BIOFIT

Bioenergy Retrofits for Europe's Industry

HORIZON 2020
BIOFIT PROJECT

BEST PRACTICE
FACTSHEET

RETROFIT OF VILNIUS CHP PLANT - 2 (LITHUANIA)

KEY INFORMATION

Leaseholder of plant:	UAB "Vilniaus Energija" Veolia Lithuania
Lease period:	2002-2017 (15 years)
Plant name:	Vilnius CHP plant 2
Location:	Vilnius, Lithuania
Industry sector:	Combined Heat and Power
Main product of plant:	Electricity and heat
Retrofit measure:	one steam boiler (60 MW) changed from gas to biomass combustion
Beginning of retrofit:	2004
Start-up after retrofit:	2006
Capital Expenditure:	11.7 million EUR

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TECHNICAL DATA

	INITIAL STATE	AFTER RETROFIT
Electricity production capacity [MW]	**24**	**29**
Heat production capacity [MW]	**929**	**939**
Main fuel	**Natural gas (used in 4 boilers)**	**Natural gas (3 boilers) and woodchips (1 boiler)**
Estimated annual GHG emissions [tCO_2eq]	**260,000**	**317,500**
Estimated annual specific GHG emissions [$gCO_2eq/kWh_{(thermal + electric)}$]	**210.6**	**156.1**

DISCLAIMER: „The information provided in this factsheet refers only to the period from 2002 to 29/03/2017 during which JSC „Vilniaus energija", a subisdiary of the Veolia Group, operated and upgraded the Vilnius district heating system under the Lease Agreement with JSC „Vilniaus šilumos tinklai" (JSC „Vilnius District Heating Company") and the Vilnius City Municipality".

INITIAL STATE

The construction of the district heat network in Vilnius started in the 1950s. The overall heat production capacity is 2300 MW, corresponding to an annual heat production of 2600 GWh (in 2015). The main sources of heat generation are plants No2 (having 4 boilers fired with natural gas) and No3 and boiler house RK-8. These were old Soviet plants fired by natural gas and heavy oil, which had to be imported from abroad. Lithuania's overall dependence on imported electricity and fuel created high costs for energy supply in the whole country.

"It is our duty to manage the entire district heating sector and take it to the Scandinavian level."

RETROFIT

MOTIVATION AND DECISION

In order to reduce dependence on foreign energy sources, there are plans to use Lithuanian biomass to provide the bulk of central heating (up to 70%) in Lithuania by 2021. In this framework, the switch from natural gas to local biomass at Vilnius CHP plant 2 was mainly motivated by the expected cost savings and by the age of existing facilities. In 2002 the Vilnius district heating network was leased for 15 years to the company Veolia, which took care of the retrofit.

PLANNING AND EXECUTION

At the Vilnius CHP Plant-2, one old 60 MW Russian-made steam boiler was retrofitted to switch from natural gas combustion to the combustion of local biomass (woodchips). A new fuel handling system was built and the boiler's combustion system was changed to bubbling fluidized bed. Dry electrostatic precipitators were added to reduce particulate matter emissions. In 2010, a 19 MW flue gas condenser and additional wet electrostatic precipitators for deeper flue gas cleaning were installed.

In addition to the retrofit of the CHP plant, the whole district heating network was retrofitted to reduce heat losses and increase heat distribution efficiency. Pipes were repaired where necessary, new customers were connected to the network, individual building substations were installed and new information technologies were implemented to continuously control the whole network on-line.

1950s
CONSTRUCTION OF DISTRICT HEATING NETWORK IN VILNIUS

2004
AGREEMENT ON RETROFIT

2005
START OF RETROFIT

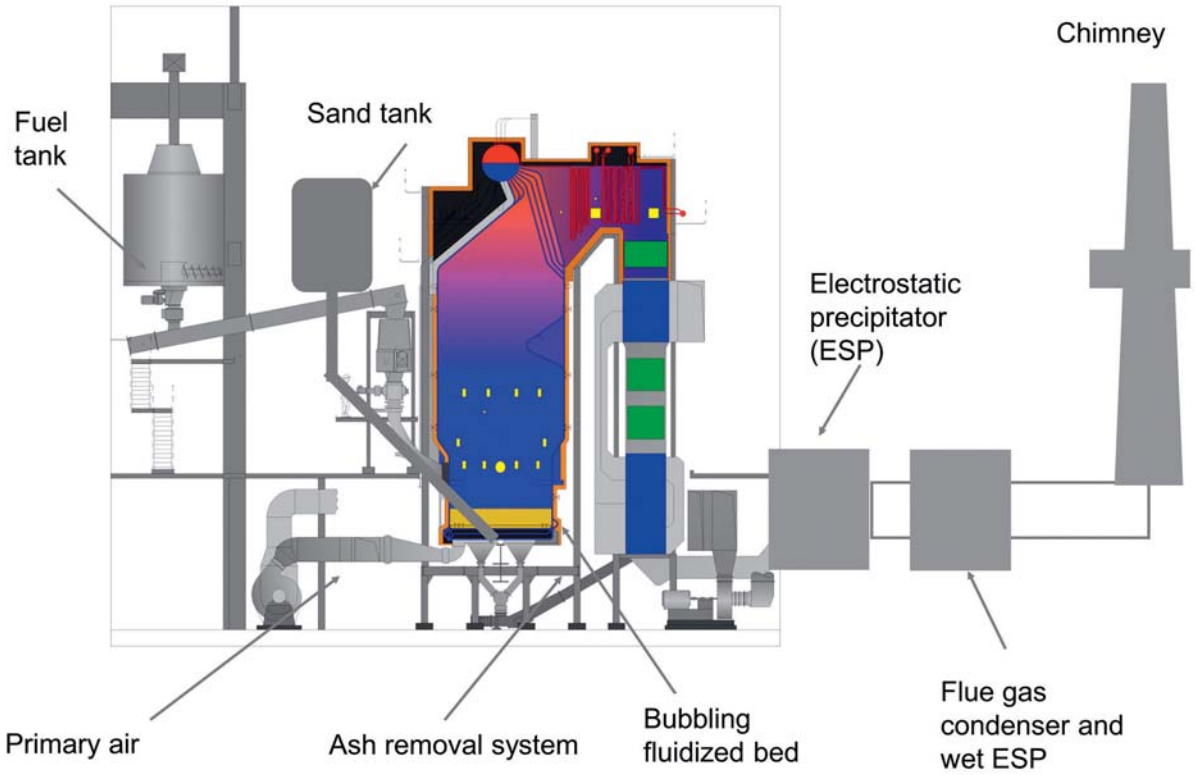
2006
BOILER STARTS OPERATION BASED ON BIOMASS

CURRENT STATE

At the end of the retrofit (2006) the biomass boiler at Vilnius CHP Plant-2 was the first biomass-retrofitted boiler of such a capacity in the Baltic states. Today the boiler is operated with woodchips and it annually provides 394 GWh of heat and 119 GWh of electricity (data of 2016).

Woodchips delivered to the plant are stored in the yard. From here they are conveyed to the fuel tank and successively to the boiler, whose average fuel supply rate is 23 t/h. The boiler, certified with an efficiency of 85%, is connected to a turbine having an electric capactiy of 16.8 MWel and a heat output of 43 MWth. In 2010 a 19 MW flue gas condenser was installed, which allows an annual heat recovery of 110 GWh (data of 2016) from the flue gases. The flue gas line is equipped with two electrostatic precipitators (one dry and one wet) for the reduction of particulate matter emissions and with a module for the treatment of condensate water.

Boiler after reconstruction




LAAIF

KRIŠTOLINIO KAMINO
NOMINACIJA

UAB „VILNIAUS ENERGIJA"

SPECIALI KOMISIJOS PADĖKA UŽ ABSOLIUTŲ TARŠOS SUMAŽINIMĄ, ĮVERTINUS GAMYBOS POKYČIUS 2005-2007 METAIS

IMPACT

Thanks to the retrofit of Vilnius CHP Plant-2, the annual gas consumption of Vilniaus Energija has been reduced by 8% and CO_2 emissions have been cut by 105,500 tonnes/year. In 2008 UAB "Vilniaus energija" got the „Crystal chimney nomination-honorable mention" for the absolute pollution reduction.

"We are proud of the improvements we have made to the district heating system during the 15 years of the lease period."

SOURCES

"Renewable energy in district heating and cooling case studies", available at https://www.irena.org/- /media/Files/IRENA/Agency/Publication/2017/Mar/IRENA_REmap_DHC_Case_Studies_2017.pdf?la=en&hash=963DB0F2449088164CAB724EC4CA8BAEB21D1141

Valentinas R., UAB Vilniaus Energija, Biomass unit in Vilnius CHP, Impact Study of the EU Renewable Energy, Directive Study Visit Lithuania, Vilnius, 15 May 2014

http://www.afconsult.com/en/do-business/references/international/renewable-energy/vilnius-chp-2-plant/

http://www.vkj.lt/apie-mus/apie-jegaine/19

http://www.esinvesticijos.lt/lt/naujienos/perdirbti-netinkamoms-atliekoms-deginti-skirta-virs-48-milijonu-

http://www.baltic-course.com/eng/good_for_business/?doc=137631

MORE INFORMATION ABOUT VILNIUS CHP PLANT-2

Website http://www.vilniausenergija.lt/en
http://www.vilniausenergija.lt

Contact info@vilniausenergija.lt

Vilniaus energija

THE BIOFIT PROJECT

BIOFIT
Bioenergy Retrofits for Europe's Industry

This best practice factsheet was prepared within the BioFIT project.
The project aims to facilitate the introduction of bioenergy retrofitting in Europe's industry.
Target industries are

- First-generation biofuels
- Pulp and paper
- Fossil refineries
- Fossil firing power
- Combined Heat and Power (CHP)

Success factors of the best practice case studies are used as basis to develop **10 concrete bioenergy retrofitting proposals** (2 per industry sector) and to facilitate the two-way dialogue with industry in dedicated working groups. The overall target is to integrate bioenergy and biofuels in existing industrial installations and encourage others to follow the existing examples.

Project website https://www.biofit-h2020.eu Contact reumerman@btgworld.com

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