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European Bank
for Reconstruction and Development

Final Report

Mid Size Sustainable Energy Financing Facility (MidSEFF)

Sema Hydro Electric Power Plant: Non Technical Summary (NTS)

December 2013

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The European Bank for Reconstruction and Development (EBRD) launched in April 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 1 billion in loans through 7 Turkish banks for on-lending to private sector borrowers.

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1. Project Description

Sema HEPP project is an hydroelectric power plant situated within the borders of Kırıkkale Province, Karakeçili District at west of Akkoşan Village borders within Central Anatolian Region. Sema HEPP is fed with water from Sema Regulator and is a run-of-the-river type. The project is built on the Kızılırmak River which is one of the many streams in Anatolia.

Sema HEPP project is intended for energy generation purpose only; no irrigation or water supply facilities have been considered in the design. Sema HEPP main project items are:

- regulator and fish passage;
- water conveyance channel;
- head pond;
- penstock;
- power house.

Sema HEPP project has been granted with Energy production license by the Energy Market Regulatory Office (EMRA) with EÜ/2729-4/1690 issue code on 26.08.2010.

Table 1 presents the key aspects of the project.

Figure 1.1: Project site

Table 1-1: Key project summary data

Project Name	Sema Hydro Power Project
Project Borrower	CG Enerji Elektirik Üretim İnşaat Sanayi Ticaret. A.Ş.
Project Sponsors	Güncem Madencilik İnşaat Sanayi ve Ticaret A.Ş.- Opal Madencilik İnşaat Limited Şirketi and Özce Madencilik ve Ticaret Limited Şirketi.
EBRD Transaction	The total project cost is USD 42,979,922 including VAT and capitalized financing costs. The proposed financial scheme includes debt financing in the amount of USD 26,000,000 and the borrower's own contribution in the amount of USD 16,979,922. The debt to equity ratio is approximately 60:40. The investment duration will be 26 months approximately.
Project Description / Business Purpose:	The location of the proposed hydro power plant is at the Central Anatolia Region of Kırıkkale Province within the boundaries of Karakeçili Borough, located on the Kızılırmak river. The project is designed with a net head of 16.2 meter and a nominal flow of 114 m3/s. Two Kaplan type turbines, each sized 8.4 MWe, will be used for a total installed capacity of 16.8 MWe. Sema HEPP project will contribute to the share of renewable energy in the Turkish energy market. The generation of electricity from renewable source will replace the electricity from the national grid and enable the reduction of 30,904 tCO_2/annum (calculated for base case scenario of electricity generation).
Installed Power	17 MW_m /16.8 MWe
Annual Electricity Production	56.6 GWh

2. Environmental and Social Baseline

2.1 Environmental description of the project area

Kırıkkale Province is located in central Turkey, forming part of the central Anatolian region. It stands on the North Anatolian Fault, and is currently in an earthquake warning zone. The average elevation is approximately 740 meters above sea level.

Water source of project is Kızılırmak River. The river is the longest inland river in Turkey and presently there are 8 main dams in operation along the river. It pours in to Black Sea in Samsun province. The Kızılırmak River which flows for a total of 1,355 kilometers, rising in Eastern Anatolia crosses Kırıkkale Province.

The province is located on the Ankara-Kayseri railway in central Turkey, 80 km east of Ankara. Kırıkkale is surrounded by Çorum, Yozgat and Kırşehir to the east, Kırşehir to the South, Ankara to the west, and Çankırı to the north. The province is surrounded by several mountains. The Karagüney Mountains cause the North of the province to be steeped and broken. The Tokus Mountain (1306 mts) is located in the North of Kırıkkale. Denek Mountain is located in the middle of Kırıkkale and its altitude is 1744 mts. The Küre mountain (1522 mts) is located in the west of Kırıkkale, whereas the Karaca mountain is the southwest of Kırıkkale.

The local economy is mainly based on industrial and agricultural products. The natural plantation of Kırıkkale is made up of steppe plants. A wide variety of plants tend to be dry and salty. Plants such as geven, harmal and thistle are typical examples. Industry is fairly limited. Kırıkkale has a continental climate and semi-arid climate (with cold and snowy winters and hot and dry summers). Rainfall occurs mostly during the spring and autumn. For this reason, the steppe formation is dominant in the area.

The project site is located in the hilly sections of Kırıkkale and it comprises steppe land, meadow and agricultural area. In the project area, there are lands to be expropriated by the project sponsor in compliance with 4650 Numbered Expropriation Law. Besides, there is not any residential area nearby to be expropriated. Since the project site is mainly agricultural area, the agricultural area usage permit was received. The agricultural lands are used for wheat and potato farming.

The plant area can be reached from a village road, 20 km after the Karakeçili District along the Ankara-Kırıkkale highway.

A dedicated study for ecological life in the region of project area was carried out. According to the Ecological Report, there are around 58 flora species and two of them are endemic (Consolida Thirkeana and Alce Apterocarpa) and these are LC under IUCN criteria. There are 3 species which are endemic.

Furthermore no protected or designated areas were found around the project location.

Table 2-1: Environmental characteristic

ENVIRONMENTAL ASPECTS	PRESENCE/DISTRIBUTION	COMMENTS
Land use /Characteristic	Private, Agricultural and Treasury	Agricultural permit and expropriation decree received. Distribution between private and treasury not established yet
	The project area is located on first degree earthquake zone	-
Water surface	N.A.	-

Protected area	N.A.	-
Flora and Fauna	2 flora species are protected under IUCN, 3 fish species endemic	Biota monitoring during operation

2.2 Social condition of the project area

According to the year 2011 census (provided in the www.tuik.gov.tr) the total population of the Kırıkkale is 274,992 people. Some scattered residential areas are near the project site. The nearest village, Akkoşan, is 1,450 meter west of Power House and 1,520 m west of the regulator. Kaldırım Village is the nearest residential area, abt. 100 metre to the regulator. Erdemli settlement is located 660 m north-east of the regulator and 520 m west of the channel. Yeniyapan village and Karabucak village are located at the east border of the channel.

In general terms the provided documents and general know-how on the project location do not highlight any particular utilization of the river by local people.

In order to assess the project acceptance by potentially affected communities a stakeholder holder engagement plan is in force.

3. Environmental and Social Impact

3.1 Land Use

Some parts of the project area are classified as Agricultural land. The sponsor received the permit in order to use the land for electricity production purposes. Private lands will be expropriated in compliance with 4650 Numbered Expropriation Law.

3.2 Water

There will be household waste water both during construction and operation phase. This is generally employees' daily waste. The pollution is biological and physical. Some considerations included in the Environmental Impact Assessment show that water discharge will be managed according the Water Pollution Control Regulation. Domestic waste water amount is calculated as 12.45 m^3/day during construction phase and 0.9 m^3/day during operation phase.

3.3 Waste

The hazardous waste is expected in negligible level due to used oils from construction machines, waste batteries and accumulators etc. These will be handled according to the related regulation. The amount of household waste caused by employees is calculated about 111.22 kg/day during construction phase and 8.04 kg/day during operation phase. Recyclable waste such as wood and plastic will be collected in separate boxes and will be delivered to licensed companies. All these activities related to waste management will be carried out according to the related regulations such as Solid Waste Control Regulation.

3.4 Fisheries

As indicated in the supplied Hydro-biologic Assessment Report, there are three endemic fish species in project. But as long as particular attention will be paid during construction and operation, the negative effects on endemic fishes as well as other aquatic organisms can be considered low. The project will affect the fish habitat in the river but the developer should take precautions such as constructing a fish passage and put in place a grid device with a proper mash dimension. The biota monitoring during operation is recommended by the PC. Compensation measures (such as repopulation) could be prescribed according to monitoring results in case.

3.5 Emissions: Noise and Particulate

Dust will be generated by earth-moving and material storage; air pollutant emissions from the operation of construction machinery and equipment. Some considerations are included in the Project Information Report and show that the levels of air-emissions are acceptable and the sponsor has stated to work within the related Turkish regulation (Evaluation and Management of Air Quality).

During operation minimal emissions can be originated not directly associated with plant operation but with traffic, maintenance etc.

In conclusion, it can be easily said that no relevant critical aspects (both for construction and operation phase) are expected related to air-emissions.

Noise emissions will be generated during construction due to equipment/machinery operation. Assessments within PIR show that noise emissions are at acceptable levels and the sponsor has stated to work according to related regulations and all precautions will be taken into account by the sponsor before and during construction.

Minimum noise emissions are expected during operation due to electro mechanic working and water flow/fall.

3.6 Seismic

The Project area is located in a tectonically active region, the civil structure's foundation design will be made by considering the value for effective ground acceleration coefficient (A0) as 0.40 as required by "Turkish Earthquake Regulation" and "Regulation about the Buildings that Will Be Constructed on Earthquake Areas".

Table 3-1: Impact Quantification

COMPONENT	IMPACT	QUANTIFICATION
Land use	Different use of the land	Treasury, Private and Agricultural (quantity to be defined)
Water	Utilization and Discharge	12.45 m^3/day during construction 0.9 m^3/day during operation
Waste	Production of solid waste	111.22 kg/day during construction 8.04 kg/day during operation
	Excavation waste	To be defined
Fisheries	Loss fish/loss Habitat	Monitoring campaign suggested during operation phase and repopulation in case.
Emissions	Noise	Construction phase< 70dBA (law limit) Operational phase: No disturbance for the nearest receptors
	Particulate	< 1.5 kg/h (law limit) monitoring campaign suggested during construction phase
Seismic	Possible damage to the project due to earthquake	A0 is taken 0.40 during civil structure's foundation design

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