SIDA DemoEast programme in Estonia. Supply, delivery and installation of wood pellet burning equipment

Regional Energy Centres (REC), Estonia

Summary

DemoEast programme is a part of Baltic Billion Fund 2 with the overall aim to stimulate the development of industry and trade in the Baltic Sea region from a Swedish perspective. The DemoEast programme objective in Estonia was to promote the pellets firing technology, equipment and to inform future clients about the projects economical and technological outcomes.

At Rakvere, Leie and Kiltsi light oil fired boilers have been converted to wood pellets burning. The supplier of the respectively 250, 150 and 200 kW pellet burners was NE Naturenergi AB. The projects included installation of pellet burner, silo, pellet transport system and automatic control system. The converted boilers were started in December 2001.

End-user area		Target Audience		Technical	
	New buildings		Citizens		Energy efficiency
■	Refurbishment of buildings		Households	■	Heating
	Transport and mobility	■	Property owners		Cooling
	Financial instruments	■	Schools and universities		Appliances
■	Industry		Decision makers		Lighting
	Legal initiatives (municipal regulations, directives, etc)		Local and regional authorities		CHP
	Planning issues		Transport companies		District Heating
	Sustainable communities		Utilities		Solar energy
	User behaviour		ESCOs	■	Biomass
	Education		Architects and engineers		Wind
	Other (Heating)		Financial institutions		Geothermal
			Other		Hydro power
					Other

Context

The Swedish Government has instructed Sida to implement a trial project in respect of programmes for the demonstration of equipment for the environment and energy sectors. The programmes shall be funded from the so-called Baltic Billion Fund 2. DemoEast programme is a part of Baltic Billion Fund 2 with the overall aim to stimulate the development of industry and trade in the Baltic Sea region from a Swedish perspective.

Objectives

The specific aim of the DemoEast demonstration programme is to make it possible for purchasers in the Baltic States, Poland and Northwest Russia to test and gain experience of Swedish equipment in the environment and energy sectors. DemoEast funds finance 50 per cent of the costs of equipment

and a small training programme when the equipment is taken into operation. The client pays the rest of the investment costs, building and consulting costs.

Process

The DemoEast programme objectives in Estonia were to promote the pellets firing technology, equipment and inform future clients about the projects economical and technological outcomes. For getting the best demonstration effect it was planned to complete programme implementing three different pellet-based demonstration projects. The selected sites are:
AS Rakvere Soojus, Kunderi str. boiler house
Kolga – Jaani Municipality, Leie Basic School
Väike – Maarja Municipality, Kiltsi Basic School.

These wood pellets projects in Estonia have been initiated and implemented by Environmental Technology of the Sound (MTÖ) in Sweden and Regional Energy Centres (REC) in Estonia.

Installation of the pellet-firing equipment in the Rakvere Basic School boiler house
Rakvere Basic School is owned by Rakvere Municipality and is located in the Rakvere town, which is the administrative, economic and cultural centre of Lääne-Viru County and is situated in north Estonia on the northern foot of the Pandivere upland, 20 km south of the Gulf of Finland.

Rakvere Basic School building is supplied by heat from their own boiler house at the Kunderi str. 6. The Kunderi str. boiler house is operated by Rakvere DH company AS Rakvere Soojus, owned partly by Rakvere town. From this boiler house the heat is supplied to the one residential building too. In the Kunderi str.boiler house there are installed two HÖGFORS boilers 21NOVA (with the capacity 500 kW with light oil fuelling) and 26NOVA (with the capacity 700 kW with light oil fuelling). The boilers are fuelled by light fuel oil. The annual light oil consumption is approx. 50 tons and the maximum heat demand capacity of the building is ca 300 kW. The annual heat production is 500 MWh.

The project plan was to convert existing light oil fuelled boiler 21 NOVA into pellets fuelled by installing pellets burner with the capacity 250 kW. The second light oil fuelled boiler will be in reserve. The total delivery programme has consisted of a pellet firing equipment. It has included among other things pellet burner integrated for installation into existing boiler, pellets feeding system, silo for pellets, ash remover, flue gas cleaner, control equipment, start up training.

Installation of the pellet-firing equipment in the Leie Basic School boiler house
Leie Basic School for 216 children is owned by Kolga –Jaani Municipality and is located in the Leie settlement, the former parochial centre and one of the biggest in the Kolga-Jaani parish, which is located in north-eastern part of Viljandi county.

Leie Basic School building is supplied by heat from their own boiler house. In the boiler house there are installed two DE DIETRICH boilers GT 306 with the capacity 110 – 145 kW each. The boilers are fuelled by light fuel oil. The annual light oil consumption is approx. 55 m^3 and the maximum heat demand capacity of the building is 200 kW.

The project plan was to convert existing light oil fuelled boiler into pellets fuelled by installing pellets burner with the capacity 150 kW. One light oil boiler will be will be in reserve. The total delivery programme has consisted of pellet firing equipment. It has included among other things pellet burner

integrated in the existing boiler, pellets feeding system, silo for pellets, ash remover, flue gas cleaner, control equipment, start up training.

Installation of the pellet-firing equipment in the Kiltsi Basic School boiler house
Kiltsi Basic School for 140 children is owned by Väike – Maarja Municipality and is located in the Kiltsi village, one of the biggest in the Väike - Maarja parish that is located in southern part of Lääne - Viru County, in the Pandivere upland. Kiltsi Basic School building is the former manor house. Kiltsi village is located not far from the pellets manufacturer AS FLEX HEAT.

Kiltsi Basic School building is supplied by heat from their own boiler house. In the boiler house there is installed on 1997 THERMIA AB boiler 20-16 with the capacity 320 kW for light oil and 180 kW for firewood. The boiler is fuelled by light fuel oil. The annual light oil consumption is approx. 55 m^3 and the maximum heat demand capacity of the building is 200 kW.

The project plan was to convert existing light oil fuelled boiler into pellets fuelled by installing pellets burner with the capacity 200 kW. The total delivery programme has consisted of a pellet firing equipment. It has included among other things pellet burner integrated for installation into existing boiler, pellets feeding system, silo for pellets, ash remover, flue gas cleaner, control equipment, start up training.

Financial resources and partners
The Swedish Government has instructed Sida to implement a trial project in respect of programmes for the demonstration of equipment for the environment and energy sectors. The programmes shall be funded from the so-called Baltic Billion Fund 2. DemoEast funds finance 50 per cent of the costs of equipment and a small training programme when the equipment is taken into operation. The client pays the rest of the investment costs, building and consulting costs

Results
At Rakvere, Leie and Kiltsi the light oil fired boilers have been converted to wood pellets burning. The supplier of the respectively 250; 150 and 200 kW pellet burners was NE Naturenergi AB. The projects included installation of pellet burner, silo, pellet transport system and automatic control system. The converted boilers have been started up in December 2001.

The total delivery programme has consisted of pellet firing equipment. It has included among other things pellet burners integrated for installation into existing boilers, pellets feeding systems, silos for pellets, ash removers, flue gas cleaners, control equipments and start up trainings.

The reductions of climate and environmental affecting emissions are estimated at:
Carbon dioxide (CO_2) 441 tons/year
Sulphur dioxide (SO_2) 1.2 tons/year

Lessons learned and repeatability
Wood pellets burning equipment installation project in three previously mentioned boiler houses implemented under SIDA DemoEast programme in Estonia show the way on wood pellets use for heating bigger buildings and allow to get practical experience in reconstruction light oil fuelled boilers by installation of wood pellets burners as well as in operating of wood pellets fuelled boilers.
Only one approach in installation of wood pellets burning equipment was implemented, i.e. installation of wood pellets burners to the existing light oil fuelled boilers and there is not possibilities

to demonstrate various versions of wood pellets burning equipment such as special wood pellets boilers integrated with pellets burner in the factory.
Final choice of solution in installation of wood pellets burning equipment was made after inspection of conditions of equipment in boiler houses. To avoid problems in the future in operating of pellets burning equipment and boiler house totally the accurate inspection of conditions of equipment in boiler houses (boiler(s), flue gas fan, chimney, control systems) must be carried out. In some cases the additional measures shall be implemented during wood pellets burning equipment installation.
During operation on installed wood pellets burning equipment the crucial point has been quality of delivered pellets, i.e. high fine particles content mainly caused by pneumatic filling of the storage bunker. To improve pellets delivery discussions have been held between pellets manufacture, transport company and owners of boiler houses. There is lack of practical experience in loose pellets transport in tankers and pneumatic filling of storage bunkers. The quality of the wood pellets is an important factor for good operation of burning equipment. Precautions have to be taken against crushing of pellets during filing procedure.
The final inspection of installed wood pellets equipment was carried out on professional level by expert engaged by SIDA and project owners have been very satisfied.
Seminars arranged under Baltic 21 project "An Environmental Technology Transfer Gathering (ETTG) between Swedish supply and Estonian demand" have shown the big interest of Estonian specialists and municipal decision makers in experience of wood pellets burning equipment installation projects implementation. ETTG has close connections with an earlier financed SIDA DemoEast project described above. One of the aims of EETG was to build up more theoretical knowledge within small-scale bio fuel firing.

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