Green energy factory

Technology at the TWTP:

- Furnace - grate furnace integrated into the boiler
- Grate - inclined moving grate
- Boiler – drum-type heat recovery steam generator (HRSG) with natural circulation
- Turbine - extraction condensing turbine

TWTP RECEIVES

- mixed municipal waste with secondary raw materials separated
- combustible ballast from other installations for processing municipal waste

SELECTION OF WASTE, UNLOADING AND LOADING IN THE COMBUSTION CHAMBER

Refuse collection vehicles unload the waste in the unloading hall of the bunker, which is a reinforced concrete tank of a capacity that ensures stocking waste for 5 days. The waste is mixed together in the bunker to obtain a uniform mixture, which improves incineration efficiency. Cranes with 6-teeth grapple buckets transport waste to feed hoppers where it falls under gravity into the loading shaft.

Radioactive material detectors were installed in the facility in order to prevent items disrupting the system from entering it. The TWTP also keeps a record of and monitors waste delivered for thermal processing.

FIVE STAGES OF THERMAL WASTE TREATMENT

Drying

In the initial grate zone, the waste is heated by means of radiation or convection, reaching temperatures above 100°C which results in the evaporation of moisture.

Degassing

As a result of continued heating, up to a temperature above 250°C, the waste releases gases (moisture and carbonisation gases).

Combustion

Complete waste incineration takes place in the third section of the incineration grate. Loss on ignition in this zone is below 0.5% of the share of mass production.

Gasification

During the gasification process, volatile products are oxidized with molecular oxygen. Most of the waste is oxidized at 1000°C in the upper section of the furnace chamber.

Afterburning

The amounts of carbon dioxide in the combustion gases is reduced in the recuperative thermal oxidation area. At this stage, secondary air is supplied for total incineration. Exhaust gases are to be given a minimum of 2 seconds in this zone at a temperature of at least 850°C.

The adopted combustion technology ensures the reduction of CO and NOx, dioxins and furans emission in the combustion chamber. Thermal energy produced during thermal waste processing is recovered in a heat recovery steam generator integrated with the grate furnace.

ENERGY RECOVERY PROCESS

The main device of the thermal energy recovery system is a heat recovery steam generator (HRSG) with natural circulation of exhaust gases. Heat exchange takes place in the boiler; exhaust gases are cooled to a

temperature of 180°C and heat is used to convert water, passing through the boiler, into superheated steam. Superheated steam (40 bar and 415°C) is directed to the electricity generation and transmission node, where it drives a steam turbine set. The actuated turbine converts mechanical energy into electrical energy.

The produced electricity is consumed by the operator, while excess energy is returned to the grid. The cogeneration mode also makes it possible to produce heat. The heat is distributed to the municipal heating network and then to the local houses and apartments.

TREATMENT OF EMISSIONS

Waste gases are generated as a result of waste combustion, which mainly consist of carbon dioxide, steam, carbon monoxide, sulphur dioxide, oxides of nitrogen and unburned or partially burned hydrocarbons. Pollution occurs both in the form of gas and dust.

Combustion gases pass through the following elements:

- Heat recovery steam generator
- Emission treatment installation
- Gas exhaust fan
- Smokestack

Emission treatment consists of the following stages:

- Denitrification of exhaust gases by means of primary methods and a secondary method of selective application of nitrogen oxides reduction (SNCR) through the injection of 25% aqueous urea solution
- Semi-dry method: with the use of lime slurry, along with the dry entrained flow method with activated carbon (aimed at reducing acidic impurities, dust, heavy metals, dioxins, and furans)
- De-dusting exhaust gases by means of fabric filtration.

Post-processing waste disposal:

By-products created during thermal processing of waste include: slag and bottom ash, boiler dust, fly ash and solid residues from the emission treatment.

Thermal waste processing residue shall be received by properly authorised external entities in the order to be disposed of in compliance with applicable legislation.