

**PROJECT INFORMATION DOCUMENT (PID)
IDENTIFICATION/CONCEPT STAGE**

Report No.: PIDC24551

Project Name	Renewable Energy Integration Technical Assistance Project
Region	EUROPE AND CENTRAL ASIA
Country	Turkey
Sector(s)	General energy sector (100%)
Theme(s)	Climate change (50%), Other environment and natural resources management (50%)
Lending Instrument	Lending Instrument
Project ID	P155510
Borrower Name	Undersecretariat of Treasury
Implementing Agency	TEIAS-Turkiye Elektrik Iletim A.S.
Environment Category	C - Not Required
Date PID Prepared	28-May-2015
Estimated Date of Approval	30-Sep-2015
Initiation Note Review Decision	The review did authorize the preparation to continue

I. Introduction and Context

Country Context

Economic development in Turkey in the post 2001 period has resulted in impressive economic achievements.

After a banking crisis in 2001, the country embarked on a concerted path of structural reforms supported by strong fiscal consolidation, strengthened banking supervision, and a shift to a flexible exchange rate regime with an independent central bank responsible for inflation targeting. Per-capita income almost tripled in less than a decade, and Turkey is now an upper middle-income country with the 17th largest economy in the world. After a swift rebound from the recession in the Global Economic and Financial crisis in 2008-09, concerns over vulnerability to tightening global liquidity as well as domestic political uncertainty have dented investor appetite; as a result, economic growth has slowed since 2012. Election-related uncertainties, geopolitical developments and concerns over the handling of corruption allegations dampened confidence and weakened private demand in 2014. Thus, despite robust exports and supportive government spending, GDP growth slowed to 2.9 percent in 2014. Exchange rate pass-through and higher food prices pushed inflation to 9.5 percent by mid-2014, almost twice the target set by the central bank, but the 12-month inflation rate slowed to 7.6 percent in March 2015. Moderate growth and exchange rate depreciation reduced external imbalances, and the current account deficit (CAD) narrowed to below 5.4 percent of GDP in January 2015, from close to 10 percent in 2011.

Economic activity is expected to remain subdued in the first half of 2015, limiting the full year growth rate to 3.0 percent in 2015.

Households and corporates are expected to postpone their spending decisions due to political uncertainty until the June elections. Fiscal policy will remain accommodative and growth supportive until the General Elections, but expected to be partially reversed afterwards. The absence of strong import demand from EU and geopolitical problems in the region will limit export performance throughout 2015. Private spending is expected to recover in the second half of 2015, when the political uncertainty is resolved, as households and corporates carry out their postponed spending. The weaker than expected performance in the second half of last year will carry over into this year. Combined with slower expected growth until the elections, it will limit annual growth rate in 2015, despite the expected recovery in the second half of 2015. The expected strong recovery in the second half of this year is likely to continue in the first half of 2016, however. Thus, growth is projected to marginally rise to 3.0 percent in 2015 and accelerate to 3.9 percent by 2016. For 2017, growth is expected to slow down towards its new potential growth rate. The fall in oil prices will contribute to reducing Turkey's current account deficit to 4.4 percent of GDP in 2015. Accordingly, the external financing requirement is expected to decline to about \$200 billion in 2015, from \$220 billion in 2014. In addition, we expect inflation to slow to 7.0 percent in 2015, owing to the fall in oil prices.

Over the medium-term, Turkey's growth prospects depend on private investment spending and productivity growth.

Persistent investment weaknesses lowered Turkey's GDP growth in the aftermath of the Global Financial Crisis. Pursuing a credit-driven consumption-based growth strategy to boost economic growth is no longer a viable option for Turkey. Households and corporates are now more leveraged compared to the early 2000s, and the banking sector's room for supporting high rates of credit growth is markedly diminished, given that the loans-to-deposit ratio stands at about 115 percent. In addition, profitability in the banking sector almost halved since the pre-crisis period, as indicated by return-on-assets and return-on-equity ratios. Restoring investor and consumer confidence will hinge on the government's determination to address the economy's structural bottlenecks through supply-side reforms. Strong reform signals would revitalize private investment spending and boost TFP growth. Higher GDP growth is needed to continue Turkey's convergence process. Most notably, new reform momentum is much needed to improve the quality of education and to upgrade skills. Boosting productivity growth and creating enough high productivity jobs to accommodate rapidly rising labor force are critical to create shared prosperity in Turkey.

Sectoral and Institutional Context

Despite the subdued economic performance in the recent past, Turkey has ambitious plans for developing renewable energy - especially wind energy. A major milestone for the development of the wind energy was Renewable Energy Law (Law No.5346) passed in 2005. Under this law, wind power plants qualify for Renewable Energy Resources Certificates (RERC) which enables them to benefit from a feed-in tariff of a minimum of 7.3 USD cent per kWh. An amendment in 2010 provided feed-in-tariffs up to 11USD cent per kWh to reward the use of locally produced equipment. A Strategy Paper prepared by the Government of Turkey in 2009 ambitiously aims for 20,000 MW of installed wind capacity by 2023. By these projections, this would amount to about 30% of the projected peak demand in 2023. 3,630 MW out of nearly 10,000 MW of licensed wind power plants accounted for 5% of the installed generation capacity and 3% of the electricity generation in 2014.

The ambitious targets of wind energy expansion in Turkey are constrained by the need for upfront

transmission investments, limitations of the existing load dispatch system, absence of a proper ancillary services market to incentivize generators to provide balancing power, lack of integration of wind prediction systems as well as the need to strengthen some of the exiting critical links (or corridors) on the Turkish transmission system. The World Bank and Clean Technology Fund (CTF) are funding the “Renewable Energy Integration Project” (REIP) with loans of Euro 217.6 million from IBRD and USD 50 million from CTF specifically to address some of these constraints and to expand wind energy capacity. To enable the absorption of increasing amounts of variable renewable energy, the REIP includes strengthening of SCADA based smart-grid systems.

The intermittent nature of wind power generation requires a careful investigation of back-up capacity needed at specific locations as well as ensuring that a robust transmission system is in place with sufficient smart components to cope with the variability of wind. Also, there is significant uncertainty in estimation of energy and peak requirements going forward. Energy requirements in 2023 can be anywhere between 380 TWh and over 450 TWh, i.e., an increase of ~130 to ~200 TWh over the next 8 years. Since majority of the new addition may be in the form of intermittent wind capacity with capacity factor typically around half of base-load capacity, a high energy growth scenario may potentially leave the system open to excessive reliance on expensive fuel, import or even supply shortfall in the worst case. These challenges need to be addressed in part at the planning stage itself.

To achieve the twin goals of meeting projected energy requirements and accelerated wind power development, without jeopardizing power system security, Turkey needs to ensure that the right generation mix is installed in an optimal sequence at the right locations. As a result, generation planning issues are paramount notwithstanding the fact that generation investment decisions are largely in private hands. Transmission planning is closely linked to generation capacity augmentation and it influences as well as influenced by generation augmentation scenarios. Two major considerations that need to be embedded in transmission planning are a comprehensive consideration of variability of wind, and uncertainties surrounding peak/energy growth including the possibility of 450+ TWh energy requirement by 2023. Guidance on the right mix of generation and creation of a transmission network that can accommodate various generation capacity as well as demand scenarios is therefore important for policy formation as well as shaping private sector investment decisions. Generation planning analysis would be a critical input to transmission planning to assess the robustness of the transmission plan in dealing with a range of generation development scenarios. Another important aspect of increasing renewable wind energy in the system is to have robust load dispatch and transmission system management capabilities that can respond to variable energy input at a short notice.

Relationship to CAS/CPS/CPF

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 pillar (iii), this project will facilitate the integration of greater amounts of renewable energy, including those financed with participation of the private sector, which will deepen sustainable growth in Turkey.

II. Project Development Objective(s)

Proposed Development Objective(s)

To assist Turkey in enhancing capacity for transmission planning as well as grid management in anticipation of increased share of renewable energy in the generation mix.

Key Results

1. New transmission planning exercise is conducted using the new software tool.
2. Number of TEIAS employees trained on use of new SCADA systems.

III. Preliminary Description**Concept Description**

The project involves capacity enhancement in the areas of : (i) Indicative Generation and Transmission Scenario Planning, and (ii) SCADA Based Smart-grid systems.

Component -1: Capacity enhancement for transmission planning under a range of indicative generation capacity expansion scenarios.

This component would strengthen the transmission planning capabilities at TEIAS in wake of increased penetration of renewable energy – especially wind energy over the medium-long term. The component involves four steps:

- a) Early training on transmission planning tools: This training would provide an update on the various generation and transmission planning tools available in the market, while providing deeper insights into some tools as an example. The training would be conducted at the World Bank office in Washington DC.
- b) Review of planning issues and planning tools: Reviewing the methodology, available planning tools, data requirements and training needs for comprehensive development of planning capacity in TEIAS.
- c) Procurement of planning tool: Select and procure a new planning tool that best meets TEIAS's requirements.
- d) Training of TEIAS staff for using the new planning tools: Create capacity within TEIAS to handle the new planning tools as well as strengthen their capability to address the more complex planning aspects arising from the introduction of greater amounts of renewable energy, as well as private sector led capacity increase. The training activity would also support the use of the planning tool for the next planning cycle and design studies to develop a renewable energy integration strategy for the 100 GW capacity augmentation plan. This design studies would be an in-house activity conducted by TEIAS staff. It would involve:
 - (i) Development of planning datasets based on available and new data
 - (ii) Specification of planning problem and scenarios
 - (iii) Planning analysis for Renewable Energy Integration for 20 GW Wind Scenario and for Long Term Generation Augmentation in Turkey.

Component-2: Capacity enhancement for SCADA based Smart grid system.

Availability and performance of SCADA/EMS System have crucial importance for reliable

operation of Turkish Power System. Upgrade of SCADA/EMS system at TEIAS has been taken-up under the APL-6 and REIP projects. It involves upgrade of the hardware and software of 11 existing control centers under the TEIAS SCADA/EMS System and addition of new functions to this system. Strengthening of the SCADA/EMS System as a result of this upgrade project shall also improve capability for integration of large amount of renewable energy resources to Turkish Power System.

For effective use of the SCADA and EMS functionalities, TEIAS operators and engineers who are in charge of operation of the Turkish Power System, especially new staff needs training. TEIAS engineers who are responsible for technical support to operational staff and first level maintenance of SCADA/EMS System hardware and software need training. Moreover, works related to extension of the system such as preparation of databases and displays for addition of new substations and power plants to this system as well as works related modifications of the databases and displays as well as in parallel with the changes and additions to the power system shall be responsibility of TEIAS engineers. Training courses shall also cover new functions such as functions related to Wind Energy Desk for wind energy resources to be implemented at NCC and ENCC within the scope of this project.

IV. Safeguard Policies that Might Apply

Safeguard Policies Triggered by the Project	Yes	No	TBD
Environmental Assessment OP/BP 4.01		x	
Natural Habitats OP/BP 4.04		x	
Forests OP/BP 4.36		x	
Pest Management OP 4.09		x	
Physical Cultural Resources OP/BP 4.11		x	
Indigenous Peoples OP/BP 4.10		x	
Involuntary Resettlement OP/BP 4.12		x	
Safety of Dams OP/BP 4.37		x	
Projects on International Waterways OP/BP 7.50		x	
Projects in Disputed Areas OP/BP 7.60		x	

V. Financing (in USD Million)

Total Project Cost:	1	Total Bank Financing:	0
Financing Gap:	0		
Financing Source			Amount
Clean Technology Fund			1

VI. Contact point

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