TECHNISCHE UNIVERSITÄT WIEN

Favourable policy frameworks to ensure the future of district heating in Eastern European Countries – The case of Brasov

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Project: progRESsHEAT (2015-2017)

- Aim: Assisting local, regional, national and EU political leaders in developing policies and strategies to ensure a strong and fast deployment of renewable and efficient heating and cooling systems

- 6 Local case studies – Brasov
  - Old district heating network, overdimensioned high network losses, low security of supply, distrust, disconnection

- Various other cities in Eastern Europe with similar conditions

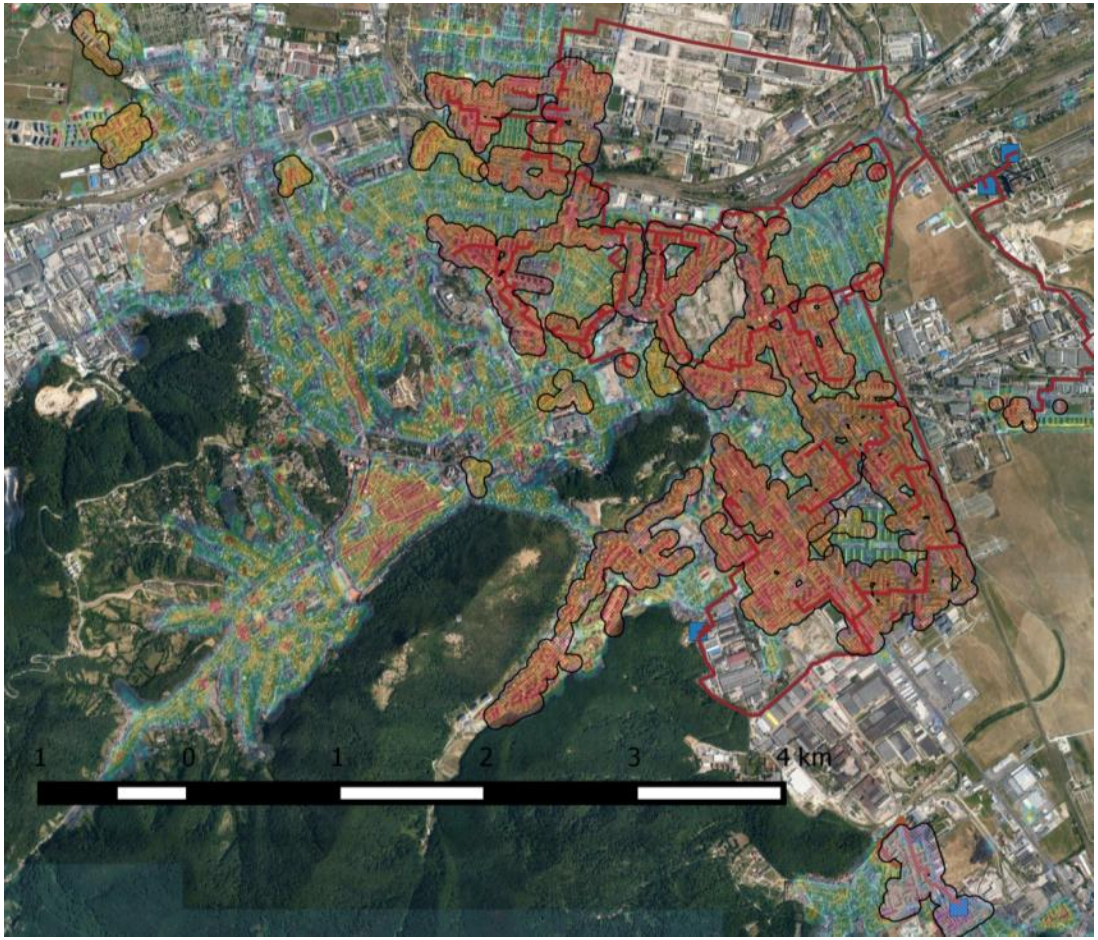
- www.progressheat.eu

Brasov overview

- Municipal area: 158 km²
- Inhabitants: 274 500 (2014)
- Altitude: 625 m

- Building stock:
  ~17 000 buildings
  ~9.8 Mio m² floor area
- Demand for SH&DHW:
  ~1 400 GWh
- District Heating (DH):
  - Four sites (DH areas)
  - 11 (new) CHP gas engines (43 MW_el / 38 MW_th) + gas boiler (107 MW_th)
  - Supplied demand: ~67 GWh
  - Network losses: ~58%!!

  →Distrust /Disconnection/
  old & overdimensioned network



Modelling Framework

Idea: Find cost optimal combination between

Heat savings

- Minimization of investments into building envelope (windows, roof, basement, walls) to achieve 8 different levels of heat savings
- Heat saving potential and levelized costs (EUR/kWh saved) derived for 30 different building classes (10 categories + 3 construction periods) in Invert/EE-Lab model[1)]

→ Heat saving level chosen that is most economic in combination with supply option

→ Iterations to calculate new levelized costs of heat after renovation

Heat supply options

- Individual vs.
  - Levelized costs of heat for 30 different building classes and 5 technologies
- District heating
  - GIS based analysis: Municipality divided into four different types of areas
    - District heating areas
    - Next-to-DH areas
    - Individual areas
    - Scattered Buildings/ Individual buildings
  - Dispatch optimisation model in energyPRO[2)] for DH supply

[1)]http://www.invert.at/
[2)]http://www.emd.dk/energypro/

Policy Assessment

2 Scenarios for district heating system

- Reference Scenario 2030
  - Current supply situation
    - Heat from external producer with Natural gas CHP engines from
  - 50% of old parts of network renewed until 2030 (~35km ~28 Mio EUR) → network losses drop to 12%

- Alternative Scenario 2030
  - Network splitting to cut off least efficient parts / bring supply closer to demand
  - Still 50% of old parts of network renewed until 2030 (~35km ~28 Mio EUR) → network losses drop to 12%
  - Investments into additional renewable technologies at the different sites
    - 0.5 MW Biomass plant
    - 3 MW_{el} heat pump
    - 2000 m² solar thermal collectors
    - + local natural gas heat only boiler

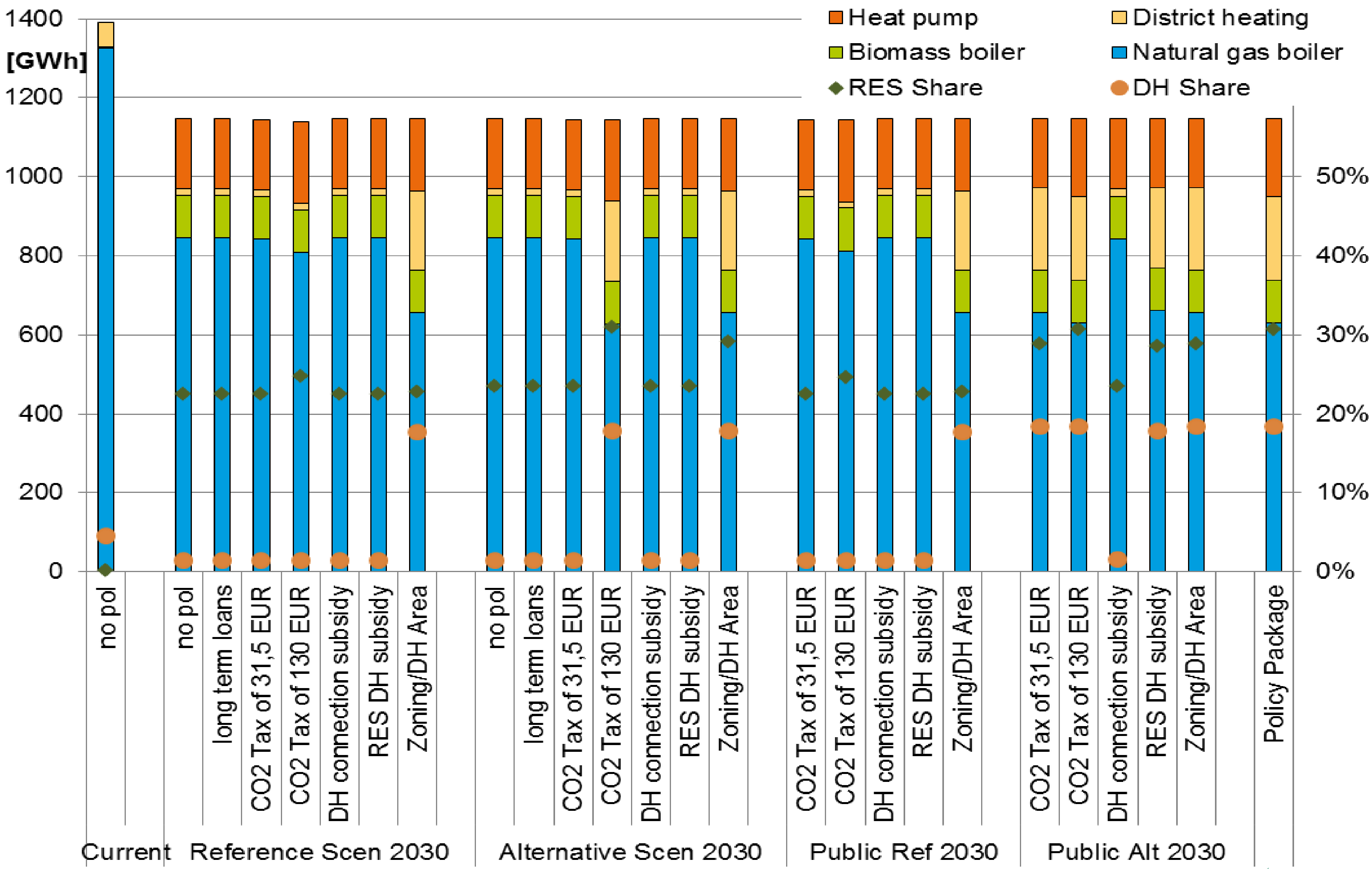
Assessed Policies

- Long term loans for network investments (1.5%, 40y) (public service)
- Free (supported) connection to DH grid
- CO_2 tax on individual fossil fuels (2 tax levels)
- 45% Investment subsidy for RES in district heating
- Zoning (heat planning) with prohibition of gas in designated district heating area
- Policy package
  Long term loans
  + moderate CO_2 tax (35€/t)
  + RES subsidy (45%)

Indicators

- Total useful energy demand for SH&DHW
- Total CO_2 emissions for SH&DHW
- Share of RES
- Share of district heating
- Total costs of heat supply and heat savings
- Average levelized cost of heat

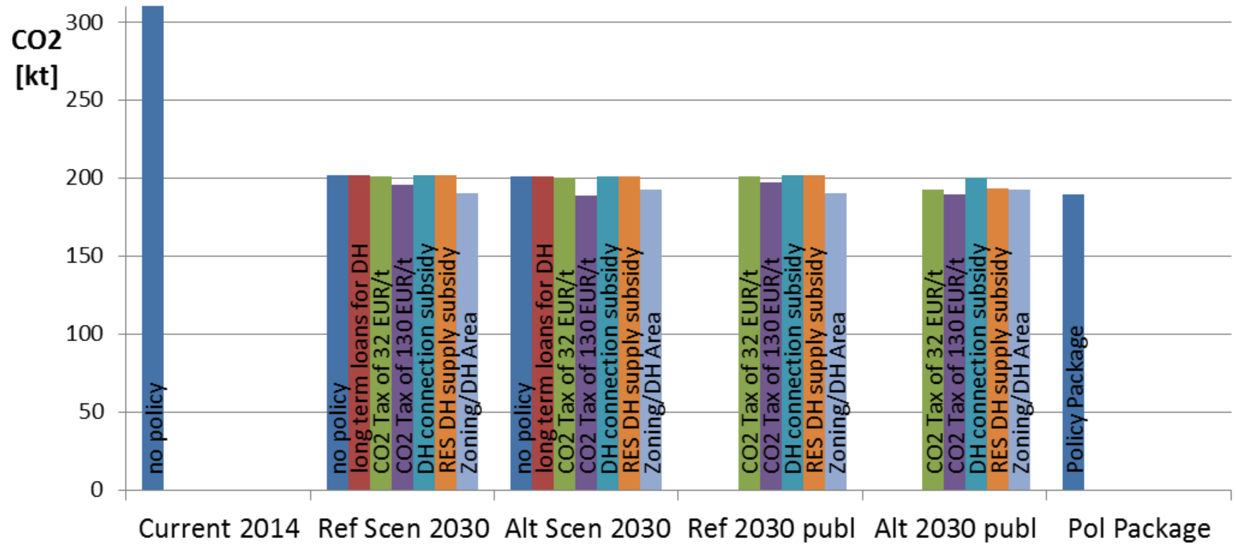
Energy demand, RES- and district heating- share



Total CO_2 emissions and total costs for heat

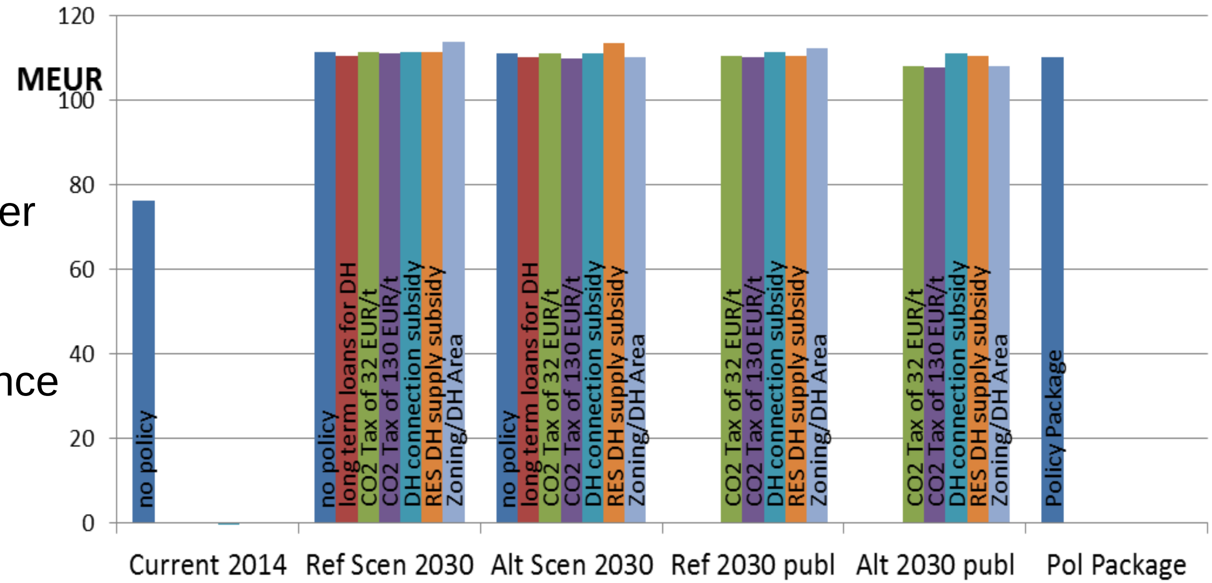
CO_2 Emissions

- Decrease of 40-44% compared to 2014
  - Heat savings and switch to individual heat pump and biomass boiler in SFH
- Higher decrease with DH
  - But limited by low RES capacities (fossil HOB) → more RES needed for additional consumers



Total costs for heat (including cost for savings)

- General increase due to higher energy prices
- Low differences in costs but Public < Alternative < Reference



Recommendations

- High investments into (old) network infrastructure needed
  - Often not viable under private economic conditions
    → Long term loans / public service / ownership structure (cooperatives…)

- High connection rate in the district heating area needed
  - to scale down fixed costs for network
    → Planning/ Zoning/ Forced connection? /Forbid fossil alternatives?
    → modern, reliable and comfortable DH system
    → Information and image campaigns on benefits of DH

- Currently low taxation on fossil fuels
  - No internalisation of CO_2 costs
  - Difficult for district heating and low carbon technologies to compete with natural gas
    → CO_2 price of ~130 €/t (26 €/MWh) needed
  - Use tax to support RES technologies

- Combination of policies
  - Long term loans + RES investment subsidies + moderate CO_2 tax of 35€/t

Thank you for your attention!

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