

Round table

Assessment of biomass potential for the Kyrgyz Republic
Bishkek, 17 July 2024

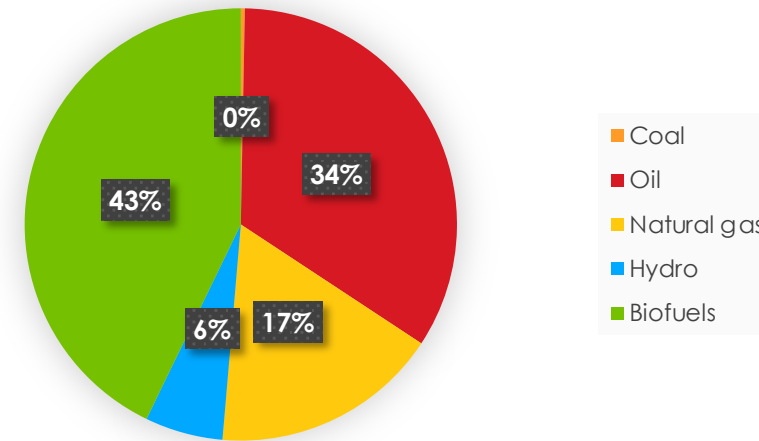
Using of biomass for electricity and heat production – Latvian experience

Agris Kamenders ,
Energy Expert, SECCA

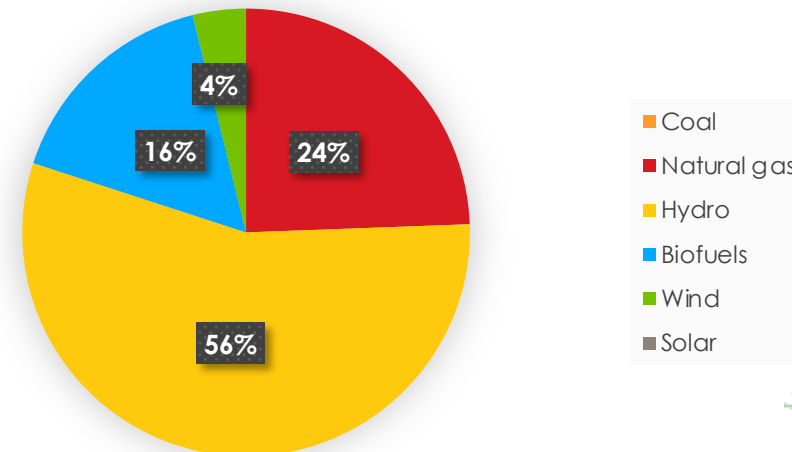
Primary energy consumption in Latvia

- In Latvia, heat energy is produced in boiler houses and cogeneration plants, simultaneously generating electricity
- Over the past 10 years, there has been a significant shift in the distribution between heat energy produced in boiler houses and cogeneration plants
- In 2007, 56.0% of the total heat energy was produced in cogeneration plants and 44.0% in boiler houses. By 2017, the share of heat energy produced in cogeneration plants had increased to 75.7%.

Total energy supply, Latvia, 2022



Electricity generation mix, Latvia, 2022



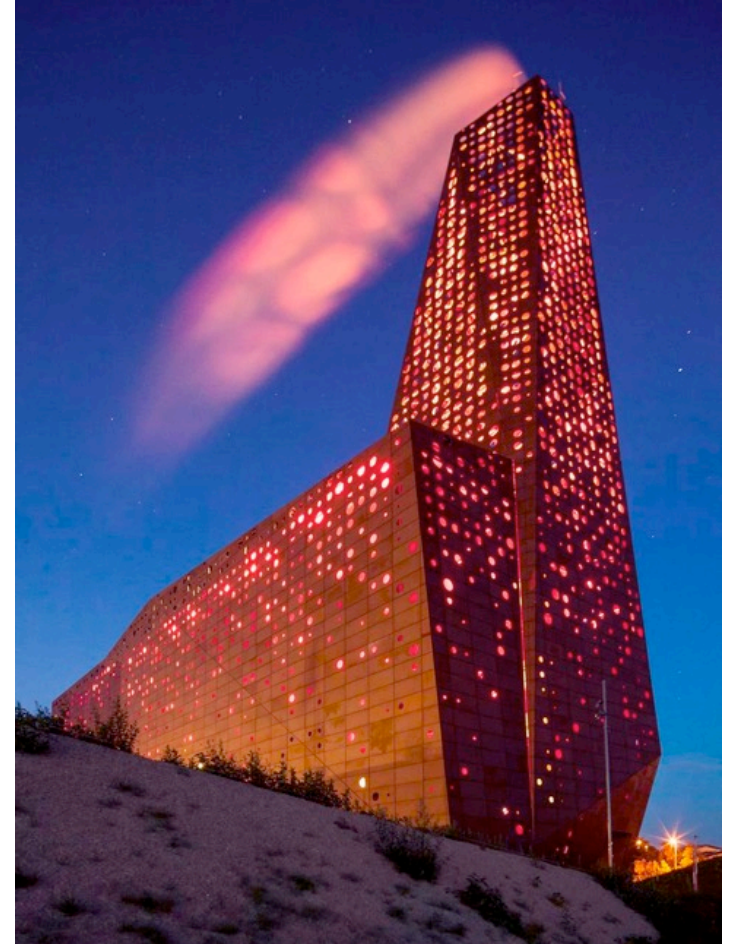
District heating (DH) in Latvia

- Number of boiler houses - 663
- Number of cogeneration plants – 132
- Annual sales - 7.46 TWh
- Annual turnover - EUR 360 million
- Tariffs regulated > 5000 MWh/year



DH coverage in EU countries

Iceland 95%
Latvia 65%
Denmark 60%
Estonia 52%
Poland 52%
Sweden 50%
Czech Republic 49%
Finland 49%
Slovakia 40%
Hungary 16%
Austria 12.5%
Germany 12%
Netherlands 3%
Great Britain 1%



District heating (DH) in Latvia

City	Annual sales(GWh)	Per cent %
LATVIJA	6 944	
Rīga	3 484	50%
Daugavpils	467	7%
Jelgava	213	3%
Jēkabpils	89	1%
Jūrmala	164	2%
Liepāja	288	4%
Rēzekne	163	2%
Valmiera	106	2%
Ventspils	217	3%



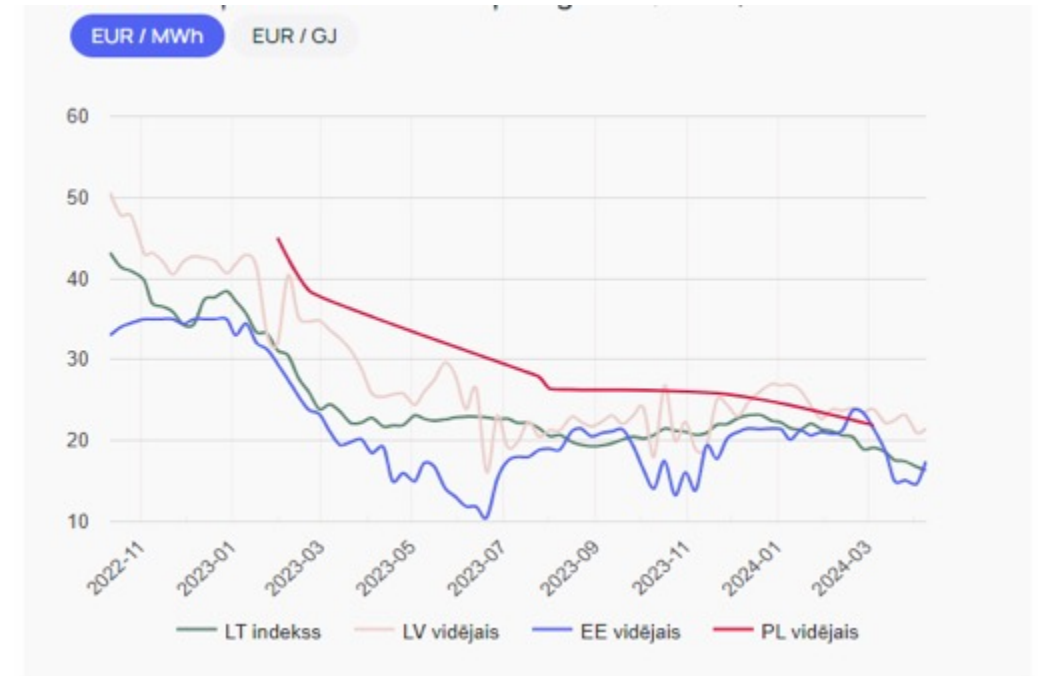
DH percentage in cities - 75%

Energy resource prices

Natural gas prices [EUR/MWh]



Wood chips prices [EUR/MWh]



Biomass combustion technologies

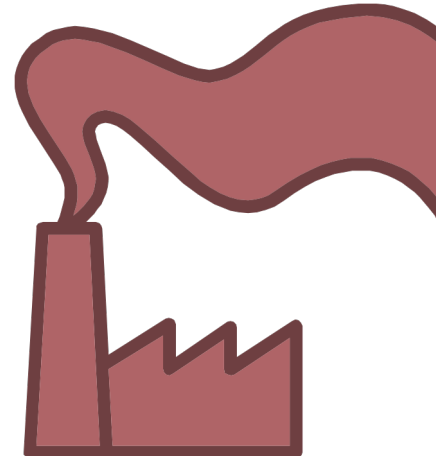
Domestic appliances:

- stoves;
- fireplaces;
- boilers;



Industrial and district heat appliances:

- pulverised burners;
- fluidized bed;
- cyclone chambers;
- bed combustion;
- etc.



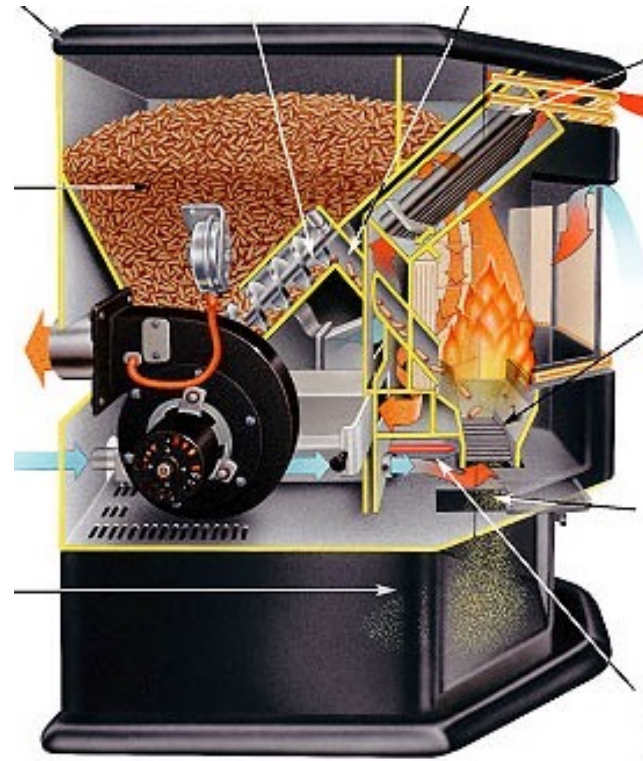
Wood log and briquette stoves

- + Simple and cheap technology;
- + Cheap fuel;
- + Possible integration of water boiler;
- Low comfort, short working time;
- Low efficiency, high emissions



Pellet stoves

Based on wood stove, designed for installation in living area
+ Fully automatic operation



Pellet boilers

- + High efficiency, low emissions;
- + Automatic/semi-automatic operation, variable load;
- + Fuel storage for long period;
- + Big choice of technologies;
- Relatively expensive technology.



Solar and pellet combisystem

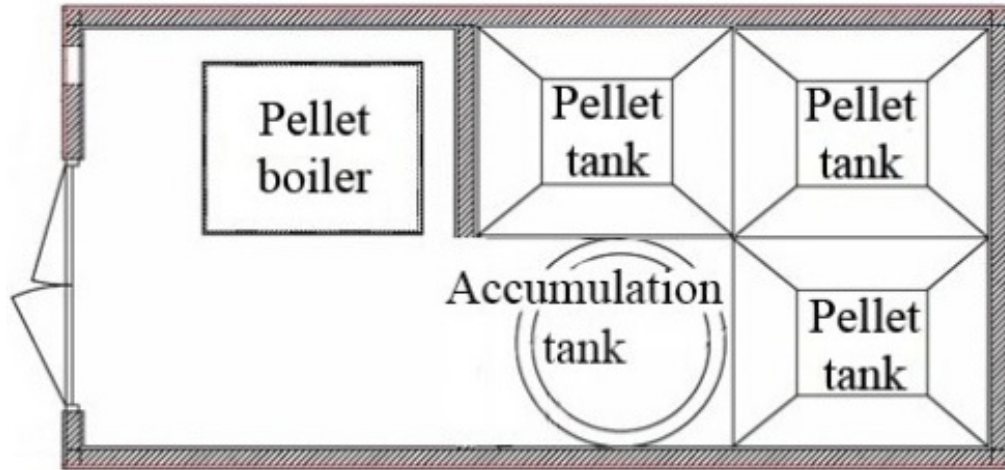
- System designed for multifamily building
- Compact and modular design. High level of comfort
- Solar thermal and pellet boilers in one system



Before and after complex after complex renovation and RES integration



Modular system concept



Funded by
the European Union



Modernization of Existing Boiler Houses

Salaspils Siltums:

- Serves 85% of town's 18 000 residents
- Installed 1720 solar collectors (12 000 KWh/year)
- Complemented by 8000 m³ high storage tank and 3MW wood chip boiler
- Increased renewable energy share by ~35%

Benefits:

- Reduced Reliance on Natural Gas
- 90% Energy for Heating from Renewables
- 20% of Thermal Energy from Solar
- Potential 5% Tariff Reduction for Residents

Project Significance:

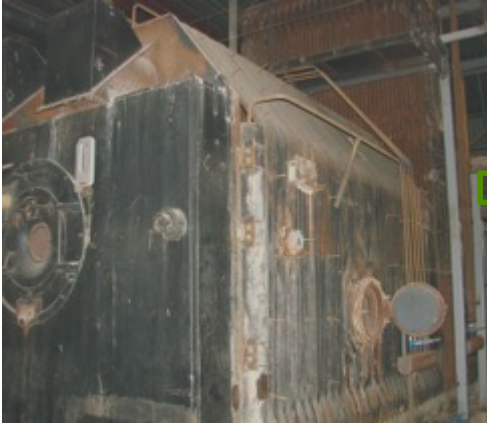
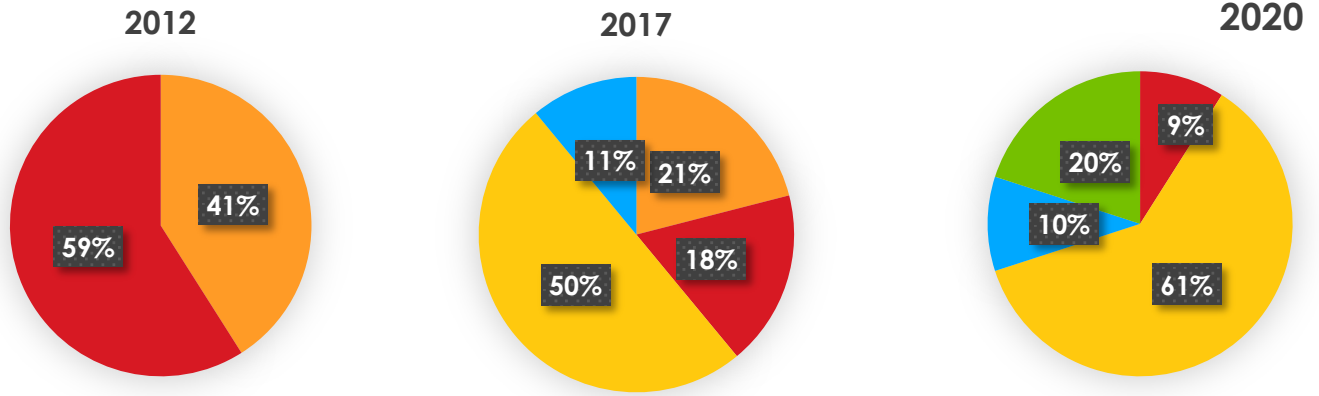
Investment: EUR 7.08 million (EU Cohesion Fund: EUR 2.73 million; SEB loan: EUR 2.8 million)



Modernization of Existing Boiler Houses



2019
1,720 solar collector field and storage tank and 3 MW wood chips boiler



2010
Outdated municipal DH system



2012
new 7 MW wood chips boiler and new gas boilers



2015
flue gas condenser

Biomass Cogeneration Plant in Latvia

Energy Source: Utilizes local renewable energy resources, primarily energy wood chips

The station's **electrical capacity is 23 MW, while its thermal capacity is 45 MW**

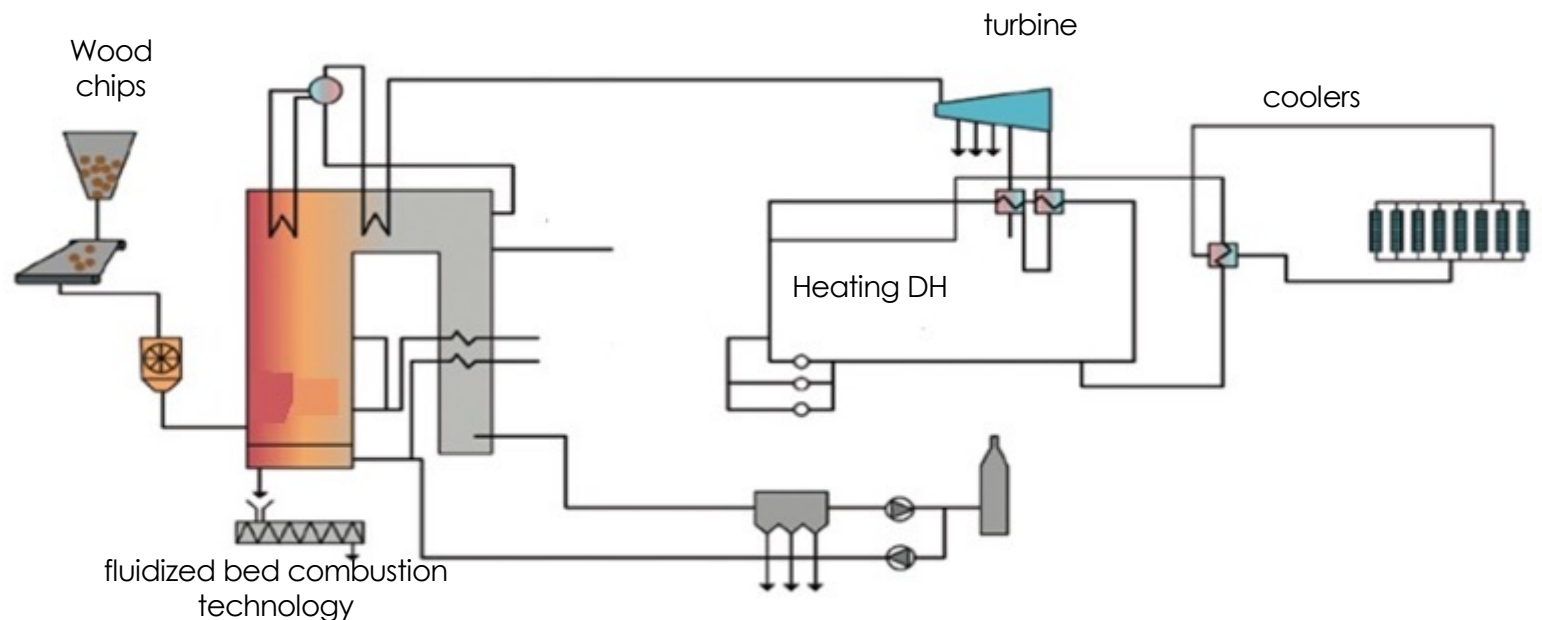
Efficiency and Reliability: Enhanced the efficiency and reliability of the city's district heating system for customers

CO2 Emissions: Reduced CO2 emissions from heat production in the city by 90% compared to 2010

Production:

- **Heat Energy:** Produces approximately 230 GWh of heat energy annually, which is supplied to Jelgava's district heating network

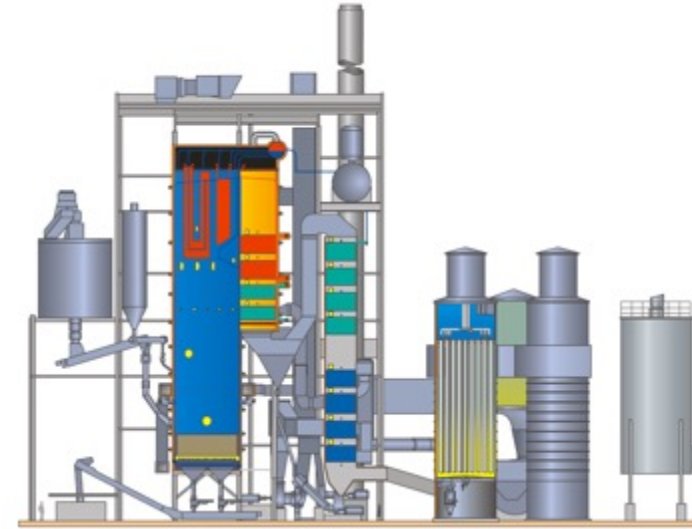
Electricity: Electricity generated is sold on the Nord Pool exchange



Biomass Cogeneration Plant in Latvia



Fuel reception area



Technology:

- **Combustion Technology:** Fluidized bed combustion with a bubbling sand layer
- **Boiler Model:** HYBEX fluidized bed steam boiler
- **Steam Production:** 26 kg/s at 117 bar, 527°C from feed water at 180°C

Capacity - Nominal Input Power: 77 MW

- **Thermal Capacity:** 45 MW
- **Electrical Capacity:** 23 MW

Wood chips CHP in Riga

Overview:

- **Capital and Largest City:** Riga, Latvia
- **District Heating Operator:** RIGAS SILTUMS

Initiative: Construction of a wood chips CHP plant

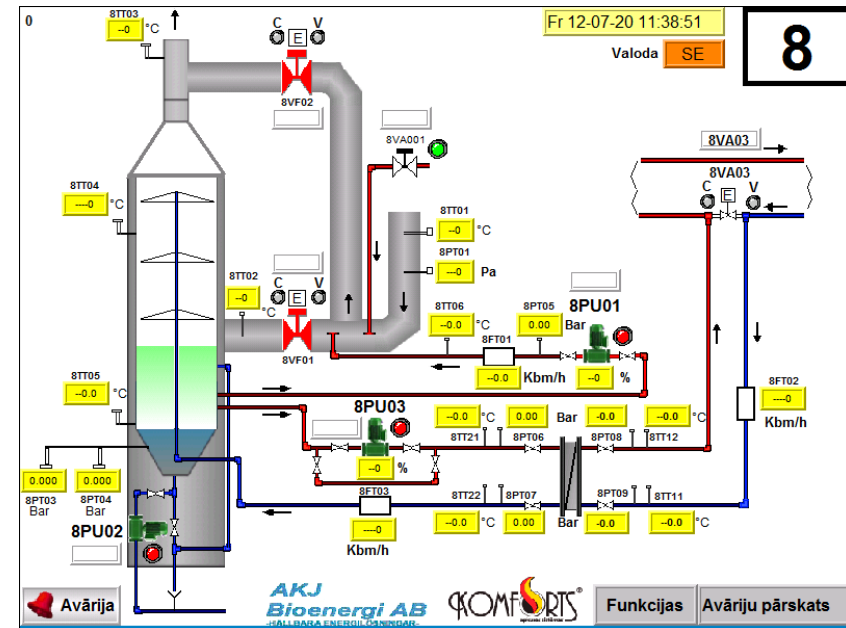
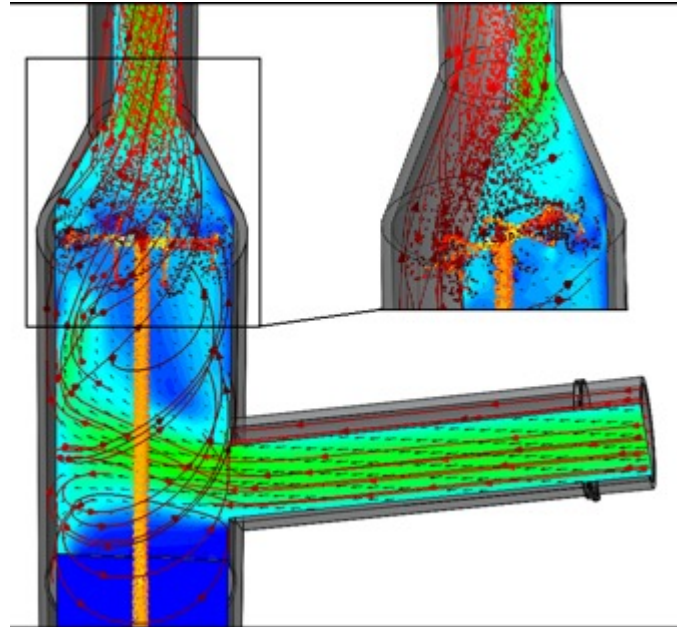
- **Output:** 4 MWeI and 22 MWth
- **Goal:** Enhance economic viability and sustainability of the fuel supply

Location of the plant	Tiraines iela 5a, Riga
Cogeneration technology	steam turbine
Electrical power/Thermal power	4 MWeI and 22 MWth
Kind of fuel	Wood fuel (mainly woodchips)
Primary energy savings per year	31,2 %
CO2 savings	23.778 tons per year
Operating hours	5250 hours /year
Year of installation/start of operation	Finished in 2013
Investment	Total investments €16m (€5.6m from EU Cohesion fund)



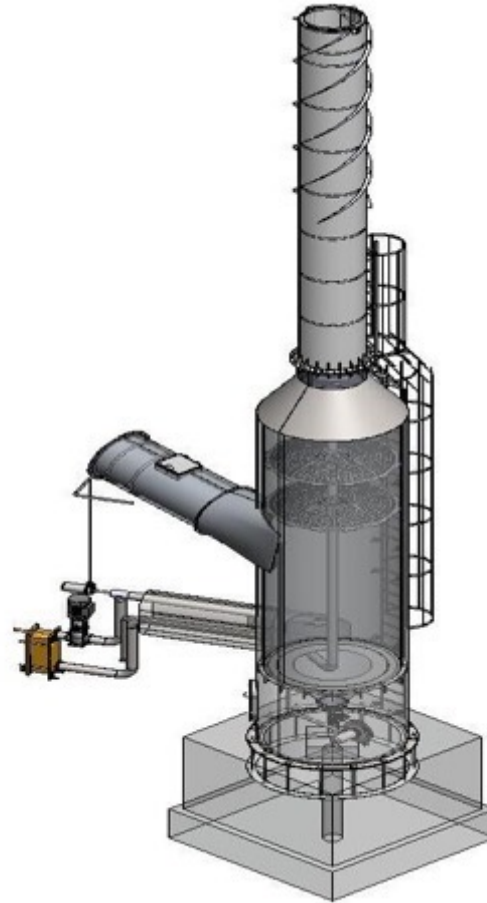
Flue gas condensation

- Direct contact flue gas condenser designed for high capacity wood chip boilers
- Simple and reliable technology. High efficiency on heat recovery and emission reduction



Condensation in big scale plants

- + Efficiency increase 10-30%
- + Dust emissions - 90%



Flue gas condenser for biomass boilers

Recent Upgrades:

- **Completion:** Last modernization finished in late 2011
- **Fuel Source:** All boilers now fully operate on wood chips

Installation of Fuel Gas Condensers:

- Increase efficiency by utilizing thermal energy from outgoing flue gases
- Heat Recovery up to 30% of heat from outgoing flue gases can be recovered

The total investment costs of the reconstruction project were 3.7 million EUR with a co-financing rate of 45.5%. The costs of the flue gas condenser system production and installation were around 420 000 EUR



Fuel switch project from - container type boiler houses

