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CLIMATE PROTECTION

AND

COST REDUCTION

OPTIONS FOR

DISTRICT HEATING

Project ID: WBGC-2021.3-2021-00013

Project Title: "FlexHeat" - sustainable district heating, cities and power generation in Vojvodina

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Background

The **Vital Management Ltd.** successfully submitted a project proposal to the West Balkans Green Center.

The **main objective** of the project is to help transform the energy sector in Vojvodina in line with the EU energy strategy. Our primary focus is on increasing the competitiveness and sustainability of district heating services in the towns in Vojvodina, improving urban sustainable energy management in these cities, reducing the use of fossil fuels, helping to integrate renewable power generation into the grid, and improving air quality.

During the project implementation we organised **two study visits, interviewed several stakeholders** in Vojvodina and gathered a lot of information on local specificities.

We concluded that Vojvodina has a very large wind power capacity due to its favourable geographical location. This creates new challenges and opportunities for the electricity industry, in particular with regard to Hungary, which is strengthening its electricity market interconnection with Serbia. Increasing energy efficiency, reducing fossil fuel use and air pollution from heating are important goals in Vojvodina.

Here below we give a short summary of potential areas of intervention in respect of further improving district heating systems in Serbia.

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Climate protection and cost reduction options

1. **Potential biogas and potable waste heat input for district and local heating**

   - in cooperation with the water utility company (close cooperation is a prerequisite for the project)

In principle, heat produced from biogas could be used for district heating. Biogas can be produced, inter alia, in wastewater treatment plants, and this is already being done in the wastewater treatment plant in Freetka, where the energy produced is partly recovered, but the volume of energy from biogas production could be significantly increased by appropriate possible developments (food waste recovery, biogas storage capacity increase, technological improvements, etc.). In other municipalities there is no biogas production from sewage treatment plants, and it may be useful to explore this possibility, even in a regional cooperation, thus solving the serious problem of sewage sludge treatment, and also to examine the possible role of the regional landfill in Freetka.

2. **Energy improvements at water utility**

The most important energy generation options are the use of excess/overheating of extracted drinking water for (district) heating, the optimisation of biogas production at the wastewater treatment plant and the installation of a solar power plant on water at the wastewater treatment plant.

3. **Installation of a solar power plant - electricity generation**

Solar power generation is a good option in Vojvodina, including for meeting part of the electricity needs of companies and municipalities from their own generation. A suitable installation site is required, where the necessary power grid is available outside the area and, if possible, also a transformer. One such specific site identified with the above characteristics is the possibility of installing solar panels on water at the wastewater treatment plant in Freetka.

4. **Automated meter reading of utility consumption, automatic processing of utility data**

Several utility companies and municipalities in Vojvodina have problems with the cost of reading utility meters, the cost of data collection and the cost and staffing requirements for data processing of the recorded utility data. These areas can be improved, even at municipal level, with the cooperation of several utility companies, using automation technologies and procedures already proven elsewhere. This could lead to significant savings in labour and material costs and service charges. In case of implementation in Subotica, it would be advisable at least to implement a cooperation between the water utility and the district heating company in order to make optimal use of the high level of technical expertise available in the district heating company.

5. **Increasing the methane content of biogas**

The methane content of the biogas would be greatly increased by the introduction of other organic substances into the digester. For example, whey waste from dairies could be brought in by tanker trucks, or the collection of cooking oil from restaurants could be an option, too. This may also require the construction of transfer stations, including the technology to feed the organic material.

6. **Installation of a second biogas tank**

The biogas produced by the treatment of sewage sludge contains about 60% methane, the rest being carbon dioxide and other gases. The amount of wastewater is relatively constant, but rainwater is also mixed in (not separately discharged), which reduces the quality of biogas production. The planned capacity of the purification hydraulic system for rainwater is 108,000 m3/day. It takes 2 to 4 days to reach normal dry season conditions after thunderstorms. Thus, the surplus rainwater can be estimated at 2000 - 4000 m3 according to the company.

The 450 m^3 biogas tank is mostly sufficient by now, but not always, as production is not always constant. During the interviews it was mentioned several times that it would be nice to have another tank of this size, because in rainy periods shortage of biogas may occur.

7. Use of geothermal energy for district heating in Subotica

Geothermal energy requires the extraction of water or steam, except for heat pumps. There are the following ways to use geothermal energy.

a) Heat recovery assisted by heat pumps

Heat pump systems do not necessarily require the extraction of water from below the surface. The heat supply medium can be surface water, groundwater, ground heat at a depth of a few metres and ground heat up to a depth of 150-300 metres. The heat pump system can be used for heating in winter and cooling in summer. The biggest advantage of heat pump assisted heating is that it can be used virtually anywhere, in single-family houses and in farms with scattered residential buildings. Another use of heat pumps is to recover "waste heat", i.e. heat that would otherwise be lost to the environment. This heat can be thermal water cooled to 30-40 °C, or waste heat from industrial processes in the form of hot water or air.

b) Direct heat supply

Most of the geothermal energy can be used directly for heating (residential heating, domestic hot water, greenhouse heating, crop drying, etc.) with good efficiency and in large quantities.

c) Combined heat and power generation

For electricity generation, water at a temperature of at least 120 °C is needed to achieve satisfactory efficiency with current technology. It is also worth exploiting the available electricity generation potential because electricity generation can be combined with direct heat recovery, which can recover about 10 times as much heat as the electricity generated. Examples are the geothermal power plants in Austria and Germany, which operate in a combined heat and power mode.

8. Upgrading heating systems in district-heated apartment buildings

There would be significant cost savings potential if the heating systems of condominiums were upgraded, including the insulation of the buildings. The EBRD has developed a financing strategy for this, which could lead to high energy efficiency projects with a good return on investment.

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