TFE-Project Poland– 2026 - Webinar 2 June

How Danish utilities interact with electricity markets through CHP plants, biomass, heat pumps, and electric boilers.

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Danish Energy Agency

PROJECT PARTNERS

- The webinar is a part of the project ’Strategic energy collaboration in Poland’ and finansied by the Danish Energy Agency.

- The participants in the project are:
  - Danish Board of District Heating (DBDH)
  - Silesian University of Technology (P).
  - Municipality of Høje-Taastrup (DK).
  - Royal Danish Embassy in Warsaw.
  - Gullev DH Advisory.

Danish Energy Agency

BILLUND DISTRICT HEATING, DK

- Billund is a small town in Southern Jutland, DK, with approximately 7,500 inhabitants.

- The town is best known for the LEGOLAND theme park, which typically attracts more than 1.5 million visitors annually, and it also has an airport serving around 4 million passengers each year.

BILLUND DISTRICT HEATING, DK

KEY FIGURES

Employees: 13.

Annual growth: 5 – 10%.

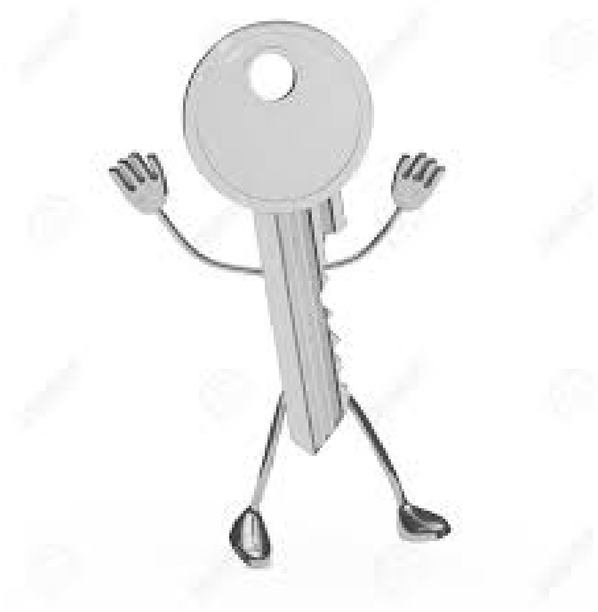
Annual revenue: approx. DKK 73 million (€9.7 million)

Debt: approx. DKK 400 million (€53 million)

Connected area: approx. 1,150,000 m² and 4,200 energy meters.

Annual production and sales: 130,000 MWh and 105,000 MWh

Ranked among the top 30 cheapest district heating companies in DK

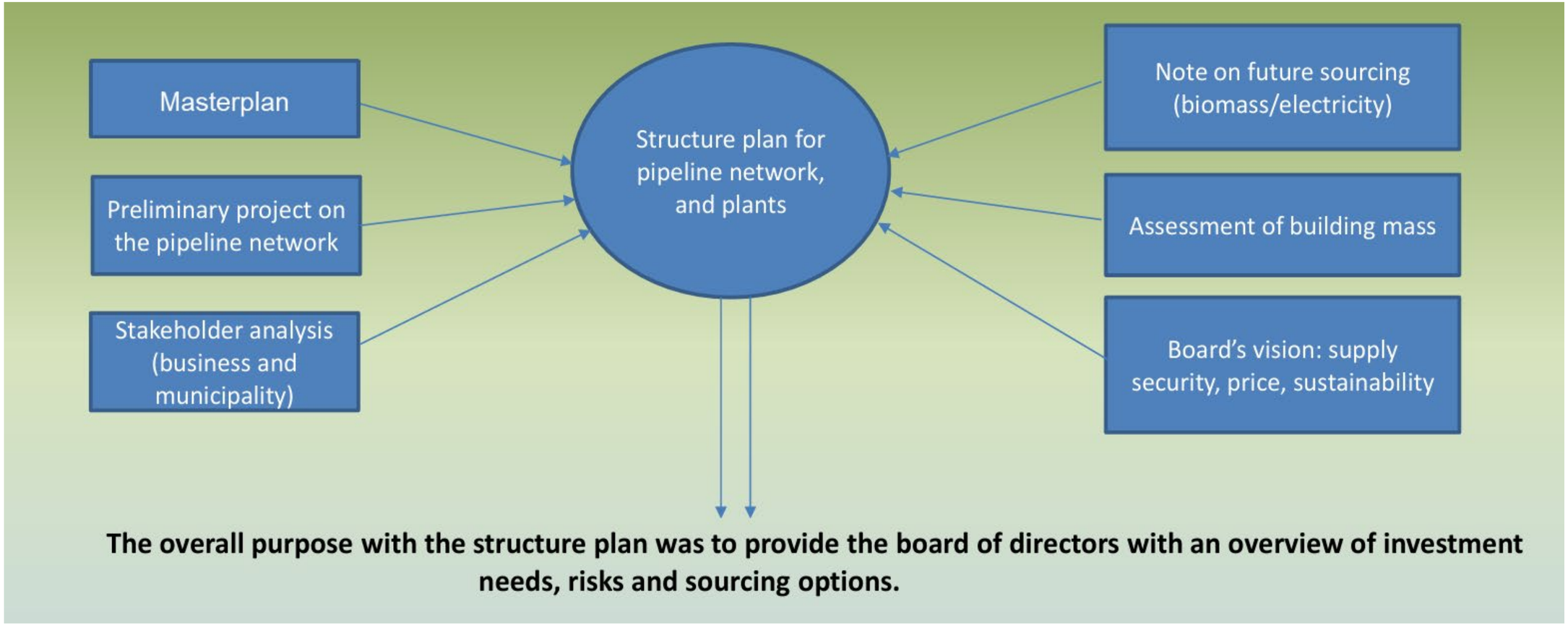


BILLUND DISTRICT HEATING, DK

FLEXIBLE HEAT PRODUCTION – SYSTEM INTEGRATION

- Wood chips: 6 MW
- Straw: 12 MW
- Electric boiler: 15+30 MW
- Heatpump : 16 MW (by 0^{O}C air temp.)
- Gasengines : 2*1.7 MW (2*1.1 Mwe)
- Gasboilers : 26 MW peak/back -up
- Heat storage tanks

STRUCTURE PLAN (ASSET)
FOCUS ON ECONOMIC OPTIMUM



The overall purpose with the structure plan was to provide the board of directors with an overview of investment needs, risks and sourcing options.

STRUCTURE PLAN – ECONOMY 10 YEARS

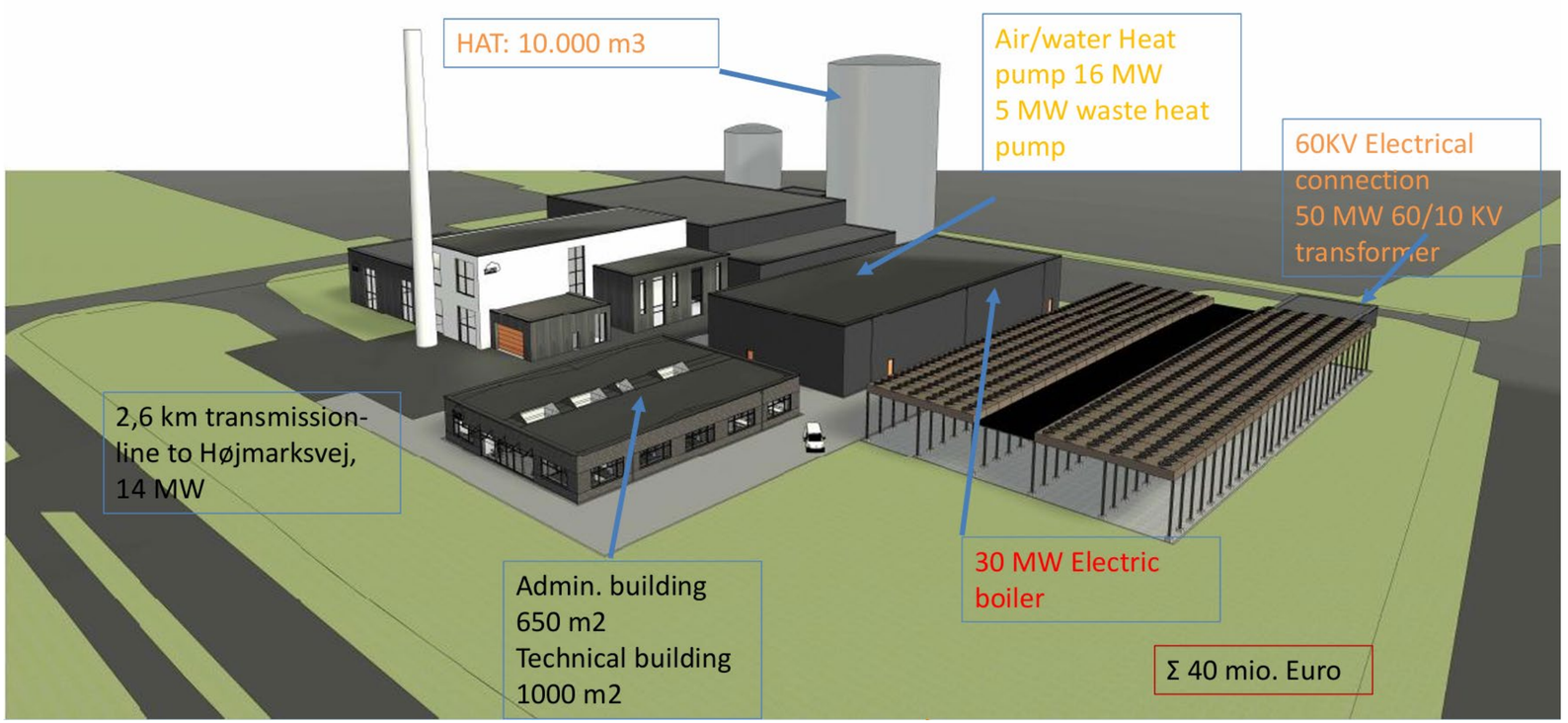
The expectations from the structural plan were built into an economic assessment:

- A conservative approach to all figures e.g.
- Urban development
- Interest rates
- Sourcing prices for fuel/electricity
- Heat loss
- Operating costs

Spent a lot of energy on the financial part:

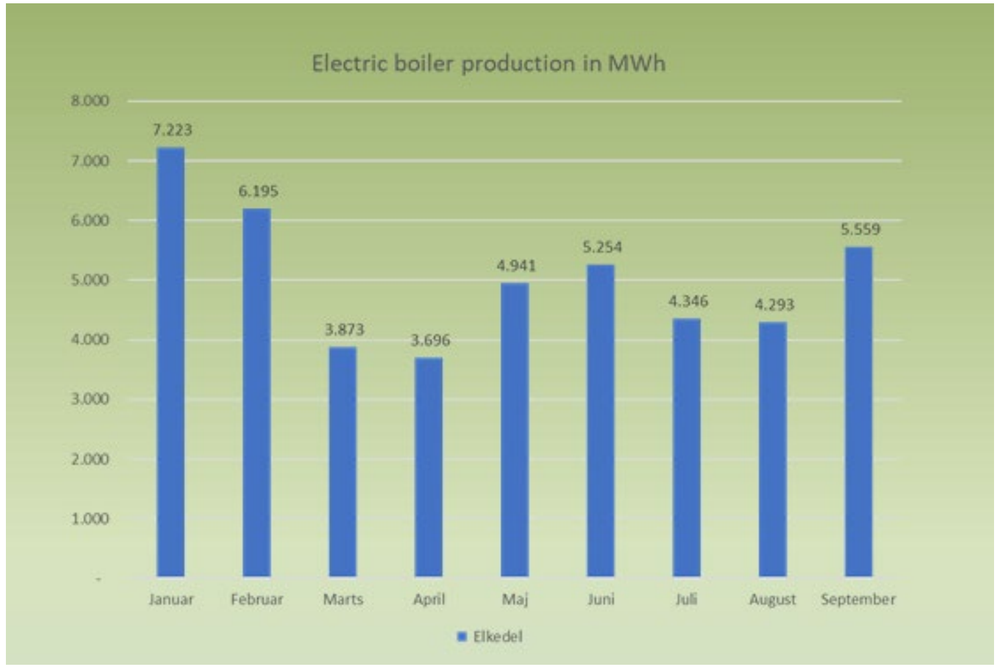
- None of our assumptions came true.
- Interest rates went from 0.5% interest to 3.5%
- Volatility in the electricity market has become more attractive faster than expected
- In 2026 we have lowered the price by 25% on the variable cost
- The project was approx.. €10 million cheaper than expected.

TENDER OVERVIEW

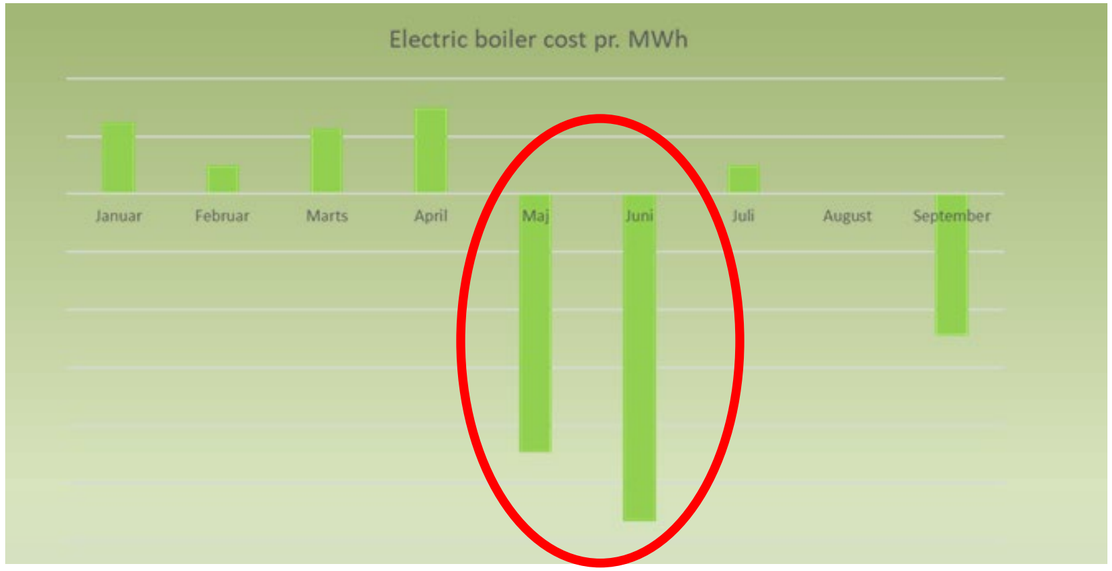


- A subsequent structural plan in December 2022.
- Detailed planning began in January 2023.
- Construction started in spring 2024, and the plant was taken into operation on 24 October 2025.

E - BOILER ON THE POWER MARKET 2025



Operating Jan. -Sept. 2025



Negativ production cost May and June 2025

E - BOILER ON THE POWER MARKET 2025

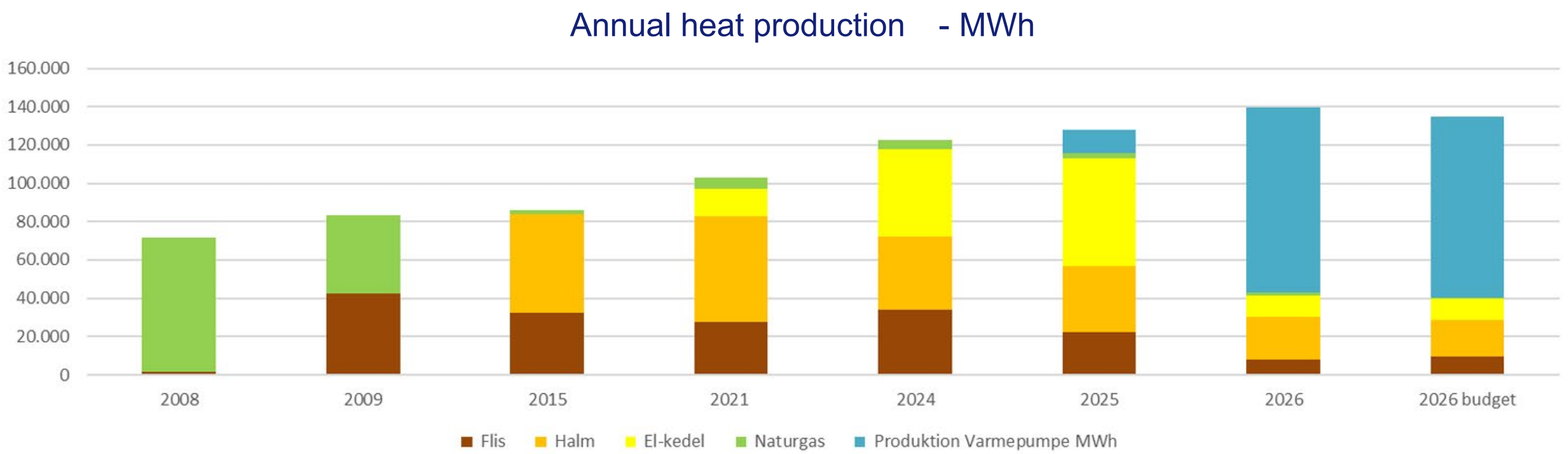
	Jan.-Sept. 2025	Percentage	Average price
Heat source	MWh	%	DKK/MWh
Production - total	85,908	100	112
Natural gas – gas engine	943	1.1	1,170
Natural gas - boiler	997	1.2	815
E-boiler	**45,379**	**52.8**	**0.00 *)**
Wood chips	14,702	17.1	317
Straw	23,886	27.8	301

Heat pump in operation after 1 October 2025.

*) Interruptible electricity customer - including all costs as distribution tariff and electricity purchase.

CHANGE IN HEAT PRODUCTION

2008 (98% natural gas) – 2026 (73% electricity)

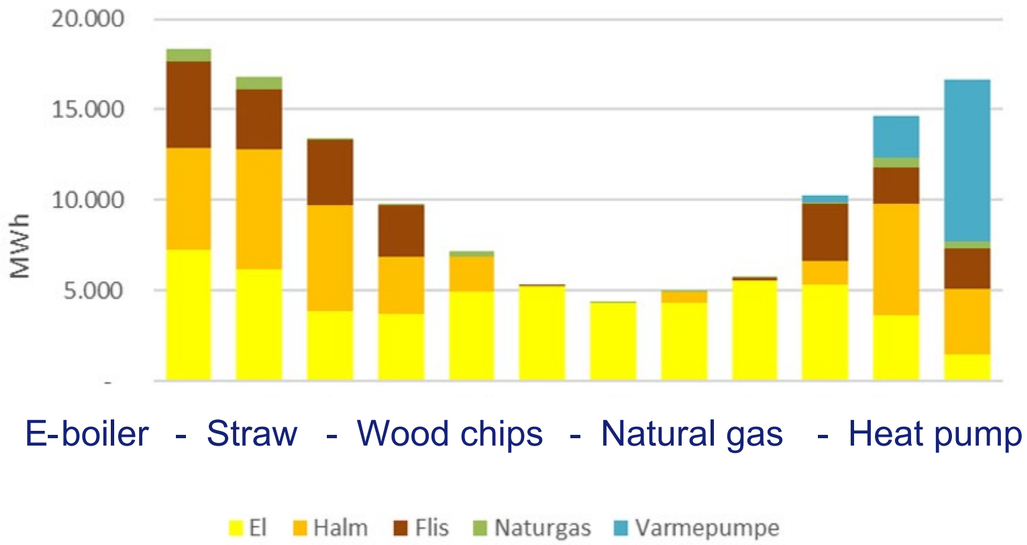


Wood chips - Straw - E-boiler - Natural gas - Heat pump

HEAT PRODUCTION

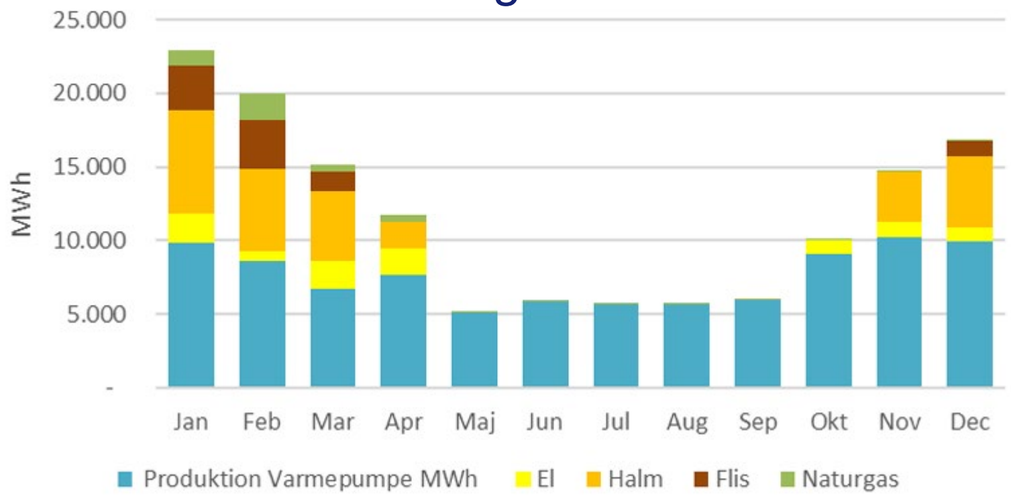
Actual 2025 and realized/budget 2026

Production 2025



E-boiler - Straw - Wood chips - Natural gas - Heat pump

Production 2026 Realized/budget



Heat pump - E-boiler - Straw - Wood chips - Natural gas

POWER MARKET

Electricity markets Billund District Heating participates in:

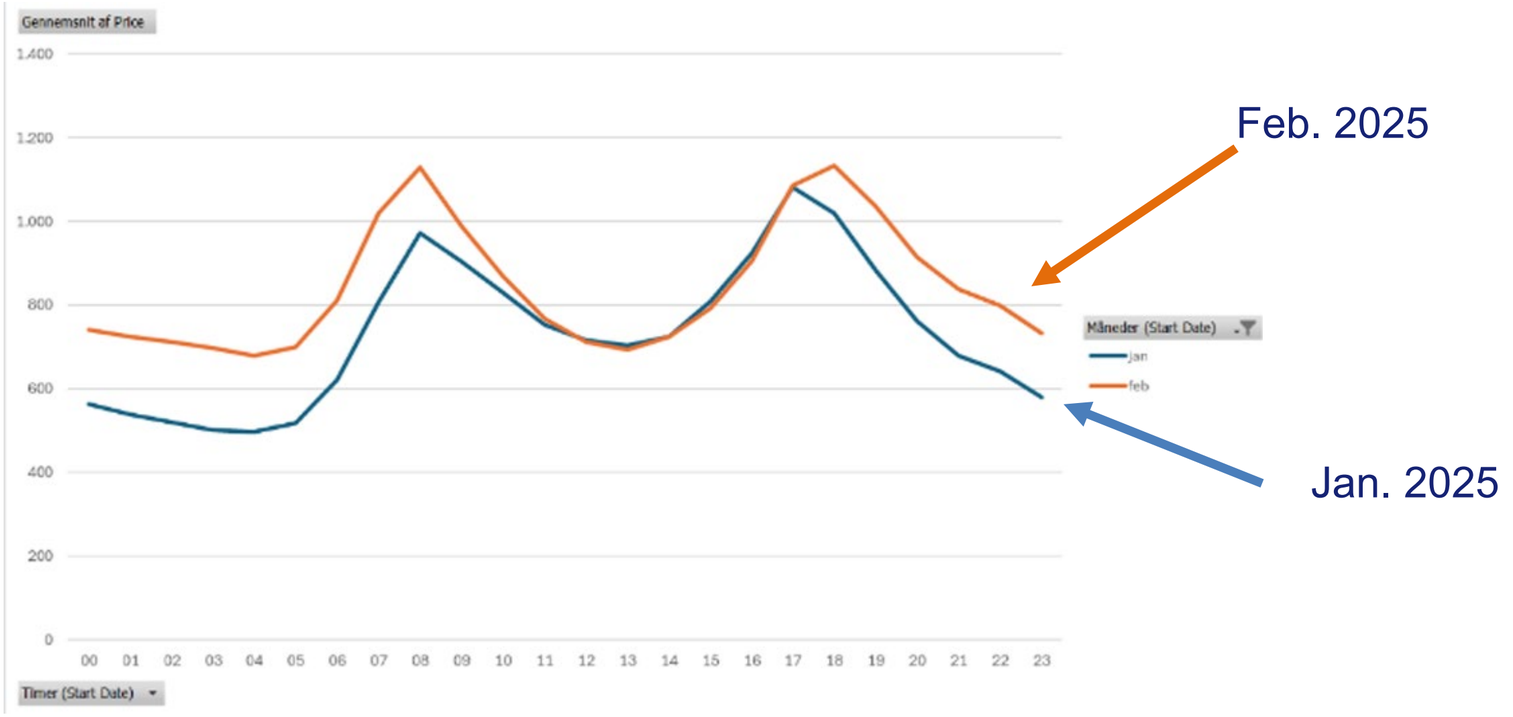
- Spot market (daily)
- Intraday (monthly – only when needed)
- Balancing services (daily)

Balancing services with electric boiler and heat pump:

- When the system lacks electricity = upregulation → electric boiler/heat pump stops
- When the system has excess electricity = downregulation → electric boiler/heat pump starts
- Denmark participates in the Picasso platform.

POWER MARKET
AVERAGE SPOT PRICES FOR DK1 (2025)

Batman -profile -price



KEY TAKEAWAYS

- Fuel flexibility
  - Multiple fuel types ensure robustness.
- Electricity market flexibility
  - Uses power prices and participate in balancing services to reduce heat production costs.
- Storage capacity
  - Enables flexibility in electricity markets and strengthens security of supply.
- Reduced costs
  - Cheaper heat for the customers

GULLEV ADVISORY

Thank you!

NAVIGATING GREEN TRANSITION

FURTHER INFORMATION: LARSGULLEV55@OUTLOOK.COM