



NORSK  ENERGI



The National Cleaner Production Center - Macedonia

CLEANER AND MORE COST EFFECTIVE INDUSTRY IN MACEDONIA

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ROUNDTABLE DISCUSSION

FROM ANALYSIS TO REALISATION

How to realise energy efficiency projects in Macedonian industry?

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**PUBLIC HEALTH-CARE "UNIVERSITY CLINICAL CENTRE" – SKOPJE
SKOPJE**

Information about the company

- The main activities of the UCC are: providing and executing public health care, health education activity for the needs of universities and high schools and participation in scientific research activity. For the Faculty of Medicine, Faculty of Stomatology, Pharmaceutical Faculty and other faculties, it provides conditions for team multidisciplinary activity with rational participation of resources and equipment, and scientific survey activity in similar disciplines.

Energy efficiency options identified

- The Clinical Centre, as an institution that provides health-care activities, is a large consumer of various forms of energy. It is a consumer of fuels for heating and transportation, production of process steam, hot water, compressed air, other compressed gases etc. At the same time, the Clinical Centre appears as a significant source of emissions of harmful materials to the atmosphere, to the water and soil.
- The whole system of energy facilities, including the boiler plant, as well as the other energy facilities, equipment and installations, located inside and out of the boiler plant, at various organisational units, is very complex. The system is not designed in total, but it was constructed step by step, with the grow-up of separate segments and erection of new buildings in the UCC. It must be emphasised that the energy system is of essential importance for the overall functioning of the Clinical Centre.
- The most of the energy equipment and installations operate with relatively large energy losses, mostly due to the years of insufficient investment and improper maintenance.
- It is an estimation that with certain investments it is possible to obtain significant direct and indirect energy savings
- The focus areas within the project were the boiler plant; namely, water treatment, production and transportation of steam and hot water; condensate return; as well as the efficiency of operation/function of certain parts of the energy facilities in the Clinical Centre. With the previous in mind, the Public Institution for Common Affairs, one of the units in the framework of the Clinical Centre, appeared to be the main carrier of the activities in the project.
 1. Huge loss of working medium – hot water, steam and condensate through the pipeline system and installations, which are very complex, with many branches, both on steam/hot water distribution side and on condensate return side. There are, also, heat losses and condensate waste directly at the consumers. As a general consequence, the whole system operates with low energy efficiency
 2. Uneven distribution of thermal energy for heating, which is manifested with the fact that some facilities in the centre experience insufficient heat supply in the coldest days, but other buildings are overheated.

1. Proper boiler operation load management, that means, obtaining optimum operating range for each boiler in the system, depending on the steam demand, is one of the pre-conditions for obtaining higher boiler efficiency and energy saving. In addition, better control of the burners operation; i.e. control of the excess air level, in order to assure complete combustion and low heat losses due to flue gasses heat content, can assure improvement of the energy efficiency.
2. Replacement of the old burners (3 of 4; one is relatively new).
3. Progressive revitalisation and replacement of the out-dated equipment in the central boiler room and in the heating sub-stations.
4. Installation of control equipment, i.e. control valves with electronic or pneumatic actuators, with possibility for remote control, at several locations (laundry, restaurant etc.).
5. Introduction of natural gas as a fuel instead of the heavy fuel oil.
6. Installation of measurement and control devices at various locations of the heating system and the steam distribution system
7. Rehabilitation and revitalisation of the system for transportation and distribution of hot water, steam, collection of condensate and condensate return in the boiler room.

The main objectives that would be obtained with implementation of this measure are:

- improvement of combustion efficiency and, consequently, reduction of fuel consumption;
- better control/regulation of the combustion process;
- reduction of the emission of CO, NO_x, PM-10, CO₂ (and other greenhouse gases);

Estimated energy savings, cost savings and investment budget

- There are plenty of options and measures that would contribute to energy saving and the overall energy efficiency improvement of the energy facilities in the Clinical Centre. However, some of the priorities are listed below:
- optimisation of steam/hot water heating network;
- installation of measurement and control equipment;
- replacement of old burners;
- fuel switch from residual fuel oil to natural gas will improve significantly the overall energy-environmental operating conditions
- revitalisation and modernisation of the equipment and devices in the boiler room and in the sub-stations in separate clinic units:
 - pumps and the additional equipment;
 - equipment for chemical and thermal feed water treatment;
 - auxiliary equipment, armature, such as valves, steam-traps, etc.;
 - condensate management;
 - others

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Estimated CO₂ reductions

Table 1. The emissions from the boiler plant

	Emissions of gases and particles from the boiler plant	Annual quantity, t/year
1	Sulphure dioxide SO ₂	144.06
2	Nitrogen oxides NO _x	42.8
3	Carbon monoxide CO	2.66
4	Carbon dioxide CO ₂	7970.40
5	Particles	10.33

** CORINAIR SNAP methodology was used for estimation of emissions from stationary and mobile sources*

Challenges for implementation

- MOTIVATION
- MONEY

