

# Dynamic prices for district heating in Aarhus

Preliminary results

# GENERAL

# Orientation

***Could dynamic prices for district heating be interesting in Aarhus?***

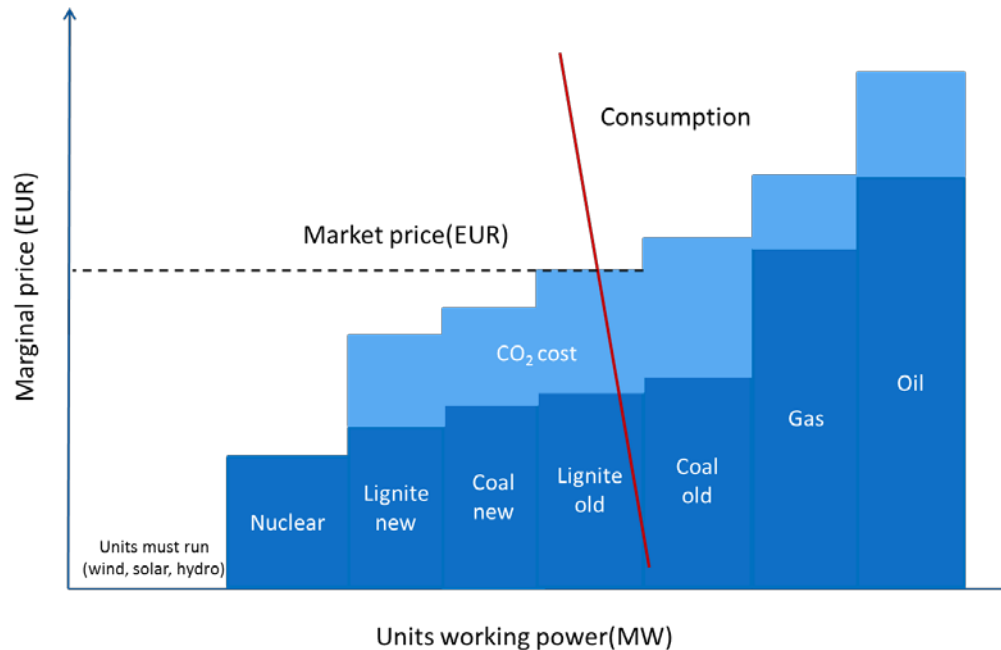
- Focus on new potential heat suppliers
  - Individual heat pumps
  - Industrial surplus heat
  - Solar heating
  - Geothermal
- Aarhus example modelled with Balmorel in cooperation with AVA

# Two kinds of heat price schemes

- Heat price based on average costs
  - Based on the average costs of producing heat, often averaged over whole year
- Heat price based on marginal costs
  - Based on marginal cost of producing one extra unit of heat. Hourly resolution

# Marginal pricing

- Cost of producing one extra unit
- Already used in the electricity sector: Nord pool spot



- Same approach for district heating?

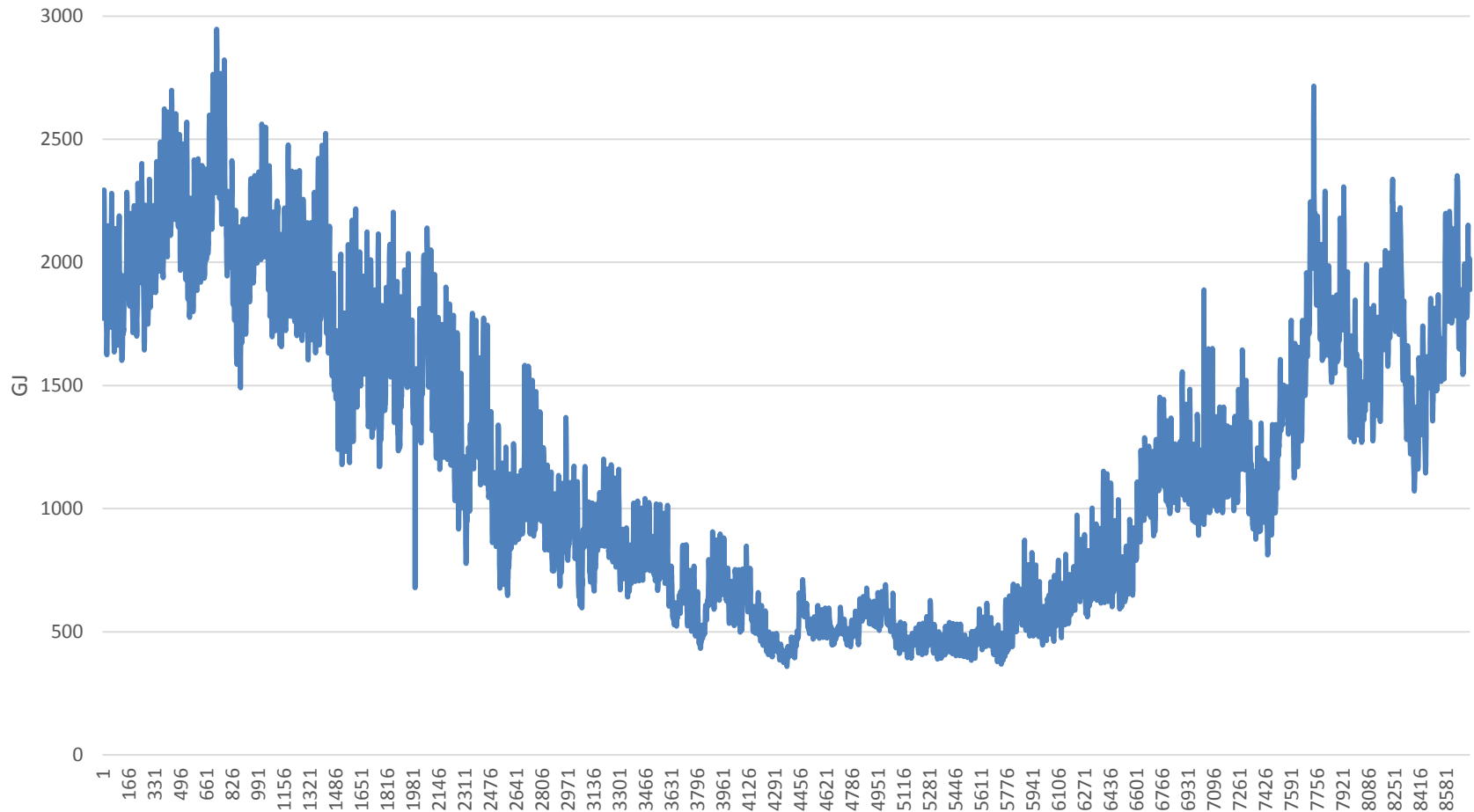
# Drivers for marginal heat price

1. The total heat demand
  - Merit order curve
2. The electricity price
  - For CHP plants, high electricity prices lower the heat price
3. Congestion (not in the simulations presented here)
  - No bottlenecks modelled

# AARHUS EXAMPLE

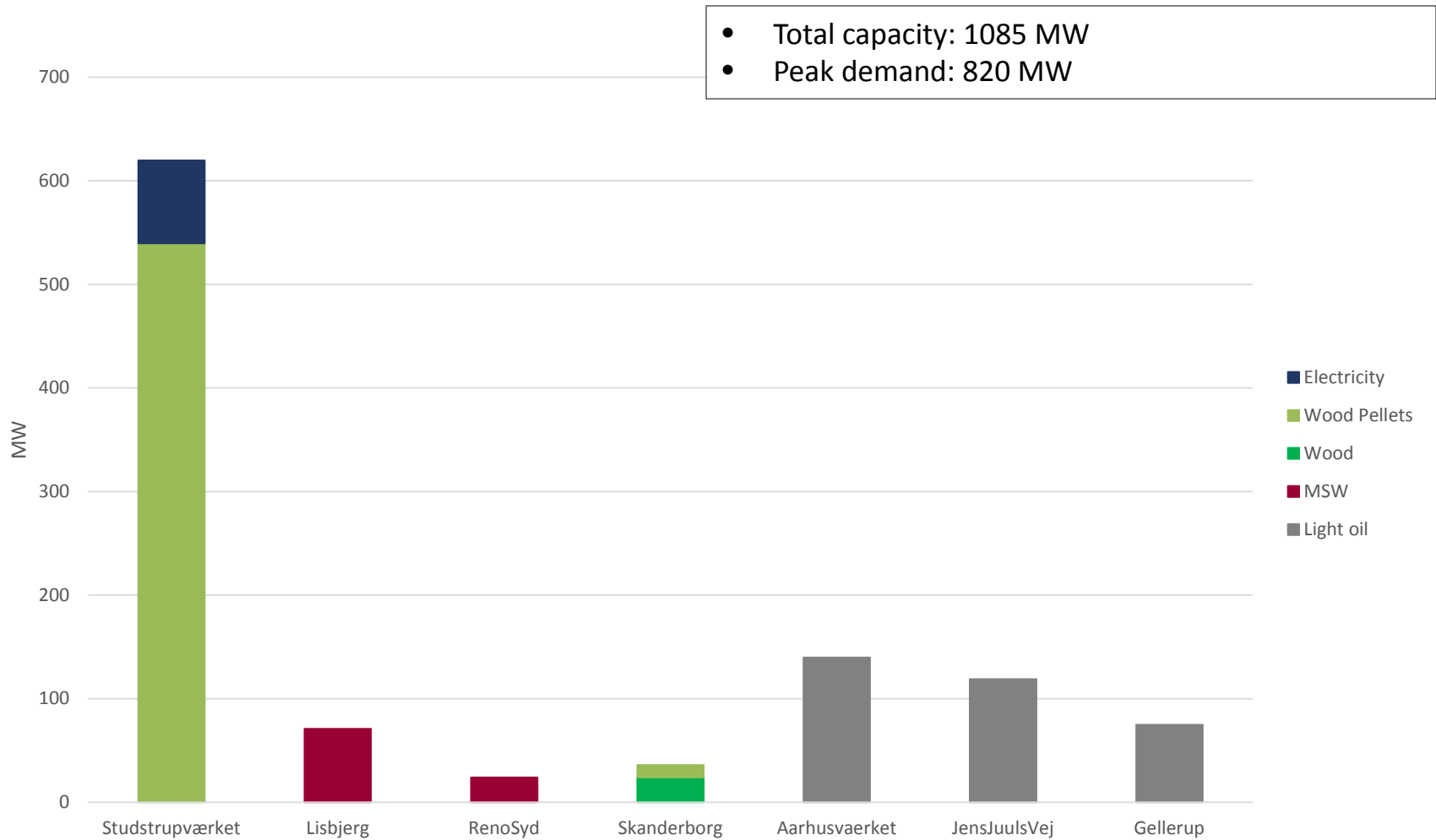
# Aarhus heat demand (2015)

2950 GJ = 820 MWh





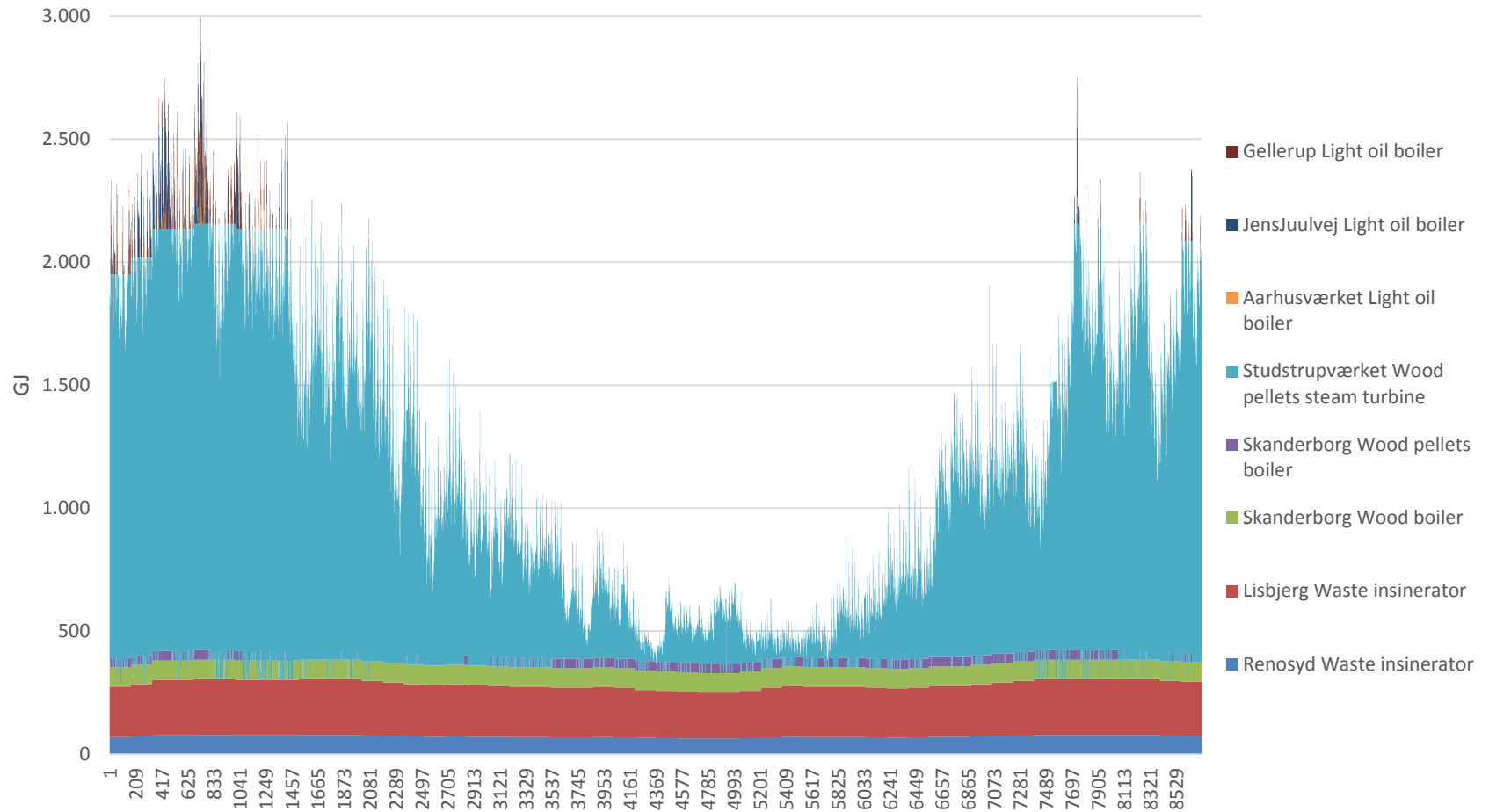
# Aarhus district heating capacity



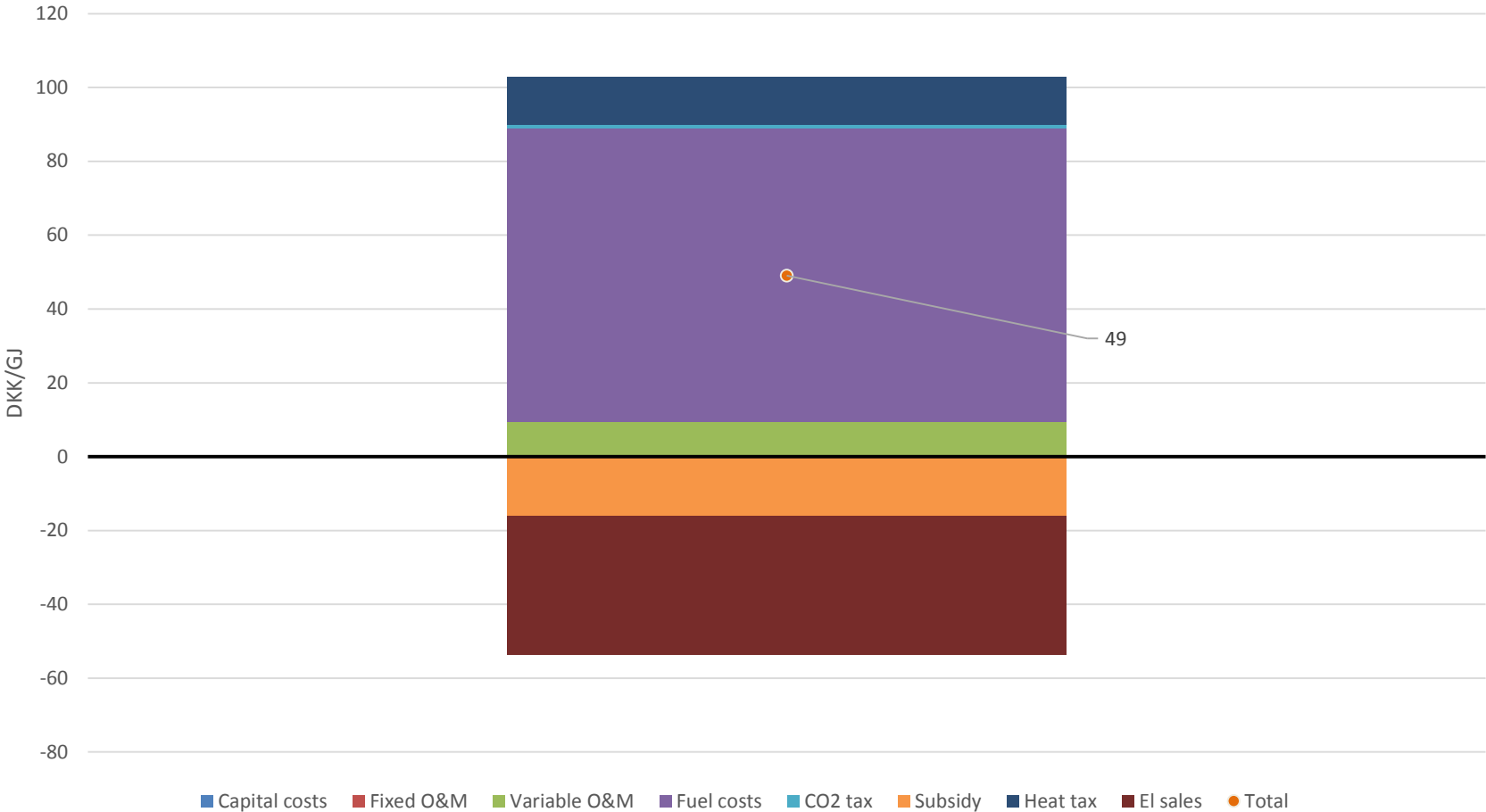
# Short term marginal costs (yearly average)



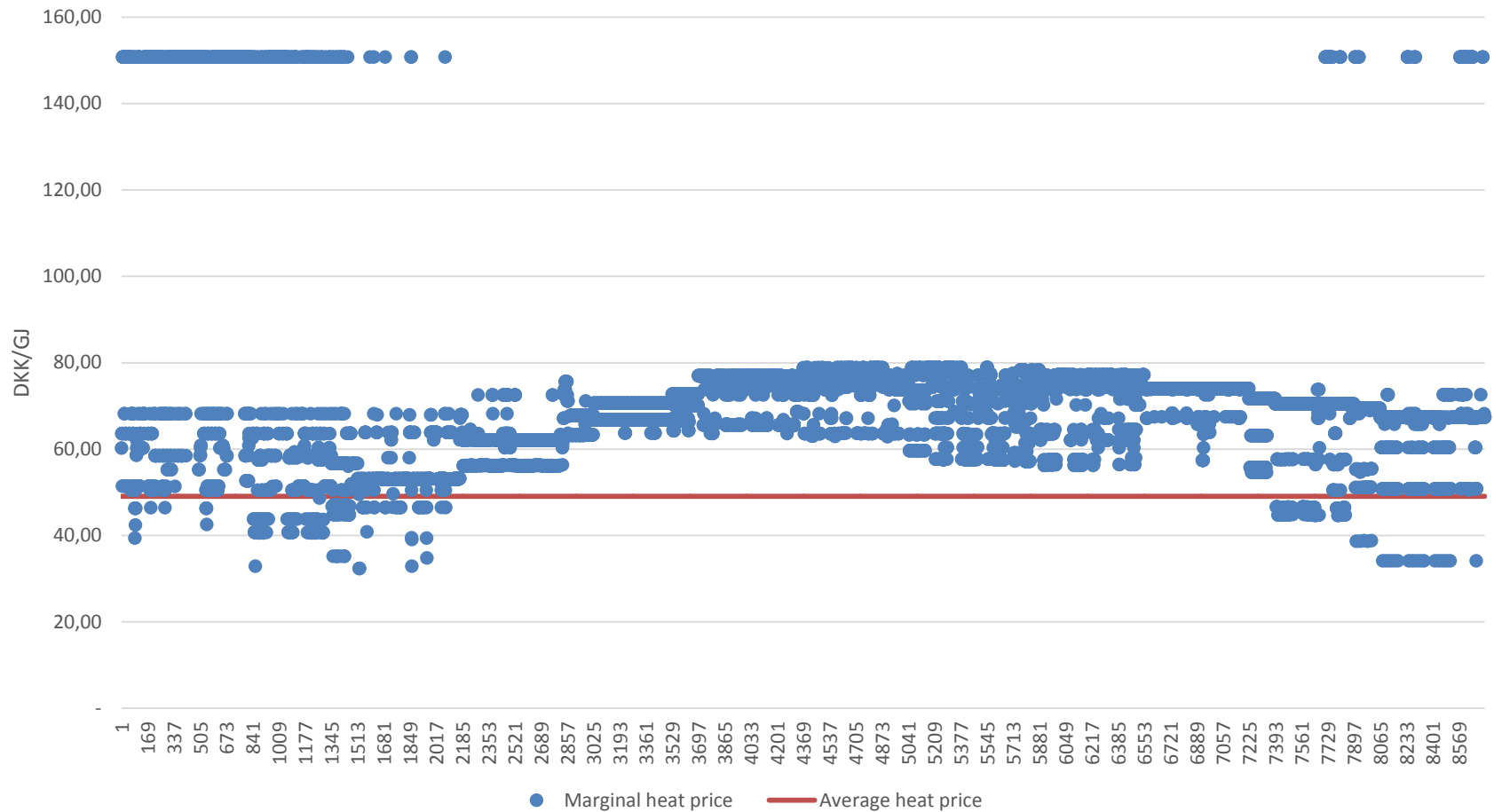
# Heat generation



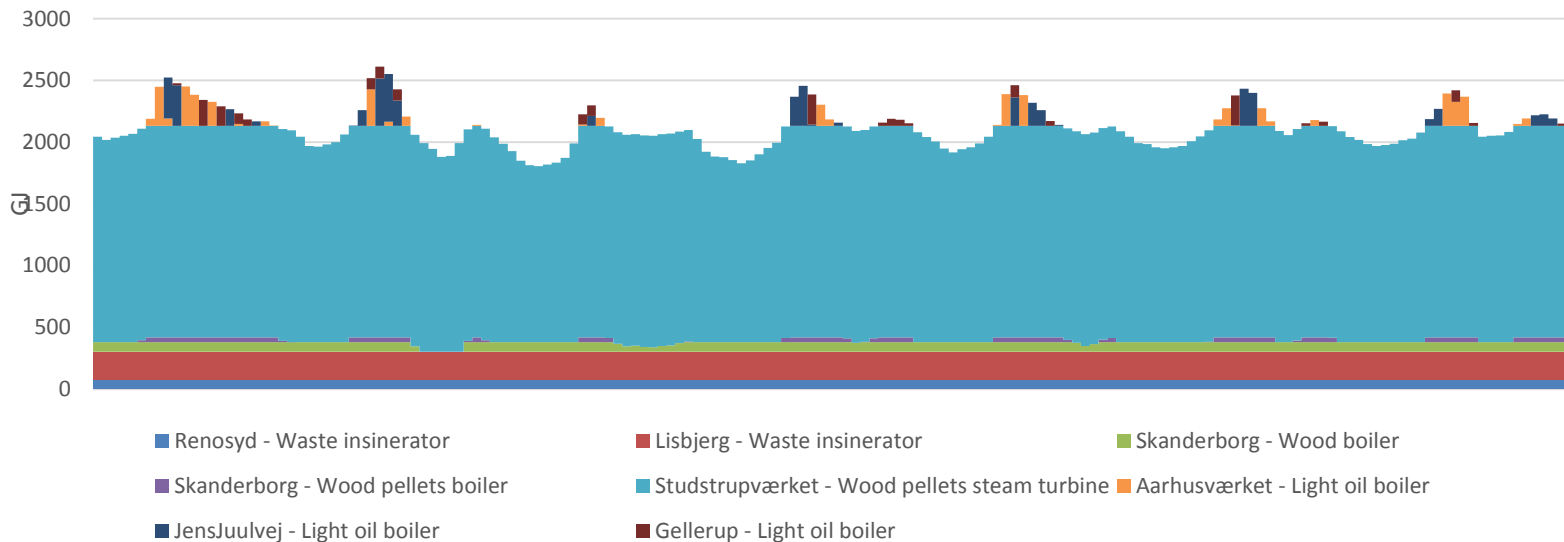
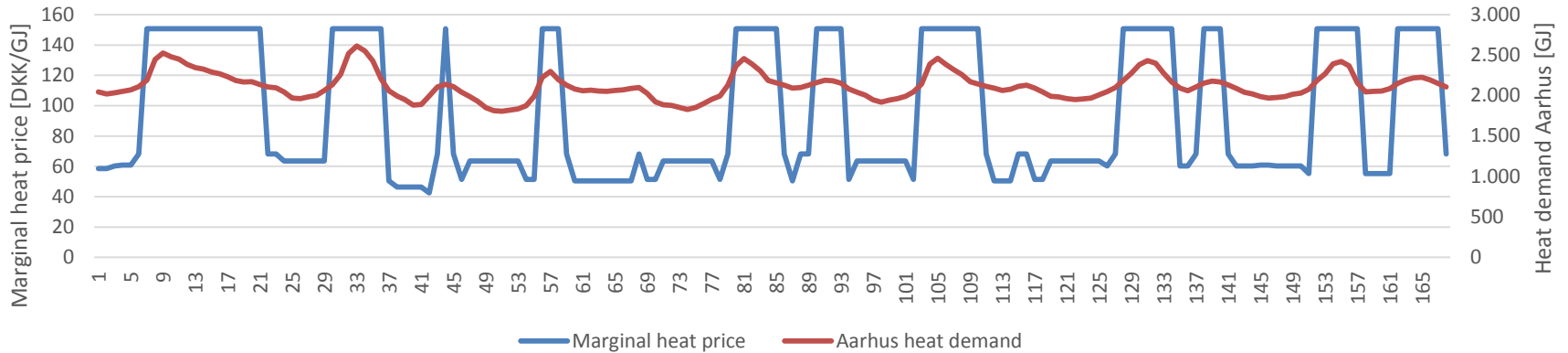
# Average cost of heat



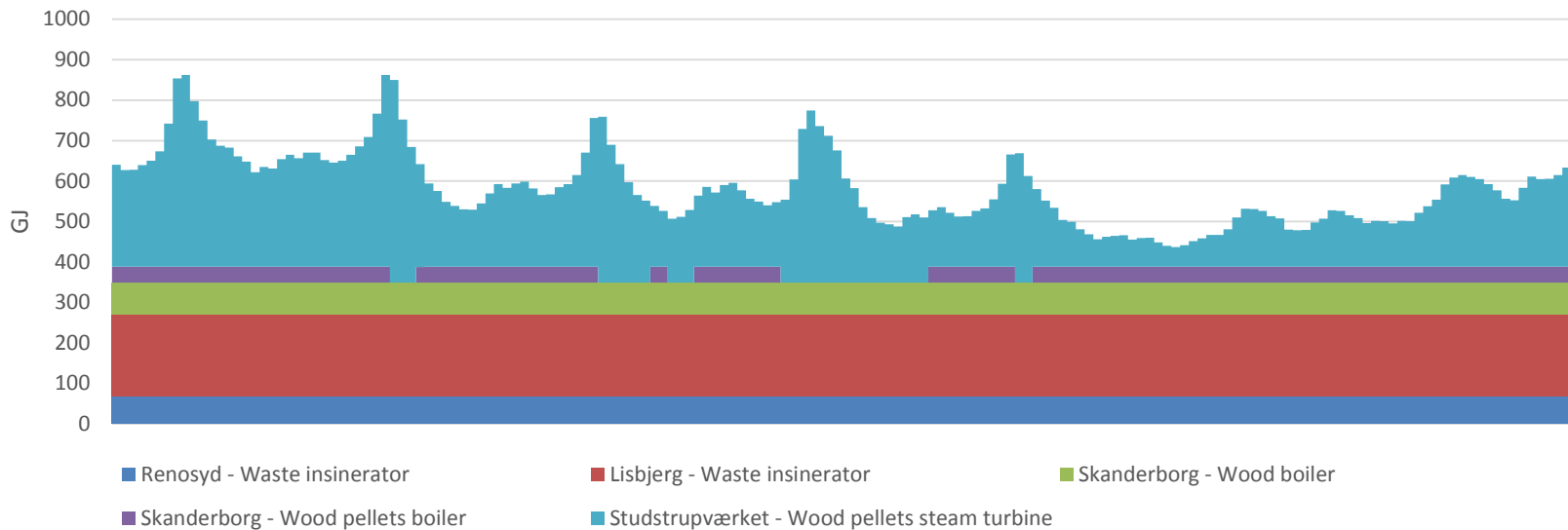
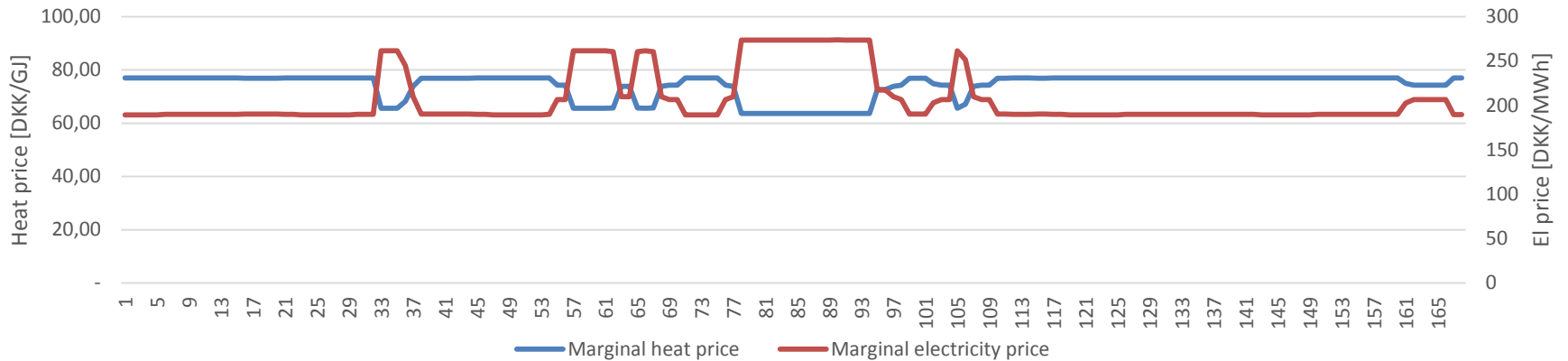
# Heat prices in both schemes



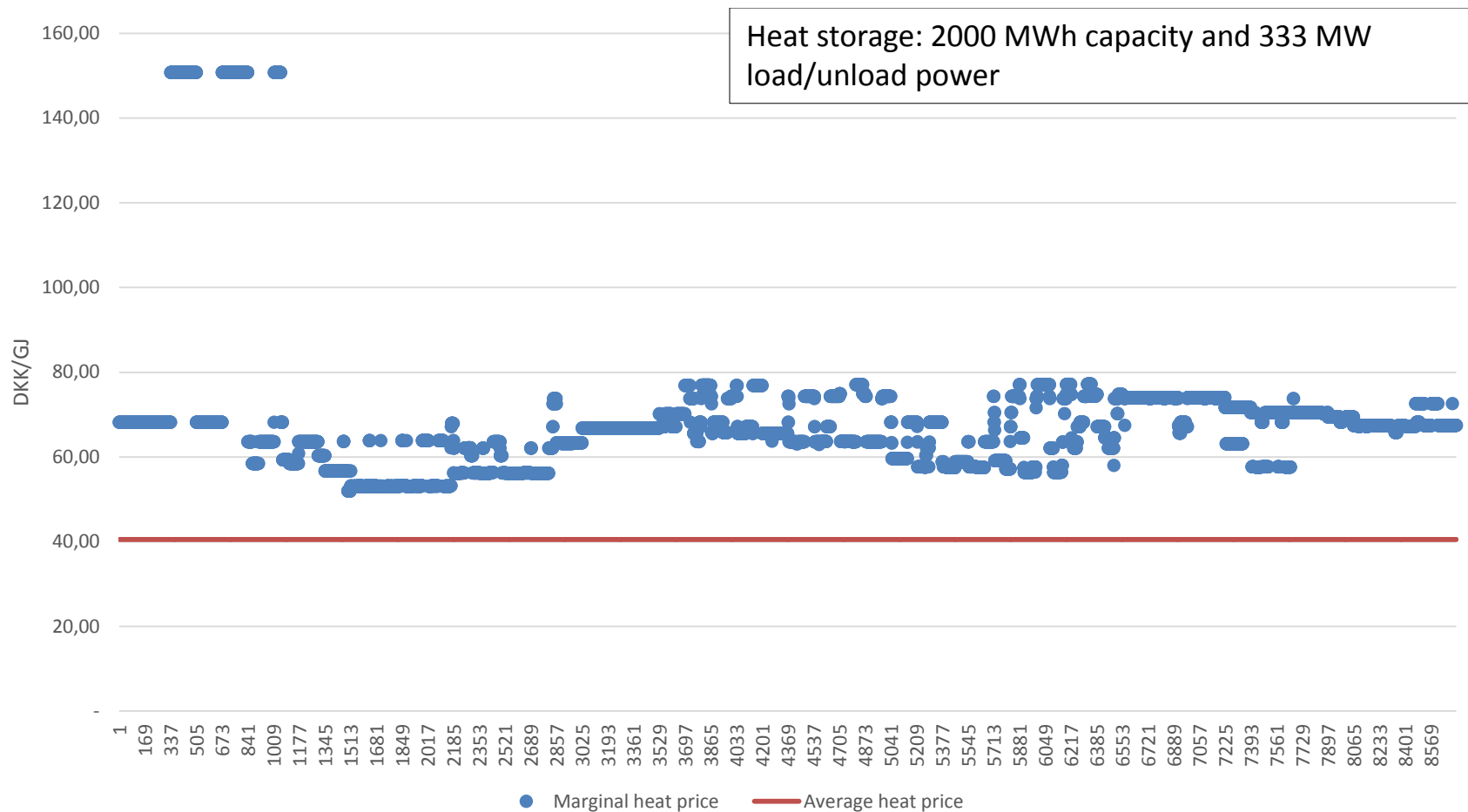
# Heat price drivers - demand



# Heat price drivers – El price

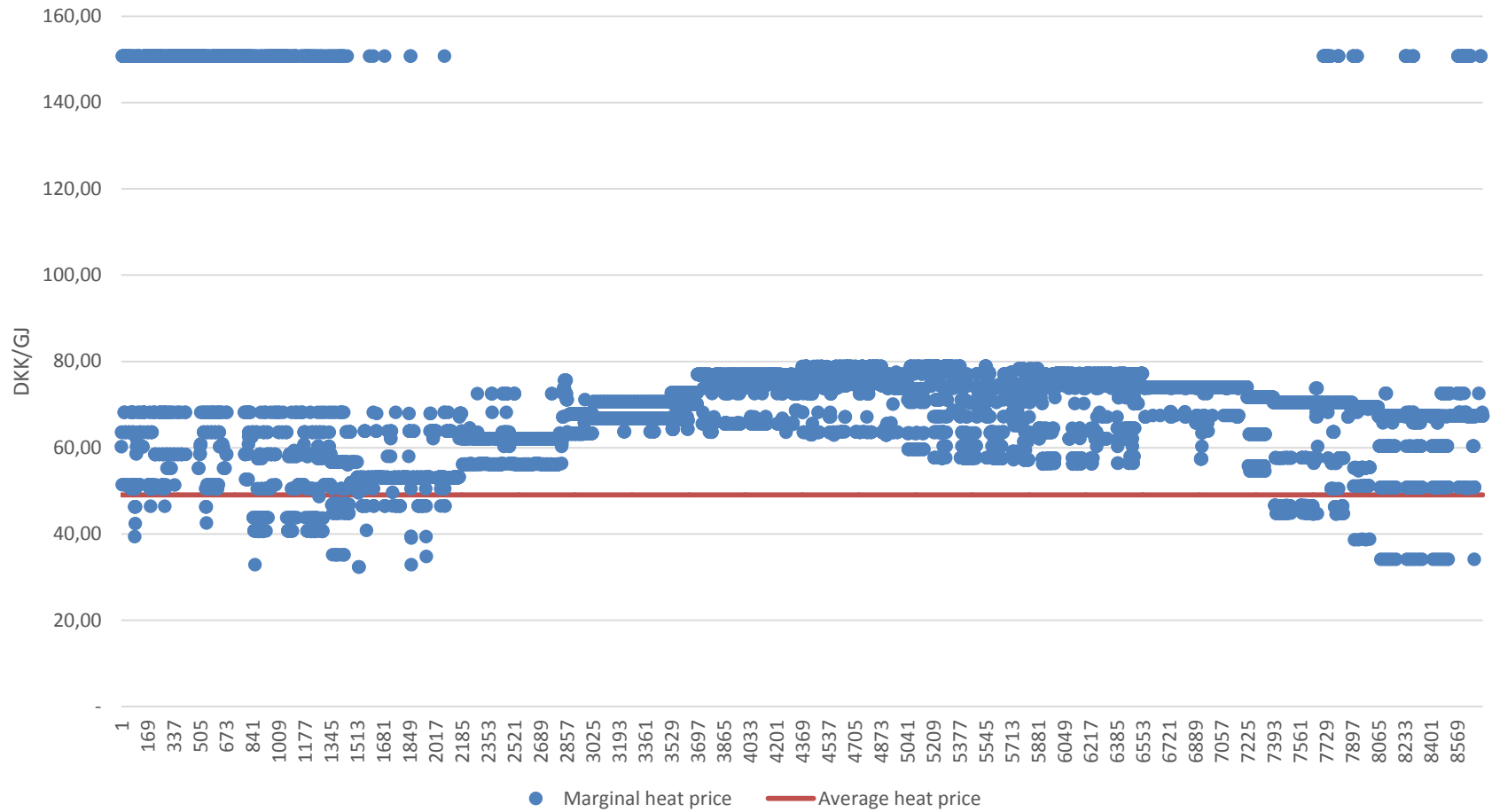


# Adding heat storage in Studstrupværket





# Before



# Comparison two schemes

## Average price

### Advantages:

- Easy to implement
- Guaranteed to cover costs

## Marginal price

### Advantages:

- Gives correct incentive to heat producers
- Good representation of value of produced heat
- Guarantees least-cost production

# Conclusions

- Advantages to both schemes
- Largest advantage to fixed average price is ease of implementation
- Largest advantage of marginal pricing is giving right incentives
- Next:
  - Finalize Aarhus results
  - Odense
  - Also 2025 and 2035
- WP3: Set-up of practical contracts for heat

**THANK YOU**