



Final Report

Mid Size Sustainable Energy Financing Facility (MidSEFF) Energy Efficiency Project at Göлтаş Cement Plant: Non Technical Summary (NTS)

May 2015

Final Report

European Bank for Reconstruction and Development

**Energy Efficiency Project at Göлтаş Cement Plant:
Non Technical Summary (NTS)**

May 2015

The European Bank for Reconstruction and Development (EBRD) launched in January 2011 a financing facility aimed at scaling up Renewable Energy and Energy Efficiency investments in Turkey, to increase the country's energy savings and decrease its carbon emissions. The Turkish Mid Size Sustainable Energy Financing Facility (MidSEFF) launched by the EBRD with support from the European Investment Bank (EIB) and European Commission (source of the Technical Cooperation funds) will provide a total of EUR 975 million in loans through 7 Turkish banks for on-lending to private sector borrowers.

This report has been prepared by MWH S.p.A., D'Appolonia S.p.A., GFA and Frankfurt School of Management and Finance (hereinafter the "Consortium") for the European Bank for Reconstruction and Development (EBRD) in relation to the above-captioned project and is confidential to the client. Neither the Consortium nor any person acting on their behalf, including any party contributing to this report, makes any warranty, expressed or implied, with respect to the use of any information disclosed in this report; or assumes any liability for direct, indirect or consequential loss or damage with respect to the use of any information disclosed in this report. Any such party relies upon this report at their own risk.

This publication has been produced under the Mid Size Sustainable Energy Financing Facility which received a financial assistance from the European Union. The content of this publication is the sole responsibility of the Consortium and can in no way be taken to reflect the views of the EU or the EBRD.

This disclaimer shall apply notwithstanding that the report may be made available to other persons for an application for permission or approval to fulfil a legal requirement.

Project Name: Energy Efficiency Project at Göлтаş Cement Plant – Non Technical Summary (NTS)				Controlled Copy	
Rev. N.	Date	Description Amendment	Edited by	Revised by	Approved by
00	May 2015	Final Report	G.D. Sener	M. Solari	D. Yurtsever

Table of Contents

1.	General Plant Description.....	4
2.	Environmental and Social Baseline	8
2.1	Environmental description of the project area.....	8
3.	Social and Environmental Impact	9
3.1	Land Use	9
3.2	Water	9
3.3	Waste	9
3.4	Noise	10
3.5	Emission to Air	10

1. General Plant Description

The location of the proposed energy efficiency project is in the Mediterranean Region, in Isparta Province, Göller Bölgesi district. The project consists of the two energy efficiency projects described below.

Project title	Brief information
Sub-Project 1 - Electricity production from waste heat recovery (WHR)	In scope of the WHR project, boilers will be installed for each of 5 stacks (pre-heater and cooler). The boilers will cool waste gases and generate steam which will then drive a 12 MW steam turbine.
Sub-Project 2 - Installation of a new and more efficient mill to the cement production unit (5th mill)	The Sponsor will add a new cement mill, vertical type, with a maximum capacity of 240 ton/h and readjust the working hours of the 5 mills.

The chosen technology for the **Waste Heat Recovery** system at Göltaş Cement is the Steam Rankine Cycle, as the gas streams that will be used for the WHR system are well above 300°C.

The cement plant has two production lines: Line 1 is a 4 stage single string preheater kiln system and line 2 is a 4 stage twin string pre-calciner kiln system. The WHR system will incorporate 5 separate boilers, these being as follows:

- Line 1: One boiler on the preheater exhaust gas and one boiler on the cooler exhaust gas steam.
- Line 2: Two boilers on the preheater exhaust gas stream – one per preheater string – and one on the cooler exhaust gas stream.

The boilers will heat and convert the water to steam which will then drive a single turbine with a design capacity of 12 MW. Following the turbine, the steam is cooled and then returned to the boilers to be re-heated.

The system that has been quoted for Göltaş with both kilns in operation has a gross power generation of 9.5 MW and net power output guarantee of 8.95 MW.

Göltaş Cement currently operates four **cement mills**, which are all closed circuit ball mills. The ball mills have been progressively added to the plant over the years as the plant capacity has been increased. The capacity of the mills ranges between 48.5 tph (ton per hour) to 102 tph.

Göltaş are proposing to install the new cement mill which would become cement mill number 5. The proposed mill is a Loesche vertical mill with a design capacity of 230 tph. There are a number of reasons provided by the plant for the installation of cement mill number 5:

- The current specific power consumption (kWh/tonne of cement) of the cement milling units will be reduced by the installation of the vertical mill. Therefore the overall electrical consumption of cement milling section of the plant will be reduced.
- The installation of the vertical cement mill will result in Göltaş Cement being able to avoid operating the cement mills in the hours of the day when the electrical tariff from the grid is at its highest.

The WHR sub project will generate 69,466,320 kWh/year of electricity, while the 5th mill installation will save additional 6,831,000 kWh/year. Total saving will thus be 76,297,320 kWh/y corresponding to 8,310,060 USD/year decrease in total electricity cost.



Figure 1.1: Project Location

Table 1-1: Key project summary data

Project Name	Two Energy Efficiency projects at Goltas plant of Isparta															
Project Borrower	Göлтаş Göller Bölgesi Çimento Sanayi ve Ticaret A.Ş.															
Project Sponsors	Göлтаş Göller Bölgesi Çimento Sanayi ve Ticaret A.Ş.															
EBRD Transaction	<table border="1"> <tr> <td>Objective of Loan</td> <td>EE investment</td> </tr> <tr> <td rowspan="2">Projects</td> <td>Project 1: Electricity production from waste heat recovery (WHR)</td> </tr> <tr> <td>Project 2: The installation of a new and more efficient mill to the cement production unit (5th mill)</td> </tr> <tr> <td rowspan="2">Maturity</td> <td>Project 1: 5 years (1+4)</td> </tr> <tr> <td>Project 2: 6 years (2+4)</td> </tr> <tr> <td rowspan="2">Interest rate</td> <td>Project 1: 5.45% fix</td> </tr> <tr> <td>Project 2: 5.60% fix</td> </tr> <tr> <td rowspan="2">Principal Payments</td> <td>Project 1: 1 year of grace period, start 12 months after first disbursement in equal semi-annual instalments</td> </tr> <tr> <td>Project 2: 2 years of grace period, start 24 months after first disbursement in equal semi-annual instalments</td> </tr> </table> <p>The scope of this REUP is to analyze energy efficiency investment plans of nine projects whose total fixed investment cost, excluding VAT and financing costs is USD 41,479,200¹, divided as follows:</p> <ul style="list-style-type: none"> - Electricity production from waste heat recovery (WHR): 19,500,000 USD; - Installation of a new and more efficient mill to the cement production unit: 21,979,200 USD. <p>The total project cost is USD 46,704,419 (EUR 33,998,994) including VAT and capitalized financing costs. The proposed financial scheme includes 90% debt financing in the amount of USD 42,000,000 (EUR 30,574,362) and equity amounting to USD 4,704,418 (EUR 3,424,632). The investment period interest expenses will be financed by shareholder's equity. The investment duration will be approximately 10 months for Project 1 (WHR) and 17 months for Project 2 (5th mill).</p>		Objective of Loan	EE investment	Projects	Project 1: Electricity production from waste heat recovery (WHR)	Project 2: The installation of a new and more efficient mill to the cement production unit (5 th mill)	Maturity	Project 1: 5 years (1+4)	Project 2: 6 years (2+4)	Interest rate	Project 1: 5.45% fix	Project 2: 5.60% fix	Principal Payments	Project 1: 1 year of grace period, start 12 months after first disbursement in equal semi-annual instalments	Project 2: 2 years of grace period, start 24 months after first disbursement in equal semi-annual instalments
Objective of Loan	EE investment															
Projects	Project 1: Electricity production from waste heat recovery (WHR)															
	Project 2: The installation of a new and more efficient mill to the cement production unit (5 th mill)															
Maturity	Project 1: 5 years (1+4)															
	Project 2: 6 years (2+4)															
Interest rate	Project 1: 5.45% fix															
	Project 2: 5.60% fix															
Principal Payments	Project 1: 1 year of grace period, start 12 months after first disbursement in equal semi-annual instalments															
	Project 2: 2 years of grace period, start 24 months after first disbursement in equal semi-annual instalments															
Project Description / Business Purpose:	<p>The location of the proposed energy efficiency project is in the Mediterranean Region, in Isparta Province, Göller Bölgesi district. The project consists of the two energy efficiency projects described below.</p> <table border="1"> <thead> <tr> <th>Project title</th> <th>Brief information</th> </tr> </thead> <tbody> <tr> <td>Sub-Project 1 - Electricity production from waste heat recovery (WHR)</td> <td>In scope of the WHR project, boilers will be installed for each of 5 stacks (pre-heater and cooler). The boilers will cool waste gases and generate steam which will then drive a 12 MW steam turbine.</td> </tr> <tr> <td>Sub-Project 2 - Installation of a new and more efficient mill to the cement production unit (5th mill)</td> <td>The Sponsor will add a new cement mill, vertical type, with a maximum capacity of 240 ton/h and readjust the working hours of the 5 mills.</td> </tr> </tbody> </table> <p>The WHR sub project will generate 69,466,320 kWh/year of electricity, while the 5th mill installation will save additional 6,831,000 kWh/year. Total saving will thus be 76,297,320 kWh/y corresponding to 8,310,060 USD/year decrease in total electricity cost.</p>		Project title	Brief information	Sub-Project 1 - Electricity production from waste heat recovery (WHR)	In scope of the WHR project, boilers will be installed for each of 5 stacks (pre-heater and cooler). The boilers will cool waste gases and generate steam which will then drive a 12 MW steam turbine.	Sub-Project 2 - Installation of a new and more efficient mill to the cement production unit (5 th mill)	The Sponsor will add a new cement mill, vertical type, with a maximum capacity of 240 ton/h and readjust the working hours of the 5 mills.								
Project title	Brief information															
Sub-Project 1 - Electricity production from waste heat recovery (WHR)	In scope of the WHR project, boilers will be installed for each of 5 stacks (pre-heater and cooler). The boilers will cool waste gases and generate steam which will then drive a 12 MW steam turbine.															
Sub-Project 2 - Installation of a new and more efficient mill to the cement production unit (5 th mill)	The Sponsor will add a new cement mill, vertical type, with a maximum capacity of 240 ton/h and readjust the working hours of the 5 mills.															

¹ EUR/USD= 1.3737 as of 17.12.2013 date of LoE signed

Annual Electricity Saving	76,297 MWh/year
---------------------------	-----------------

2. Environmental and Social Baseline

2.1 Environmental description of the project area

The Göлтаş cement plant is located in the Mediterranean Region in Isparta Province (see wide scale location in the maps below).

The project will be located in an already in-operation cement plant. The factory is within Sponsor's own land. So there is no interference neither with forestry, agricultural, private nor historical, archaeological, cultural goods/heritage.

The available plant is located within an industrial site far from natural protected area or areas with valuable habitats/species. There are neither trees nor fauna residing within new installation area.

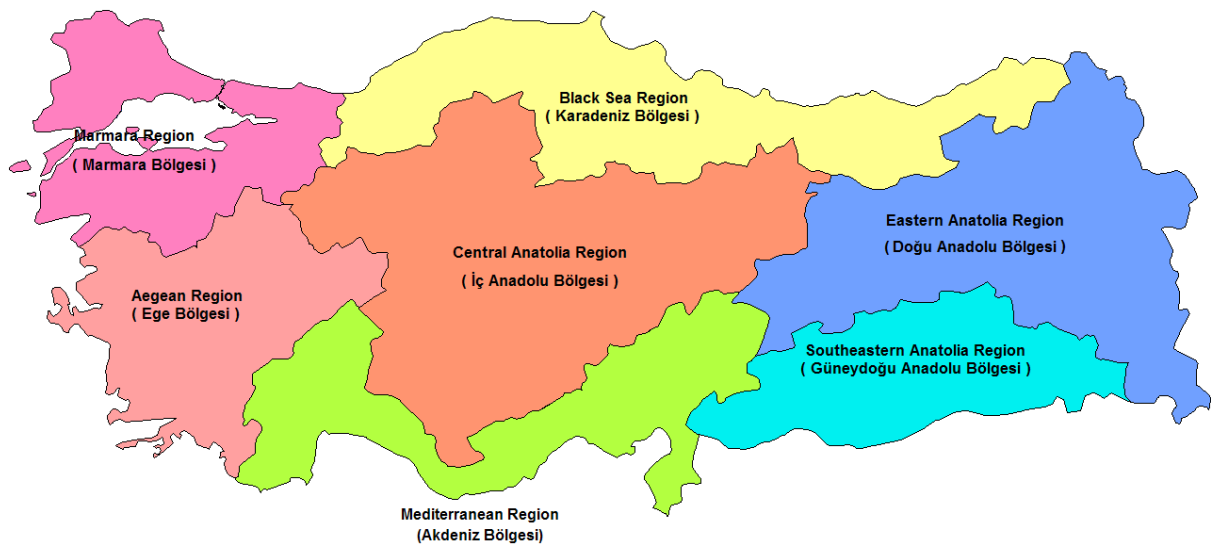


Figure 2-1: Turkey Map – Mediterranean Region



Figure 2.2: Isparta Province location in Turkey Map

3. Social and Environmental Impact

3.1 Land Use

The Project will take place in an existing Plant. No new areas will be bought and no further actions are needed in terms of Land Acquisition. No involuntary resettlement and economic displacement is expected.

The existing plant is not interfering with any cultural heritage. There are no settlements or scattered houses close to the plant, thus no particular issues are expected.

3.2 Water

There should be household wastewater both during installation and operational phases. No information was given within PIR with regard to installation period.

The wastewater which will be produced during operation is generally employees' daily waste. Based on the assumption that the daily domestic water requirement is 150 litres per capita, considering 364 employees during the operation phase domestic water requirement related to employees need is estimated to be 54.6 m³/day. In addition to that 5 m³/day water will be used in order to overcome dust daily. So, a total of 59.6 m³/day wastewater will be produced daily.

The wastewater will be treated through in-plant wastewater treatment plant. It is already in operation and the Environmental Permit had been already given by the Authority.

In scope of this permit, the Sponsor is responsible to measure water pollutant parameters outlet of the wastewater treatment plant and submit the results to Ministry of Environment and Urbanization in order to assure that the values are below than legal limit values every 6 months.

The pollutant parameters to be measured are: Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Suspended Solid (SS) and pH. Below in the picture, the measurement results are shown. The limit values set by Turkish Regulation of Control on Water Pollution are given below:

Table 3-1: Limits set by Turkish Regulation of Control on Water Pollution

Pollutant Parameters	Limit Value
BOD	50 mg/L
COD	180 mg/L
SS	70 mg/L
pH	6 - 9

3.3 Waste

According to PIR, the solid wastes that are expected to be generated at Göltas cement factory are due to increase in employee number. With 7 personnel increase, the total worker number will be reached to 364.

As the general practice of Göltas Cement, the solid waste will be collected by Goller Region Municipality and disposed to Göltas Municipality Landfill. For the management of solid waste, the Turkish Regulation on Solid Waste Control, emerged by 2872 numbered Environmental Law is being followed.

As maintenance for construction machinery and equipment will be carried out at the technical services, waste oil will be collected in specific storages temporary and will be sent to licenced disposal areas in compliance with the "Regulation on Control of Waste Oil".

Medical waste that may be generated on site due to accidents etc will be handled in compliance with the "Regulation of the Medical Wastes Control" dated 22.07.2005.

For the time being, Göltaş Cement is following a proper waste management system which will be also implemented to new plant units.

In accordance with that, the hazardous waste is sent to Süreko Inc. Co. to be disposed by incineration, landfilling and several successive chemical processes. If hazardous waste is listed under Annex 2-C, in accordance with the Hazardous waste regulation, the waste is sent to landfill area. The recyclable waste is collected separately on site and in the administrative buildings

Packaging waste is sent to ÇEVKO which is the Pro-Europe European umbrella organisation for the packaging and packaging waste recovery systems. This organization mainly uses the "Green Dot" trade mark.

Scrap metals and demolition waste resulting from site activities are sent to Gursoy İzabelik Recycle which is licenced under the Ministry of Environment and Urban Development for separation of scrap metal, transportation, intermediate storage and recycling and for building / facility demolition services.

3.4 Noise

Noise emissions are expected during operation due to mills working. A detailed study in the project information report shows that the level is acceptable for the nearest settlements. The closest house to the cement factory is at a distance of 2,600 m. The expected noise level at a distance of 100 m is 59.21 dBA during operation. This value is below the limit value which is 70 dBA.

In accordance with Turkish Environmental Law, cement factories are exempted from noise monitoring. Considering the residential areas are far enough to the plant site, the noise level during installations are expected to be reasonable although; no information was given for noise level during installation period.

With its EIA Certificate, the sponsor is obliged to work according to related regulations and all precautions will be taken by the sponsor before and during construction. By considering that, it is expected to be less than 70 dBA.

3.5 Emission to Air

A study on PIR shows that air-emissions are acceptable levels and the sponsor is obliged to work under the related Turkish regulation (Evaluation and Management of Air Quality).

During construction period the dust production will be emerged from material loading, unloading and dissembling. In total 0.56 kg/h dust is foreseen to be produced, this value is far beyond the limit value which is set as 1 kg/h by Turkish Authorities.

During operation NO_x, SO_x and dust emissions will appear related to coal usage which will be used as fuel for hot air furnace. Bag filters will be fixed to the outlet points of it in order to maintain the regulatory values.

In scope of the Environmental Permit, the Sponsor is responsible to measure Dust, NO_x, SO₂, CO, PM₁₀ and NO_x every 2 years and submit the emission report to the Ministry. Samples are taken from 64 points and each air emission parameter is recorded.

As seen from the data above, the standard values are fixed 50 and 75. Because some parts of the plant was renewed after 1993 and some parts of the plant are in operation since before 1993.

Before commissioning of the mill, Environmental Permit will be obtained and the air emissions will be monitored by disclosing periodical reports to the Ministry of Environment and Urbanization.

Table 3-2: Impact Quantification

COMPONENT	IMPACT	QUANTIFICATION
Land Use	<u>Different use of the Land</u>	No change in the Land use: the new facilities are within an existing industrial area
Waste	<u>Production of solid waste</u>	487,7 kg (1.34 kg/person/day (with 7 workers increase, total number will be 364 people)
	<u>Excavation waste</u>	N. A.
Water	<u>Consumption and Discharge</u>	54,6 m ³ /day during operation and installation phase (0,15 m ³ litter per capita, total employee 364 people) 5 m ³ /day water to overcome dust daily
Emissions	<u>Noise</u>	The expected noise level at a distance of 100 m: 59,21 dBA during operational phase
	<u>Particulate</u>	During construction period the dust production will be emerged from material loading, unloading and dissembling. In total 0.56 kg/h dust

MidSEFF Office

Asmadalı Sokak, No. 27

Kosuyolu

34718 Kadikoy, Istanbul

TURKEY

www.midseff.com