

BIOMASS HEATING– Production of electricity generated from biomass GRAČANICA

EKO TOPLANE Ltd



Project goals

- To offer the citizens and industrial entities ecological, local and affordable electricity supply
- Significant improvement of air quality in the town and the suburbs due to a smaller number of coal-fired boiler rooms
- The use of absolutely regional resource- biomass
- CO₂-neutral production of heat and electricity

Gračanica heating system

- The heating plant has worked since October 20, 2008
- The heat pipeline has been built in the length of 14.5 km
- 174 substations functioning on the pipeline—
13.3 MW
- Previous investments cca. 12.5 mil. BAM
- Goal: Further expansion of the network and adding new users
- Production of electricity generated from biomass

Biomass

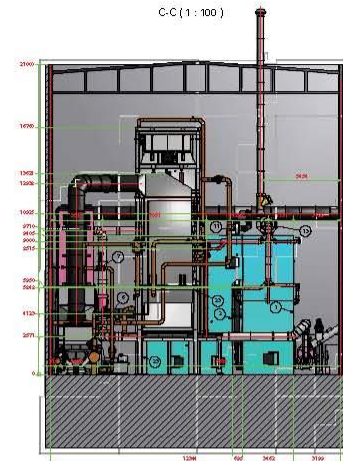
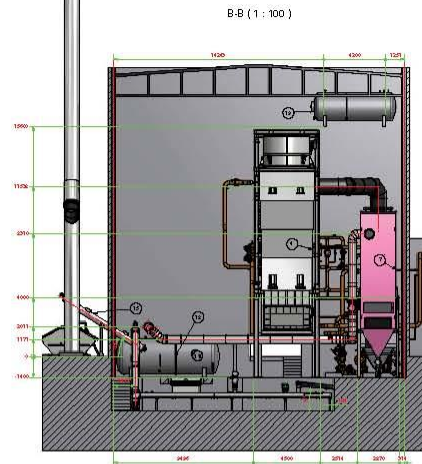
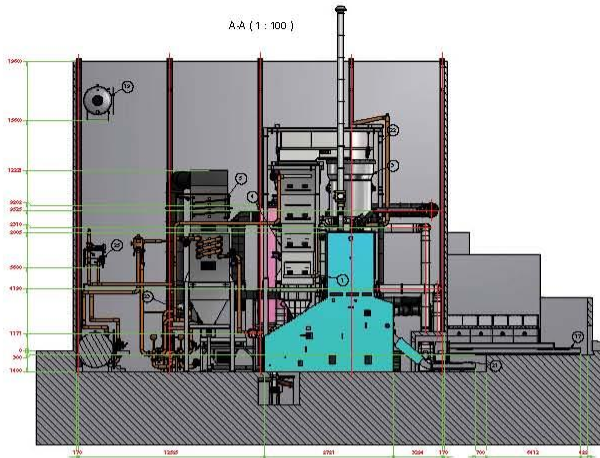
- Solid biomass
- One-meter-long logs, crop waste, bark, sawdust,
- One-meter-long logs \rightarrow cubic meter = "pm"
- Chopper \rightarrow chipped wood cubic meter = "spm"



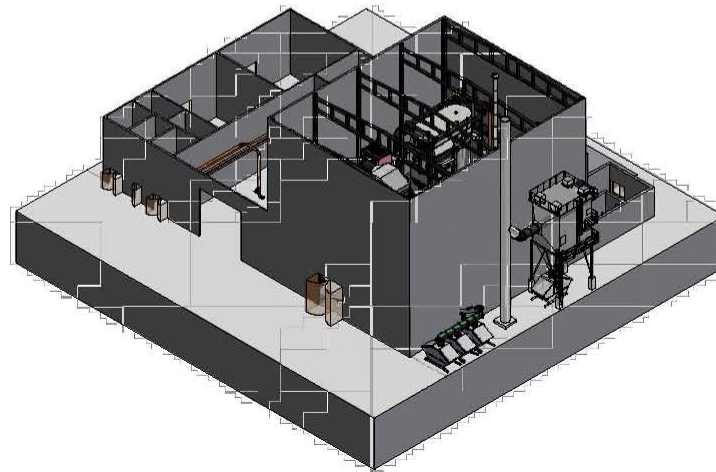
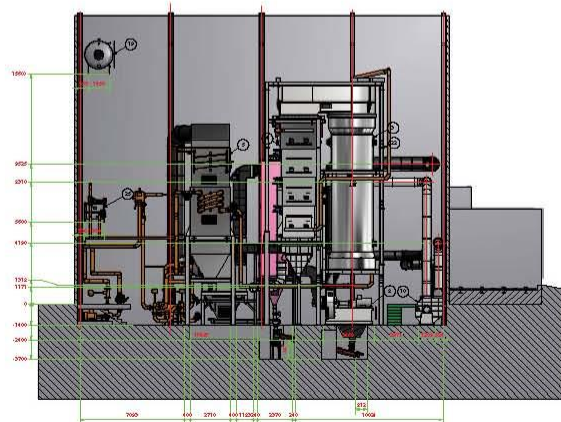
Technical equipment in the heating plant - currently

- Biomass boiler 6 MW (Phase I)
- Biomass boiler 4 MW (Phase II)
- Heat accumulator 4.500 kWh
- Oil-fired boiler 11 MW
- Heating piping system: Pre-insulated piping system which is thermally strengthened
- Indirect heating substations
- System of remote monitoring and management

Plant scheme



D-D (1 : 100)



| Code | Symbol | Hydraulischer | Benennung Deutsch | Benennung English |
|------|--------|---------------|--------------------------------|-----------------------------|
| 1 | | | Personen | Person |
| 2 | | | Personen für Konstruktion und | Person for construction and |
| 3 | | | Wahlstühle | Ballot boxes |
| 4 | | | Wahlzettel | Ballot paper |
| 5 | | | Wahlurne | Ballot box |
| 6 | | | Wahllocher | Ballot slot |
| 7 | | | Wahllocher für den Wahlstempel | Ballot slot for the stamp |
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Alle Dimensionen sind in Metern angegeben. Die Zeichnung ist eine schematische Darstellung und ist nicht zur Ausführung geeignet. Die Zeichnung ist eine schematische Darstellung und ist nicht zur Ausführung geeignet.

Production of electricity

- Thermal oil boiler plant with ORC unit for the production of electricity generated from the combustion of biomass
- Gross power of electricity: 1.862 kW
- Net power of electricity: 1.775 kW
- Available heat: 7.843 kW
- Temperature of water: 90/60 °C
- The availability of the plant is 8.000 work hours per year

Biomass as fuel

- wood biomass/chipped wood
- In accordance with the new European standard EN 14961-1:2010
- size P63/P100
- Water content up to W55
- Ash content up to do A3

Emissions

- Dust (PM) < 20 mg/m_n³
- Carbon monoxide (CO) < 150 mg/ m_n³
- Nitrogen oxides (NOx) < 250 mg/ m_n³
- Sulfur (SO₂) < 1.000 mg/ m_n³
- Organic compounds (TOC) < 10 mg/ m_n³
- Reference: 11 vol.-% O₂, dry volume at 0°C, 1.013 mbar

Environment- goal

- Environmental permit for biomass combustion
- Electronic filter for flue gas filtration (EU-standard)
- Modern combustion standard, 100% CO₂ neutral project
- Heat is generated from CO₂-neutral biomass
- Survey results showed less CO₂ = cca. 6000 t per year in the new phase of the project
- Needed additional funding for the realization of the Phase II

GRAČANICA HEATING SYSTEM



HEAT PIPES



HOUSE CONNECTION



HEATING SUBSTATION

