

# DISTRICT HEATING IN STATKRAFT

Development, construction and operation

CENBIO WORKSHOP - GARDERMOEN  
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# 5 strategic priorities in Statkraft:



**European Flexible Generation**



**Market Operations**



**International Hydropower**

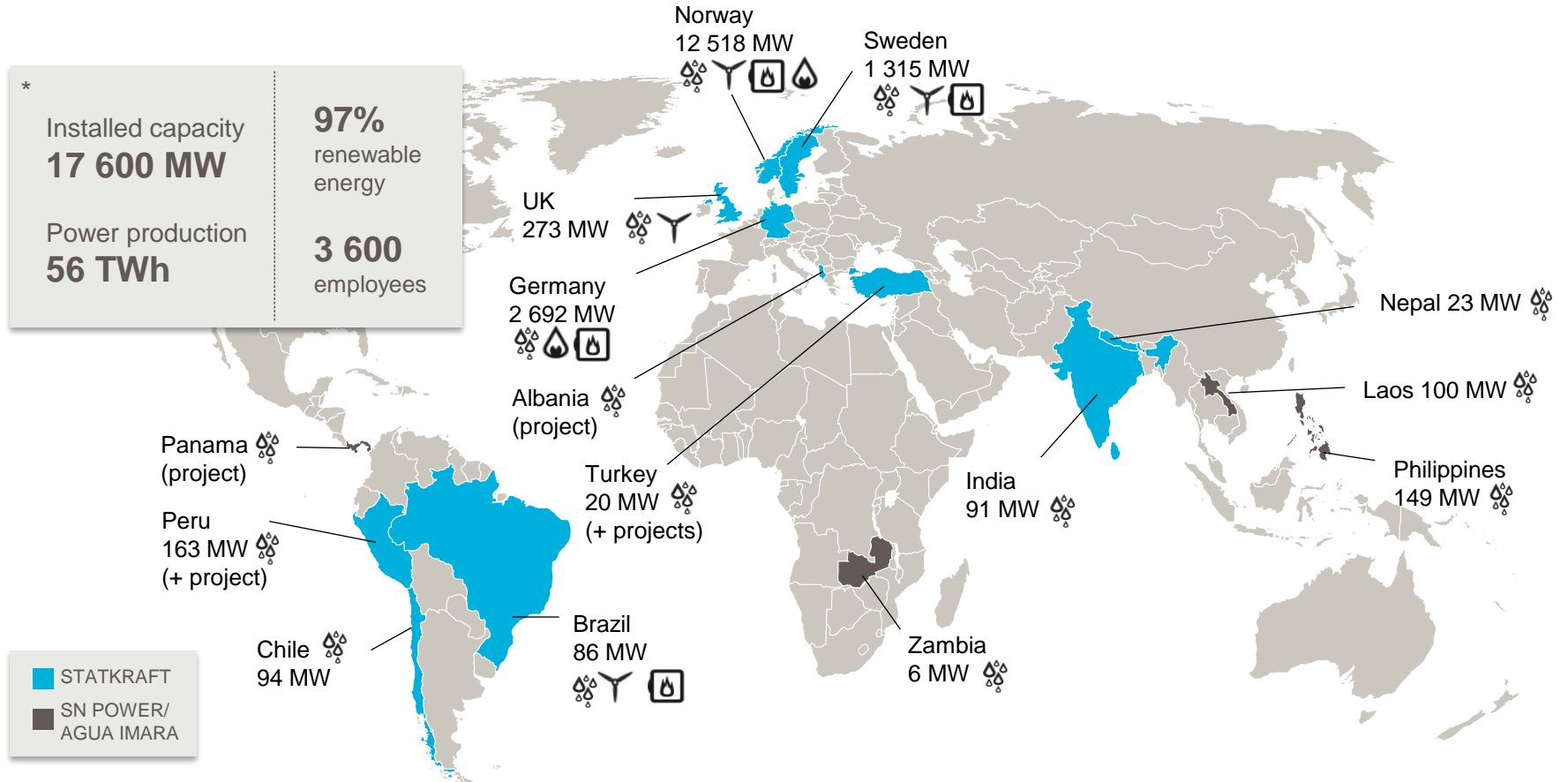


**Wind Power**



**District Heating**

# Energy production:



\* 2013 figures. Includes: - Statkraft/SN Power's share of installed capacity

# District Heating (and cooling)

## Strategic goal:

- ▶ To be among the most profitable players in the Nordic market

## Current priorities

- ▶ Increased profitability in existing operations,
- ▶ Profitable growth
- ▶ Increased robustness

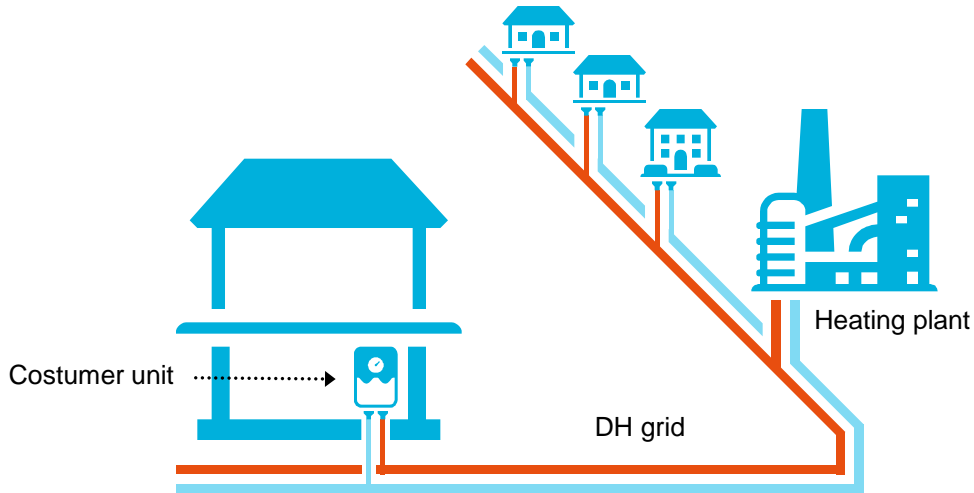
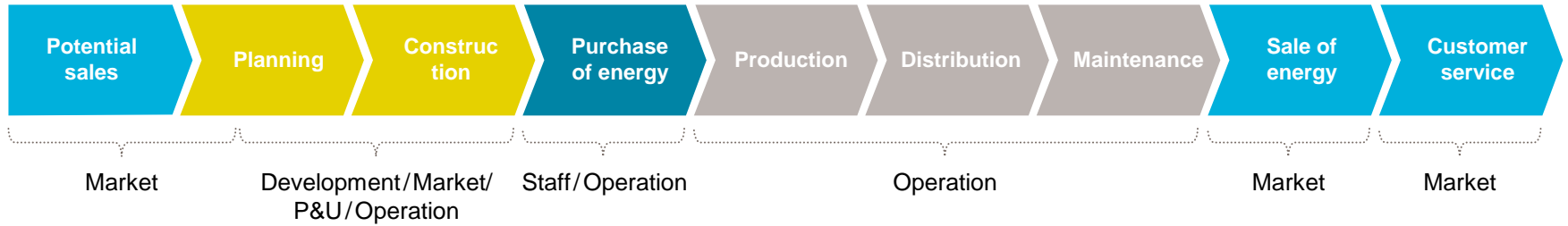


# District heating (and cooling) – key figures

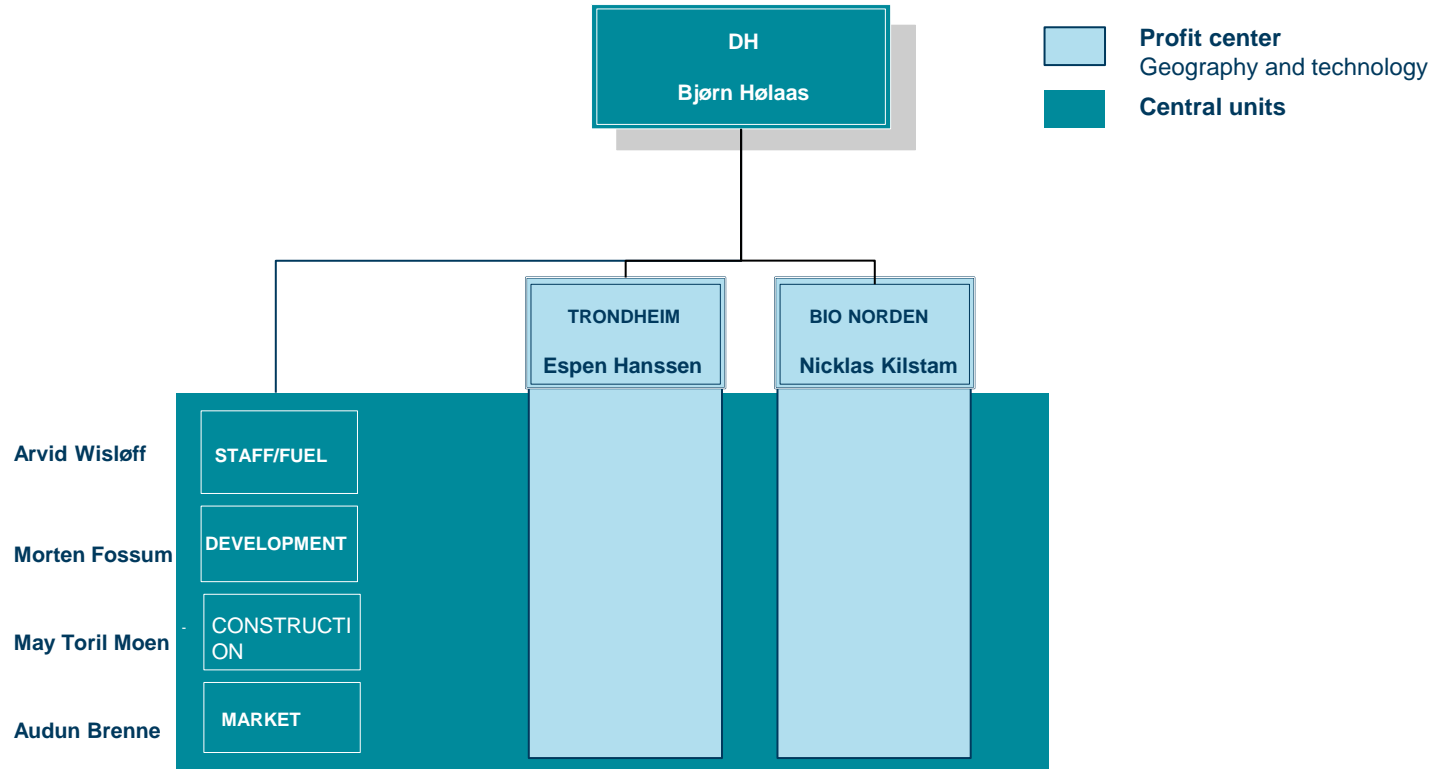


- 1,1 TWh heat/cool production
- 1 GWh el production
- 20 heating plants
- 3 cooling plants (20 GWh)
  
- 4500 customers
- 10 energy sources
- 300 km distribution grid
- 131 employees

# Value chain



# Organization - Statkraft Varme AS (1.9.2014)



# Successful growth

From 0,5 TWh to 1,1 TWh since 2008



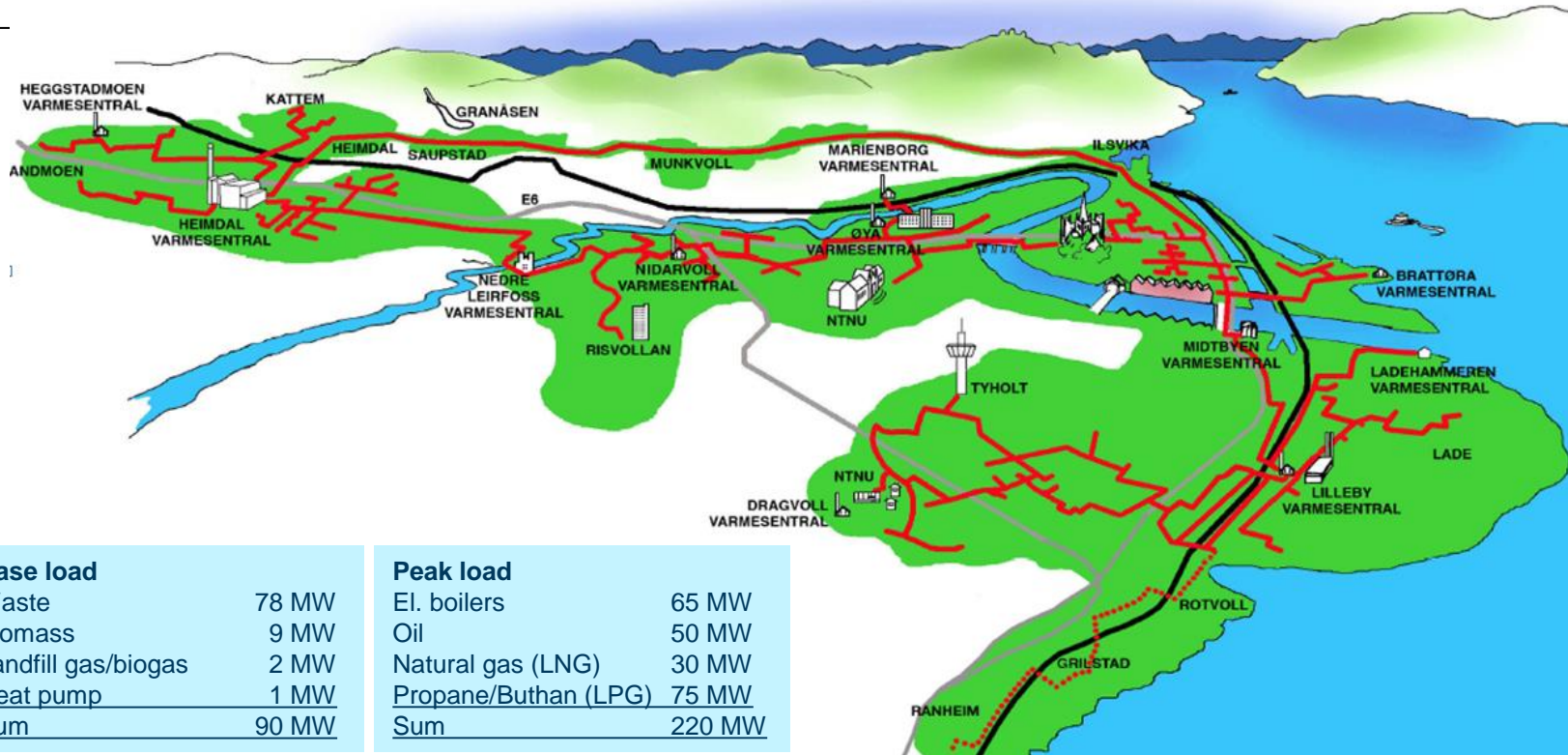
- ▶ Started in Trondheim (1982)
- ▶ M&A
  - Genoa - plants in Sweden (2008)
  - Bio Varme AS (2011) - plants and projects in mid-Norway, Oslo, Akershus, Vestfold og Østfold
- ▶ Greenfield developments (biomass)
  - Trosa and Vagnhærad (2010)
  - Harstad (2010)
  - Ås (2011)
  - Stjørdal (2011)
  - Sandefjord (2012)
  - Kungsbacka (2012)
  - Moss/Rygge (2014)



# DISTRICT HEATING IN TRONDHEIM FROM 1982

600 GWh heat, 12 GWh cooling

10 heating plants, 2 cooling plants, 250 km distribution grid



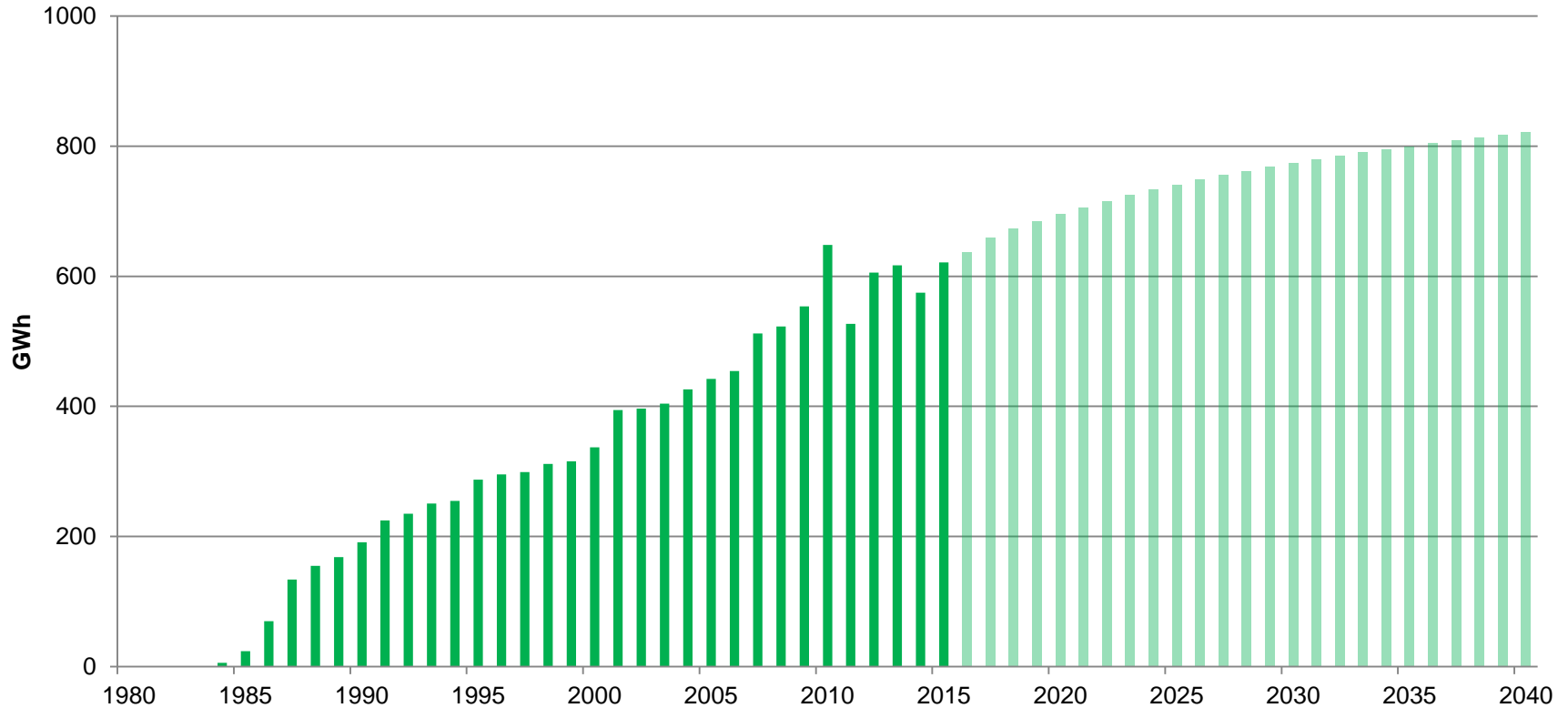
## Base load

Waste	78 MW
Biomass	9 MW
Landfill gas/biogas	2 MW
Heat pump	1 MW
<b>Sum</b>	<b>90 MW</b>

## Peak load

El. boilers	65 MW
Oil	50 MW
Natural gas (LNG)	30 MW
Propane/Buthan (LPG)	75 MW
<b>Sum</b>	<b>220 MW</b>

# Historical growth/forecast - Trondheim

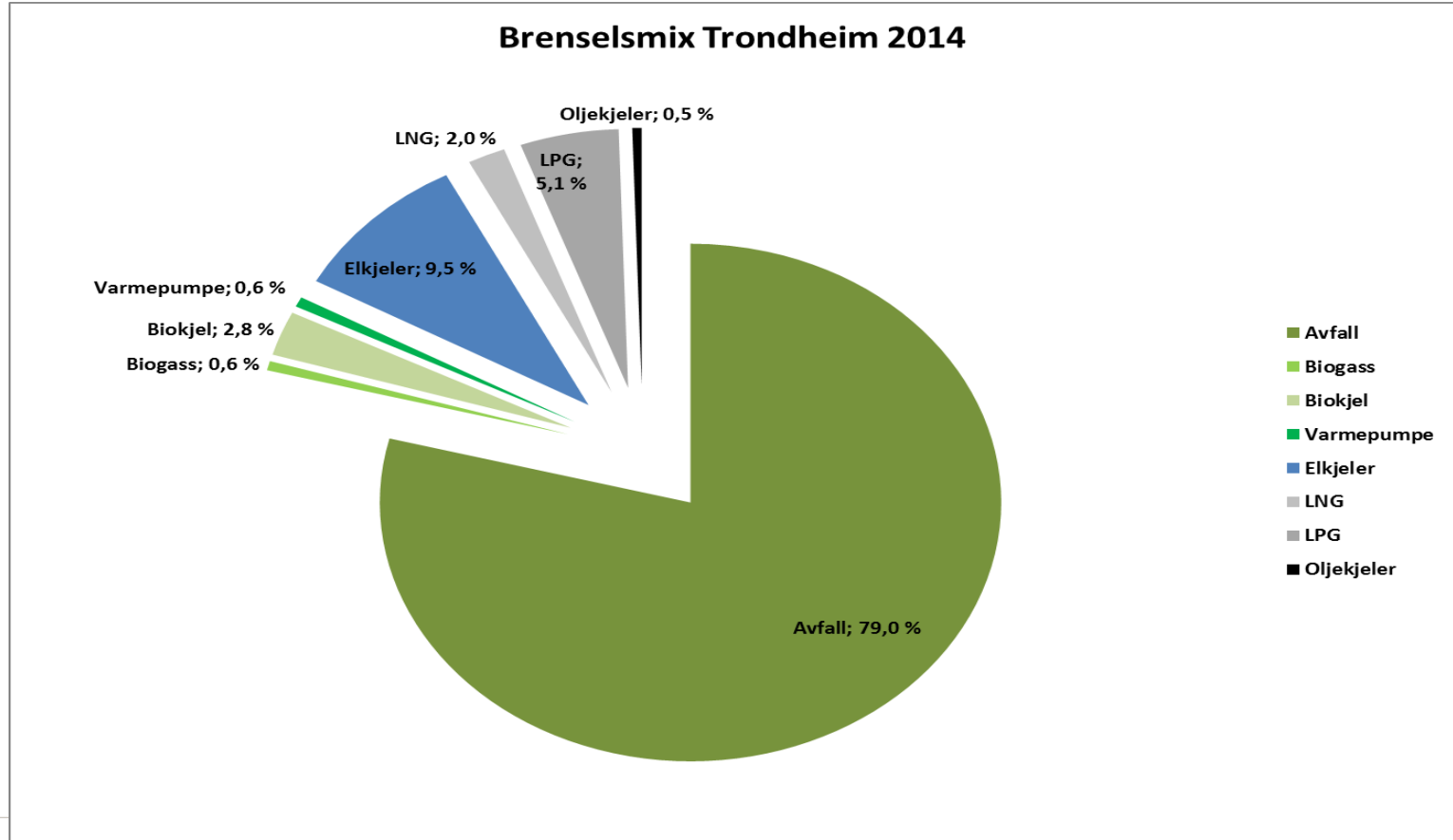


# Waste to Energy plant - Trondheim

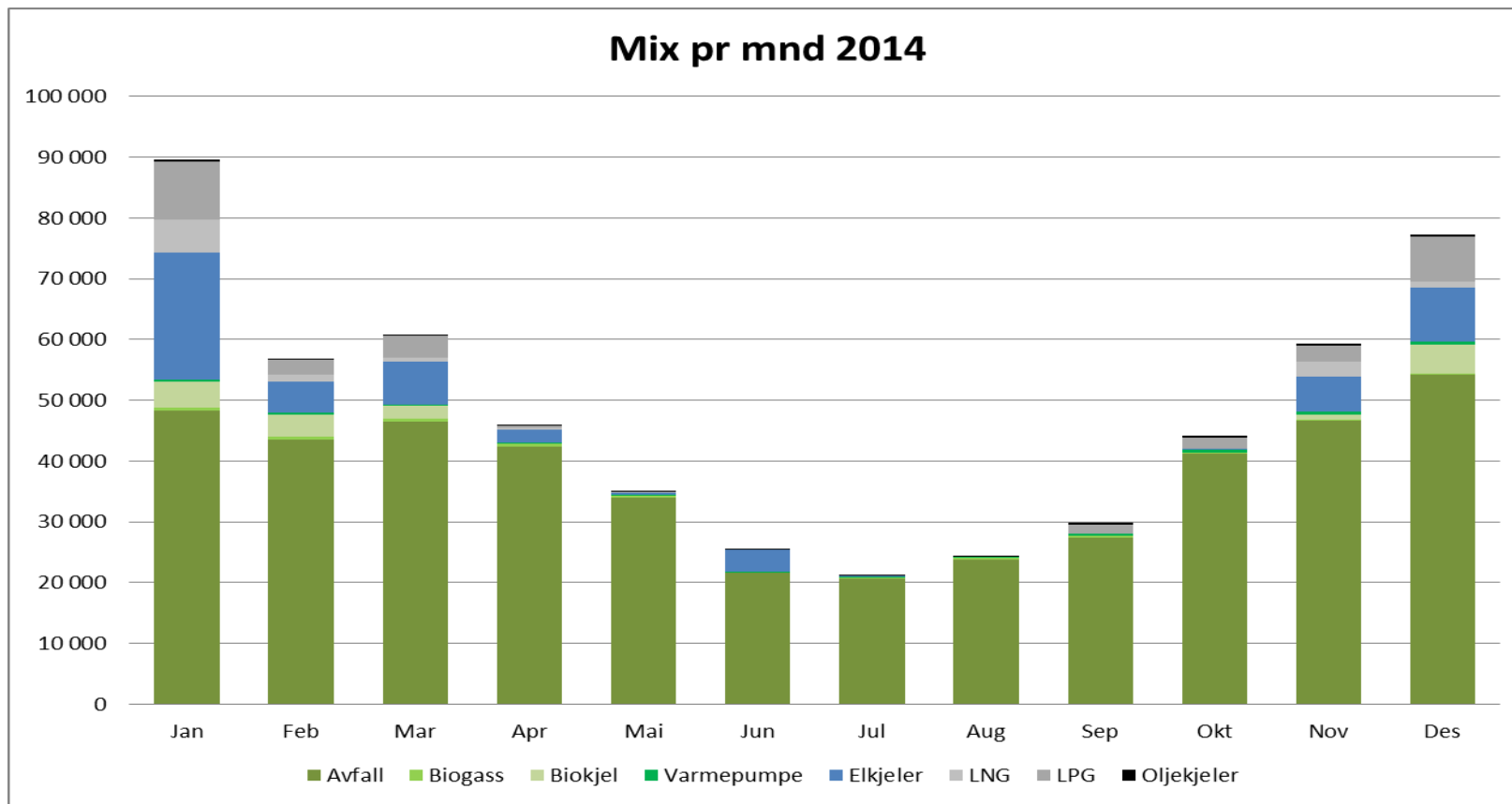


Line 3. (2007) - 40 MW - 15 tons W/hour

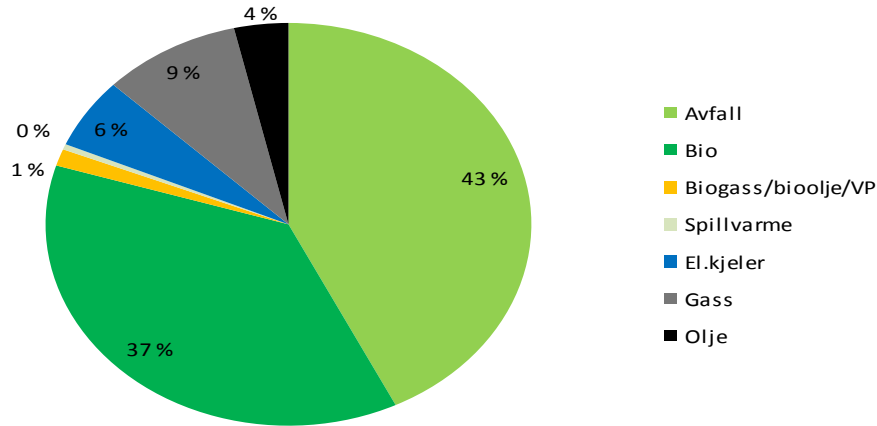
# Energymix in Trondheim DH 2014



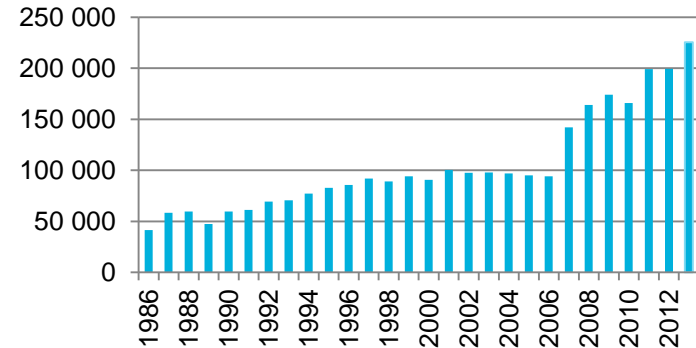
# District heating in Trondheim – 2014 (MWh)



# Fuelmix – plants in Norway and Sweden



Tons of waste/year - Trondheim



Waste and biomass are the most important energy sources. Target is 90% renewable energy.

# Primary DH grid

## - Ranheimsvegen (DN 600, 80 MW)





# DH grid to domestic apartments.

## - Horneberg area, Trondheim 2012





# DH grid – customer unit



- compact
- durable
- efficient

Enduser  
satisfaction is  
very important

# District heating image in Trondheim

(local newspaper, January 31. 2009)



# Greenfield developments (biomass)

- Trosa and Vagnherrad (Sweden 2010)
- Harstad (2010)
- Stjørdal (2011)
- Ås (2011)
- Kungsbacka ( Sweden 2012)
- Sandefjord (2014)
- Moss/Rygge (2015)

Comprehensive construction of biomass plants -  
Approx. 1 billion NOK invested last 5 years

# Wood fuel supply strategy

- Wood fuel quality/cost is essential for effective and profitable operation
- Each plant is designed for a range of wood fuels with variations in water content and particle size



# Biomass qualities – approx volumes/year

	GWh	Tonnage/volume
Briquettes/pellets	70	14 000 tonnes
Wood chips	130	200 000 m <sup>3</sup>



# Example Sandefjord

## Teknisk info

Kapasitet: Bio: <sup>1)</sup>2 x 4 MW Bio  
RGK: <sup>1)</sup>2 MW  
Bioolja: <sup>1)</sup>6 MW  
Olja: <sup>1)</sup>6 + <sup>3)</sup>1,5 + <sup>4)</sup>1 MW  
VP: <sup>2)</sup>2 x 0,35 MW  
Elpanna: <sup>1)</sup>1,2 + <sup>5)</sup>1,5 MW  
**Totalt: 27,9 MW**  
1) Bugården, 2) Kilen Brygge, 3) Kilen mobil, 4) Kamfjord mobil, 5) Prestegårdsveien

Driftsättning: 2015

Bränsletyp: Fuktiga biobränslen



Fjärrvärme	2014	2015 (prognos)	2016	2017
Produktion (GWh)	3,6	20,4		
Leverans (GWh)	3,0	16,9		

# Example Moss

## Teknisk info

Kapacitet:	Bio:	<sup>1</sup> 5 + <sup>5</sup> 0,9 MW
	RGK:	<sup>1</sup> 0,75 MW
	Gas:	<sup>2</sup> 3 + <sup>1</sup> 8 + <sup>1</sup> 8 MW
	Biovärme:	<sup>3</sup> 4 MW (LM)
	VP:	<sup>3</sup> 0,4 + <sup>3</sup> 0,4 + <sup>3</sup> 0,4 + <sup>4</sup> 0,23 MW
	Olja:	<sup>3</sup> 3 + <sup>4</sup> 0,72 + <sup>5</sup> 1 MW
	Elpanna:	<sup>5</sup> 0,135 + <sup>1</sup> 0,1 + <sup>1</sup> 0,1 MW
	Deponigas:	<sup>2</sup> 1,2 MW
	<b>Totalt:</b>	<b>15,6 MW (37,3 MW)</b>

1) Årvollskogen, 2) Mosseporten, 3) Mølla, 4) Fleischer brygge, 5) Jeløya

Driftsättning: 2016

Bränsletyp: Fuktiga biobränslen



Fjärrvärme	2014	2015 (prognos)	2016	2017
Produktion (GWh)	23,2	26,2		
Leverans (GWh)	18,2	22,4		

Adress:



**THANK YOU**



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