

Carbon financing for the Murmansk district heating network, Murmansk, Russia

The Murmansk District Heating rehabilitation project is a Joint Implementation project developed between the Russian Federation and the investor countries of the Baltic Sea Region Testing Ground Facility. Energy saving measures were taken in the production and distribution of district heating in the Leninsky district of Murmansk City, leading to reduction in emissions of greenhouse gases.

Introduction

The history of State Heat and Power enterprise TEKOS dates back to the 1960s when “Severnaya” boiler plant was built in order to provide heat to apartment blocks that were under construction. In the beginning of the 1970s “Severnaya” boiler plant was renamed to “Enterprise of heating networks” TEKOS, and a resolution was made to transfer heat supply sources and networks to the ownership of the “Enterprise of heating networks”. Currently TEKOS operates 31 boiler plants in 18 cities and settlements in the Murmansk region. The plants include 173 boilers with a total capacity of 1 163 Gcal/hour, the distribution networks comprise of 389 km of culverts, and 3 300 people work for the company.

TEKOS has also recently taken charge of two city power supply networks, in Kovdor and Zapoljarnij, which includes 251 transformer substations, 144 km of overhead power lines and 280 km of underground power lines.



Existing heating point connection



Example of new substation connection with heat exchanger

The main activity of the enterprise remains the production, transportation and distribution of heat and domestic hot water to consumers. Municipal housing is the main consumer of heat. Within Murmansk City, TEKOS operates the Severnaya and Rosta centralized district heating systems which service the Leninsky district accounting for one third of the city population. The Company is also responsible for maintenance of its own distribution piping networks, as well as maintenance of the networks in Oktjabrsky and Pervomajsky districts, although TEKOS does not own these networks. TEKOS has an agreement with the building owners to maintain buildings internal heating systems in Leninsky, Oktjabrsky and Pervomajsky districts.



Norsk Energi, The Norwegian Association of Energy Users and Suppliers is an independent competence centre within the following areas: ENERGY - ENVIRONMENT - SAFETY. Today, we have 75 employees and 206 member companies from industry and public administration and thus represents a forum for energy producers and consumers. Currently, our members utilize 90% of the energy consumption of Norwegian industry.

Energy saving measures

The Leninsky district of Murmansk City serviced by Severnaya and Rosta centralised district heating systems accounts for about one third of the City population, with a heat of approximately 700 000 Gcal/year (812 GWh per year). The existing district heating systems in the Leninsky district are to a large degree of the "open type" i.e. all domestic hot water is produced in the central plant and distributed to the consumers through the district heating piping network. This results in water quality problems and relatively high energy consumption.

The Priority Investment Program (PIP) that is proposed for the Leninsky district consists of installation of heat exchanger stations with modern control equipment in all served buildings. Replacement of some parts of the distribution piping network and installation of control equipment, new pumps with variable speed control and new burners on two boilers in the Severnaya boiler plant is also proposed. The PIP will require an investment in the of approximately 30 Million EUR.

The investment program will result in reduced energy consumption for the end user by 15% and the fuel consumption in heating plants will be reduced by over 20%. This will correspond to a reduction in CO₂ emissions of approximately 297 614 tonnes over the 5 year Kyoto period. The Murmansk District Heating Rehabilitation project has been prepared as a Joint Implementation (JI) project developed between the Russian Federation and the investor countries of the Baltic Sea Region Testing Ground Facility (Iceland, Norway, Sweden, Denmark, Finland and Germany). The JI project was prepared by NEFCO on behalf of TGF (in its capacity as Fund Manager to the Facility). The project developer and owner is TEKOS. The Project Design Document (PDD) was prepared by Norsk Energi and the Murmansk Oblast Energy Efficiency Centre (MOEEC).



Emissions from the existing boiler house

Project Financing and implementation

The project is financed through a contribution from TEKOS, grants from the Northern Dimension Environment Programme (NDEP) and the Swedish Bilateral Aid Agency (SIDA), with the majority of the investments coming from a loan from the Nordic Investment Bank (NIB).

Financier	Type	EUR x 1000	%
Local Contribution, TEKOS	"In Kind"	7 300	24 %
NDEP	Grant	5 000	17 %
SIDA	Grant	700	2 %
NIB	Loan	15 000	50 %
NEFCO (JI Bridge)	Loan	2 000	7 %
Total Financing Commitments		30 000	100 %

Like many large scale infrastructure projects, the return on investment is low, and is unlikely to be of interest to local Russian banks who are very focused on short payback periods. This emphasises the need for carbon financing and the project IRR improves significantly with the additional revenue from the sale of carbon credits.

Scenario	IRR ¹⁾	Payback period
Without sale of carbon credits	2.89 %	10 years
With sale of carbon credits ²⁾	4.85 %	9 years

¹⁾ IRR calculated over a 10 year period from first investment in 2007

²⁾ sale of carbon credits over the first Kyoto period only

The table above shows that the sale of carbon credits generates additional income, which results in a more acceptable return on the investment. The return on investment improves further, to an IRR of 6.19 %, if the sale of carbon credits is considered to be possible after 2012.

For a full explanation of the methodology used please refer to the Project Design Document ([http://ji.unfccc.int/JI_Projects/Verification/PDD, project number 0027](http://ji.unfccc.int/JI_Projects/Verification/PDD,project_number_0027)).

More information

For more information of this project and to find out the benefits of Energy Efficiency please contact Norsk Energi,

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