PROJECT INFORMATION DOCUMENT (PID)
CONCEPT STAGE

Report No.: PIDC827

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Renewable Energy Integration (P144534)</th>
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<tr>
<td>Region</td>
<td>EUROPE AND CENTRAL ASIA</td>
</tr>
<tr>
<td>Country</td>
<td>Turkey</td>
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<td>Sector(s)</td>
<td>Other Renewable Energy (80%), Transmission and Distribution of Electricity (20%)</td>
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<td>Theme(s)</td>
<td>Infrastructure services for private sector development (80%), Regional integration (20%)</td>
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<td>Lending Instrument</td>
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<td>Project ID</td>
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<td>Borrower(s)</td>
<td>TEIAS- Turkish Electricity Transmission Company</td>
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<td>Implementing Agency</td>
<td>TEIAS (Turkish Electricity Transmission Corporation)</td>
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<td>Environmental Category</td>
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<td>Date PID Prepared/Updated</td>
<td>08-May-2013</td>
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<td>Date PID Approved/Released</td>
<td>11-May-2013</td>
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<td>Estimated Date of Appraisal Completion</td>
<td>15-Nov-2013</td>
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<td>Estimated Date of Board Approval</td>
<td>15-Mar-2014</td>
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<td>Concept Review Decision</td>
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I. Introduction and Context

Country Context

Turkey’s macroeconomic policies and the reforms introduced in the last ten years have resulted in vigorous economic growth. Turkey recovered from the 2009 recession quickly, with a GDP growth of about 9.0 percent in 2010 and 8.5 percent in 2011. The strong growth was facilitated by rapid credit growth and high capital inflows supported global liquidity and healthy Turkish balance sheets.

Turkey is likely to be able to realize growth rates about five percent per annum in the medium term. This growth path is predicated on continued progress on Turkey’s unfinished structural reform agenda. Turkey remains vulnerable to a slowdown of capital inflows due to its high reliance on external financing. Turkey’s key structural strengths, primarily its resilient banking sector, dynamic
private sector, and favorable public and external debt dynamics mitigate risks to the economy and suggest a favorable medium-term outlook for Turkey’s growth performance.

**Sectoral and Institutional Context**

Securing sufficient and reliable energy to a growing economy in an environmentally sustainable manner has been and remains the Turkish government’s main energy policy concern. Future demand growth is projected to be around 6.5-7.5 percent per annum, which could lead to supply shortages if generation investments fall behind load growth. In particular, Turkey imports all the oil and gas it uses and these imports may more than double over the next decade. To diversify the sources of energy supply, Turkey is improving the security of energy supply by ambitious projects to increase domestic energy production, including indigenous renewable energy generation.

Turkey has made important progress in reforming the power sector, with advisory and investment lending support from the Bank. The originally vertically-integrated state-owned electricity monopoly (TEK) had been split into two state-owned companies: a generation and transmission company (TEAS) and a distribution company (TEDAS). In 2001, the Government passed the Electricity Market Law (Law 4628) which inter alia further split TEAS into three companies: the Turkish Electricity Transmission Company (TEIAS), the Turkish Electricity Trading and Contracting Company (TETAS) and the Electricity Generating Company (EUAS). It also established the Electricity Market Regulatory Agency (EMRA) as an independent regulatory authority which provides generating licenses and sets tariffs. The law also laid the basis for the establishment of a wholesale electricity market and gradual opening of the retail electricity market.

Turkey has been a party to the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol since 2004 and 2009, respectively. Although Turkey has no emission reduction target within the scope of the Kyoto Protocol, climate change mitigation and low emission development policies are at the core of the country’s national strategies. The country has been conducting intense mitigation activities in areas such as energy efficiency and renewable energy generation. National Climate Change Strategy (NCCS) approved by the High Planning Council in May 2010 and under implementation through a National Climate Change Action Plan aims to fully integrate climate change-related objectives into its development policies, disseminating energy efficiency, increasing the use of clean and renewable energy resources, actively participating in the efforts for tackling climate change, and providing its citizens with a high quality of life and welfare with low-carbon intensity.

**Key Issues**

- Rapid demand growth strains the operation of existing transmission assets. System demand growth without the corresponding expansion of transmission assets introduces power exchanges closer to stability limits due to a reduction of the system’s operational margins;
- Underutilized potential of wind energy resources. This project will help TEIAS integrate wind generation in the Aegean and Marmara regions;
- CO₂ emissions in Turkey. This project will help address the reduction of Green House Gases (GHG) emissions by helping integrate wind generation onto the grid;
- Severe grid instability from integrating wind power on a large-scale without corresponding investments. Significant investments in smart grid technologies are needed to make wind energy more grid-compatible and compensate for variations in wind generation which may require additional reserves;
• Insufficient levels of transmission real-time monitoring and control technologies. This proposed project will deploy fledgling technologies (real-time monitoring, autonomous control, smart meters and two-way communications) to allow TEIAS to maximize their assets; and
• Lack of adequate transmission asset to bundle complementary renewable energy resources. This project will expand the transmission capacity to maximize the complementary benefits of hydro and wind power.

Rationale for Bank Involvement

The World Bank Group fosters sustainable economic growth in emerging markets as part of its mandate to reduce poverty and improve people’s lives. It supports activities to address energy security and climate change by promoting renewable energy and energy efficiency solutions. The Bank has assisted in the design and implementation of the energy reform program in Turkey over the last decade, both through investment financing as well as through policy advisory support and technical assistance. The proposed project is part of the Bank’s efforts to scale up its clean energy efforts by exploring opportunities to boost a cleaner energy mix. The Bank is well-positioned to support TEIAS in the improvement of its operations given its ongoing involvement in the structural reforms of the sector and its long participation in improving transmission capacity.

Relationship to CAS

The project contributes to the realization of the objectives of the Turkey Country Partnership Strategy (CPS) for FY12-15. The CPS has three main strategic objectives and pillars: (i) Strategic Objective 1 - enhanced competitiveness and employment; (ii) Strategic Objective 2 - improved equity and public services; and (iii) Strategic Objective 3 - deepened sustainable development. In harmony with pillars (i) and (iii), this proposed project will facilitate the integration of renewable energy, including those financed with participation of the private sector, which will contribute to promoting Turkey’s competitiveness while deepening its sustainable growth.

II. Proposed Development Objective(s)

Key Results (From PCN)
The results indicators of the new investments include:

Outcomes:
• Additional renewable energy generation provided with access to the grid (MW - Wind);
• Additional Energy production from renewable generation provided with access to the grid (MWh/year - Wind);
• Reduction of greenhouse gas (CO2, NOx, SOx) emissions from the wind power program supported under the project (metric Ton/year);

Outputs:
• Added transmission capacity for peak power (MW);
• Added transmission capacity for energy (MWh/year);
• Transmission lines constructed (km).

III. Preliminary Description
Concept Description

I. Description
The REI project is expected to strengthen the transmission system by increasing its capacity and expanding the automation of control, management, and protection systems to maintain high voltage grid stability and counteract the propagation of large disturbances. This includes upgrading the Supervisory Control and Data Acquisition (SCADA) system software expanding the number of Remote Telemetry Units and Communication Equipment; modernizing the Human Machine Interface, a new National Control Centre with a renewable dispatch console; constructing a submarine and underground power cable, and Gas-insulated substations (GIS). The REI project consists of the following four components:

Component 1: Construction of wind power grid connection structures
This component includes the development of four 380kV 500 MVA highly digitalized wind power grid connection structures in the provinces of Can, Izmir, Hamitabat, and Catalca consisting of: i) high voltage (HV) wind power substations; ii) HV grid interfacing equipment; iii) commercial smart-metering systems; iv) feeders (underground cables) to evacuate power from the site; v) telemetered dispatch systems; vi) digital protection systems; vii) supervisory systems; and viii) automatic voltage control systems.

Component 2: Smart-grid applications to improve grid operation and management
These applications will provide detailed information to enable operators to manage demand/supply balance in real time to reduce outages, the need for peak power, and the need for spinning reserves in the system. They will add new capabilities for measurements and control through Phasor Measurement Units (PMUs) to make the Turkish grid much more reliable and minimize the possibilities of blackouts in the face of the progressive integration of variable renewable generation.

Component 3: Lapseki-Sutluce 380 KV submarine power cable
Lapseki-Sutluce 380 KV Submarine Power Cable (phase II): Just as the first phase of this undersea project under the ongoing Adaptable Program Loan (APL6) project, the cable under this component will go under the Dardanelles strait. The cable is expected to be one single length 3.8 km long. This is a crucial project for connecting the Asian and the European sides of Turkey. Its relevance to renewable energy lies with the transmission of bulk electricity including renewable generated power from the Anatolia side to the high-growth Istanbul area and beyond towards the European ENTSO-E networks.

Component 4: Expansion of urban transmission networks
The component adds two open air 380/154 kV substations to help reduce transmission losses and voltage drops in the provinces of Antalya and Urgup and will increase system capacity to cope with the rapidly rising demand. In addition, it will add six 154/33 kV (GIS) located in the provinces of Atasehir, Hadimkoy, Selcuk, Yakuplyu, Muratpasa, and Sultanbeyli.

IV. Safeguard Policies that might apply

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<th>Safeguard Policies Triggered by the Project</th>
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V. Financing (in USD Million)

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<td>International Bank for Reconstruction and Development</td>
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<td>Clean Technology Fund</td>
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VI. Contact point

World Bank

Contact: Sergio Augusto Gonzalez C
Title: Sr Power Engineer
Tel: 458-9973
Email: sagonzalez@worldbank.org

Borrower/Client/Recipient

Name: TEIAS- Turkish Electricity Transmission Company
Contact: Mr Kemal Yildir
Title: General Manager
Tel: 90-312-212-6915
Email: kemal.yildir@teias.gov.tr

Implementing Agencies

Name: TEIAS (Turkish Electricity Transmission Corporation)
Contact: (90-312) 222-9283
Email:

VII. For more information contact:

The InfoShop