



Final Report

# Mid Size Sustainable Energy Financing Facility (MidSEFF)

## Edincik Wind Power Plant: Non Technical Summary (NTS)

August 2013

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**European Bank for Reconstruction and Development**

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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.

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Project Name: Edincik WPP - Non Technical Summary (NTS)				Controlled Copy	
Rev. N.	Date	Description Amendment	Edited by	Revised by	Approved by
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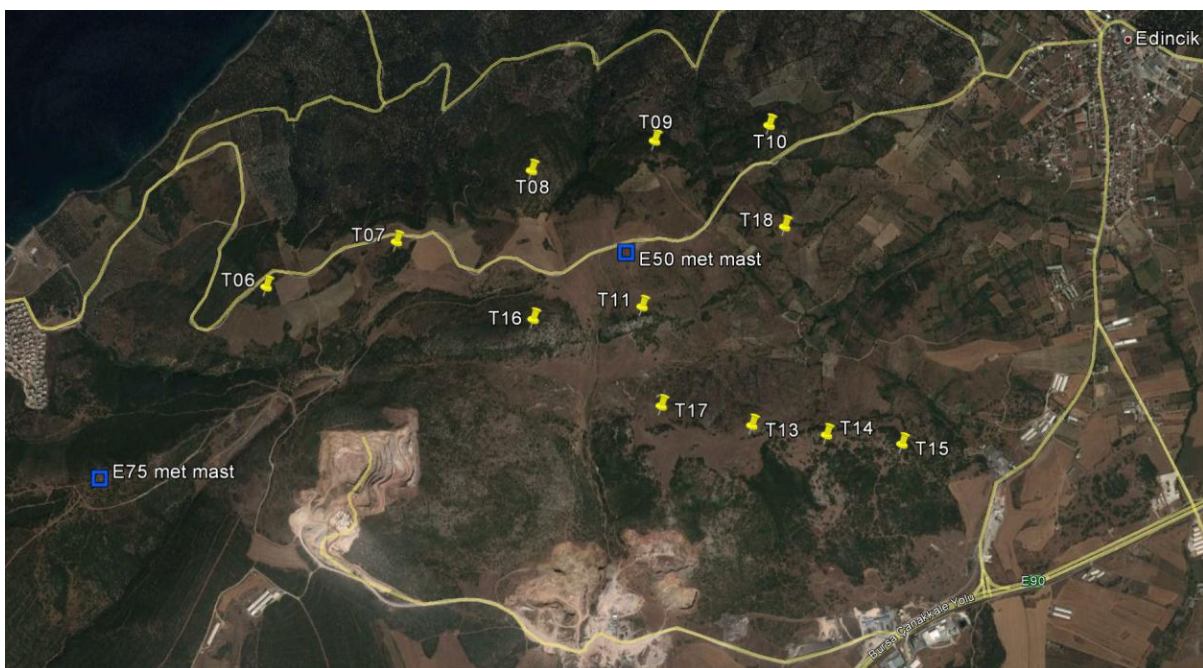
# 1. General Plant Description

Edincik WPP Project, which is composed of 12 turbines for a total installed capacity of 30 MW, is located in Marmara Region, Balıkesir Province, Bandırma District of Edincik Township. The site is predominantly covered by low bushes and short trees. The altitude of the project area is in between 200 m an 332 m mean sea level.

The construction of Edincik Wind Power Plant (WPP) started in September 2012. The project was expected to start operation in September 2013.

The selected configuration adopts 12 Nordex N100/2500 wind turbine models – each one rated 2,500 kWe with a 100 meter rotor diameter mounted on a tower with an 80 meter hub height.

Edincik WPP project has been granted with Energy Production License given by the Energy Market Regulatory Office (EMRA) on March 8, 2012. Table 1 presents the key aspects of the project.



**Figure 1.1: General view of the plant layout**

**Table 1-1: Key project summary data**

<b>Project Name</b>	Edincik Wind Power Project
<b>Project Borrower</b>	Edincik Enerji Üretim A.Ş.
<b>Project Sponsors</b>	E.N.A Tekstil A.Ş. and Umut İnşaat Turizm Sanayi ve Ticaret A.Ş.
<b>EBRD Transaction</b>	The total project cost is EUR 43,067,554 including VAT (EUR 396,000) and capitalized financing costs (EUR 2,633,500). The VAT amount is small as the investment has incentive an encouragement certificate which includes VAT exemption for imports. The proposed financial scheme includes total debt financing in the amount of EUR 32,900,000 and the borrower's own contribution in the amount of EUR 10,167,554. The debt to equity ratio is approximately 76:24.
<b>Project Description / Business Purpose:</b>	<p>The Edincik Wind Power Plant (WPP) is planned to be constructed approximately 13 km west of Bandırma District on the southern shore of Turkey's Sea of Marmara.</p> <p>The Edincik WPP will produce 95 GWh/year of electricity based on a probability level of 75%, including the losses. The overall capacity factor of the Edincik WPP is 36.05%.</p> <p>The grid connection point is Bandırma 2 substation which is approximately 9 km away from the wind farm. The connection voltage is 154kV with double circuit 795MCM overhead transmission line.</p> <p>The Edincik WPP will contribute to the Turkish energy share, by producing green energy to be sold to the market with total expected revenue of USD 7,906,860.</p> <p>The electricity generation from a renewable source will replace the electricity from the national grid and enable reduction of 57,950 tonnes of CO<sub>2</sub> equivalent.</p>
<b>Installed Power</b>	30 MWm
<b>Annual Electricity Production</b>	95,000,000 kWh

## 2. Environmental and Social Baseline

### 2.1 Environmental description of the project area

The plant location and its surroundings are mostly rural and used as pasture land. There are forest areas within the Project site; some of the turbines and planned access road which would be used for turbine transportation are located on the forestry area. The wind farm is located both on the military land (assigned to treasury during construction of the plant) and private land. Due to the favourable wind conditions in the region, there are two more licensed wind farms around the proposed project.

About birds presence, the project area is located between a major and secondary migration route that crosses the Anatolian Peninsula from the North-West to the South-East as detailed by the map below.



Figure 2.1: Wide Scale Bird Migration Routes (by Prof. Dr. Levent Turan)

At the project site and in close vicinity there are a number of conservation sites and important bird habitats around the Edincik WPP. The nearest relevant area is Manyas Bird Sanctuary (Lake Manyas) which is approximately 20 km far from the project location.

According to a dedicated assessment done by a biologist on the site there are more than 75 flora species belonging to 34 families, none of which are endemic or under protection.

Table 2-1: Environmental characteristic

ENVIRONMENTAL ASPECTS	PRESENCE/DISTRIBUTION	COMMENTS
Land use	The project area consists of private and military and forestry lands	Permits are received.
Waters surface	Manyas Bird Sanctuary (approximately 20 km far)	-
Protected area	Manyas Bird Sanctuary (Lake Manyas)	-
Flora and Fauna	More than 75 flora species belonging to 34 families	None of which is identified endemic or under protection.

## **2.2 Social condition of the project area**

According to the year 2007 census the total population of the Balıkesir province and Bandırma district were approximately 1,118,133 and 140,000 people, respectively.

The project area is hilly and overlooks to the east the village of Edincik, from which it is easily accessible through an existing road of about 1.4 km. The area in which the wind turbines will be constructed is not suitable in terms of agricultural activities.

At the project site and in close vicinity there is no place which is important historically, culturally and archeologically e.g.

## 3. Social and Environmental Impact

### 3.1 Land Use

Considering that the turbines are already erected and no physical resettlement action has been necessary. All of the lands belong to the forestry, military (to be assigned to treasury) and private owners (one turbine area) and they have already been purchased by mutual agreements. There is no settlement on the project area.

### 3.2 Water

There should be household water waste both during construction and operation phase. This is generally employees' daily waste. Based on the assumption that the daily domestic water requirement is 150 litres per capita, considering 15 employees during the construction phase and 7 employees during the operation phase, the domestic water requirement are respectively estimated to be 2.25 m<sup>3</sup>/day and 1.05 m<sup>3</sup>/day. Domestic wastewater generated by project workers will be collected in impermeable septic tanks constructed in line with Turkish regulation. These wastewaters will be collected by vacuum trucks of the Municipality of Bandırma. As a consequence, WPP project will not affect the water component.

### 3.3 Waste

The solid waste that is expected to be generated at Edincik WPP is excavation waste (from preparation of tower foundations) and domestic solid waste (paper, plastics, glass etc.). Daily domestic solid waste production is 1.34 kg per capita, for a total of 20.1 kg/day and 9.38 kg/day taking into account respectively 15 project workers during construction phase and 7 project workers during operation phase. The recyclable waste will be displaced in separate waste containers.

The excavation waste (app. 5,730 m<sup>3</sup>) will be kept under cover during laying of the foundations (to prevent dust generation) and used as filling material for the same excavation holes. The domestic solid waste that cannot be re-used will be stored in containers on site and sent to Manyas Municipality's disposal site regularly.

As maintenance for turbines and equipment will be carried out at the technical services and on site: by considering 12 turbine towers, 3,600 lt waste oil will be generated. The waste oil will be handled with regard to "Regulation on Control of Waste Oil".

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

### 3.4 Birds and other species

The project is between a mayor and a secondary bird routes migration. Main bird migratory road which is known to be closest to the area where Edincik WPP is planned to be built is in the line that passes over Bosphorus and is approximately 125 km distance to the project are. The secondary migration route passes through Dardanelles Strait over Şarköy in Trakya, follows Aegean shores is in approximately 100 km west of the area where Edincik WPP will be built. Moreover 20 km far away from the project area, there is Manyas Bird Sanctuary that it's a very important birds' habitat. The sponsor should implement a monitoring campaign at least for a period of the first two years to ensure the no interference with the birds migration.

The turbines are already constructed and there is no interference with valuable or protected fauna and flora species.



### 3.5 Emissions: Noise and Particulate

Noise emissions will be generated during construction due to equipment/machinery operation. A detailed study was carried out by The Scientific and Technological Research Council of Turkey in form of a noise dispersion map. This Study shows that in operation no extraordinary noise level is expected at close dwellings. Noise emissions are expected during operation due to turbines working. The noise level at Edincik Township - which is abt. 750 m away from the project site will be about 47 dBA. This value is under legal limits which is 70 dBA. Monitoring campaign could be put in place during operation in case.

Dust generated from earth-moving and material storage, and air emission from the operation of construction machinery and equipment. The air-emissions are at acceptable levels and the sponsor is obliged to work under the related Turkish regulation (Evaluation and Management of Air Quality).

During operation minimal emissions can be appear not directly associated with plant operation but with traffic, maintenance etc. So it can be easily said that no relevant aspects both construction and operation phases for emissions.

### 3.6 Landscape

Landscape is usually a sensitive aspect for this kind necessary of project. A photomontage study from the points of view of the closest receptors/points is necessary to assess the visual impact of the project on landscape. Being this study is not prepared yet, the sponsor should implement as well as the assessment of transmission line visual impact.

**Table 3-1: Impact Quantification**

COMPONENT	IMPACT	QUANTIFICATION
Land use	<u>Different use of the land</u>	13 km <sup>2</sup>
Water	<u>Utilization and Discharge</u>	2.25 m <sup>3</sup> /day during construction phase 1.05 m <sup>3</sup> /day during operation phase
Waste	<u>Production of solid waste</u>	1.34 kg/person/day (30 workers during construction and 8 workers during operation)
	<u>Excavation waste</u>	5,730 m <sup>3</sup> (vast amount of excavation waste is reused)
Birds and other fauna and flora species	<u>Interference with migration routes/interference with protected species-</u>	The project is located between a major and secondary migration route, a monitoring campaign will be done at least for the first two years to verify the real interference of the WPP with the birds migration routes. The project's construction is almost completed and no interference with other fauna and flora valuable species has been registered
Emissions	<u>Noise</u>	Construction phase < 70dBA (law limit = 70dBA) Operational phase=47 dBA (law limit = 50dBA)
	<u>Particulate</u>	0.189 kg/h (law limit = 1.5 kg/h)
Landscape	<u>Changing in the aspect of the area</u>	No photosimulation supplied by the sponsor demonstrate as the impact of the project is negligible, but in any case the PC suggests a photosimulation also considering the power line

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