Co-generation of Energy from Wood: A Case Study from a Large-Scale Wood-Based Bioenergy Plant (20 MW_{el}/10 MW_{th}) in Piesteritz

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1.1 Stadtwerke Leipzig GmbH – Shareholder

Stadt Leipzig

100 %

LVV
Leipziger Versorgungs- und
Verkehrsgesellschaft mbH

83 %

LVB

Leipziger Verkehrsbetriebe (LVB) GmbH

74,9 %

Wasser zum Leben
Kommunale Wasserwerke
Leipzig GmbH

100 %

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|1.2 Stadtwerke Leipzig GmbH - Milestones

Gas- & Dampfturbinenwerk (GuD)

1992 **"Stadtwerke Leipzig GmbH" is founded**
SWL takes over gas and electricity supply

1995 **Conversion to natural gas complete;**
Combined-cycle power plant comes onstream in Leipzig

2001 **First acquisitions abroad [Tczew (PL), Jelenia Góra (PL)]**

2002 **More acquisitions abroad [Klaipeda (LT), Jablonec (CZ), Sofia (BG)]**

2003 **Stakes acquired in Starogard Gdanski (PL)**

2004 **Largest acquisition abroad at Gdansk (PL)**

2006 **Biomass power plant comes onstream at Bischofferode/Germany (Thuringia)**

2007 **Construction start for biomass power plant at Piesteritz/Germany (Saxony-Anhalt)**

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2.1 Projects under the Renewable Energy Act (EEG)

- **Since about 1999 SWL‘s strategic planning has focused on “renewable energies”**
- **The accent has been on natural wood for energy production and biogas**
- **The first reference project using wood is the Bischofferode biomass power plant (construction 2003 to 2005)**
- **As a basic policy, expansion is sought only with viable projects.**
- **Growth is possible only outside SWL‘s supply area**

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| 2.1 Bischofferode site

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| 2.1 The Plant Concept for Bischofferode

- **Condensing power plant, 20 MW electric power, with air-cooled condenser**
- **Furnace heat output 54.9 MW**
- **Power fed at 20 kV to grid of Eon Thüringen**
- **No heat extraction (not enough demand)**
- **Gross electric efficiency 36.95 %**
- **Fuel exclusively consists of uncontaminated wood (logging waste)**
- **Operating license granted pursuant to BImSchV § 13**
- **Consistent optimization for electric efficiency**

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| 2.2 Target Market Biomass Plants

- **Stadtwerke Leipzig has decided to erect a biomass-fired cogeneration plant at Wittenberg (Piesteritz)/Germany with an electric power of 20 MW and heat extraction.**
- **This will need approx. 92,000 tonnes of natural wood (absolutely dry) per year for operation.**
- **In this connection, long-term wood supply contracts have been concluded.**
- **Heat supplies to Stickstoffwerk Piesteritz (SKW) will feed a max. of 15 tonnes/h of steam to SKW‘s low-pressure system, resulting in a cogeneration bonus.**
- **Power plant erection and operation will create 22 jobs directly at Wittenberg, and another 30-50 in the region.**

| 3.1 Piesteritz Biomass Thermal Power Plant

Power station parameters

- Size up to 20 $MW_{electr.}$
  10 MW_{therm}
- Energy source is virgin wood
- Construction starts 2007
- To come onstream 2009

- **The aim is to repeat the successful Bischofferode power station project**

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| 3.2 Piesteritz Project Characteristics

Fuel	Natural wood (as defined by NAWARO in EEG)
Furnace heat output	approx. 65 MW
Combustion method	Circulating fluidized bed
Fuel quantity, approx.	92,000 $tonnes_{abs.dry}$/a
Thermal output	15 tonnes/h saturated steam, 3.5bar
Electric power	20 MW in extraction/condensing mode
Condensation	Air-cooled condenser
Flue gas cleaning	Limits of indexed 13th Law on Protection against Harmful Effects on the Environment (BImSchV)

- **Generated power is fed to the grid of the regional utility pursuant to the Renewable Energies Act (EEG).**

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| 3.3 Piesteritz Process Description: DELIVERY

- **Wood for combustion is delivered to power plant by road.**
- **Wood goes to intermediate storage for further drying or is used directly.**
- **Wood cuttings are fed to stationary chopping machine to make chippings as required for furnace.**
- **Conveyors take chippings to buffer store or direct to fuel bins at furnace.**
- **When chopping machine is not working (night/weekend) furnace is supplied from buffer store by bridge crane.**

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| 3.3 Piesteritz Process Description: FUEL CONCEPT

- **100% uncontaminated wood**
- **Fuel wood**
  - **Logging wood waste, 2-6 m cuttings up to 800 mm**
  - **Crowns, roots**
  - **Gnarled, decayed, deadwood**
  - **Pest-infested wood**
- **Of this > 70 % hardwood**
- **As a partial fraction chippings may be delivered by third parties**

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3.3 | Piesteritz Process Description: FUEL LOGISITICS

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3.3 Piestritz Process Description

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Thank You

for Your Interest.

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