Nikolay Denisov,

, Ph.D., Chairman of the Krasnodar Region Legislative Assembly's Committee on Industry, Construction, Housing, Utilities and Amenities

IMPLEMENTATION OF GREEN AND ENERGY-SAVING TECHNOLOGIES IN KRASNODAR REGION

The Olympic construction and development program for Sochi has resulted in a number of success stories in the area of implementation of environment-friendly and energy-saving technologies in the region. The Sochi project gave Krasnodar Region more than an array of modern sports facilities and venues; it was a comprehensive project covering implementation of new engineering, transportation and social infrastructure networks that are up to the international quality standards.

A report dedicated to this sub-project was presented at a round table discussion that focused on the preparation of the National Strategy for Implementation of Environment-Friendly and Green Technologies in the Public Housing, Utilities and Amenities Sector. On April 2, 2014, the Russian State Duma Committee on Housing Policy and Utilities and Amenities held a session that addressed the agenda.

Green standards were put on the list of the requirements for all Olympic construction projects by the government.

A comprehensive system of green standards was developed that set, among others, the following priorities:

- conservation of the surrounding territories;
- ban on direct incineration of untreated waste;
- mandatory certification of construction materials;
- ban on the use of trees protected by CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora), Red Data Book of the Russian Federation, and Red Data Books of Russia's subjects;
- priority of the locally sourced construction materials in order to minimize air pollution during transportation.

Additional requirements were to use the natural light to the best advantage in order to save energy and to use energy-

Olympic venues in Sochi: Fisht Olympic Stadium, Iceberg Skating Palace and Bolshoy Ice Dome

Ust-Labinsk hospital's solar power station

saving lighting units; no 50 Hz incandescent or fluorescent lights were allowed.

A number of projects significantly improved Sochi's environmental profile, among them the successful launch of the 1st phase of the Bzugu waste water treatment facilities upgrade project in Khosta that gave the area the capacity to treat up to 70 thousand cubic meters of waste water daily, and the successful completion of the high-capacity sewerage pumping station near the Sochi sea port. These two projects allowed to make the Sochi residents' dream finally come true — to have the Navaginsky waste water treatment plant situated in the city's downtown area shut down and have the city's waste water managed by the more distant Bzugu waste water treatment facilities.

At present, works are in progress for the 2nd phase of the Bzugu waste water treatment facilities upgrade project, which will increase the facilities' capacity up to 140 thousand cubic meters of waste water daily and through that provide a long-term solution to the waste water treatment needs of Sochi's Central and Khosta areas.

Also, the new Adler waste water treatment facilities with the capacity to treat up to 50 thousand cubic meters

Bzugu waste water treatment facilities in Sochi

Renovated Sochi railway station

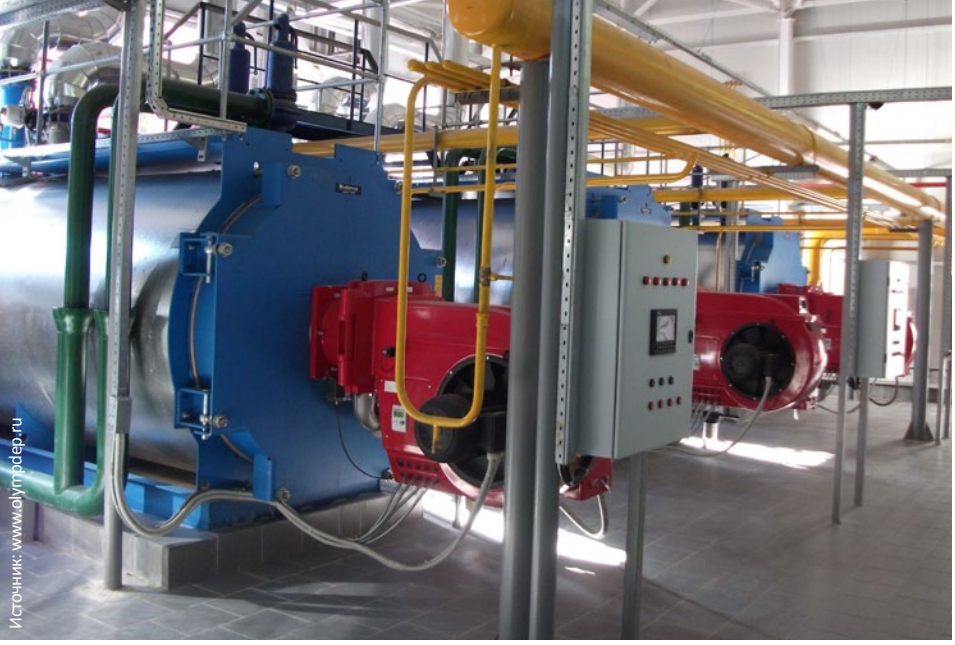
of waste water daily will be a significant improvement to Adler's waste water treatment network. The project will allow to discontinue the use of septic tanks which will have a favourable impact on the overall environmental situation in the Greater Sochi.

New waste water treatment facilities that were built in Sochi's mountain Olympic cluster i.e. in Krasnaya Polyana, Esto-Sadok and Laura have allowed to discontinue direct disposal of untreated water waste into the local mountain rivers.

Sochi has also benefitted from a heat supply system upgrade project that was part of the long-term regional target program Energy-saving and Increased Energy Efficiency in Krasnodar Region for 2011–2020. The total amount of investments into the project is assessed at 239 million roubles. A total of 230 condominium residencies were fitted with an in-house heat supply station each. For all residential constructions projects, the independent heat supply system solutions and closed-circuit heat supply system solutions were implemented. The heat supply stations were fitted with steal piping with anti-corrosive and heat insulating coating. Heat meters were installed at inlet points to measure the total heating load for heat supply and

Beregovaya wind power station in Temryuk district

Solar power station at the health resort Rassvet in Anapa



hot water supply. Each heat supply system was equipped with an automatic temperature adjustment solution for the heat-transfer fluid depending on the outside air temperature.

This project has significantly increased the level of comfort and reliability of the heat supply system for the local residents who can now enjoy optimal indoor temperature in all seasons while saving 10 to 15% of heat energy. The end user hot water rates were by reduced by 22%. The new heat energy production cycle now consumes 7.6% less of gas, 32% less of water and 11.9% less of electricity.

The energy saving value of the project is expected to reach 31 million roubles per year, or 5.8 roubles per square meter. The estimated project payback period is 6 years.

Another of the program's objectives is development of renewable power generation technologies. Krasnodar Region is Russia's most promising territory for the renewable power generation due to its location and climate resources. Renewable power sources are expected to be able to supply up to 2, 200 MW of heat energy and up to 1, 300 MW of electric energy. The total potential for the alternative power generation sources in the region is assessed at 2.5 million tons of oil equivalent per annum.

There are a total of 70 functioning solar power stations in Krasnodar Region, among them solar energy collectors with the total area exceeding 7000 square meters. The calculated annual heat production capacity for these stations is 6 GWh and 5200 Gcal, with the potential to save up to 1000 tons of oil equivalent per annum compared to conventional boiler units. The functioning solar power stations are supplying energy to a number of important infrastructure facilities and health resorts of the Black Sea and Azov Sea,

Fully automated boiler unit #29 after upgrade in Sochi

Residential complex Platanovy in Pushkin Street, Krasnodar

the areas which enjoy an average of 260 to 280 sunny days per year.

A solar power station with the total area of 600 square meters has been built in Ust-Labinsk to provide hot water supply to the central hospital in the area.

Another solar power station, with the total area of 370 square meters, has been built in Anapa's city hospital.

A solution for the year-round heat supply to the buildings is being developed based on the inbuilt solar panels enhanced with sealed insulating glass units.

VETROEN-YUG PLC and VES-YUG PLC, in cooperation with the Krasnodar Region Industry and Energy Ministry, have developed a number of investment projects to support construction and operation of the wind power stations with a total capacity of 398 MW in Gelendzhik, Anapa, Yeisk and village Blagoveshchenskaya.

The following two investment projects are in the final stages of production:

Construction of Russia's largest wind power station Blagoveshchenskaya near Anapa, with the planned capacity of 119.6 MW;

- Construction of wind power station Mirny in Yeisk region, by the Azov Sea, with the planned capacity of 60 MW.
- Construction sites have already been agreed and the target power distribution plans have been approved.

Low heat energy has been used in the Krasnodar Region for over 30 years to supply heat to the local residences, greenhouses and spa resorts. There are a total of 12 wells, 1700 to 2300 m deep which serve as sources of geothermal energy. Up to 10 million cubic meters of water with the temperature ranging from 75° to 110 °C is recovered from these wells. Currently, only 6–7% of the total potential of these geothermal sources is being used in the local heat supply systems, which defines great prospects for further development of this resource.

The cost-effective solution would be to use geothermal energy sources to produce 3 to 3.5 million tons of oil equivalent per annum which would account for 20–23% of the region's total consumption of the fuel and energy resources.

Clause 8.10.6 of the Resolution of the Krasnodar Region Legislative Assembly of 24 July 2009 #1381 (On the Urban Planning Norms and Standards in Krasnodar Region) stipulates alternative energy sources as a mandatory component for the power supply systems for the construction projects financed from the regional and municipal budgets.

The important outcomes of these projects are the reduced power consumption in the production of the gross regional product and the improved overall environmental situation in the Krasnodar Region. ●