Overview



Methodology – “Relevant Regions”

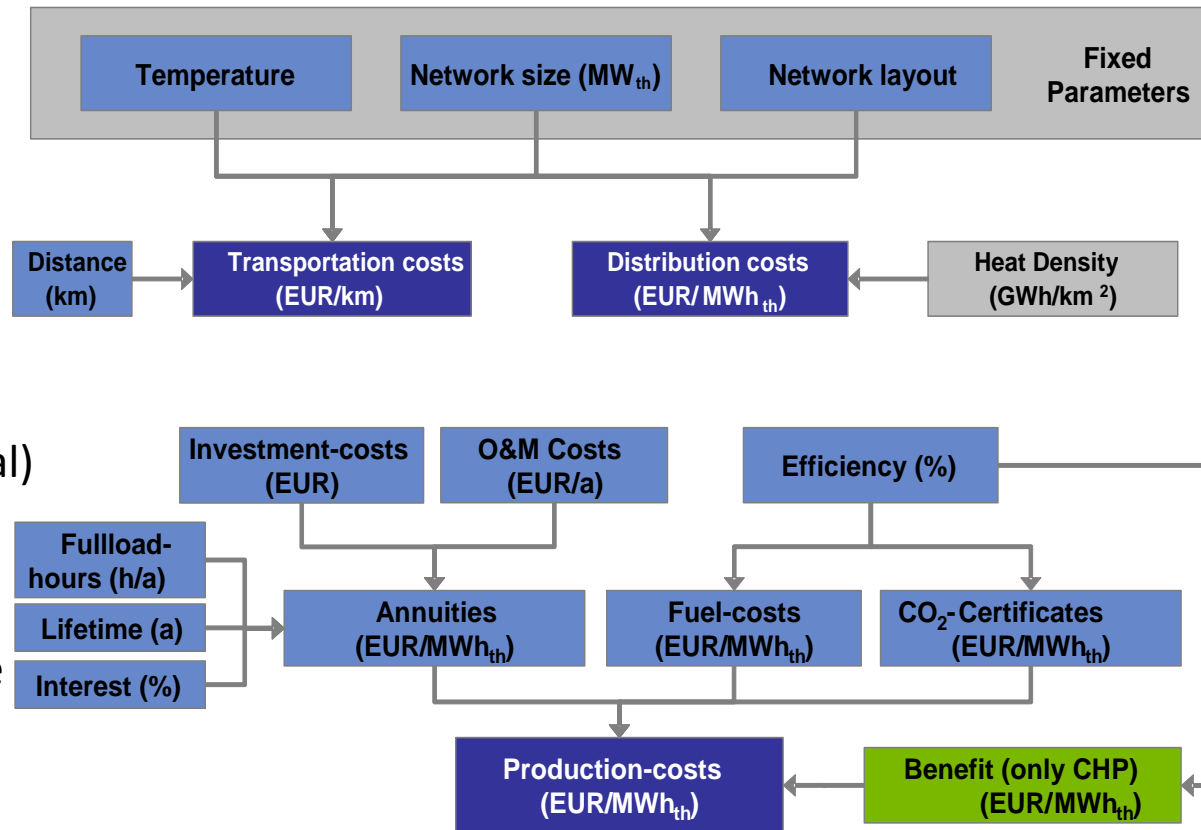


- Suggested criteria of plot ratio of 0.3 led to only 7 regions with demand >10 GWh/a
- “Main Regions”
 - Heat density of raster element >10 GWh/km²
 - Plot ratio > (0.25 - energy demand)
 - Annual heat demand >10 GWh
 - 38 municipality-crossing main-regions (including 109 municipalities)
- “Secondary Regions”
 - Remaining 2367 municipalities
 - Classified to 30 types of secondary regions
 - Climatic aspect (sea level)
 - Distribution of heat density
 - Existing network infrastructure
 - Availability of technologies (Gas, Geothermal, Waste Heat)



Methodology – Cost-Benefit-Analysis

- CBA is done for the 38 “Main-” and the 30 “Secondary-Regions”
- Each region
 - Divided into area w/ w/o existing network
 - Demand split into 5 different heat density classes
 - 10 sub-regions
 - Merit order of all technologies (also local) including **production-, transportation-, distribution costs** and generated income



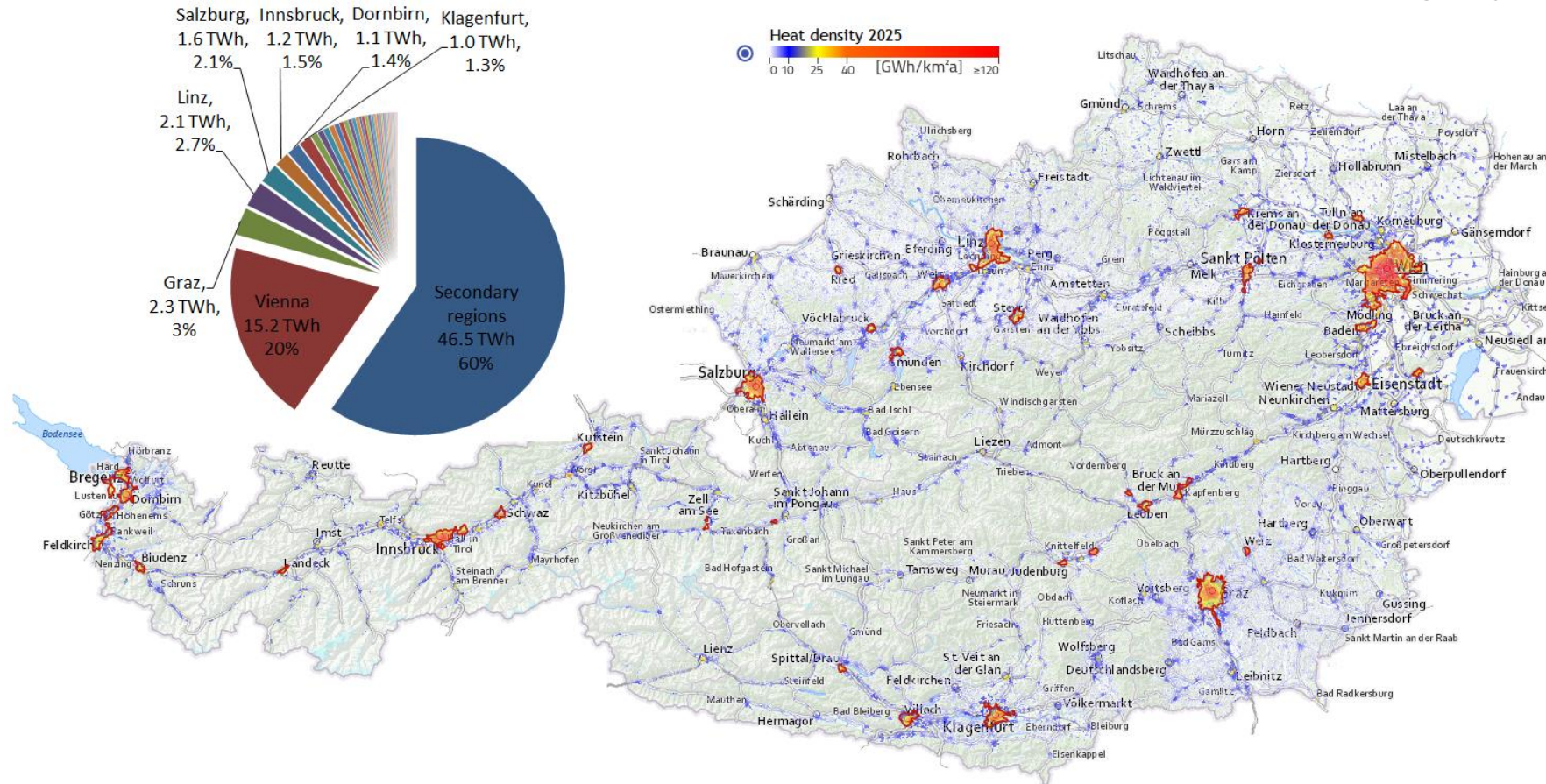
Results – Heat demand and relevant regions



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Available soon: www.austrian-heatmap.gv.at

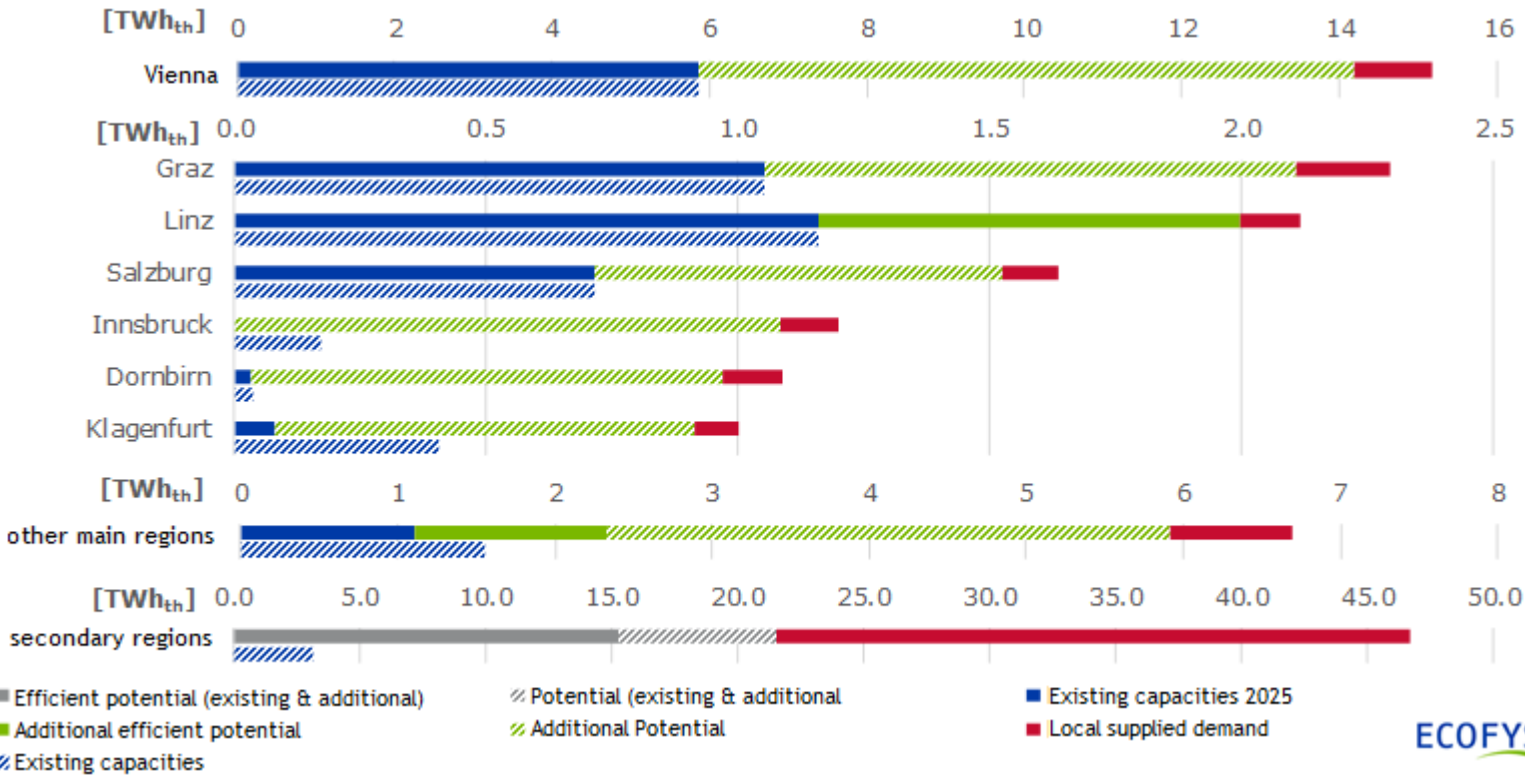




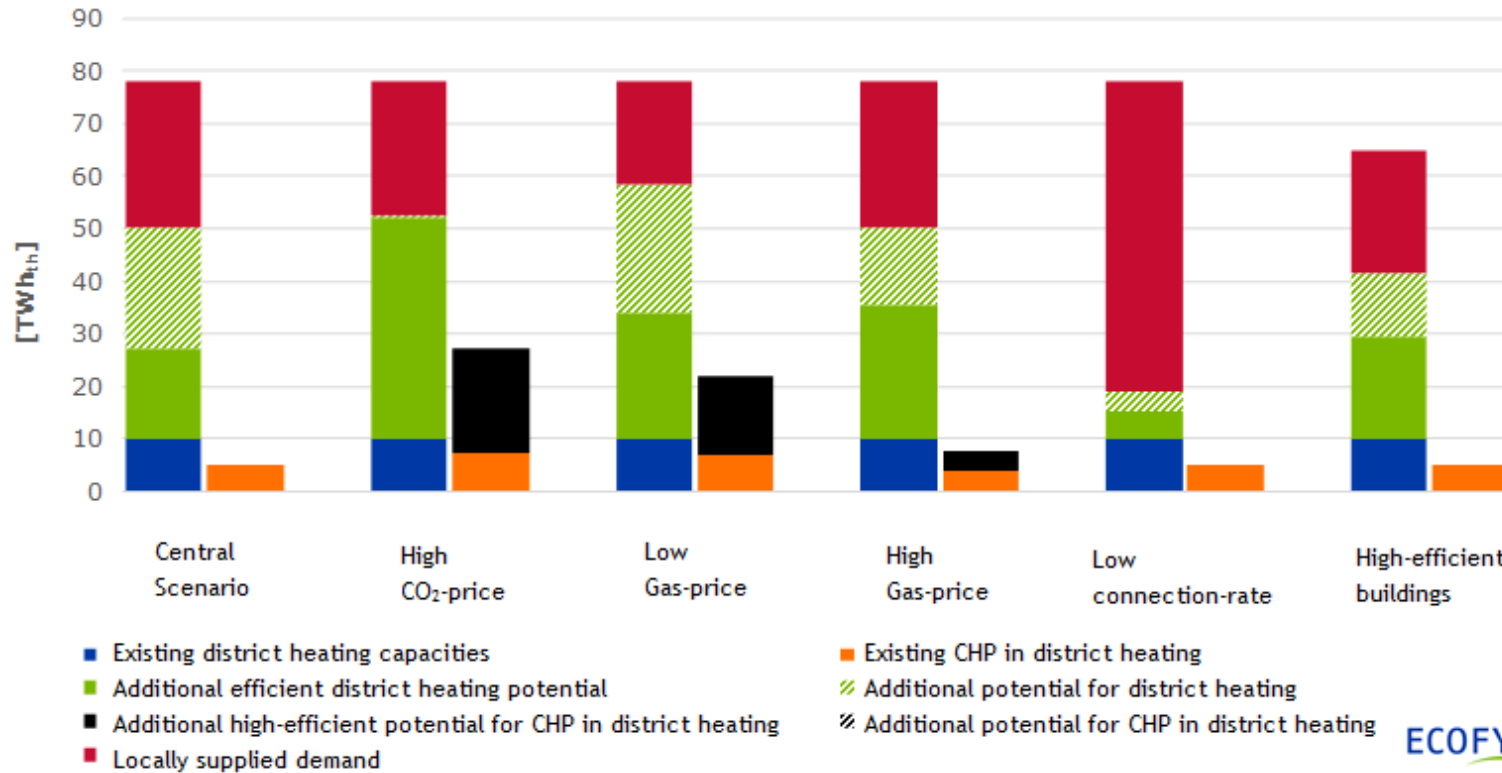
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Results – Economic potential (Central scenario)



Results – Sensitivity analysis



Results



- 40% of residential heat demand in “main-regions”
- Under central-scenario conditions DH has high potential
 - Economical feasible down to 10-20 GWh/km²
 - Depending on heat production costs
 - 90 % connection rate
 - Also potential in “secondary regions”
 - But less than 50% are “efficient” (rather in rural areas)
 - No potential for additional CHP under assumed conditions
- District heating has high sensitivity to connection rate
 - Limited potential when applying 45% connection rate
 - Energy planning or connection obligation is necessary



Conclusion



- No exact method in directive
 - Plot ratio not clear enough and maybe too simple
- Combination of exact (main regions) and aggregated method (secondary regions)
- No general method on how to determine “relevant” regions
- Only certain degree of detail in national assessments
 - No exact information about demand per building
 - Model limitations: (One model network, Size, Temp.-level, ...)
- Local characteristics are important
 - Network size, ground properties, individual parameters
 - Cost of integration of waste heat/ geothermal heat etc.
- Availability of data is not as in some other countries



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Thank you for your attention!



Questions / Discussion

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