



ELENIA

# Transition from Gas to Biomass in Finnish District Heating Systems

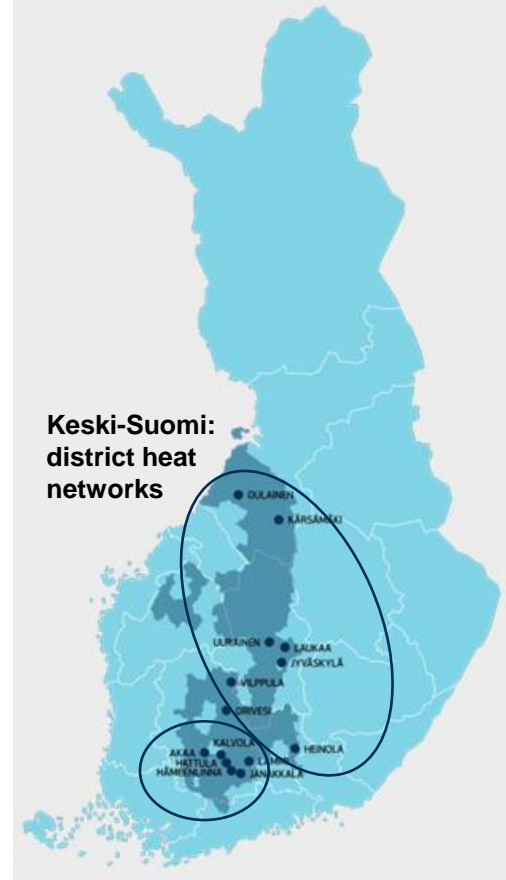
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# Elenia Lämpö Oy

## Overview of operations

- Turnover 73 M€, personnel 90
- 16 district heating networks in Finland
- Six natural gas distribution networks in Häme region
- Around 5 000 customer contracts = over 80 000 end-customers
- Owned by a venture capitalist consortium: the Ilmarinen Mutual Pension Insurance Company, 3i and Goldman Sachs

## Key locations



2011 facts	Heat sales	Electricity generation	Gas sales
Share of revenue	 78,6 %	 11,0 %	 10,4 %
Volume (GWh)	886	132	126

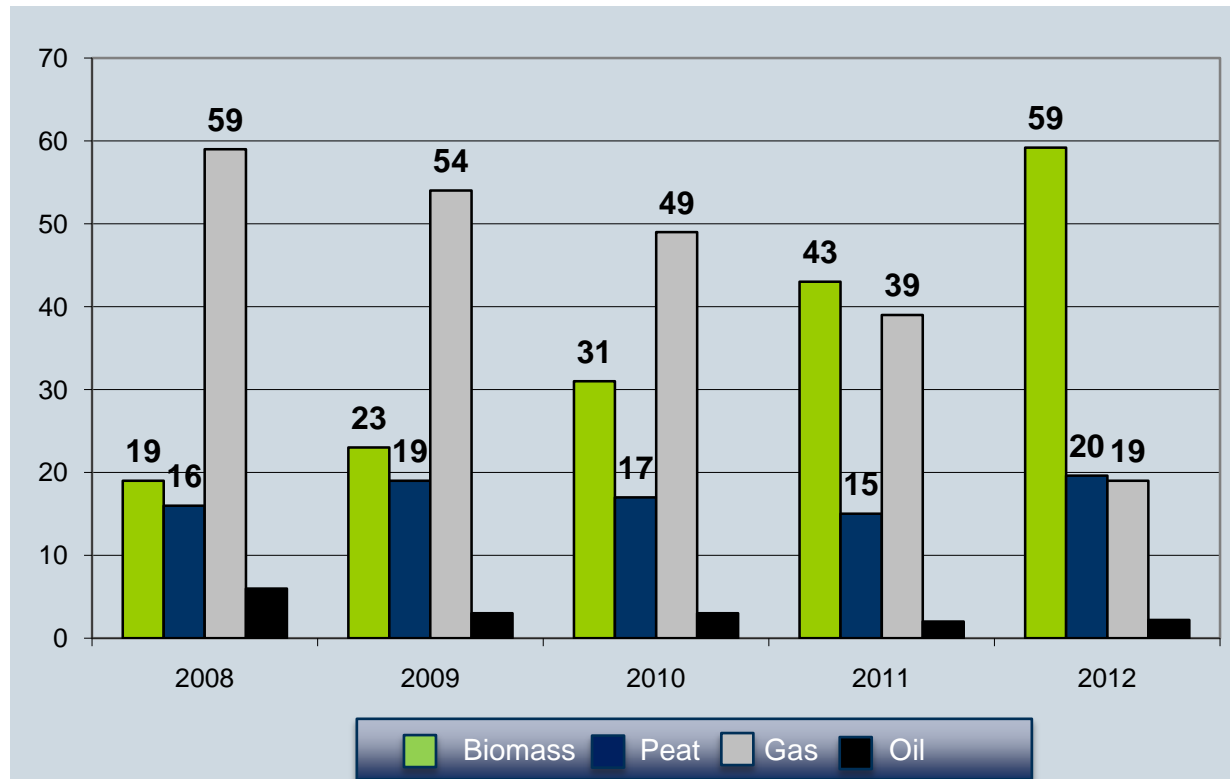
# What Elenia Lämpö does for better environment?

- We increase the share of biomass in our production
- We significantly invest in new technology
- We develop our plants to be more energy efficient
- We cooperate with forestry associations and partner plants in fuel supplying
- Third parties evaluate our operation
  - Fair district heating certificate ("Reilu kaukolämpö")
  - Energy efficiency agreements
  - Certified occupational health and safety management system OHSAS 18001
  - Certified environmental management system ISO 14001



# Energy sources in our production (%)

- Considerable decrease in fossil fuel usage 59 => 19 %
- Remarkable increase in biomass usage 19 => 59 %
- 2012 use of domestic fuels (biomass, peat) 79 %



# Turenki network

## Overview of operations

## Key locations

2011 facts	Heat sales	Gas usage	Purchased heat
Volume (GWh)	50	40	19

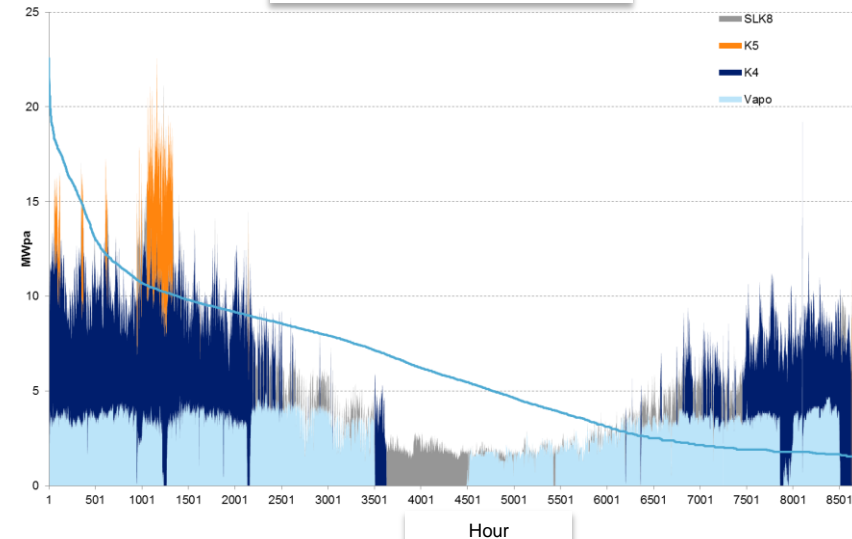
- Elenia produces district heating using 3 gas boilers
- Elenia buys about 3MW base heat load from VAPO
- Main reasons for the project: transfer to biomass
  - Gas price in Finland 50€/MWh, biomass price 20€/MWh
    - Gas taxes still increasing
  - Turenki is situated close to Hämeenlinna power plant
    - Hämeenlinna plant uses 400 GWh biomass yearly
      - Major biomass terminal nearby
    - Biomass supply secured to Turenki by the same long term frame biomass supply contracts
  - Heat purchase contract ends soon



# Start by feasibility study

- Feasibility study to optimize
  - Plant type, options:
    - CHP water & steam cycle
    - CHP ORC cycle
    - Heat only boiler
  - Boiler size
- Good competition for the study between Finnish biomass plant experienced engineering companies
  - Chemitec, CTS, Pöyry, ÅF, Sweco,...
- Result: optimized plant:
  - Heat only boiler
    - Long term electricity price forecast in Nordic Countries below 50€/MWh
  - About 10MW<sub>th</sub> biomass boiler + flue gas scrubber

Heat Production , boiler operation hours



- Max load 24,2 MW
- Summer load 1,6 MW

# Call for bids of biomass boiler plant

- Call for the bids should be prepared by engineering company if you do not have biomass experience
- Two ways to define the boiler size:
  - Fixed size
  - Give base data for size optimizing for the boiler suppliers (our choice)
- Main items to define in the call for bids, biomass
  - Fuel qualities and mixes, fuel storage size
  - Environmental requirements: existing, coming
- Several competent biomass boiler suppliers in Finland:
  - Andritz, Foster Wheeler, Metso & MWPower, Renewa
  - Please listen their comments to fuel qualities!!

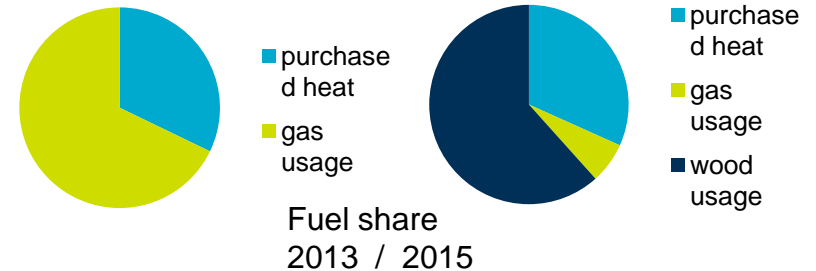
# Evaluation criteria for the plant

- Supplier references: not only boiler size but also technical solution and fuel quality
- Price +
  - Cost of the needed basement etc
- Life time operation cost of the whole plant
  - Max load, min load -> needed peak fuel amount
    - Firing technology: BFB, CFB, grates,...
- Fuel feeding arrangements
  - Typical biomass plant operating problem is to get the fuel in to the boiler
- Efficiency, availability...
  
- Scrubber investment will be realized later on – to compensate the purchased heat

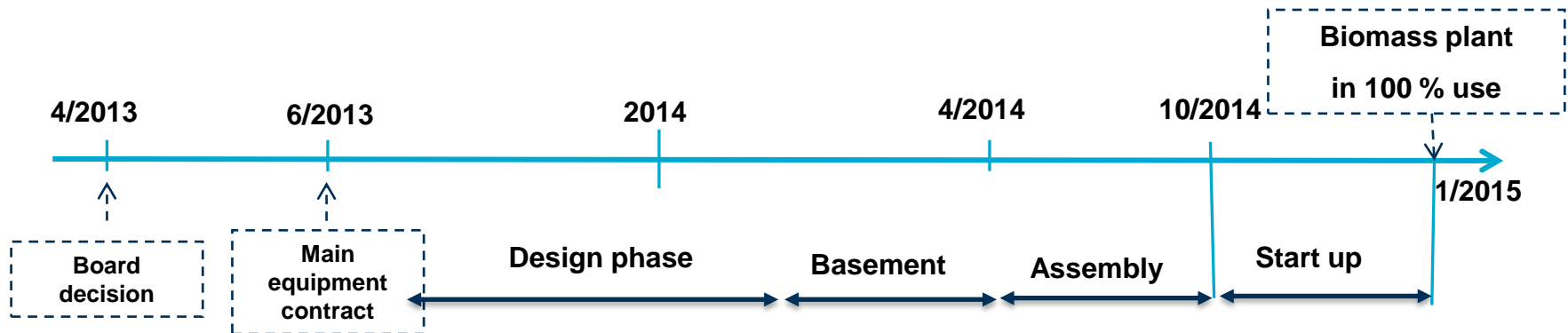


# Board evaluation criteria for the investment

- Result (EBITDA) increase by > 1M€/year
- Investment cost
  - Boiler plant is 70% of total cost
    - boiler+house+fuel feeding storage, conveyors, electrification, automation
    - Basement, connections (DH, el, automation)
- CO<sub>2</sub> emission decrease



- Project schedule:



**Thank You!**  
**Questions?**