
Danish Energy
Agency
Methodology pricing
waste heat sources

Agenda

– Heat source categories
– Risks Waste heat sources
  • Cooperation risks
  • Delivery risks – sunk costs
  • Economic risks
– High-grade and low-grade waste heat source pricing
– Learnings

Heat source categories

1. High-grade waste heat sources
   - Thermal Power/CHP plants and Cooling (Includes waste incineration)
   - Surplus waste heat sources
2. Low-grade waste heat sources
   - Infrastructure (Includes data centre)
   - Other not constant industrial sources

Waste heat sources

3. Ambient heat sources

4. Agnostic heat sources – sources which can be established everywhere
   (Can include biomass and some of above sources like CHP and heat pumps using various sources)

Risks/barriers – waste heat sources

Cooperation risks:

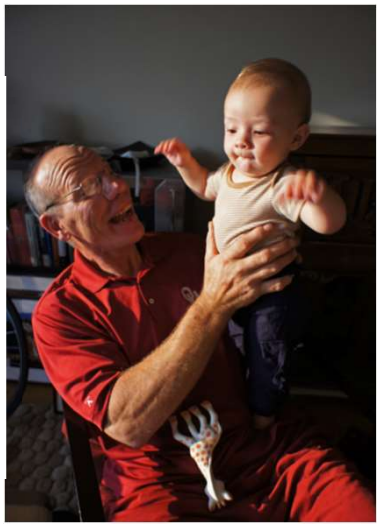
- Different economic objectives
- Not same understanding of issues
- Strategic issues (dominating supplier)
- Transparency
- Confidence
- Playing field – small/large
- Secondarily production

Risks/barriers – waste heat sources

Delivery risks **Increased/decreased sales – Industrial waste heat supply**

Decreasing sales

Outdated product



End of lifetime

Risks/barriers – waste heat sources

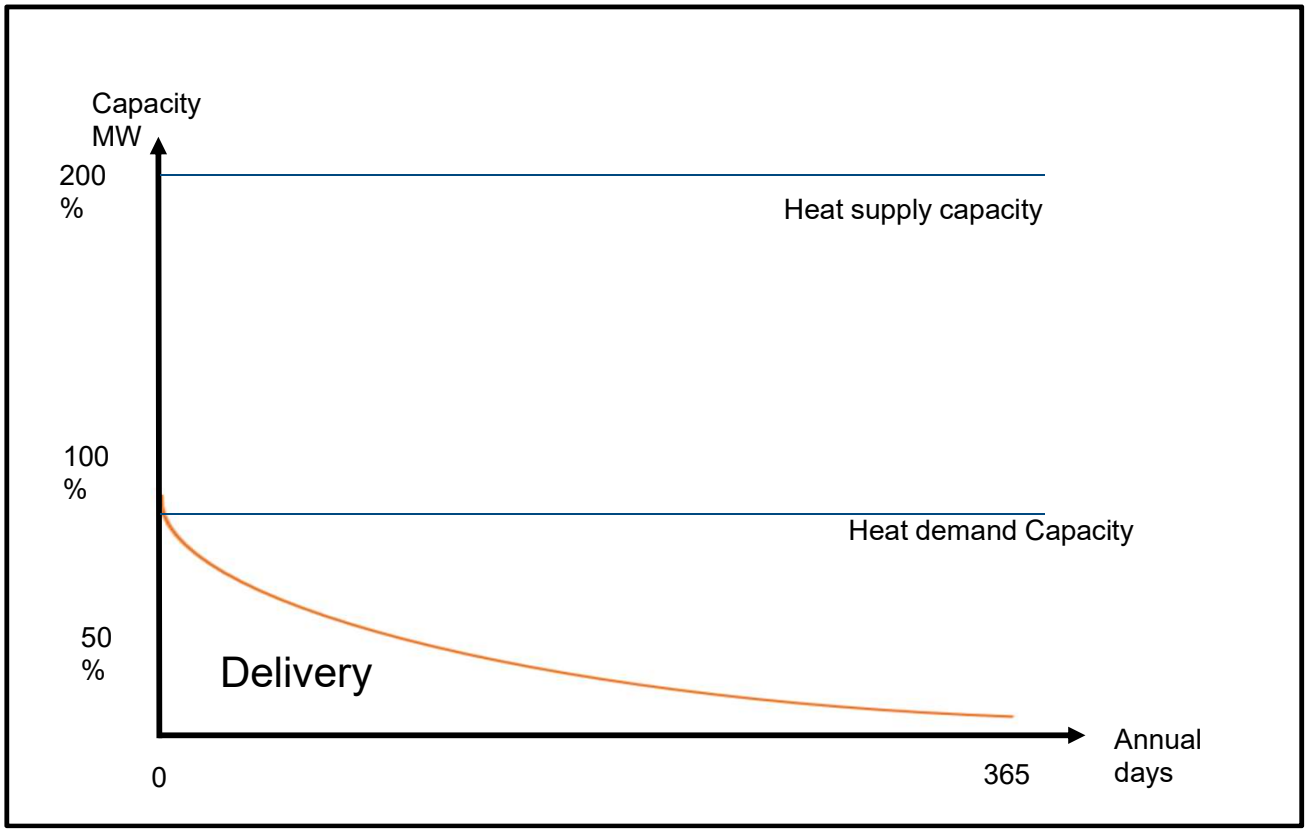
Delivery risks: **Heat source technology “Best Available Technology (BAT)”**

Modern industrial production

Food factories - Cooling/Heating

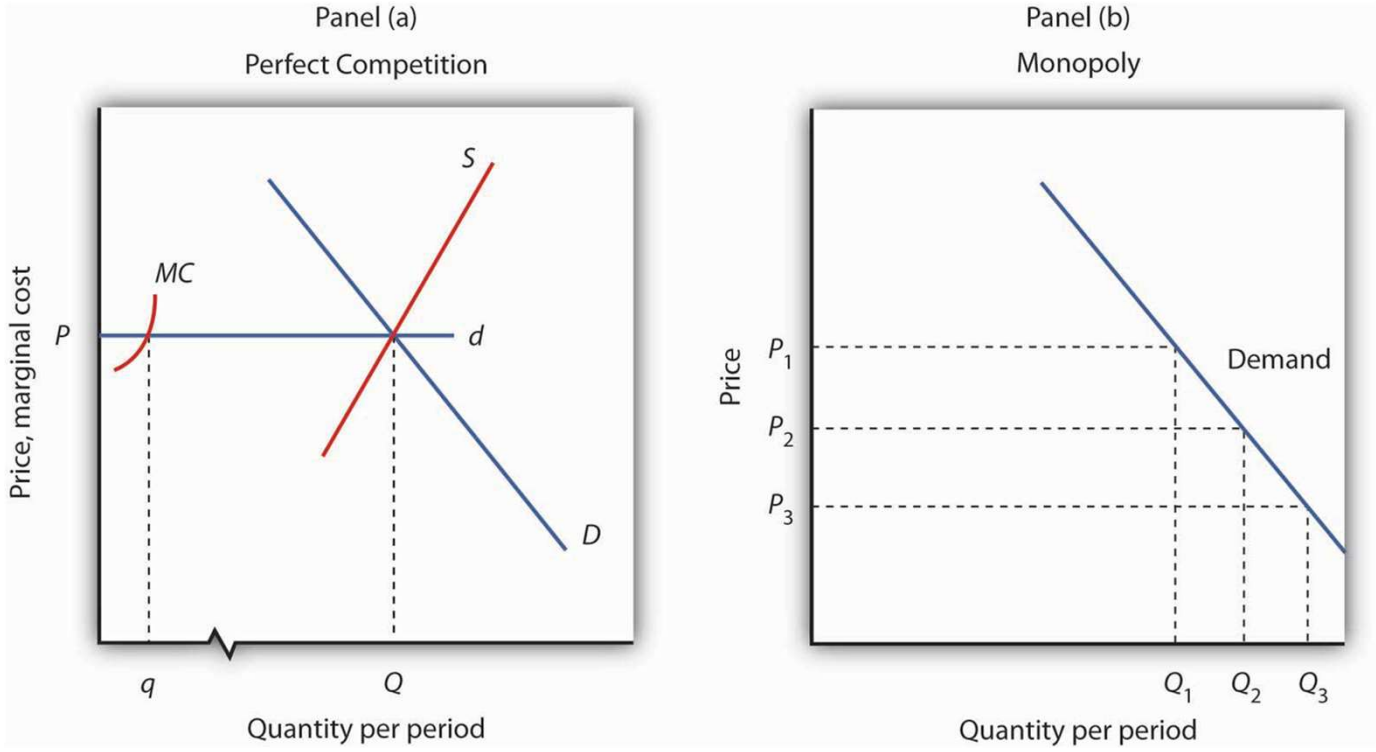
Risks/barriers – waste heat sources

Delivery risks: **Network too small compared to waste heat delivery**



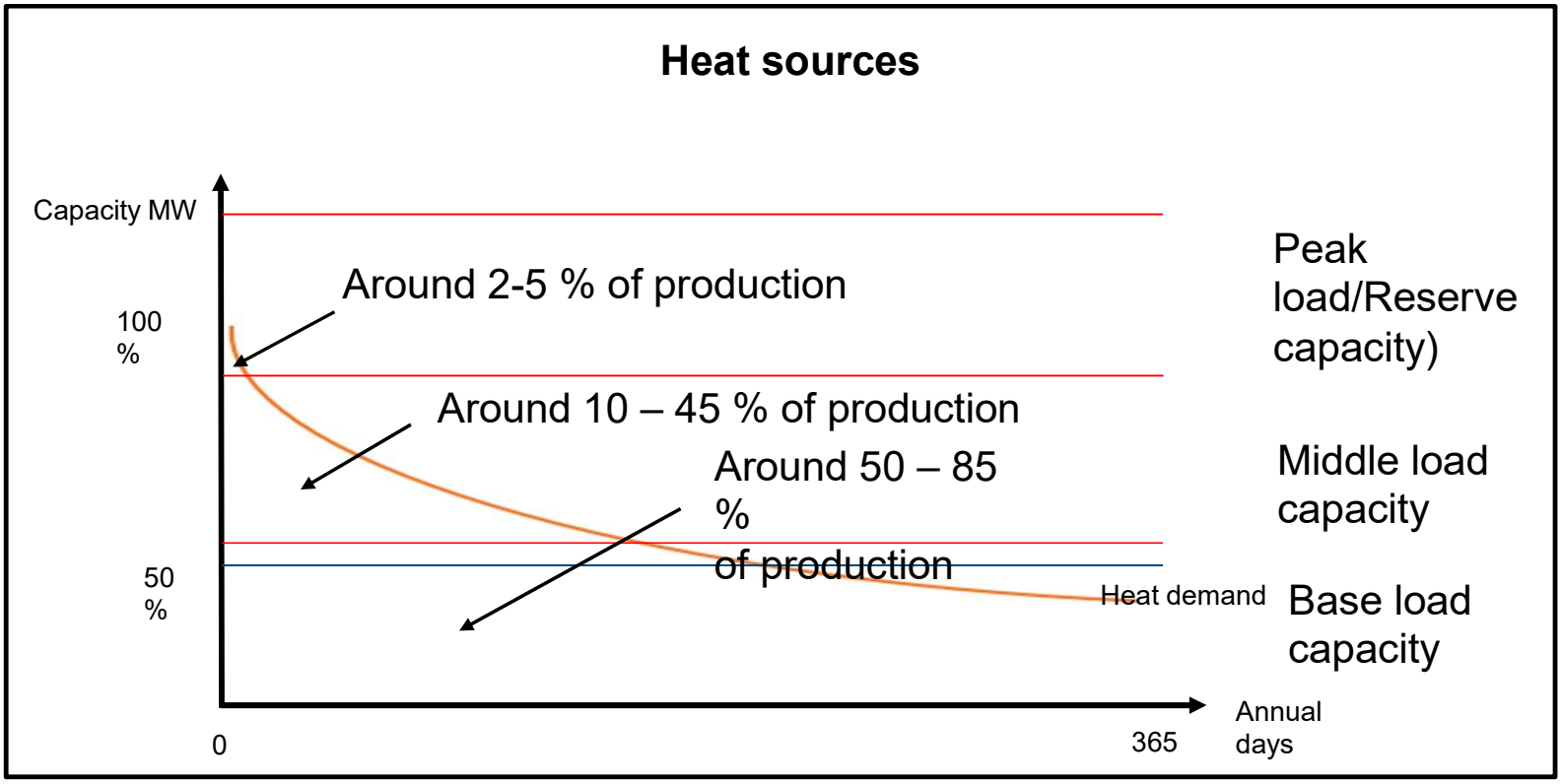
Risks/barriers – waste heat sources

Delivery risks: **Competition - Other "economic viable" heat sources in area**



Risks/barriers – waste heat sources

Delivery risks: **Base load delivery – Annual delivery hours and time of year**



Risks/barriers – waste heat sources

Economic barriers:

- Temperature
- Age of heat source – Expected lifetime
- Constant delivery (Base load/middle load)
- Need for heat storage
- Distance from heat source to network
- Investments
- Pay-back – feasibility for source owner
- Present heat price – if low

Economic risks:
- Space for negotiating heat price

Risks/barriers – waste heat sources

Economic barriers:

- Temperature
- Constant delivery (Base load/middle load)
- Need for heat storage
- Distance from heat source to network
- Age of heat source – Expected lifetime
- Investments
- Pay-back – feasibility for source owner
- Present heat price – if low

Economic risks:
- Space for negotiating heat price / feasibility

Cooperation barriers

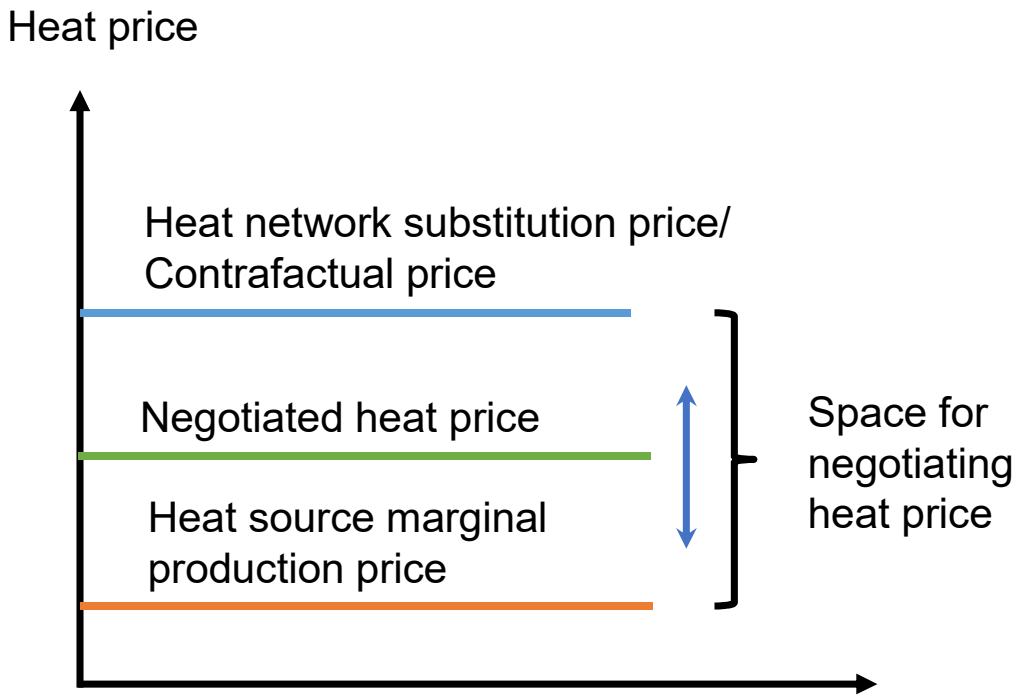
Delivery barriers:

- Increased/decreased sales – Industrial waste heat supply
- Heat source technology "Best Available Technology (BAT)"
- Network too small compared to waste heat delivery capacity
- Other "economic viable" heat sources in area
- Base load delivery – Annual delivery hours and time of year

Delivery risks:
Sunk costs

Methodology – waste heat sources

Space for negotiating heat price

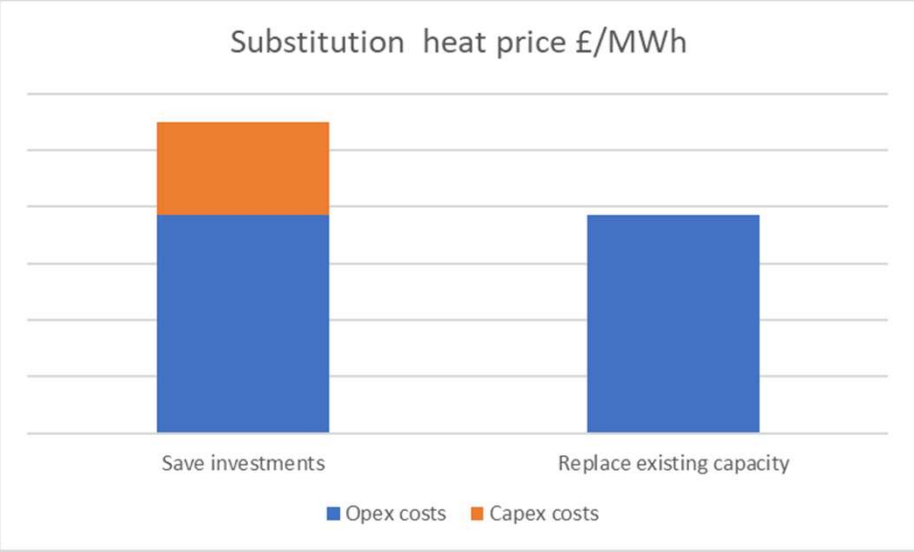


Methodology – waste heat sources

Space for negotiating heat price

Substitution price

- Including CAPEX costs if source save heat source investments for DH company
- Not Including CAPEX costs if replacing existing capacity still available



Methodology – waste heat sources

Space for negotiating heat price

Marginal waste heat price – the price for extracting waste heat from process including investments, operational costs, maintenance and savings

Marginal heat prices – special cases

- CHP extraction plant
- CHP back pressure
- Combined Cooling and heating
- Waste incineration
- Low-grade and ambient heat

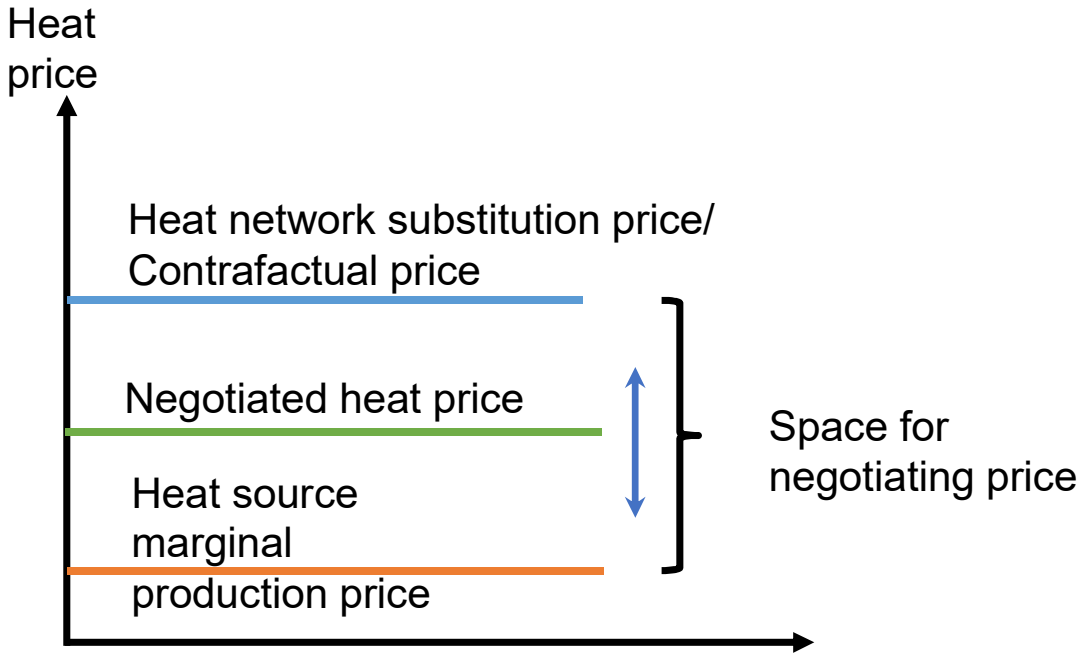
Extra fuel used for producing heat

- Fixed price or sharing costs

- Heat pump (Almost no space for negotiating price)

Methodology – waste heat sources

Space for negotiating heat price



Considerations when negotiating:

- Risks
- Investments
- Pay back requirements
- Timeframe
- Temperature/Reliability
- Back-up capacity
- Competitors

Learnings – waste heat sources

High grade heat sources - almost always space for negotiating heat price

If heat pump is needed for increasing source temperature – not much space for negotiating heat price

Low grade infrastructure heat sources very stable and reliable heat source suitable for all purposes (Base load, middle load and peak load) – price maybe annual payment

Investigation and negotiations take time – build middle load and reserve load capacity first


Danish Energy Agency
Thanks
John Tang Jensen
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