



## **A short technical description**

### **of the project mini THERMAL POWER STATION capacity 12.0 MW of electric energy**

NVK Energosouz LLC offers to build a mini THERMAL POWER STATION, using wood chip as fuel. Mini THERMAL POWER STATION will consist of the following modules:

- 1. The fuel preparation section**, which includes:
  - the composition of the wood area, 1 ha, built of the quarterly principle from 10 m long and 4 m width stacks. Between the stacks there are fire breaks, which are used for the crane and the truck. The area of the stacks is 992-1049 m<sup>2</sup>, the volume is approximately 10000 m<sup>3</sup>. Number of stacks – 4 pieces. The total volume of warehouse is 40640 m<sup>3</sup>. The proposed organization of the warehouse will stabilize the humidity of wood chips;
  - **two stationary chipper chip**, which are mounted below the zero mark with a nominal capacity of up to 20 tons of cod per hour each;
  - **the composition of the chip** is located in the immediate vicinity of shredders and "live bottom", an area of 1000 m<sup>2</sup> and the capacity of 3000 m<sup>3</sup>. Supply of chip from the shredders on composition is performed using the transporters.
  
- 2. Section of wood chip transportation** from a warehouse to the receiving bins of boilers:
  - **the two transporters** (or mechanical loader) that serve the chip from the wood chips composition to the "live bottom" composition ;
  - two "live bottom" warehouses that serve chips, each in a separate transporter;
  - **transporters of chips** in receiving boiler hoppers.
  
- 3. Boiler room**, an area of 1500 m<sup>2</sup>, is equipped with three steam boilers.
- 4. Machine (turbine) room**, an area of 500 m<sup>2</sup>, which is located in a separate room and includes two turbogenerator installations, with nominal capacity of 6MVt each.
  
- 5. SYSTEMS and power equipment.** At the output of each turbogenerator a block transformer with capacity of not less than 6 Mw is set up in order to increase the voltage up to 35kv and 10kV KRG. In addition, in the TP composition there are the transformers of their own needs. Power supply for these transformers is made from two independent sources of electricity.
  
- 6. System of control and management.** The mini-TPP is built with a high level of automation, allowing you to work automatically without the intervention of the operator.
  
- 7. Branch of the HVO** is designed for the preparation of purified water that goes to the powering of steam boilers.
  
- 8. On the territory of the mini-TPP there is a ground of auxiliary equipment:**
  - artesian chink** and the domestic water supply;
  - reverse water supply;**

**system coolers** for cooling water return;  
**fire tanks** and fire pumping stations;  
**chimney**;  
**sewage treatment plant.**

## 9. A short list of construction works.

Development of the design-budget documentation, in all parts, including: Theo, EIA, heat mechanics, construction, MC, AU, MANUAL, electric, estimate financial, technical support at the facility documentation in the State Committee of Ukraine.

The development of the project works (cf.) and project organization (PIC).

The execution of construction works in full.

Purchase, manufacture and supply of basic and auxiliary equipment in the building.

Performing of installation works.

Implementation of complex commissioning.

To perform all installation works are supposed to attract construction organizations.

Assembly is carried out by manufacturers of the equipment supplied.

## 10. Evaluation of the effectiveness of the project

The project is supposed to be implemented in two queues.

Primarily it is anticipated to build a THERMAL POWER STATION with a capacity of 6 MW, consisting of two boilers and one turbogenerator. In second place one boiler and turbine generator is set.

The costs of the implementation of the first stage, including equipment, design, construction and start-up, working capital per year, will amount up to 5 to 6 million dollars. Time of construction - 18 months.

The volume of sales for the year of operation will be

$8000 \text{ hour} * 6000 \text{ kW} * 0,125 \text{ Euro} = 6 \text{ million Euro}$  (0,125 Euro - the cost of exploitation by the green tariff), or 6,6 million USD.

The basic costs of the operation of a THERMAL POWER STATION with a capacity of 6 Mw consist:

with the cost of raw materials

$8000 \text{ hours} * 25 \text{ t. couple} * 0.4 \text{ kg} * 17.5 \text{ dollars} = 1.4 \text{ million USD,}$

wage:

$100 \text{ persons} * 12 \text{ months} * 7000 \text{ UAN.} = 8.4 \text{ million UAN. or } 336000.00 \text{ USD}$

with the cost of electricity for own needs:  $700 \text{ kW.} * 2 \text{ UAH.} * 8000 \text{ hours} = 11200000 \text{ UAH. or } 448000,00 \text{ USD}$

The total volume of annual expenses will be  $0.448 + 0.336 + 1.4 = 2.184 \text{ million USD,}$  which is less than half the income for the year.

Thus, the investments pay off, giving about

$5.9: [6,6-2,255-(6,6-2,255) * 0.18] = 1.63 \text{ years (20 months)}$   
to operate the station.