Öko-Institut e.V.
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Challenges for district heating methodologies

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District heating – methodological challenges

1. Cogeneration is methodologically more complex
   - ⇒ Need to consider both: Power and heat
2. District heat network
   - ⇒ Heat losses
   - ⇒ Pumping power
3. Multiple baseline scenarios for heat generation
   - ⇒ Hot water / heating may be generated differently
   - ⇒ Different existing heating devices (stoves, boilers)
   - ⇒ Determine baseline scenario for different cases (buildings types, areas)
4. Rebound effects
   - ⇒ Increased room temperature due to higher comfort with DH, resulting in increased heating demand due to the project activity

Dealing with cogeneration (1)
Backpressure plants

- Backpressure plants: Relation heat / steam is fixed
- No power generation at the project site in the absence of the project
- Power may substitute
  - ⇒ Average grid OM / BM?
  - ⇒ Power in a similar plant w/o cogeneration?
- Small plants
  - ⇒ Assume OM / BM as default for electricity substitution
- Large plants
  - ⇒ Account for ERs associated with energy savings: Assume similar plant (same fuel and technology) w/o cogeneration

Dealing with cogeneration (2)
Steam extraction

- Heat extraction results in a loss of power generation
- Determine power loss coefficient β
  - ⇒ β = marginal loss of power generation per marginal heat extraction
  - ⇒ Typical range β = 0.15 – 0.25
- Loss of power generation may be substituted by
  - ⇒ additional fuel combustion in the cogeneration plant in condensing operation mode (use emission factor of the plant)
  - ⇒ power generation in plants at other sites (use BM/OM)
- Project emissions

  PE = Heat extracted * β * EF for power

Baseline emissions

- Calculate baseline emissions on the basis of heat actually supplied by the DH system
  - ⇒ Exogenous factors influencing heating demand are factored out (improvements in buildings insulation, climatic variations, etc)
  - ⇒ Heat losses of the DH network are automatically considered
- Estimate efficiency of baseline heat supply systems (ε)
  - ⇒ Sample measurements
  - ⇒ Conservative default assumptions
- Estimate rebound effects
- Baseline emissions

  BE = Heat supplied / ε * Rebound factor

Quantifying rebound effects

- Rebound effects are irrelevant where DH substitutes automatic centralized heating systems (boiler)
- Important: Substitution of individual stoves or electric heating
  - ⇒ Not all rooms may be heated
  - ⇒ The average temperature in apartments may be considerably lower than with DH systems
  - ⇒ Heating demand may be increased due to the project activity
- Quantification of rebound effects
  - ⇒ Heating demand is nearly proportional to room temperature => Base calculation on differences in room temperature
  - ⇒ Use historic fuel consumption data and adjust with degree days

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Thank you for your attention!

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