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100% renewable DH production



Example - Lund

District Heating in Lund - History

Sweden

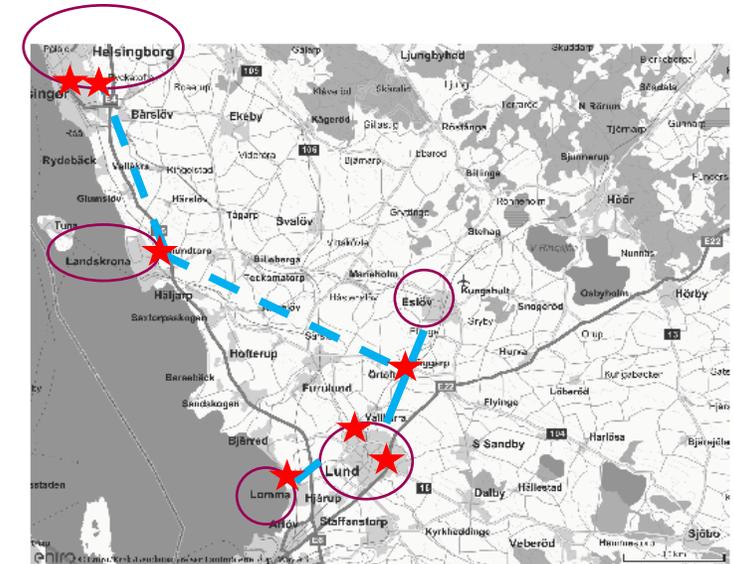
- 10 million people, 425 000 km², 2000 km from north to south

City of Lund

- 120 000 inhabitants, whereof 40 000 university students at one of the worlds top 100 University

District heating in Lund

- The integrated DH system supply 3 cities (Eslöv, Lomma and Lund) in Southern Sweden.
- Lund is in the middle with Eslöv 20 km to the north and Lomma 10 km to the west.
- The system has also an import/export pipeline to two other cities (Landskrona and Helsingborg) located around 25 and 40 km away.



- ★ Major heat production plants
- Connection lines within the integrated system
- - "Import/export" lines to other systems

District Heating in Lund - History

- 1963: First HoB (oil) supplying a new part of the city
- 1966: Expansion goes on, Now 3 HoBs, all on oil, in different parts of the city
- 1970: 13 HoBs on oil
- 1975: A new major localization is established, some small HoBs closed. Total production 730 GWh.
- 1985: Low temperature geothermal with huge heat pumps (47 MW) becomes the base production units
- 1991: A new CHP (natural gas) is built
- 1996: District cooling is introduced and supplies heat to DH net during summer
- 1999: DH system of Lund is connected to Lomma's DH system that already has a CHP on wood chips. The systems are operated as one unit.
- 2006: Lund/Lomma DH system is connected to the DH system in Eslöv

Major decisions on environmental impact

2010

- Background:
 - Pmax 300 MW
 - Capacity 454 MW whereof 344 MW fossil based
 - Production around 950 GWh, whereof 350 GWh fossil based
- Company board decisions:
 - Environmental goal is set to 0% fossil fuels for planned production (ok to use fossil fuels in emergency situations)
 - To build another wood chips based CHP on 55 MW_{heat} from boiler + 15 MW_{heat} from exhaust gas condensor

2018

- Political goal: 0% fossil production including emergency situations
- Decided to:
 - Close natural gas fired CHP
 - Convert Natural gas fired HoBs to Bio gas
 - Convert fossil oil based HoBs to Bio oil

Capacity development

2014

- New CHP taken into operation
- Capacity: 524 MW, whereof 344 MW fossil based (66%)
- Environmental goal 0% fossil fuels for planned production not yet reached

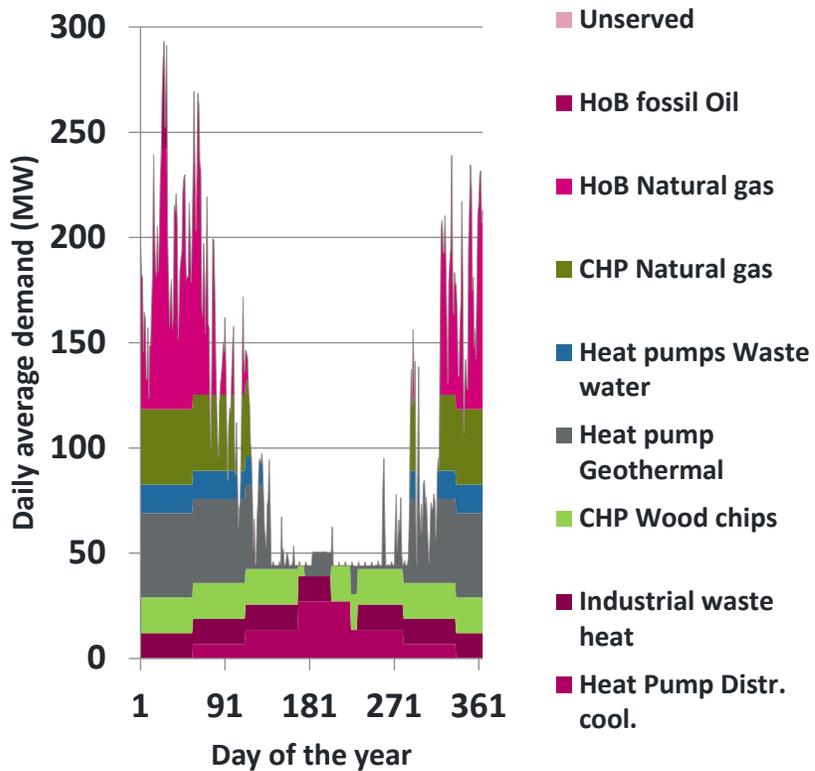
2019

- Natural gas fired CHP closed, Natural gas fired HoBs converted to Bio gas, Oil fired Hobs converted to Bio oil
- Production: 913 GWh, Whereof 0 GWh fossil based

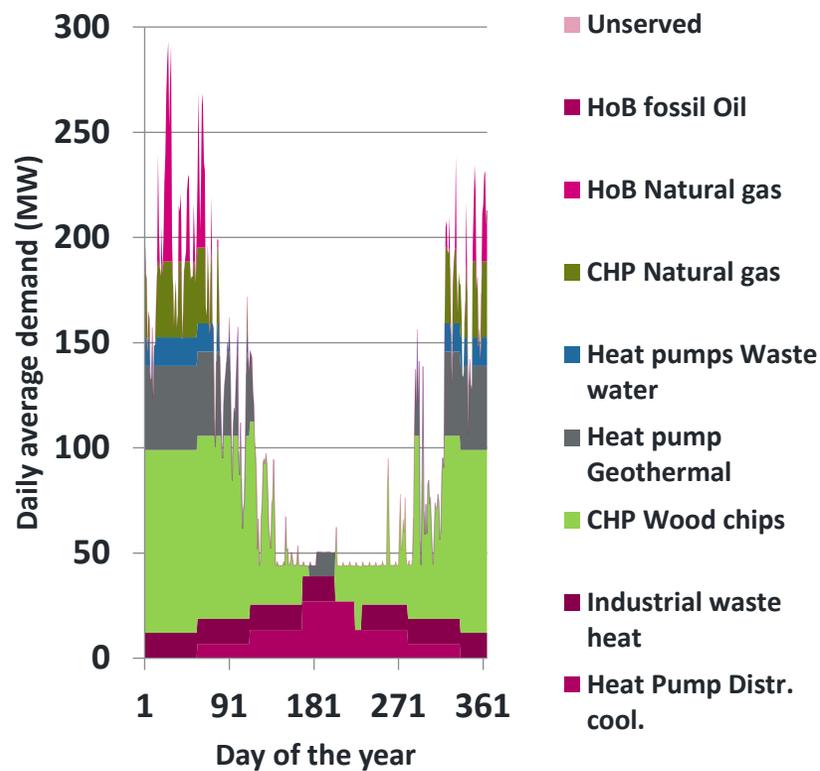
Installed capacities (MW)						
Unit	2013		2014		2019	
Heat Pump Distr. cool.	27	6%	27	5%	27	7%
Industrial waste heat	12	3%	12	2%	12	3%
CHP Wood chips	17	4%	87	17%	87	21%
Heat pump Geothermal	40	9%	40	8%	40	10%
Heat pumps Waste water	14	3%	14	3%	14	3%
CHP Natural gas	36	8%	36	7%	0	0%
HoB Natural gas	124	27%	124	24%		
HoB Bio gas					124	30%
HoB Fossil oil	185	41%	185	35%		
HoB Bio Oil					110	27%
Total	454		524		413	
Total fossil fuels	344	76%	344	66%	0	0%

Heat production in different type of units

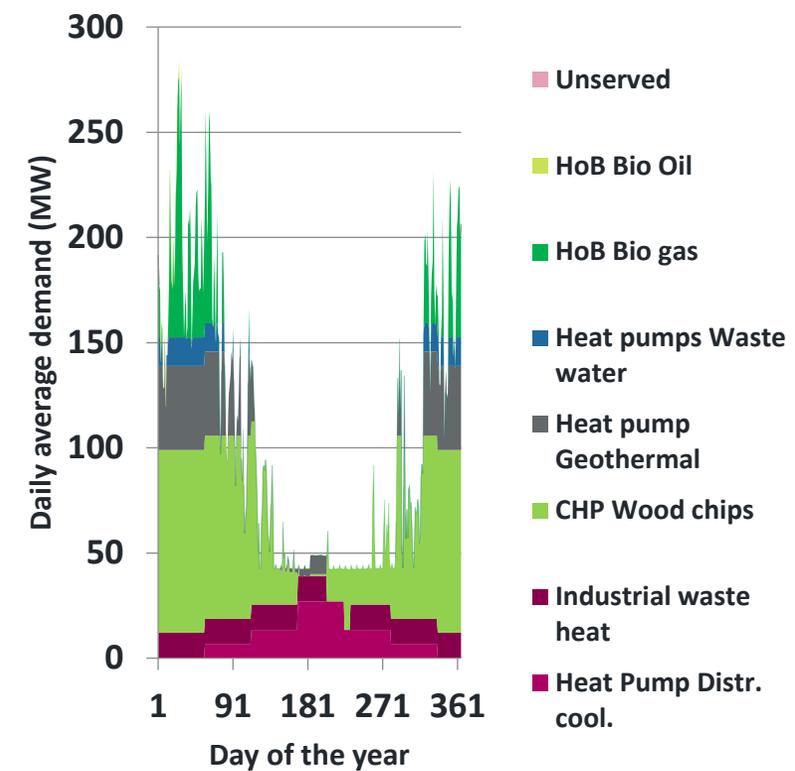
Annual heat production 2013



Annual heat production 2014



Annual heat production 2019



Production development

2014

- New CHP taken into operation
- Total production: 943 GWh, whereof 113 GWh fossil based (12%)
- Environmental goal 0% fossil fuels for planned production not yet reached

2019

- Natural gas fired CHP closed, Natural gas fired HoBs converted to Bio gas, Oil fired Hobs converted to Bio oil
- Electricity to Heat pumps comes from their own 2 CHPs and 4 wind power plants
- Production: 913 GWh, Whereof 0 GWh fossil based

Annual production (GWh)						
Unit	2013		2014		2019	
Heat Pump Distr. cool.	90	10%	90	10%	90	10%
Industrial waste heat	96	10%	96	10%	96	11%
CHP Wood chips	134	14%	464	49%	456	50%
Heat pump Geothermal	216	23%	143	15%	139	15%
Heat pumps Waste water	57	6%	36	4%	35	4%
CHP Natural gas	134	14%	70	7%	0	0%
HoB Natural gas	209	22%	43,7	5%		
HoB Bio gas					98	11%
HoB Fossil oil	6	1%	0	0%		
HoB Bio Oil					0	0%
Total	943		943		913	
Total fossil fuels	350	37%	113	12%	0	0%



... FOR BETTER RESULTS.