BIOFIT

Bioenergy Retrofits for Europe's Industry

HORIZON 2020
BIOFIT PROJECT

MOABIT CHP PLANT - 2 (GERMANY)

BEST PRACTICE
FACTSHEET

KEY INFORMATION

Plant owner:	Vattenfall
Plant name:	Moabit CHP
Location:	Berlin, Germany
Industry sector:	Combined Heat and Power
Main product of plant:	Electricity and heat
Retrofit measure:	change from coal combustion to biomass and coal co-firing
Beginning of retrofit:	2011
Start-up after retrofit:	2013
Capital Expenditure:	Not available

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TECHNICAL DATA

	INITIAL STATE	AFTER RETROFIT
Electricity production capacity [MW]	**Not available**	**140**
Heat production capacity [MW]	**240**	**240**
Main fuel	**Coal**	**Coal and biomass**
Estimated annual GHG emissions [tCO_2eq/y]	**Not available**	**Not available**
Estimated annual specific GHG emissions [$tCO_2eq/(kWh_{(thermal+electric)}$]	**Not available**	**Not available**

INITIAL STATE

The Moabit CHP plant started operation in 1900. Between 1987 and 1989, large parts of the plant were retrofitted. In 1990, a new block with a 240MWth circulating fluidized bed (CFB) combustion system was built. The CFB boiler was originally designed for the co-combustion of bituminous coal and lignite (maximum 40%).

"Since 2013, the Moabit CHP plant has again been setting new standards with its use of biomass"

RETROFIT

MOTIVATION AND DECISION

In October 2009, a Climate protection agreement was signed between the city state of Berlin and Vattenfall, owner of the Moabit CHP plant. Subsequently, Vattenfall started to elaborate a retrofit project, in order to include biomass combustion at Moabit. The already existing CFB boiler allowed to introduce biomass directly into the combustion process (co-combustion of biomass and coal) without complex treatment processes and with reasonable effort in terms of technology. Moreover, the boiler had already been tested for coal and biomass co-firing with up to 10% biomass. The objective of the retrofit was to increase the biomass share up to 40%. In April 2011 a second agreement was signed, which concerned the sustainable procurement of wood, and in May 2011 the detailed planning of the retrofit project was finalized.

PLANNING AND EXECUTION

The main focus of the retrofit was the construction of the infrastructure for unloading, transport, storage and dosing of biomass, including an intermediate storage of 9000 m3. Moreover the boiler's heat exchanger system was tied-in into the water steam cycle and new measures were introduced for fire protection, both in the machine hall and along the biomass supply system. The retrofit started in 2012 and was completed in 2013. Afterwards the plant started operation based on coal and biomass co-combustion.

1900 CONSTRUCTION OF THE MOABIT CHP PLANT

1990 INSTALLATION OF NEW CFB BOILER

2011 AGREEMENT ON RETROFIT

2012 START OF RETROFIT

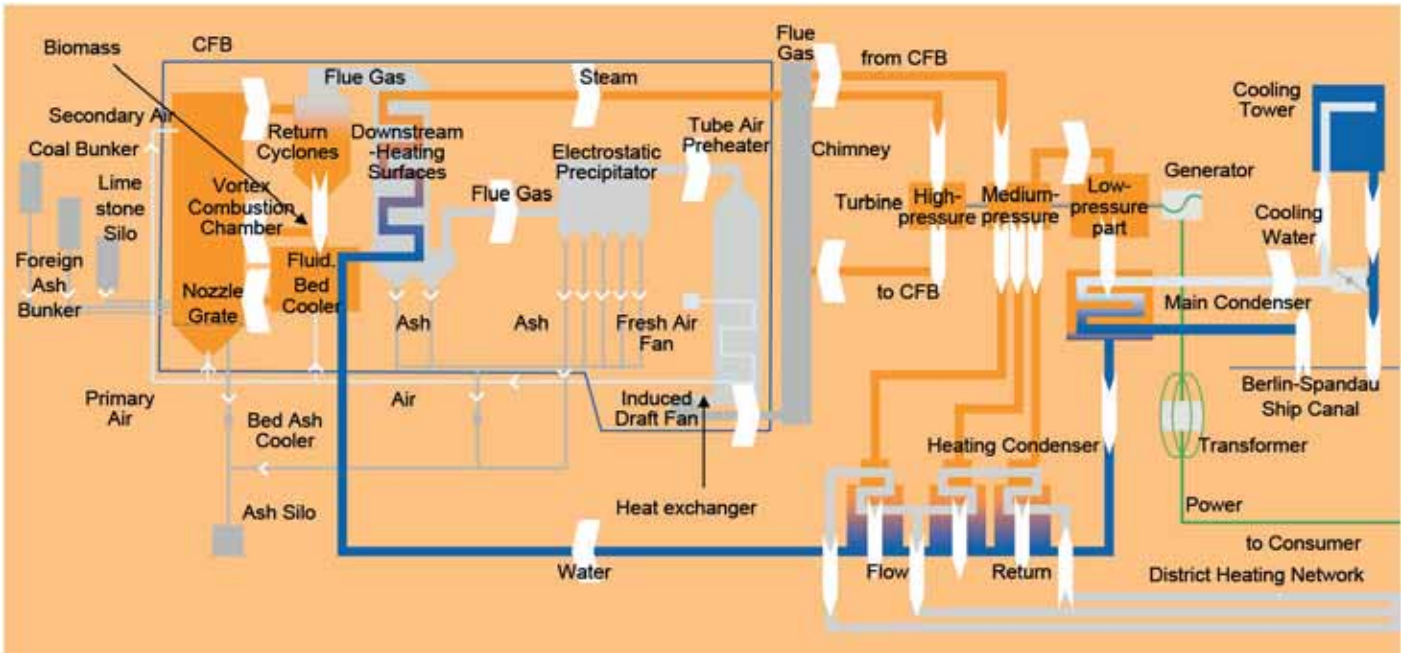
2013 START OF OPERATION WITH INCREASED SHARE OF BIOMASS

CURRENT STATE

Today at the Moabit CHP plant 40 % of the combustion heat capacity is obtained from woodchips and pellets, coming from the vicinity of Berlin and also from international markets. The biomass supply rate to the boiler approximately is 40 t/h.

Woodchips and pellets are delivered to the plant via ship. A semiautomatic crane is used to unload the ships. Oversized particles are immediately separated by a classifier to protect the conveying system (SICON®). A conveying belt brings the fuels to the boiler house, according to the boiler's demand. Fuels in excess are removed from the belt and delivered to a temporary storage, where they are stored for a maximum time period of 7 days.

The whole plant is continuously monitored for fire protection. Spray levels are installed above the temporary biomass storage, where the temperature (monitored by IR cameras) shall not exceed 60 °C. Automatic spraying units are located in the tunnel area and from the conveyor bridge to the feed regulation system. A dry extinguishing system is installed along the belt conveyor and in the machine hall, which is also equipped with combustion gas detectors and fire detection system.



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IMPACT

Vattenfall had committed to reduce the annual CO2 emissions of its plants in Berlin by 1.2 million tonnes in the time period 2016-2020. It is estimated that the retrofit of the Moabit plant delivered a CO2 emissions reduction of 250,000 tons/year, thus significantly contributing to the overall target.

OUTLOOK

In October 2018 the Berlin House of Representatives decided to ban hard coal-fired power generation on the city territory by 2030, in order to reduce CO2 emissions. (In 2017 the use of lignite had been already stopped). This measure affects the Moabit CHP plant, therefore Vattenfall is currently evaluating possibilities for a futher retrofit in order to phase out coal.

"The sustainable and secure generation and distribution of heat is part of Vattenfall's core business"

SOURCES

https://powerplants.vattenfall.com/en/moabit

D. Seibt "Biomass & Waste Co-firing in Coal Power Plants" 4th EU - South Africa Coal and Clean Coal Working group meeting, Johannesburg, South Africa, 5 -6/11/2012

https://www.enerdata.net/publications/daily-energy-news/berlin-phases-out-hard-coal-2030-and-plans-close-three-power-plants-ge.html

https://www.stadtentwicklung.berlin.de/denkmal/liste_karte_datenbank/de/denkmaldatenbank/daobj.php?obj_dok_nr=09050441

MORE INFORMATION ABOUT THE MOABIT CHP PLANT

VATTENFALL

Website www.vattenfall.de Contact https://www.vattenfall.de/kundenservice-kontakt

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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Disclaimer: The sole responsibility for the content of this factsheet lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the INEA nor the European Commission are responsible for any use that may be made of the information contained therein. This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817999