

CHP Plant Conversion

- from coal, oil and gas to biomass

A 125 MW coal-fired boiler in Stalowa Wola, Poland has been converted into biomass using Exergy innovative biomass steam drying technology.

The Stalowa Wola Power Station (established in 1938), has undergone several extensions in various stages after the Second World War to the mid-eighties. The latest change in the coal-fired power plant was the conversion of one of the boiler units to completely run on biomass.

Project background

The Stalowa Wola power station was using bituminous coal as the main fuel. Replacement of traditional power generation processes in Poland, based on use of hard coal and lignite, with new technologies is part of the Polish national strategy and strongly supported by the European Union's policy.

Task objective

The investment task consisted of the construction of a biomass combustion plant in OP-150, 125 MW boiler in "Stalowa Wola" S.A. and aims to reach the following objectives:

- increase the production of electricity generated from renewable sources,
- improve the economic efficiency of power and heat generation in the Power Station,
- reduce the level of pollution emission to the environment,
- reduce the consumption of coal,
- stabilize manufacturer's status on the energy suppliers' market in Poland.

Supplier

Swedish Exergy developed steam drying technologies in the late 70's. The first commercial plant was delivered in

1980 for drying of paper pulp. Since then Exergy drying technologies have been commissioned around the world in many different applications and materials such as peat, forest and agro biomass, sludge, bagasse for green energy, pellet production, biogas, and bio-ethanol.

The company also provides consulting services and feasibility studies, along with a wide range of engineering skills and services to supply turn-key systems with a focus on saving costs, energy and the environment.

Principles and features

Stalowa Wola power plant utilizes Exergy two stage drying technology: The Exergy Air Stream dryer is a low temperature dryer designed in this application as a pre-dryer to superheated steam dryer. In Exergy Air Steam Dryer, the drying air is indirectly heated in heat exchanger using low pressure generated steam from superheated steam dryer. Wet product with 50 percent solids is fed into the pre-dryer via an airlock after the fan. The product dries in drying ducts and separates in an ultra-high efficiency cyclone. The dried 60 percent dry solid product is discharged from the bottom of the cyclone through an airlock, where the product is fed to the Exergy Super-Heated Steam dryer to be dried to 90 percent solids.

Exergy steam dryer is a closed and pressurized system where the material to be dried is exposed to indirectly superheated steam. The dryer consist

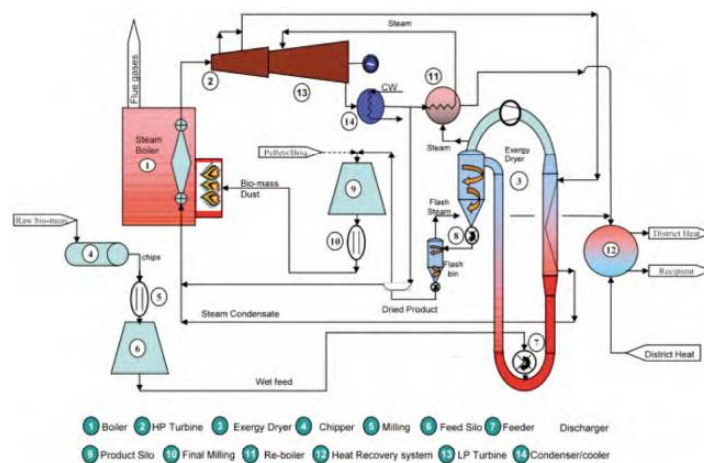
of ducts, heat exchanger, cyclone and a steam fan. The pressurized superheated steam circulates within the dryer loop and serves as a transport media for the solids. Dried material and superheated steam are separated in a cyclone and steam is re-circulated.

Specially designed feeding and discharge equipment allows the dryer to operate at 2-4 bar overpressure. The generated steam from the water in the product is used in pre-dryer as heat source.

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Facilities built and in operation: 50 tons/hr biomass system – Stalowa Wola, Poland (2012)



System schematics and process flow

Fresh wood/energy crops/agro-waste with 50-60% moisture is chipped (4) and pre-milled (5) to less than 5 mm and stored in feed silo (6). The milled product is fed to the steam dryer (3) through pressure tight rotary valve (7). The product is dried to moisture content under 10% and discharged from the steam dryer (3) through rotary valve (8) and flash bin to product silo (9). Dried biomass is milled (10) to dust and used as fuel in steam boiler (1) modified to use biomass. Steam, produced at 80-110 bar and 500-550°C, is expanded in the high pressure (HP) turbine (2). Bleed at 15-20 bar is used to indirectly heat the steam dryer (3). Product moisture is evaporated into steam at 2-4 bar in the dryer and converted into clean steam in re-boiler (11). Steam from re-boiler (11) is expanded in low pressure (LP) steam turbine (13) and condensate is returned to the boiler via condenser/cooler (14). Condensate from re-boiler (10) and flash steam from steam dryer (3) is used in heat recovery system (12) to produce district heat/hot water or used in pre-dryer.

Czech company plans to export hardwood chips from U.S. to Europe

Headquartered in Duchcov, the Czech Republic the company GreenHeart Energy has recently set up a subsidiary in Texas where, according to reports in local newspapers, it has found a plentiful and long-term supply of woody biomass suitable for export to Europe. The chips are expected to be used as biomass fuel for European utilities.

The company plans to harvest Mesquite wood in south Texas and export chips from Corpus Christi where the company has applied to lease storage for 40 000 tons of chips.

Mesquite brush is widely considered an invasive species that spreads quickly taking over range and grasslands and able to survive in arid conditions.

The company estimates that over 1/2 million acres of mesquite exists within 100 miles of Corpus Christi, with a yearly availability of 19 million tons. Furthermore the above ground harvesting method encourages resprouting of the bush enabling a harvest in 10 year cycles.

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