BIOPOWER 5 CEX

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GENERAL INFORMATION

- **ELECTRICAL OUTPUT**

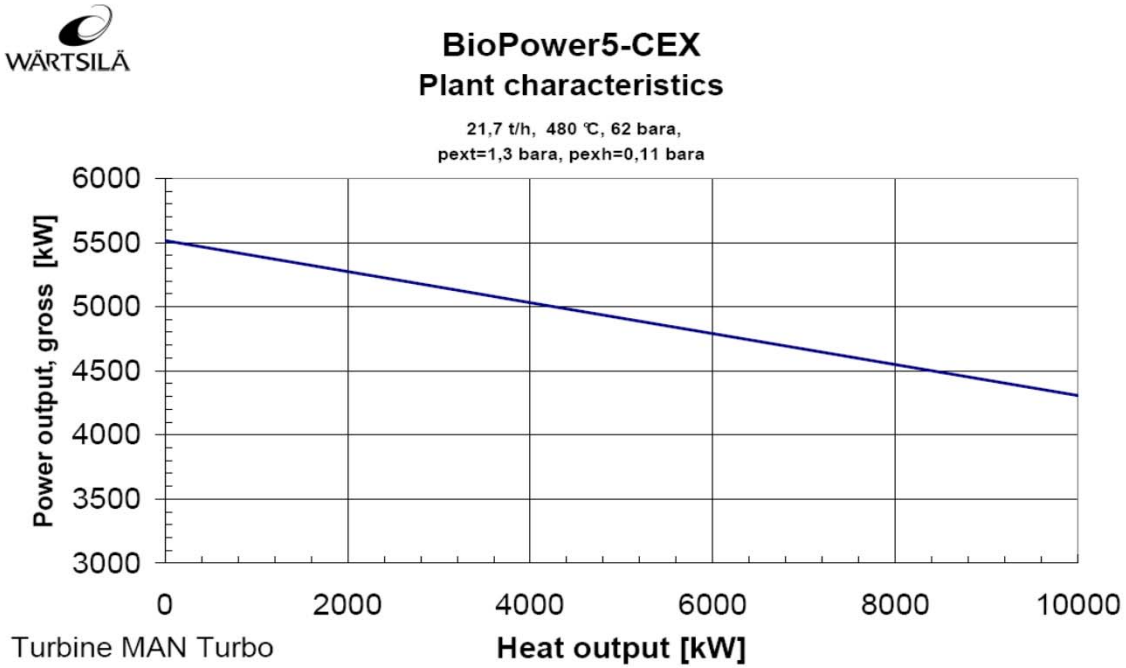
4.3 – 5.5 MWe

- **HEAT OUTPUT**

Up to 10 MWth (16 t/h steam 1,3 bara)

- **FUEL TYPE**

Wood chips, bark, saw dust, harvest residues, clean recycle wood
Moisture 35-50 %...60%
Particel size less than 300x50x50 mm



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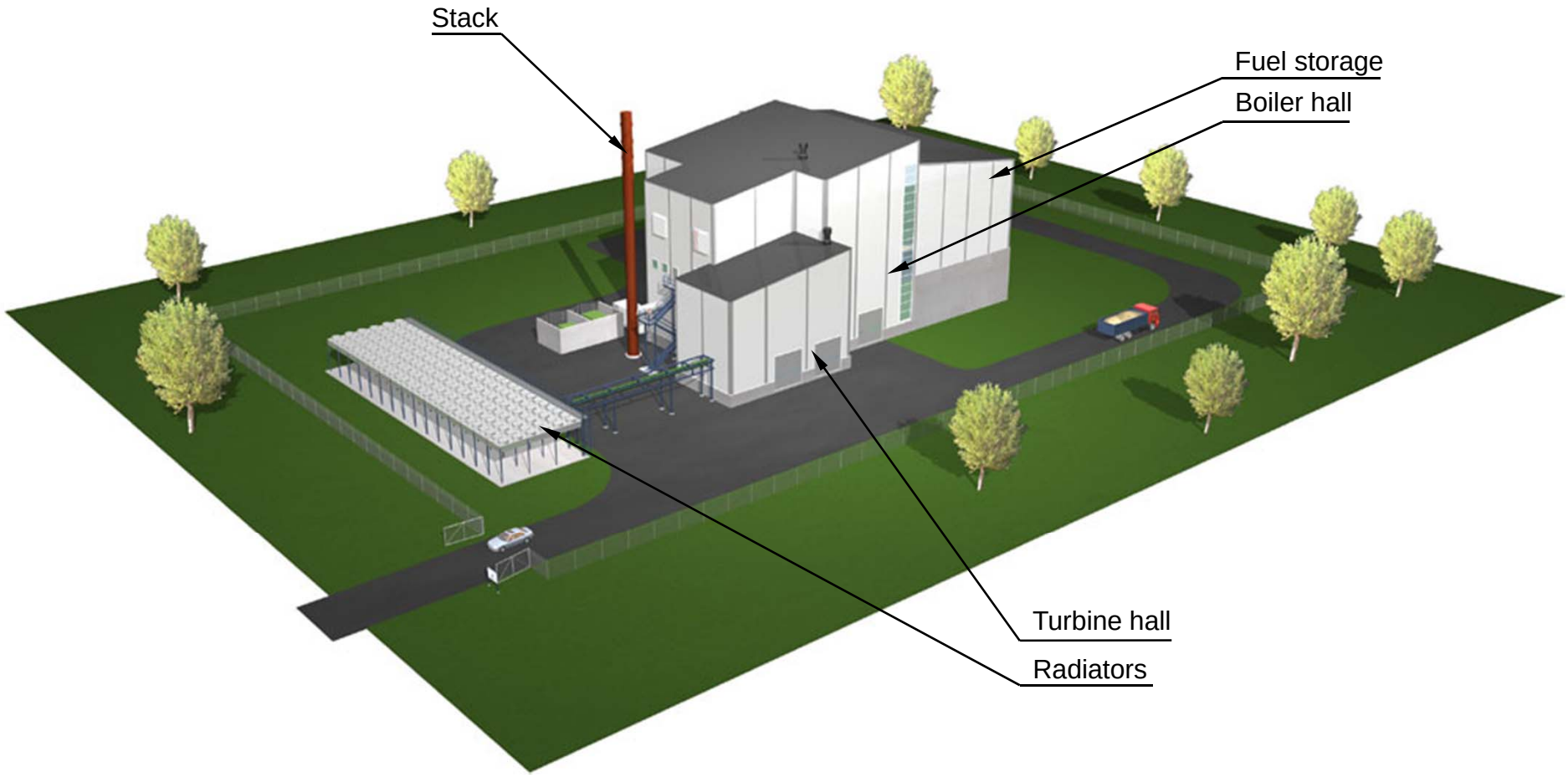
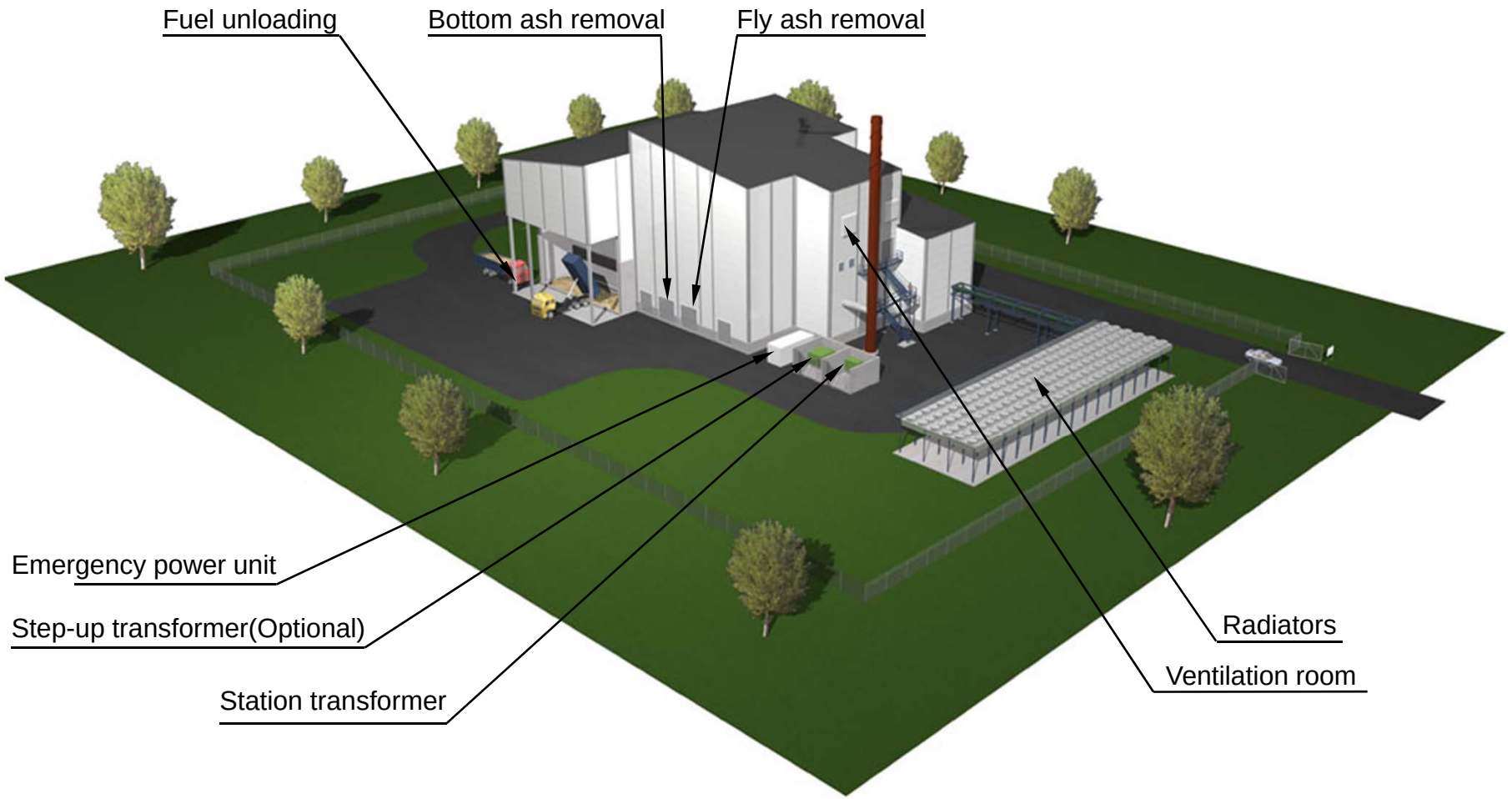
3D SITE LAYOUT

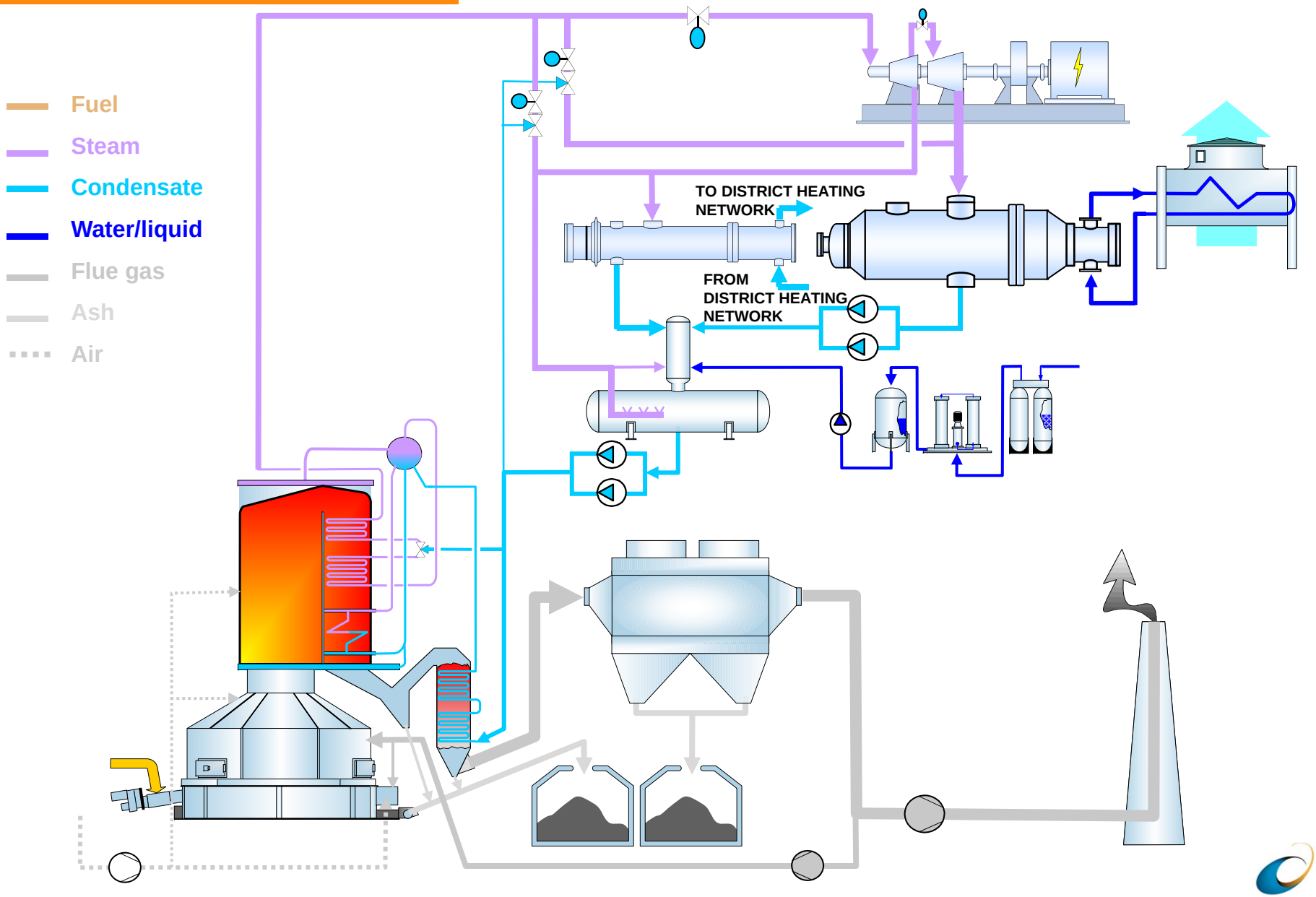


3D SITE LAYOUT



FLOW DIAGRAM

BIOPOWER 5 CEX



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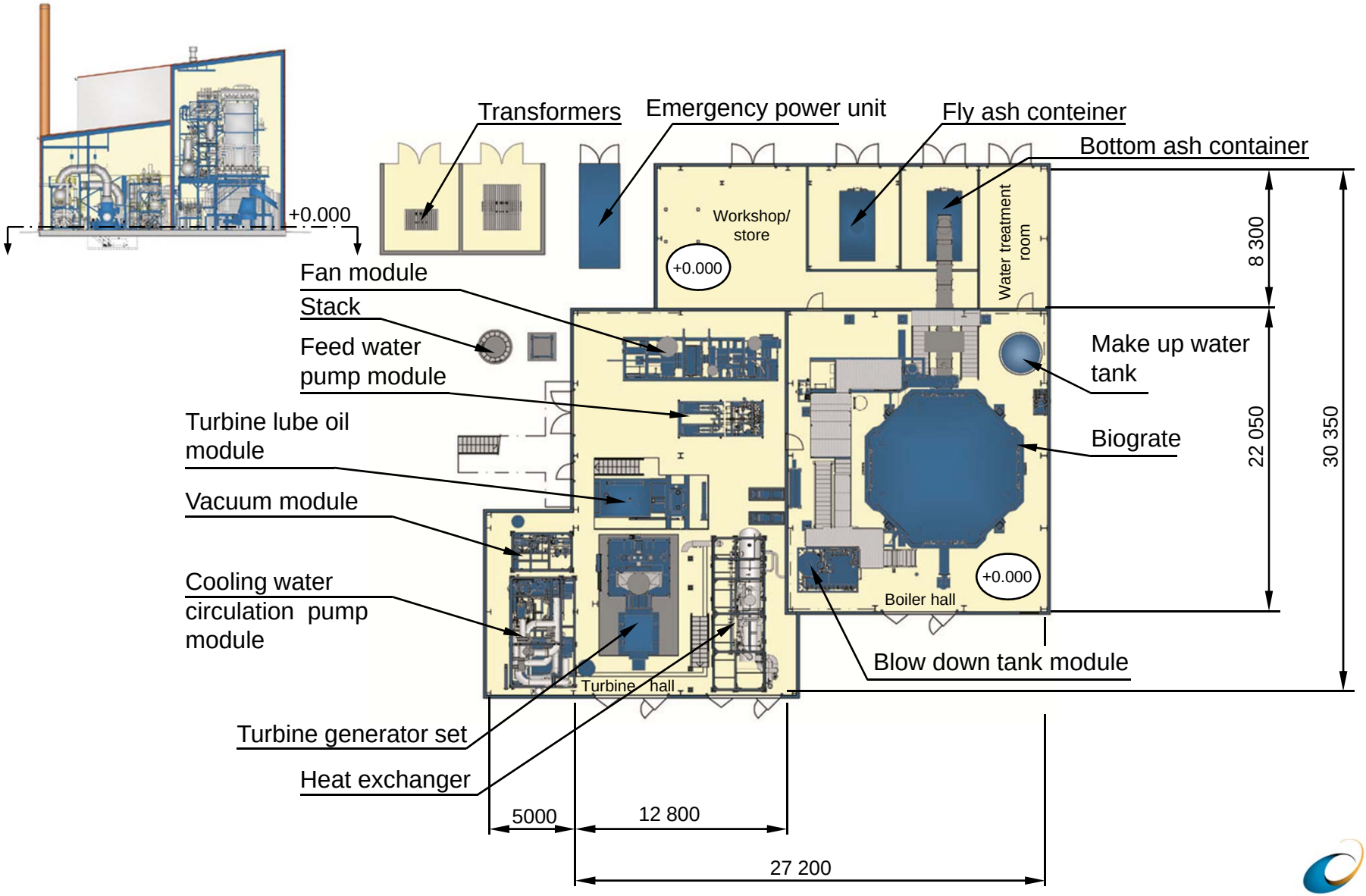
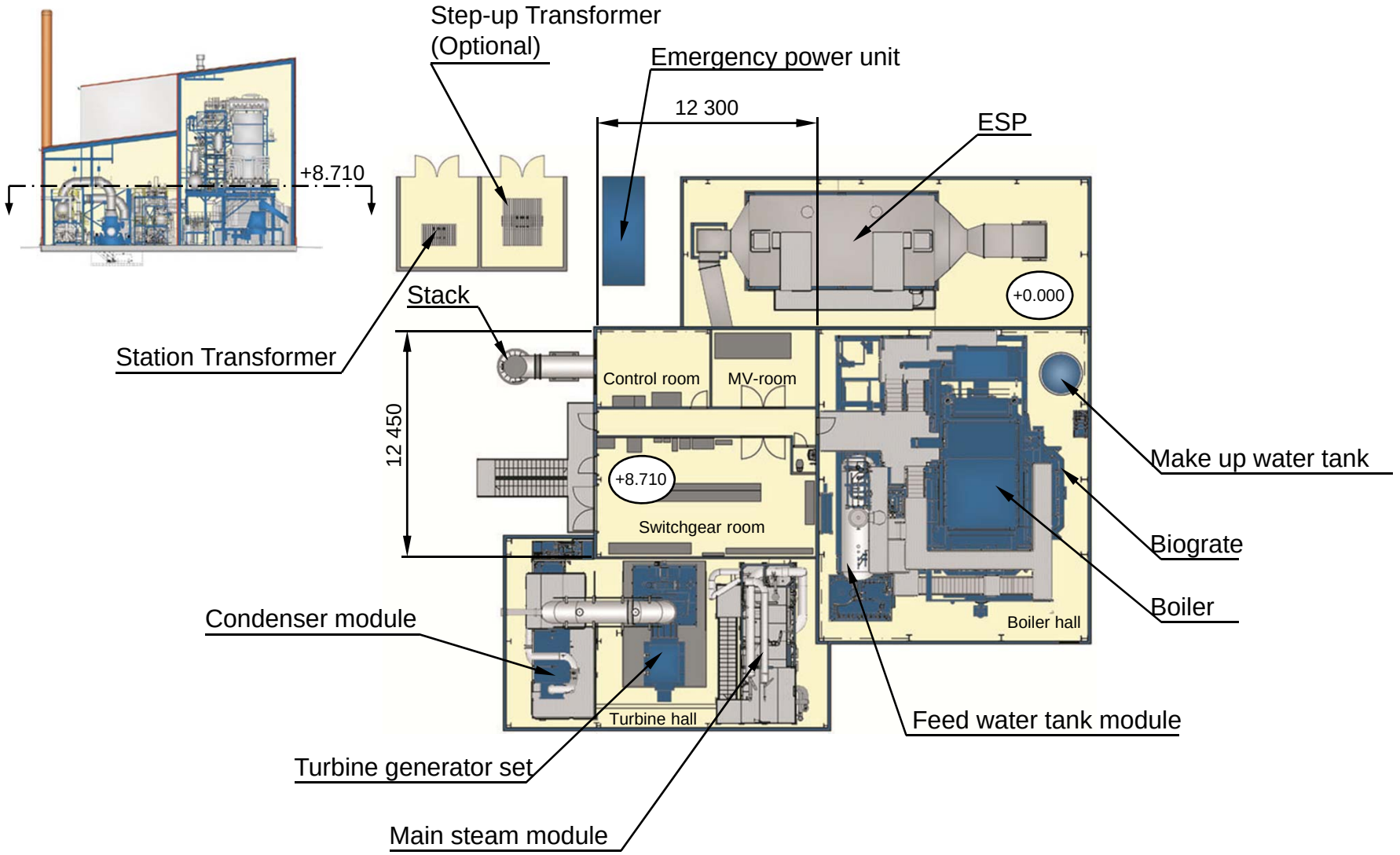
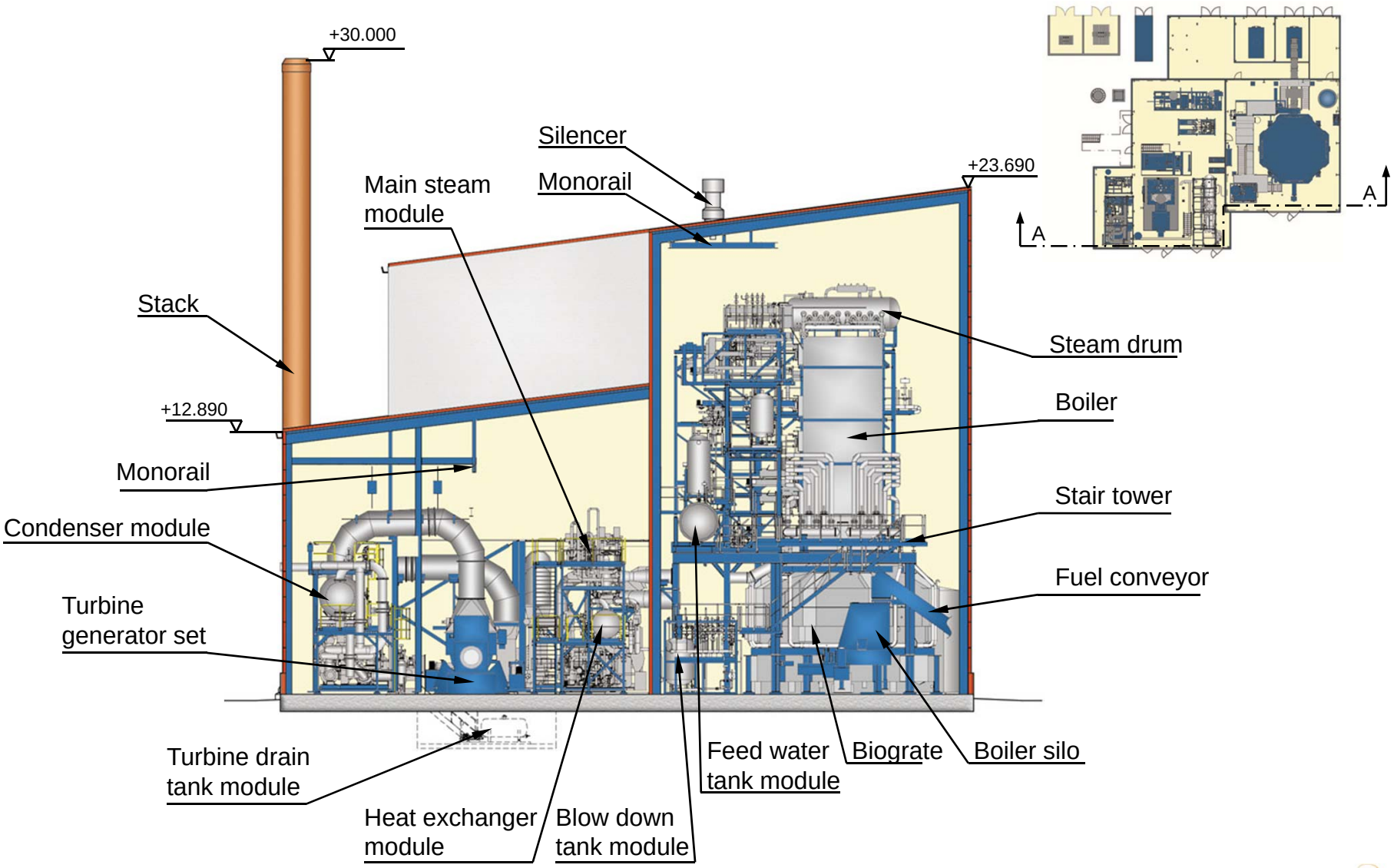
PLAN LAYOUT +0.000



PLAN LAYOUT +8.710

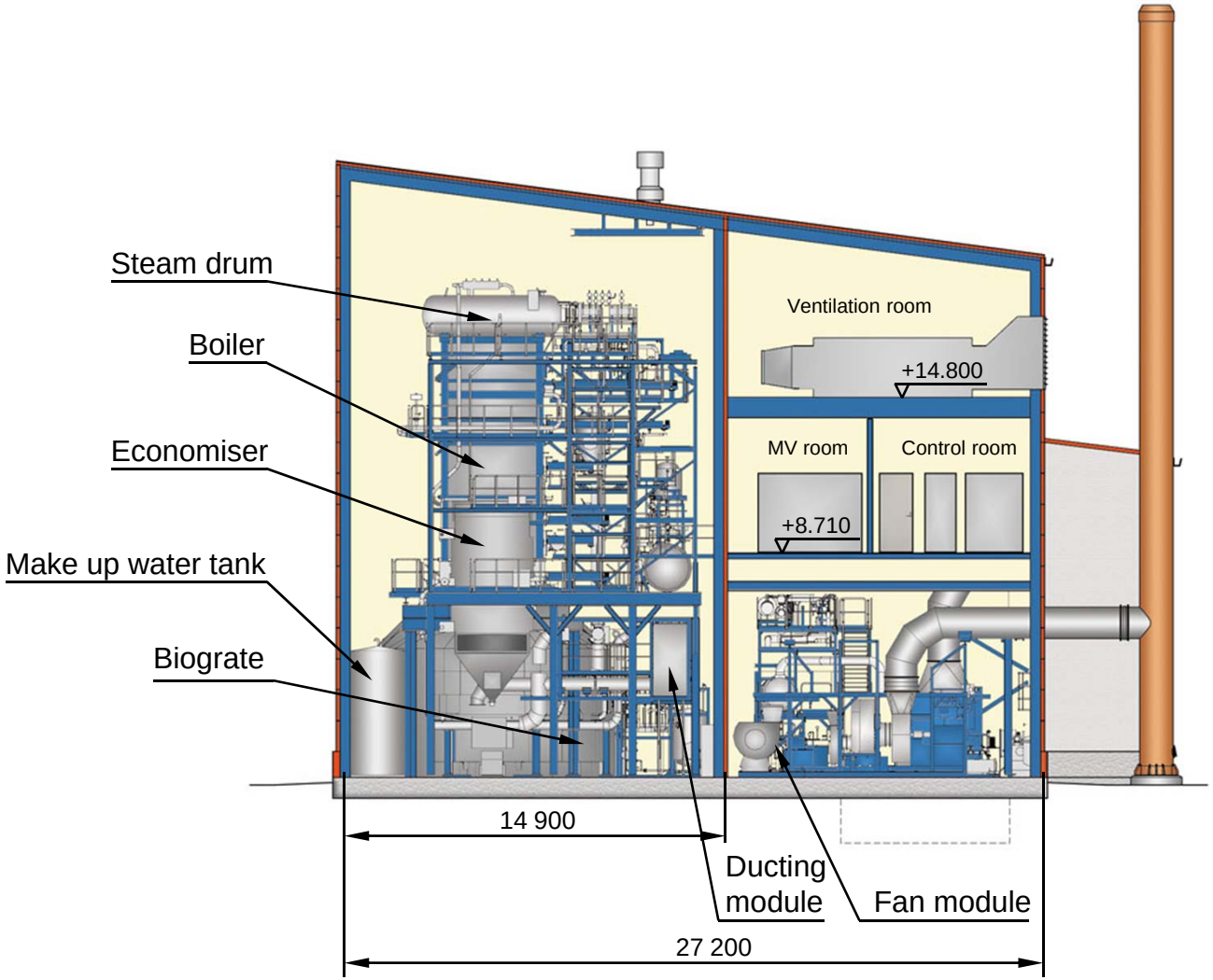


SECTION A-A

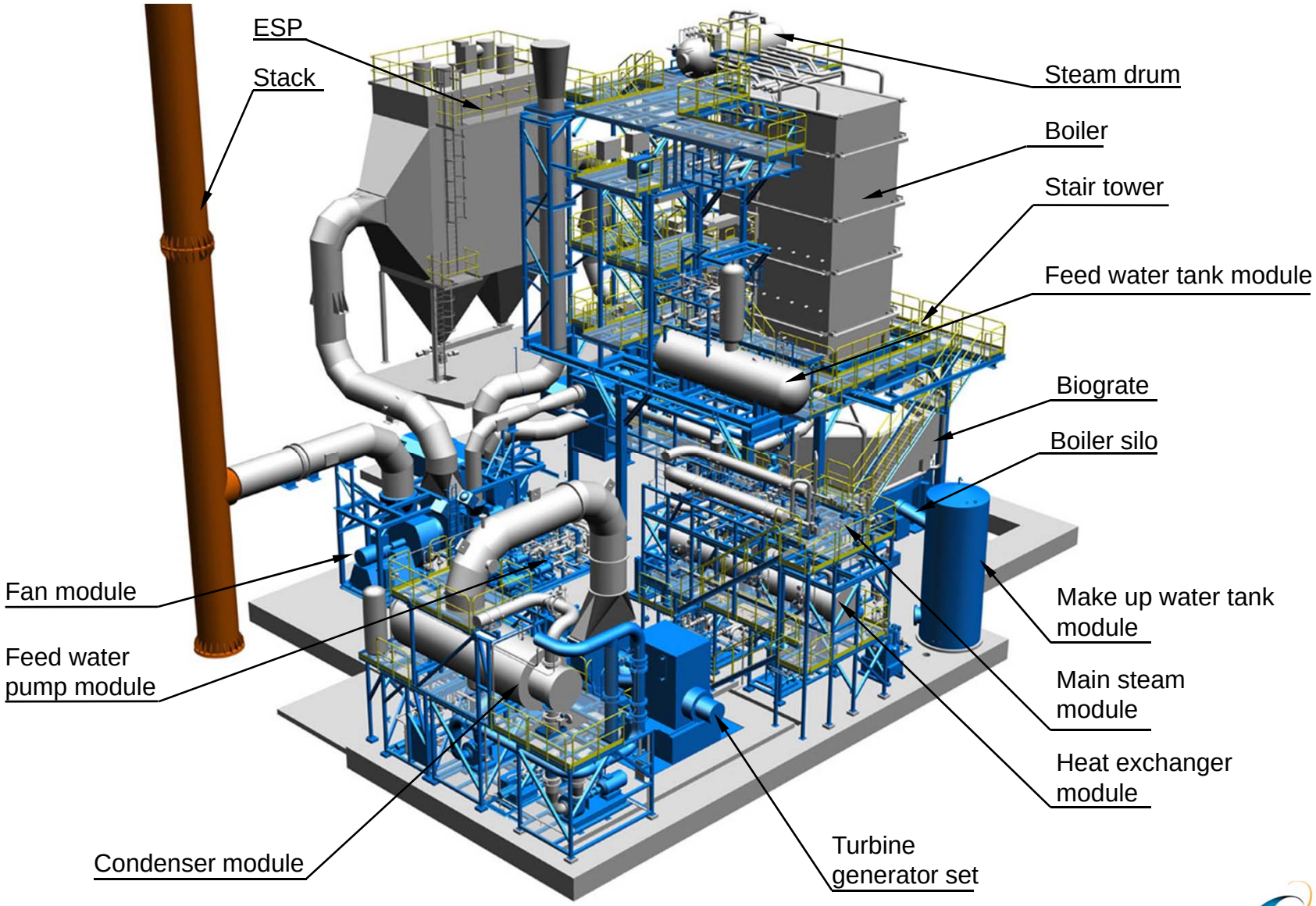

+30.000
+23.690
+12.890
Silencer
Monorail
Main steam module
Stack
Steam drum
Boiler
Monorail
Stair tower
Condenser module
Fuel conveyor
Turbine generator set
Turbine drain tank module
Heat exchanger module
Blow down tank module
Feed water tank module
Biograte
Boiler silo
A
A

SECTION B-B

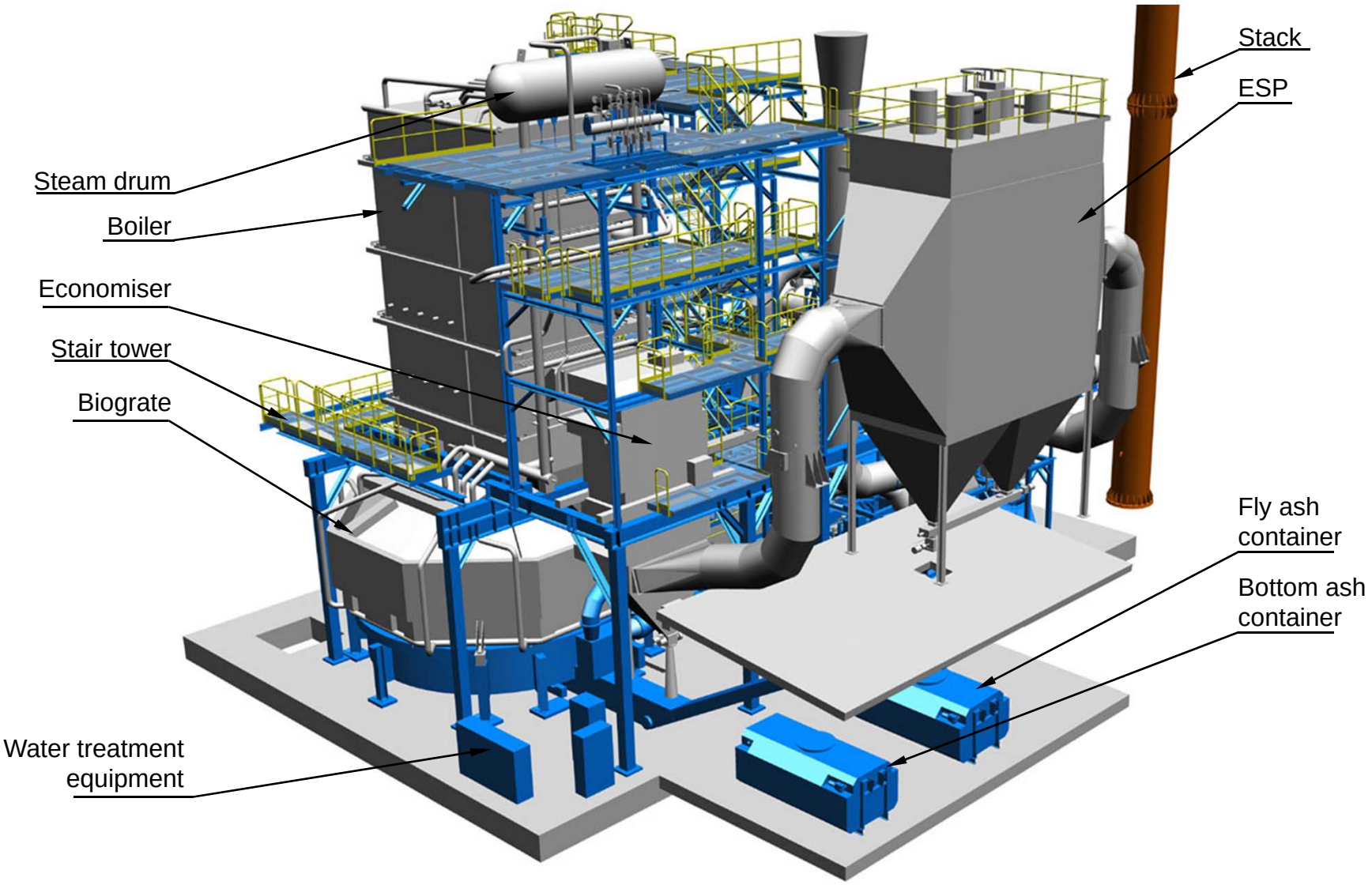

B
B


Steam drum
Boiler
Economiser
Make up water tank
Biograte
Ventilation room
+14.800
MV room
Control room
+8.710
14 900
Ducting module
Fan module
27 200

3D LAYOUT

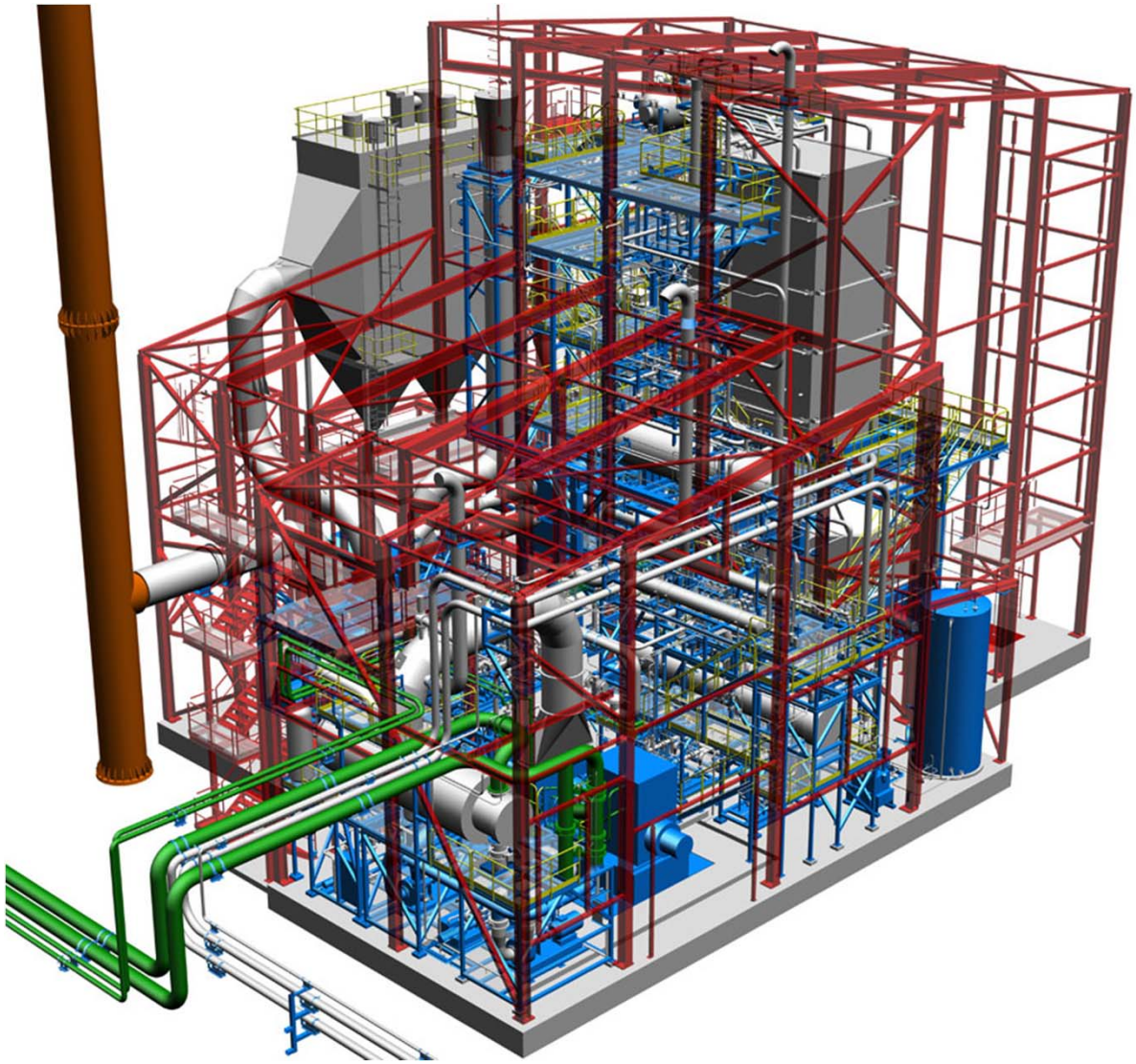

ESP
Stack
Steam drum
Boiler
Stair tower
Feed water tank module
Biograte
Boiler silo
Fan module
Feed water
pump module
Make up water tank
module
Main steam
module
Heat exchanger
module
Condenser module
Turbine
generator set

3D LAYOUT


Stack
ESP
Steam drum
Boiler
Economiser
Stair tower
Biograte
Fly ash container
Bottom ash container
Water treatment equipment

BUILDING STEEL FRAME

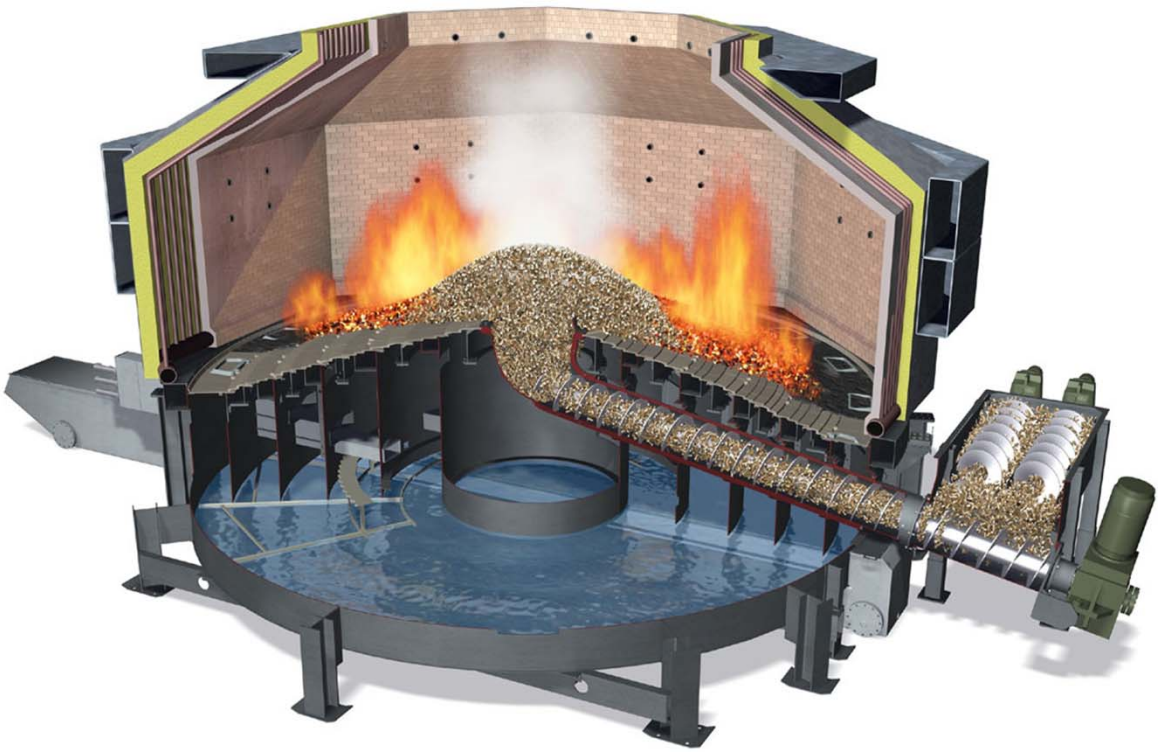
Building and process equipment are both built as an independent structure.



BIOGRATE

BIOGRATE AND FUEL FEEDING

- Conical rotating grate
- Fuel feeding with stoker screw to the center of the grate
- 3-5 rotating grate rings
- 2-4 fixed grate rings
- Wide grate area for complete combustion
- Flexible controlled primary air distribution
- Effective ash grate with air introduction
- Wet bottom ash system
- Grate material temperature measurement – flue gas recirculation used for grate cooling



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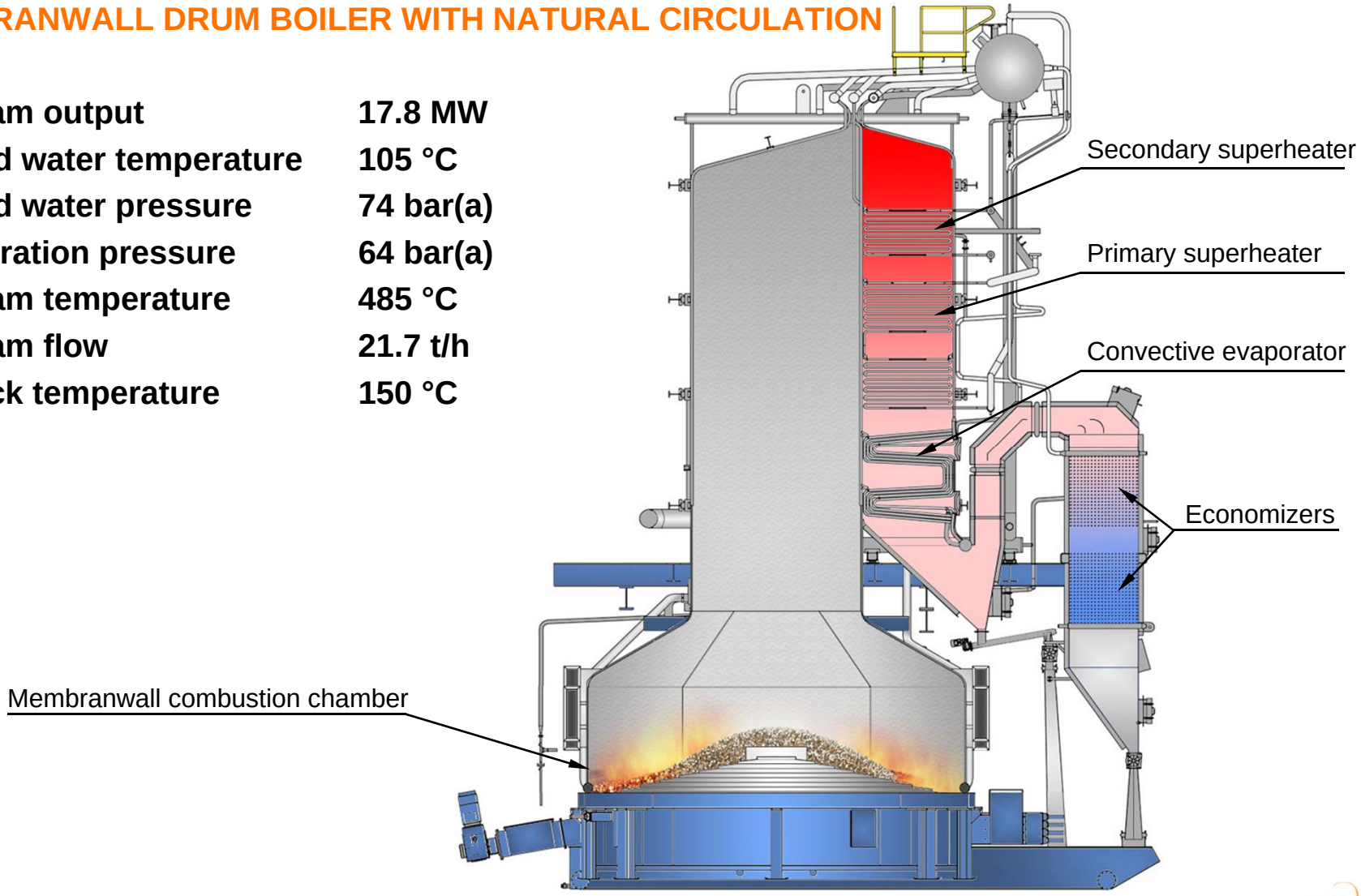
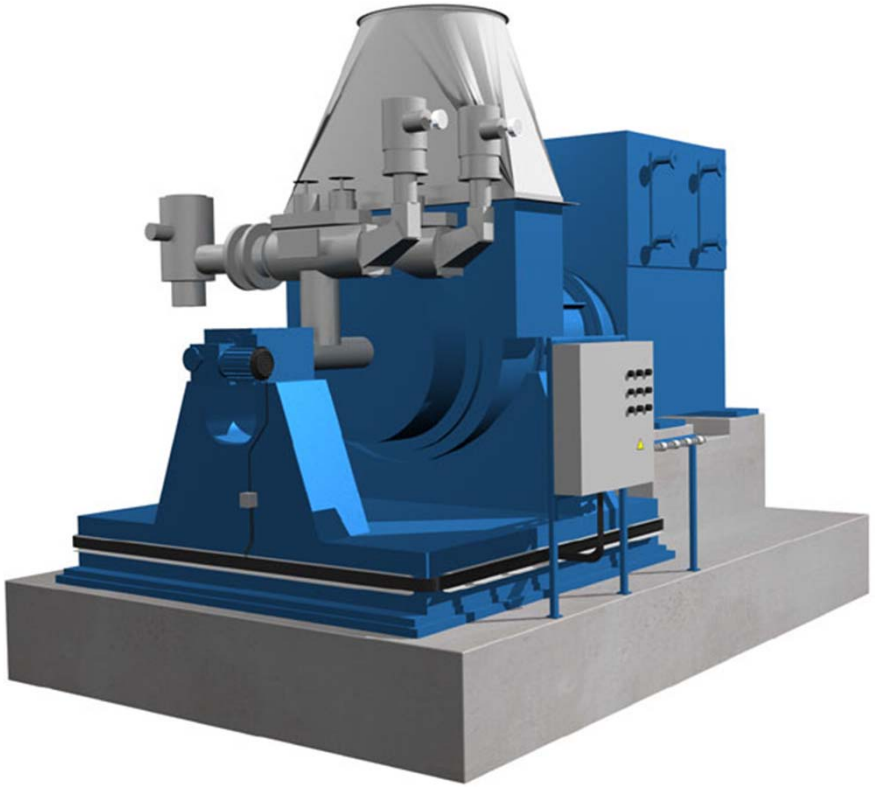
BIOPOWER 5 BOILER

MEMBRANWALL DRUM BOILER WITH NATURAL CIRCULATION

- **Steam output** **17.8 MW**
- **Feed water temperature** **105 °C**
- **Feed water pressure** **74 bar(a)**
- **Operation pressure** **64 bar(a)**
- **Steam temperature** **485 °C**
- **Steam flow** **21.7 t/h**
- **Stack temperature** **150 °C**

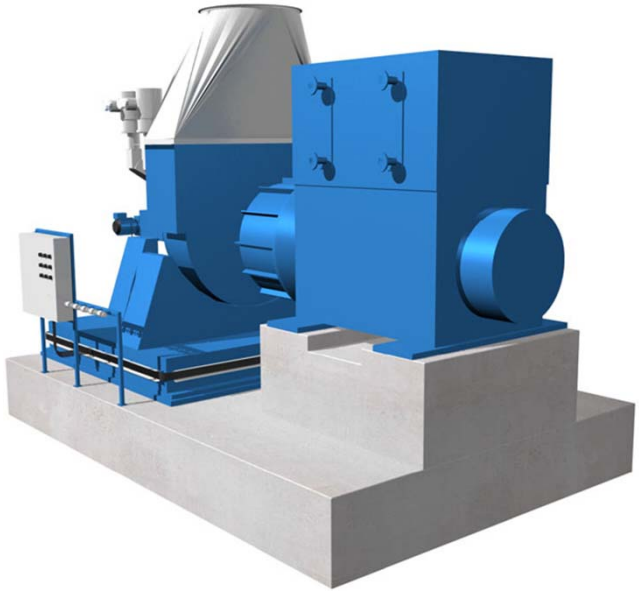


TURBINE AND GENERATOR



AXIAL MULTI STAGE REACTION TURBINE BP5 CEX

• Steam flow	21.7 t/h
• Pressure/temperature	62 bar(a)/480 °C
• Extraction temperature	1.3 bar(a)
• Exhaust pressure	0.11 bar
• Temperature	47 °C
• Speed	~12000/1500 rpm
• Gear box	Planet type
• Speed control	Siemens S7
• Power output	Max 5500 kW
• Generator voltage	6/11 kV
• Generator cooling	Water circulation



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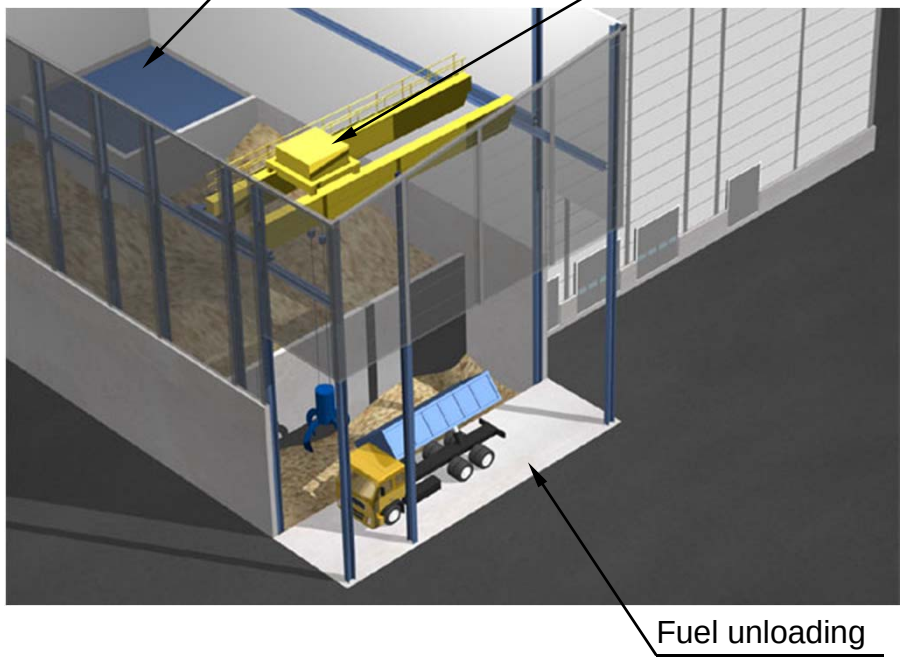
FUEL STORAGE ALTERNATIVES

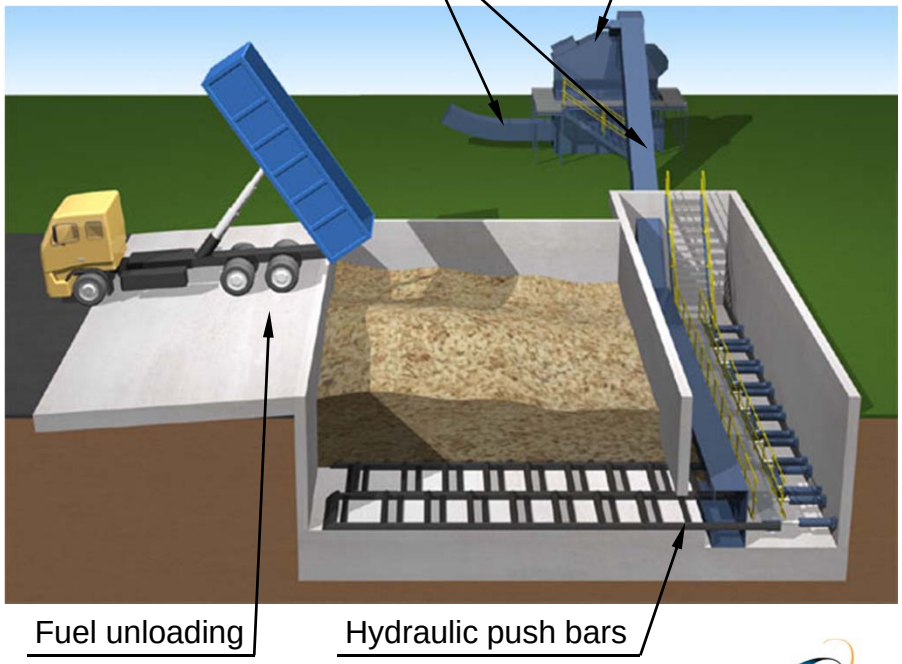
GRAB CRANE STORAGE

- Standard volume 2500m³
- 3 days operation



PUSH BAR STORAGE

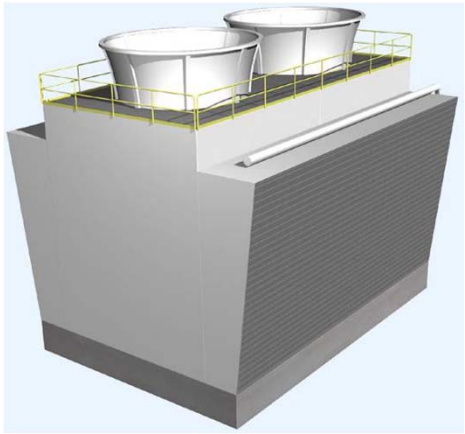
- Standard volume 500m³
- 16 hours operation



COOLING ALTERNATIVES

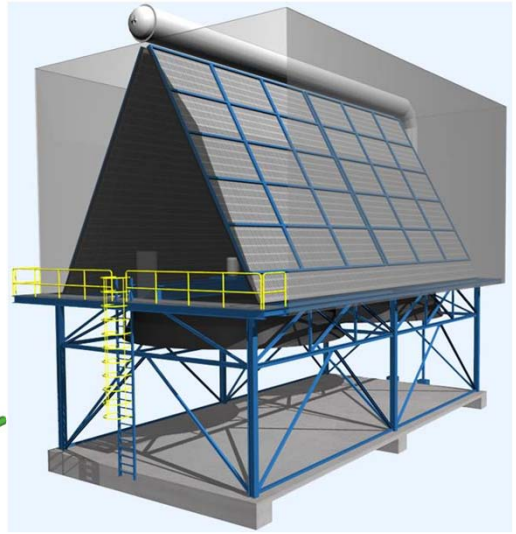
COOLING TOWER

- **Ambient temperature 27°C**
- **Water consumption 18 m³/h**
- **Power consumption**
  - *Fans 40 kW*
  - *CW Pump 90 kW*



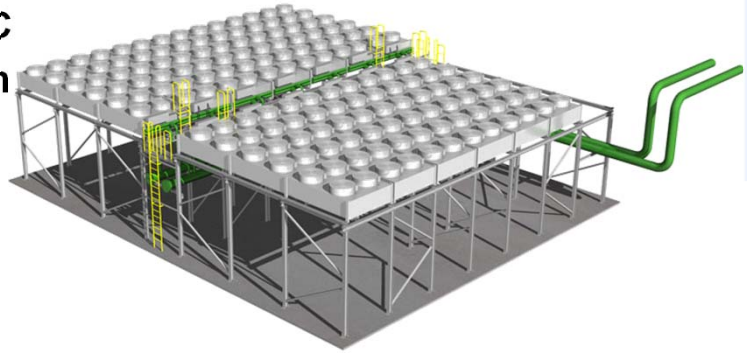
AIR COOLED CONDENSER

- **Ambient temperature 25°C**
- **Water consumption 0 m³/h**
- **Power consumption**
  - *Fans 100 KW*
  - *CW Pump N/A*



RADIATOR

- **Ambient temperature 20°C**
- **Water consumption 0 m³/h**
- **Power consumption**
  - *Fans 125 KW*
  - *CW Pump 90 KW*



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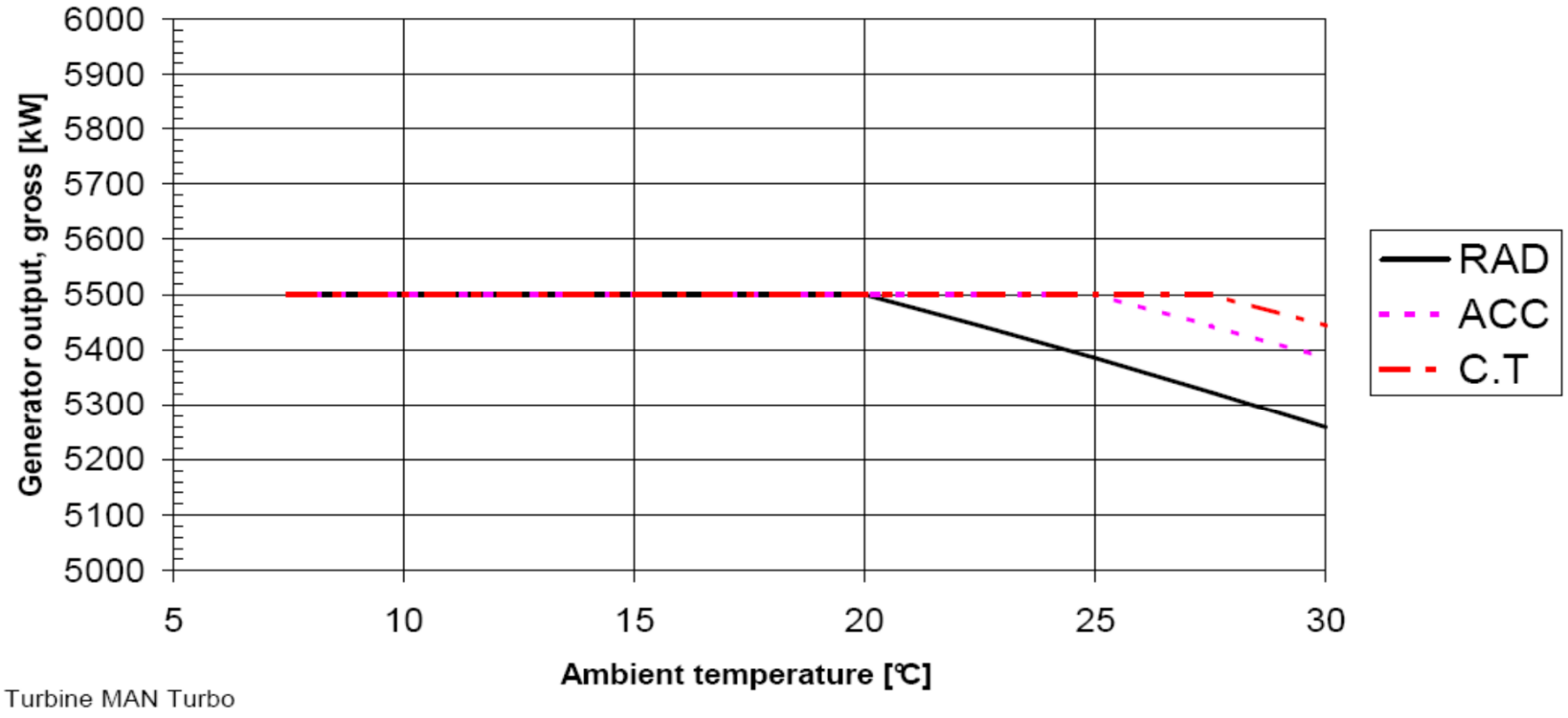
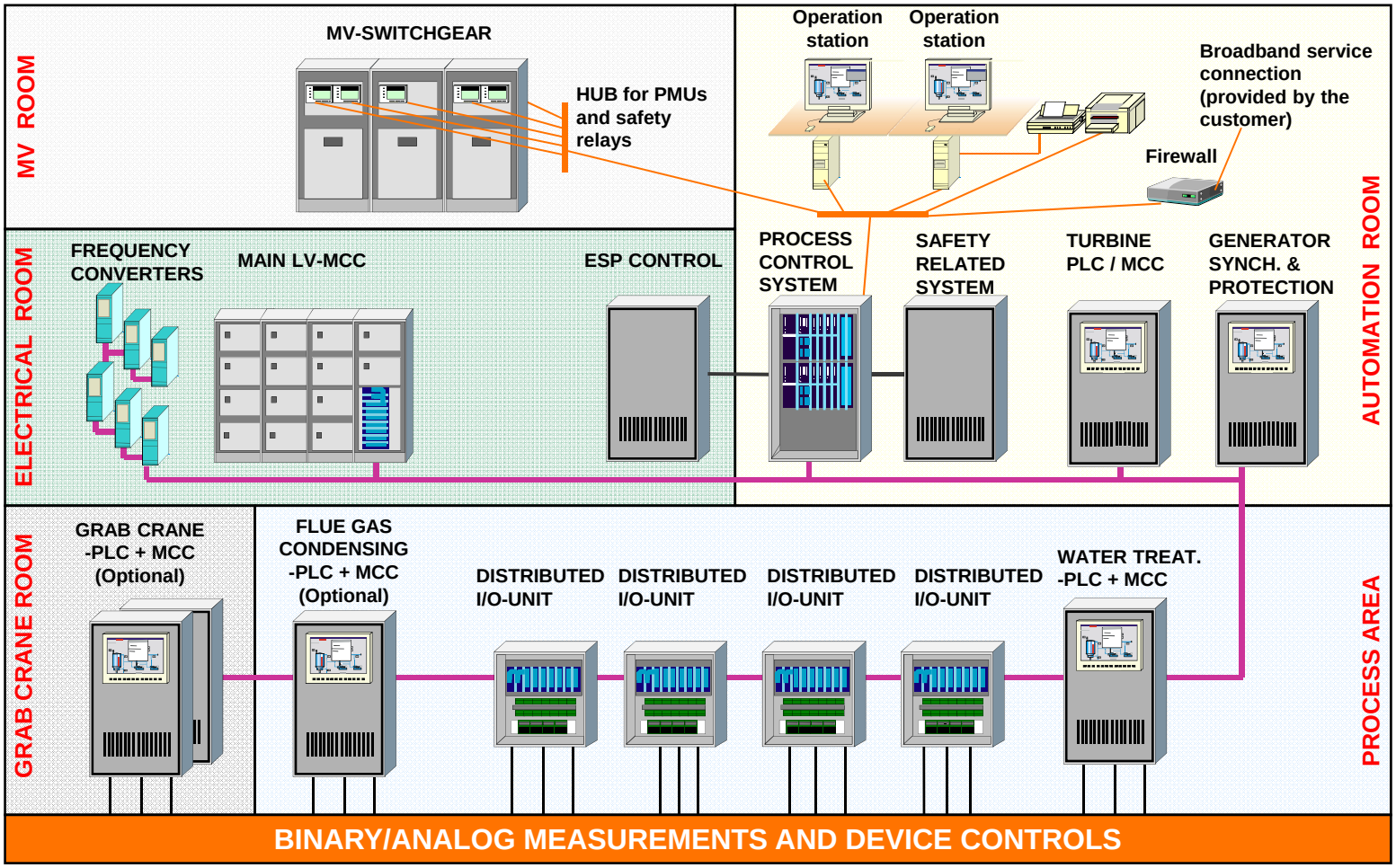
COOLING ALTERNATIVES



Turbine MAN Turbo

BIOPOWER5 AUTOMATION LAYOUT



SERIAL PRODUCTION

BENEFITS OF SERIAL PRODUCTION

- **Standardized solutions**
  - *Pre design*
  - *Variations with options*
- **Modular product structure**
- **Networked way of working**

BENEFITS TO THE CLIENT

- **Fast quotation**
- **Consistent quality**
- **Tested components**
- **Clear scope of supply**
- **You know what you will get**
- **Fast schedule**
- **Economically attractive price level**

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MODULARIZATION

BENEFITS OF MODULARIZATION

- Minimized fieldwork
- Modules are fabricated and tested at factory under controlled working conditions
- Work is performed according to our high standards
- Faster and more cost-effective construction
- Fewer fitting errors
- Minimized lay-down space on site

MODULES COSISTING OF:

- Valves and instruments
- Electrical connection to safety switch
- Instrument connection box
- Connections for piping
- Piping supports
- Installation rack
- Insulation

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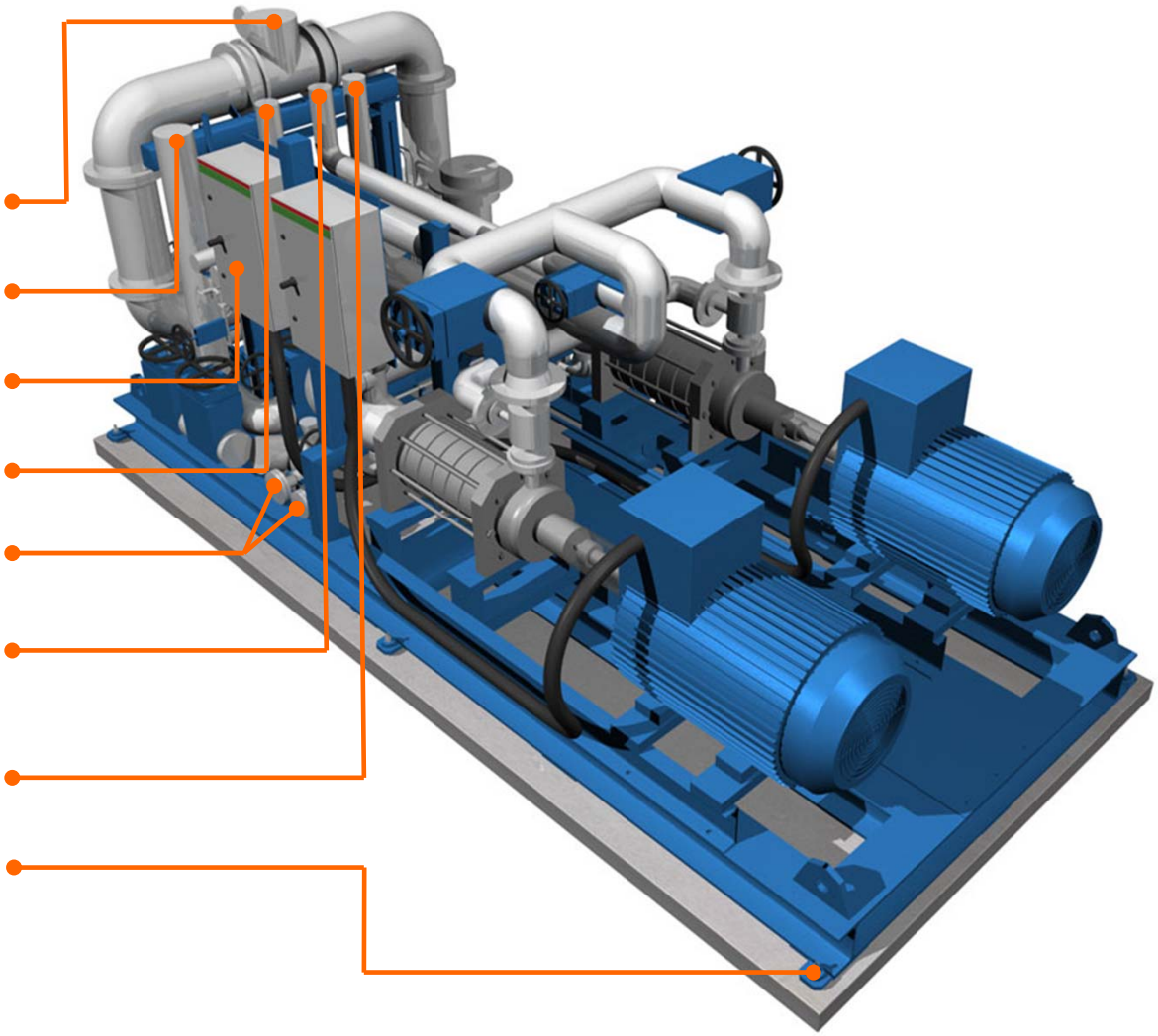
CONNECTION POINTS OF MODULE

CONNECTION POINTS OF FEED WATER PUMP MODULE



- Feed water inlet (Feed water tank)
- Feed water outlet (Economiser)
- Electrical connection
- Chemical dosing inlet
- Drain
- Feed water outlet (Desuperheater & Reduction valves)
- Feed water outlet (Recirculation)
- Steel frame connected to foundation

LIST OF MODULES

- **B310 Fan module**
- **B340 Ducting module**
- **H150 Cooling water ciculation pump module (with radiators)**
- **T130 Closed cooling water module**
- **T140 Turbine drain tank module**
- **W110 Condenser module (with radiators)**
- **W130 Vacuum Module (with radiators)**
- **W140 Condensate pump module (with radiators)**
- **W160 Heat exchanger module**
- **W170 Condensate pump module**
- **W310 Feed water pump module**
- **W320 Feed water tank module**
- **W410 Blow down module**
- **W420 Venting module**
- **W540 Live steam module**
- **W550 Main steam module**
- **X131 Make-up water tank module**
- **X132 Make-up water pump module**

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Situation today

Motala

Trollhättan

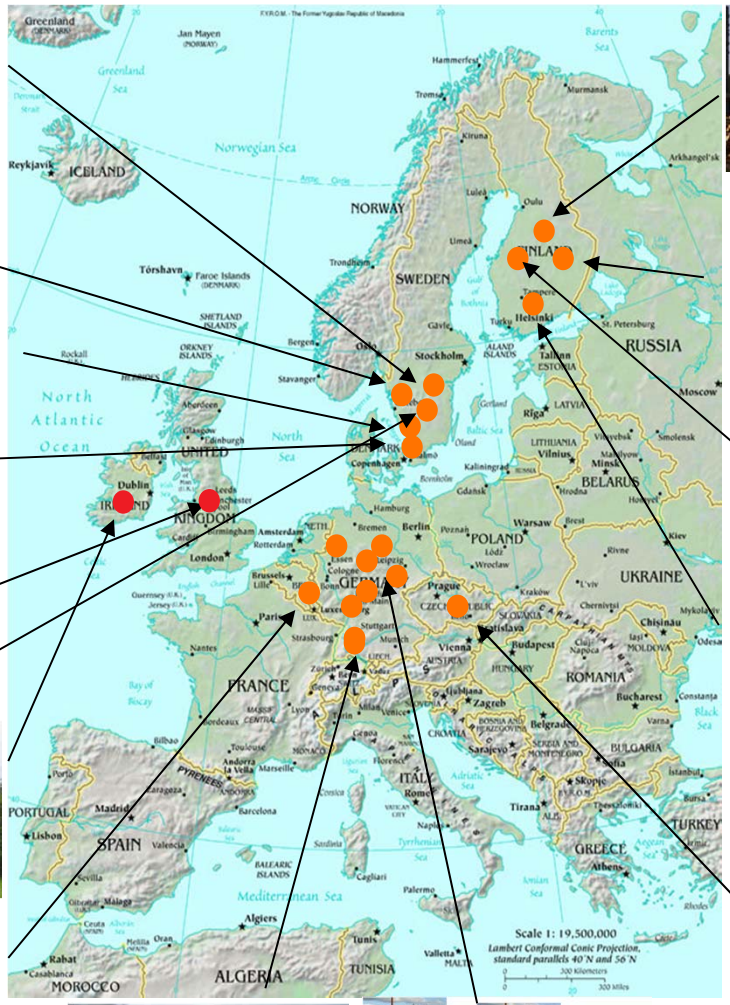
Marks Värme

Halmstad

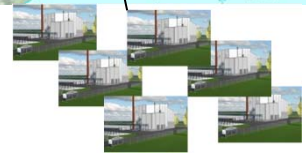
2*Royal Brewery Tranås

Grainger sawmills

2* Amel Cogen



Baden



6* Best Energy

Vilppula

Kiuruvoima

Puulaakso

Renko

Less Forest

100+ grates operating worldwide

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