



Report and Recommendation of the President to the Board of Directors

Project Number: 49370-002
October 2018

Proposed Loan and Administration of Technical Assistance Grant Turkmenistan: National Power Grid Strengthening Project

Distribution of this document is restricted until it has been approved by the Board of Directors. Following such approval, ADB will disclose the document to the public in accordance with ADB's Public Communications Policy 2011 after excluding information that is subject to exceptions to disclosure set forth in the policy.

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 15 October 2018)

Currency unit	–	Turkmen manat/s (TMT)
TMT1.00	=	\$0.285714
\$1.00	=	TMT3.50

ABBREVIATIONS

ADB	–	Asian Development Bank
CAPS	–	Central Asia Power System
EMP	–	environmental management plan
LIBOR	–	London interbank offered rate
MOE	–	Ministry of Energy
PAM	–	project administration manual
PIU	–	project implementation unit
PMU	–	project management unit
TA	–	technical assistance
TUTAP	–	Turkmenistan–Uzbekistan–Tajikistan–Afghanistan–Pakistan

WEIGHTS AND MEASURES

bcm	–	billion cubic meters
km	–	kilometer
kV	–	kilovolt
MW	–	megawatt
TWh	–	terawatt-hour

NOTE

In this report, "\$" refers to United States dollars.

Vice-President	Wencai Zhang, Operations 1
Director General	Werner Liepach, Central and West Asia Department (CWRD)
Director	Ashok Bhargava, Energy Division, CWRD
Team leader	Sohail Hasnie, Principal Energy Specialist, CWRD
Team members	Aileen Aguilar, Operations Analyst, CWRD Michael Beauchamp, Senior Social Development Specialist (Safeguards), CWRD Christina Pak, Senior Counsel, Office of the General Counsel Olga Dyakova, Treasury Specialist, Treasury Department Kazuto Muraguchi, Finance Specialist (Energy), CWRD Diep Pham, Senior Financial Management Specialist, CWRD Atsumasa Sakai, Energy Specialist, CWRD Catherine Santiago, Senior Procurement Specialist, Procurement, Portfolio and Financial Management Department Duncan Lang, Environment Specialist, CWRD Encarnacion Webb, Associate Project Analyst, CWRD
Peer reviewer	Dae Kyeong Kim, Senior Energy Specialist (Smart Grids), Sustainable Development and Climate Change Department

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

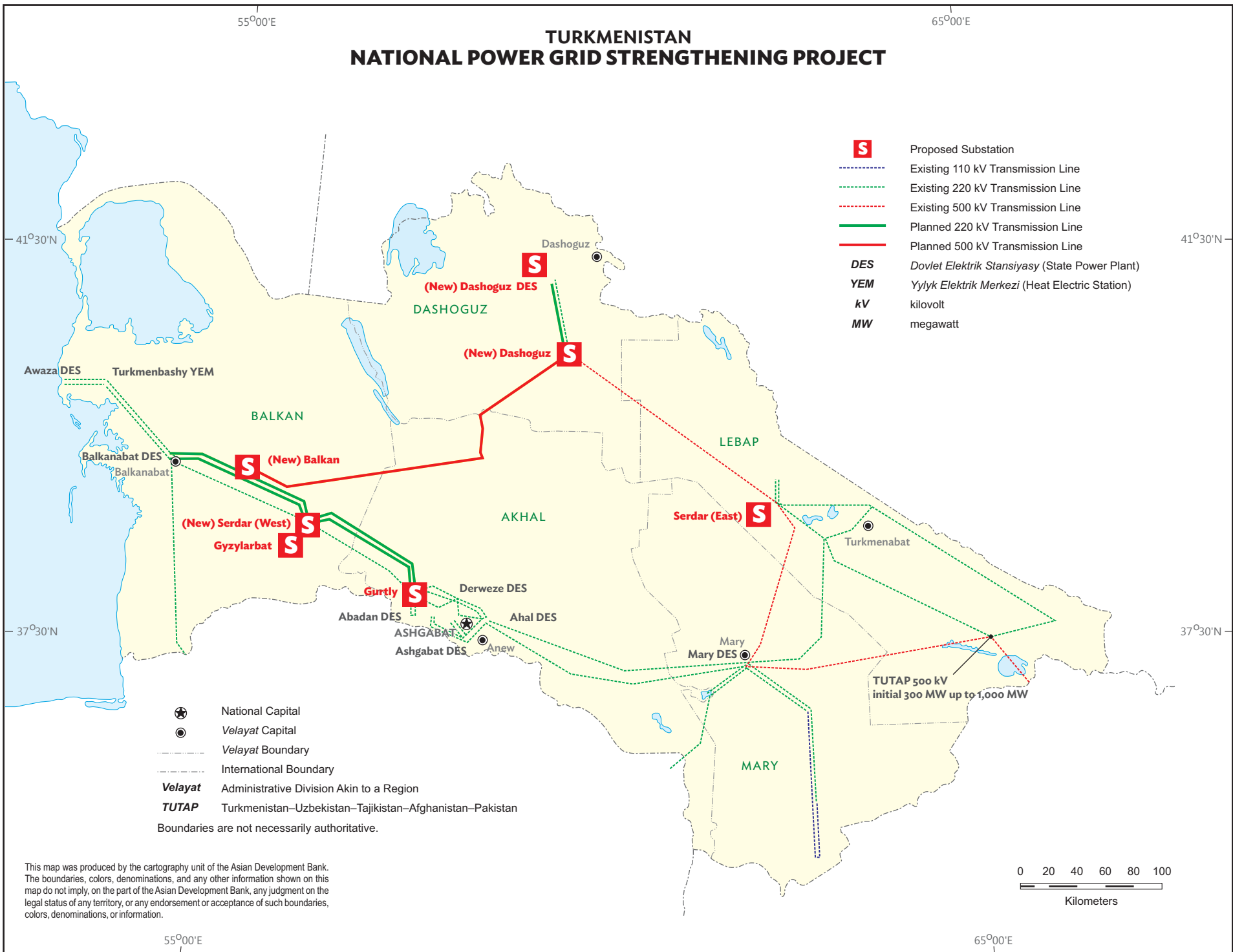
CONTENTS

	Page
PROJECT AT A GLANCE	
MAP	
I. THE PROPOSAL	1
II. THE PROJECT	1
A. Rationale	1
B. Impacts and Outcome	4
C. Outputs	4
D. Summary Cost Estimates and Financing Plan	5
E. Implementation Arrangements	6
III. ATTACHED TECHNICAL ASSISTANCE	8
IV. DUE DILIGENCE	8
A. Technical	8
B. Economic and Financial	8
C. Governance	9
D. Poverty, Social, and Gender	9
E. Safeguards	10
F. Summary of Risk Assessment and Risk Management Plan	10
V. ASSURANCES AND CONDITIONS	11
VI. RECOMMENDATION	11
APPENDIXES	
1. Design and Monitoring Framework	12
2. List of Linked Documents	14

PROJECT AT A GLANCE

1. Basic Data		Project Number: 49370-002	
Project Name	National Power Grid Strengthening Project	Department /Division	CWRD/CWEN
Country Borrower	Turkmenistan Turkmenistan	Executing Agency	Ministry of Energy of Turkmenistan
2. Sector	Subsector(s)	ADB Financing (\$ million)	
✓ Energy	Electricity transmission and distribution		500.00
		Total	500.00
3. Strategic Agenda	Subcomponents	Climate Change Information	
Inclusive economic growth (IEG)	Pillar 1: Economic opportunities, including jobs, created and expanded	CO ₂ reduction (tons per annum)	890,000
Environmentally sustainable growth (ESG)	Global and regional transboundary environmental concerns	Climate Change impact on the Project	Medium
Regional integration (RCI)	Natural resources conservation Pillar 1: Cross-border infrastructure	ADB Financing	
		Mitigation (\$ million)	3.40
4. Drivers of Change	Components	Gender Equity and Mainstreaming	
Governance and capacity development (GCD)	Institutional development	No gender elements (NGE)	✓
Private sector development (PSD)	Organizational development Public sector goods and services essential for private sector development		
5. Poverty and SDG Targeting		Location Impact	
Geographic Targeting	No	Nation-wide	High
Household Targeting	No		
SDG Targeting	Yes		
SDG Goals	SDG7		
6. Risk Categorization:	Complex		
7. Safeguard Categorization	Environment: B Involuntary Resettlement: C Indigenous Peoples: C		
8. Financing			
Modality and Sources		Amount (\$ million)	
ADB		500.00	
Sovereign Project (Regular Loan): Ordinary capital resources		500.00	
Cofinancing		0.00	
None		0.00	
Counterpart		175.00	
Government		175.00	
Total		675.00	
Currency of ADB Financing: USD			

TURKMENISTAN NATIONAL POWER GRID STRENGTHENING PROJECT



★ National Capital
 ● Velayat Capital
 - - - Velayat Boundary
 - - - International Boundary
Velayat Administrative Division Akin to a Region
TUTAP Turkmenistan–Uzbekistan–Tajikistan–Afghanistan–Pakistan
 Boundaries are not necessarily authoritative.

This map was produced by the cartography unit of the Asian Development Bank. The boundaries, colors, denominations, and any other information shown on this map do not imply, on the part of the Asian Development Bank, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries, colors, denominations, or information.

183594 17TKM ABV

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan to Turkmenistan for the National Power Grid Strengthening Project. The report also describes the proposed administration of technical assistance (TA) to be provided by the Japan Fund for Poverty Reduction for Improving Energy Efficiency and Capacity, and if the Board approves the proposed loan, I, acting under the authority delegated to me by the Board, approve the administration of the TA.

II. THE PROJECT

2. The project will (i) build about 1,100 kilometers (km) of new 110-kilovolt (kV), 220 kV, and 500 kV transmission lines; (ii) construct four new substations; and (iii) expand three existing substations. The project will cover four of the five regions of Turkmenistan, and will help establish an interconnected national transmission grid to improve reliability and energy efficiency of the network. Hydrocarbon-rich Turkmenistan has been an exporter of baseload power to its neighbors, notably Afghanistan. The reinforced transmission network is an essential prerequisite for improving power supply reliability for domestic consumers and current and expanded future electricity exports.

A. Rationale

3. Turkmenistan is a sparsely populated country with a total population of about 5.7 million, the lowest among Central Asian countries.¹ Its economy is built around its vast hydrocarbon resources: Turkmenistan is the 12th largest natural gas producer in the world, and the 10th biggest oil producer in Asia and the Pacific.² The country's economy expanded at an annual rate of 12.3% during 1998–2016.³ Hydrocarbon-related products consistently averaged close to 90% of annual exports from 2001 to 2015. As the Turkmen economy is highly vulnerable to global oil and gas prices, economic growth slowed from over 10% in 2013–2014 to about 6.5% in 2017 because of a sharp contraction in oil and gas export revenues.

4. Turkmenistan has the world's fourth largest share of natural gas reserves, at 9.4% of the global total or 17.5 trillion cubic meters, after the Russian Federation, Iran, and Qatar.⁴ Annual production of natural gas averaged about 60 billion cubic meters (bcm) during 2005–2016. The country is an exporter of gas, primarily to the People's Republic of China, totaling about 45 bcm per year, half of what it used to export in the early 1990s, to its neighbor countries.⁵ Turkmenistan has more than 5.4 gigawatts of installed power generation capacity, nearly all of which comes from natural gas-fired power plants. The country clearly has sufficient gas resources to be a major exporter of gas and electricity.

5. Turkmenistan was a key part of the Central Asia Power System (CAPS) created under the auspices of the Soviet Union in the 1970s.⁶ Turkmenistan's power system was developed at that time with a strong export orientation because of its rich hydrocarbon resources and its proximity to large populations in surrounding countries and regions, such as Afghanistan, Iran, Uzbekistan,

¹ ADB. 2018. Basic Statistics 2018. Manila.

² ADB. 2017. Country Partnership Strategy: Turkmenistan, 2017–2021. Manila.

³ International Monetary Fund. World Economic Outlook Database, October 2016. (accessed 20 April 2018).

⁴ BP. 2017. *BP Energy Outlook: 2017 edition*. <https://www.bp.com/content/dam/bp/pdf/energy-economics/energy-outlook-2017/bp-energy-outlook-2017.pdf>.

⁵ It stalled gas exports to Iran in 2017 and the Russian Federation in 2016.

⁶ The CAPS covered southern Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan.

and southern Kazakhstan. During the early 1990s, electricity exports from Turkmenistan peaked at 13 terawatt-hours (TWh) per year. The collapse of the Soviet Union resulted in a progressive decline in power trade in the CAPS. Turkmenistan was first to disconnect from the CAPS in 2003. Subsequently, it maintained seasonal export of electricity, especially during the winter months, to Tajikistan through Uzbekistan until 2009, but that also stopped once Tajikistan was disconnected from the CAPS in December 2009. Turkmenistan's electricity exports declined to 1.5 TWh in 2010. By 2017, its electricity exports had increased to 3.4 TWh thanks to a new export market.

6. The Asian Development Bank (ADB), under its Central Asian Regional Economic Cooperation (CAREC) Program, has been working closely with all regional countries to achieve energy security through power interconnection and power trade.⁷ Within CAREC, there are energy resource complementarities and uneven distribution of energy among countries. Central Asian countries are energy rich and can export it, including to large markets in energy-deficient Afghanistan and Pakistan. While Central Asian countries are 100% electrified with stable demand growth, Afghanistan and Pakistan have large populations without access to energy; demand growth is therefore high. Thus, CAREC's Central Asia–South Asia Regional Energy Market is one of the key pillars of CAREC's work plan for the energy sector.

7. ADB's regional energy trade initiatives in CAREC have supported linking Turkmenistan's large energy resources to large new markets. The proposed 1,800 km Turkmenistan–Afghanistan–Pakistan–India gas pipeline aims to export an annual 33 bcm, equivalent to a supply of about 50,000 megawatts (MW) of power generation capacity to South Asia. Within the Central Asia–South Asia Regional Energy Market framework, through the Turkmenistan–Uzbekistan–Tajikistan–Afghanistan–Pakistan (TUTAP) and Turkmenistan–Afghanistan–Pakistan power interconnection initiatives, ADB is financing multiple electricity transmission lines to enable power export initially to Afghanistan. This has enabled Afghanistan to access more than 3 TWh of electricity from its neighbors. Collectively, these imports will supply electricity to about 8 million Afghan households, businesses, and industries. But numerous households in Pakistan and Afghanistan still do not have access to modern electricity, especially in cities close to the border with Turkmenistan. The proposed project will enable future power trade with Pakistan.

8. With ADB's support within the CAREC umbrella, Turkmenistan became the third country to export power to Afghanistan, after Tajikistan and Uzbekistan. Under the TUTAP power interconnection framework, Turkmenistan signed a power purchase and sales agreement with Afghanistan extending to 2028, for an estimated export volume of about 1.5 TWh per year valued at about \$75 million per year, assuming an average price of \$0.05 per kilowatt hours (kWh).

9. Since 2012, ADB has financed multiple projects in Afghanistan to strengthen Turkmen–Afghan power interconnection. This includes construction of 500-kV transmission line from Afghan–Turkmen border to Kabul, associated sub-stations and distribution networks in several provinces to utilize imported power from Turkmenistan.⁸ These projects are under advanced stages of construction and will be completed and put into operation during 2019–2020. ADB is also financing a high voltage direct current back-to-back convertor station inside Afghanistan that will enable synchronized power transfer from Turkmenistan to the Afghan national grid.⁹

⁷ Turkmenistan joined CAREC in 2010.

⁸ ADB. Islamic Republic of Afghanistan. Energy Supply Improvement Investment Program Tranche 1 (\$275 million).

⁹ ADB. Islamic Republic of Afghanistan. Energy Supply Improvement Investment Program (G-0521/0522/0523) Tranche 2 (\$415 million).

10. In parallel, the recent opening of Uzbekistan for power trade in the CAPS—as illustrated by each of its bilateral declarations with the Kyrgyz Republic, Tajikistan, and Turkmenistan—has created new dynamism and hope in reinvigorating the CAPS. Turkmenistan and Uzbekistan signed a memorandum of understanding that aims to reconnect Turkmenistan with Uzbekistan initially on an island mode—supply with a dedicated generator without connecting the two power grids—for Turkmenistan to export electricity to part of Uzbekistan. It may open new opportunities for power export to Kazakhstan, the Kyrgyz Republic, and Tajikistan. In the backdrop of this promising power export outlook for Turkmenistan, some part of its power grid needs urgent rehabilitation and expansion as described below.

11. Turkmenistan has a 100% electrification rate and a transmission network of more than 6,100 km. Primarily built in 1970s during the Soviet era, Turkmenistan’s transmission network is in urgent need of rehabilitation and expansion. Transmission losses on 500 kV and 220 kV are high, at about 5%, which could be halved with a modern transmission system. Power supply reliability is low, with a large number of faults in the network, and weak redundancy makes large sections of the network vulnerable to outages. The absence of strong interconnections between different regions of the country further amplifies the problem for remote regions.

12. Turkmenenergo, the State Energy Corporation is the vertically integrated power utility in the country. In 2017, it produced more than 23 TWh of electricity, exporting 15% of that to neighboring countries. Demand for electricity has grown modestly during 2012–2017, at an annual average of 1.5%–2.0%. The domestic demand growth is expected to be steady and moderate in the medium term, with peak electricity demand increasing from about 3,813 MW in summer 2018 to 4,300 MW by 2024. The government is in the process of reinforcing new generation capacity to come online. It plans to add 2.5 gigawatts of additional capacity by 2020, which will provide adequate headroom to export electricity if the grid is strengthened.

13. The National Programme for Socio-Economic Development of Turkmenistan, 2011–2030, adopted in May 2010, aims to achieve strong and sustainable economic growth on the basis of efficient integration of the country into the world economy, with maximum diversification of its export potential. The National Program for Socio-Economic Development has identified developing the fuel and energy industry as a key component. To meet its strategic objectives to expand electricity exports to neighboring countries and beyond, it is essential that a robust, reliable, and efficient power transmission network is in place.

14. For the power transmission system to be in step with the addition of new generation capacity for power export, areas with high loss and low reliability needs immediate attention. A well-integrated transmission system with multiple redundancies removes overall reserve generation capacity, cuts losses, and removes transmission network congestions. System Load-flow modeling and studies by independent experts have identified these vulnerable spots.

15. Detailed load-flow modeling—with and without the investment—indicated that about 800 MW–1,000 MW of additional electricity capacity will be available by implementing the project because of loss reduction, reduced need for reserve, and optimized power flow. Accordingly, it identified strengthening transmission links between the five regions of Turkmenistan—Ahal, Balkan, Dashoguz, Lebap, and Mary—as a high priority. The associated new transmission lines, rehabilitation of some key transmission line segments, constructing new substations and expanding existing substation as envisaged under the project and described in para. 20 below

will create a ring system to help achieve an N-1 redundancy standard.¹⁰ This will provide a highly reliable and efficient system due to contingency and interconnections as per international norms. In addition, the system loss reduction will bring in climate mitigation financing valued at \$3.4 million based on ADB's Guidance Note on Counting Climate Finance in Energy.¹¹

16. ADB's recently approved Strategy 2030 highlights infrastructure development and regional cooperation and integration as major ADB value additions and comparative advantages.¹² Fostering regional cooperation and integration is one of the seven operational priorities under the new strategy. The CAREC 2030 strategic framework¹³ supports energy efficiency improvements, regional cooperation, and power trade. The project is also consistent with the objectives of ADB's Energy Policy¹⁴ to support (i) energy efficiency improvements; (ii) effective regional cooperation in the energy sector; and (iii) energy sector investments complying with ADB safeguards policies regarding environment, involuntary resettlement, and indigenous peoples.

17. ADB's country partnership strategy for Turkmenistan, 2017–2021 will help the country become a key catalyst for regional cooperation and integration by diversifying its markets and positioning it as a trade and transit hub.¹⁵ The strategy identifies the export of excess power via the TUTAP power interconnection initiative as an excellent way to achieve these goals.

18. The project is the first such project by any international financial institution in the power sector in Turkmenistan. It will enable the Government of Turkmenistan to get familiar with and introduce good practices of robust techno-economic evaluation in project investment decision making, higher safeguard requirements consistent with international standards, an open competitive bidding process in procurement, advanced project management practices, and international financial management reporting. Together, these are expected to deliver higher value addition with trickle-down effects throughout the national power system. A modern and strengthened network, in view of possibly reconnecting to the CAPS, will provide significant benefits to Turkmenistan and Central Asia. The government alone would not be able to incorporate these interventions.

B. Impacts and Outcome

19. The project is aligned with the following impacts: energy exports diversified and capacity improved. The project will have the following outcomes: reliability of power supply improved and volume of power export increased.¹⁶

C. Outputs

20. **Output 1: Power transmission infrastructure strengthened.** Output 1 will be achieved through (i) construction of 450 km of a 220 kV double-circuit transmission line from Ahal (Gurtly,

¹⁰ N-1 is a standard feature for enhancing reliability, and it refers to failure of 1 segment from "n" number of parallel segments between two points without compromising power flow between these points.

¹¹ ADB. 2017. *Guidelines for Estimating Greenhouse Gas Emissions of Asian Development Bank Projects*. <https://www.adb.org/sites/default/files/institutional-document/296466/guidelines-estimating-ghg.pdf>.

¹² ADB. 2018. *Strategy 2030: Achieving a Prosperous, Inclusive, Resilient, and Sustainable Asia and the Pacific*. Manila.

¹³ ADB. 2017. *CAREC 2030: Connecting the Region for Shared and Sustainable Development*. Manila.

¹⁴ ADB. 2009. *Energy Policy*. Manila.

¹⁵ ADB. 2017. *Country Partnership Strategy: Turkmenistan, 2017–2021—Catalyzing Regional Cooperation and Integration, and Economic Diversification*. Manila.

¹⁶ The design and monitoring framework is in Appendix 1.

Ashgabat) to Balkan (Balkanabat) and about 65 km of spur transmission lines; (ii) construction of 560 km of a 500 kV single-circuit transmission line from Balkan (Balkanabat) to Dashoguz (Dashoguz); (iii) construction of 25 km of a 220 kV single-circuit transmission line between 500 kV and 220 kV substations in Dashoguz; and (iv) construction of 500 kV substations in Balkan, and Dashoguz, as well as 220 kV substations in Ahal, Balkan and Dashoguz.

21. **Output 2: Project and financial management capacity of executing agency and implementing agency improved.** Output 2 will address the challenges because the ADB process, systems and International Financial Reporting Standards is new to the executing and implementing agency. Attached TA (para. 31) will directly contribute to output 2 by undertaking critical analytical work and necessary training.

22. **Output 3: Regulatory framework and awareness of energy efficiency in Turkmenistan improved.** Output 3 will support development of regulatory framework and increase awareness of energy efficiency options in power generation, transmission, distribution and end use.

D. Summary Cost Estimates and Financing Plan

23. The project is estimated to cost \$675.0 million (Table 1). Detailed cost estimates by expenditure category and financier are included in the project administration manual (PAM).¹⁷

Table 1: Summary Cost Estimates
(\$ million)

Item	Amount
A. Base Cost^a	
1. Construction of 220 kV double-circuit transmission line from Ahal to Balkan	174.0
2. Construction of 500 kV single-circuit transmission line from Balkan to Dashoguz	202.4
3. Construction of 220 kV single-circuit transmission line between 500 kV and 220 kV substations in Dashoguz	7.3
4. Construction of 500 kV substations in Balkan and Dashoguz, 220 kV substations in Ahal, Balkan and Dashoguz	201.3
Subtotal (A)	585.0
B. Contingencies^b	59.5
C. Financial Charges During Implementation^c	30.5
Total (A+B+C)	675.0

kV= kilovolt.

Note: Assuming the Asian Development Bank finances all equipment costs and the government funds all installation costs.

^a In 2018 prices; includes 15% value-added tax for local goods.

^b Physical contingencies (5% of base cost). Price contingencies computed at 1.5% on foreign exchange costs and 6.2% on local currency costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.

^c Includes interest and commitment charges. Interest during construction has been computed at the 5-year United States dollar fixed swap rate plus a contractual spread of 0.5% and maturity premium of 0.10%. The Asian Development Bank loan will be onlent to Turkmenenergo on the same terms and conditions. Commitment charges are 0.15% on the undisbursed loan amount.

Source: Asian Development Bank estimates.

¹⁷ Project Administration Manual (accessible from the list of linked documents in Appendix 2).

24. ADB will finance the supply of goods for the substations and the transmission lines, delivery of transmission line construction equipment, and installation of telecommunication system at all the substations. Turkmenenergo will finance the civil works for the entire project. The government will provide counterpart funding for all taxes in connection with the project.

25. The government has requested a regular loan of \$500 million from ADB's ordinary capital resources for the project. The loan will have a 25-year term, including a grace period of 5 years, an annual interest rate determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility,¹⁸ a commitment charge of 0.15% per year, and such other terms and conditions to be set forth in the legal agreements for the project. The government plans to convert the LIBOR loan to a fixed interest rate after the loan is effective. The government will relend the proceeds of the loan to Turkmenenergo State Energy Corporation, under a subsidiary loan agreement upon terms and conditions satisfactory to ADB. The summary financing plan is in Table 2. ADB will not finance taxes.

Table 2: Summary Financing Plan

Source	Amount (\$ million)	Share of Total (%)
Asian Development Bank		
Ordinary capital resources (regular loan)	500.0	74.07
Turkmenenergo	175.0	25.93
Total	675.0	100.00

Source: Asian Development Bank estimates.

E. Implementation Arrangements

26. The Ministry of Energy (MOE) will be the executing agency for the project. It will be responsible for procurement of goods, management of contracts, and management of payments for works and services under the project.

27. The MOE will establish a project management unit (PMU) within the Department for Long-term Development, New Technologies and Capital Construction. The PMU will be responsible for the overall management and monitoring of the project. The environment specialist, to be appointed at the PMU, will be responsible for ensuring compliance with applicable national environmental regulations, and effective implementation and monitoring of the environmental management plan (EMP).

28. Turkmenenergo will be the implementing agency for the project. It will act as the purchaser and employer of all contracts under the project. Turkmenenergo will establish a dedicated full-time project implementation unit (PIU). The PIU will administer all contracts related to the project. It will be responsible for preparing project plans, progress reports, applications for withdrawal of funds, and any other reports required by ADB.

29. The PMU staff will include 5–6 experts (some will be part-time) covering the following fields of expertise: project manager, procurement specialist, environment specialist, and stakeholder communication specialist. The PMU team will oversee the works of the PIU team, which will comprise a power transmission engineer, substation engineer, field engineer for managing construction and installation (one per site), information technology specialist, social impact

¹⁸ The maturity premium is 0.10% per annum for the 25-year term and a grace period of 5 years.

specialist, and finance specialist. The PIU team will have additional responsibility for effective implementation of the EMP.

Table 3: Implementation Arrangements

Aspects	Arrangements		
Implementation period	January 2019–December 2023		
Estimated completion date	31 December 2023		
Estimated loan closing date	30 June 2024		
Management			
(i) Executing agency	Ministry of Energy		
(ii) Implementing agency	Turkmenenergo State Energy Corporation		
(iii) Project management unit	Designated in the Ministry of Energy's Department for Long-Term Development, New Technologies and Capital Construction; 5 staff		
(iv) Implementation unit	Established within Turkmenenergo; 5–6 staff, including part-time staff		
Procurement under ADB loan financing ^a	Open competitive bidding	Three open competitive bidding packages: (i) supply and delivery of equipment, parts, and materials (4 lots for 7 substations) and transmission lines (3 lots for 4 lines); (ii) supply and delivery of construction equipment (1 lot); and (iii) supply and installation of SCADA system (1 lot).	(i) \$431.9 Million (ii) \$20 Million (iii) \$10 Million
Procurement under Turkmenenergo financing	Turkmenenergo procedure for procurement of works	Civil works and installation services (3 packages)	\$96.7 Million
Consulting services under attached technical assistance ^a	Selection of individual consultants and consulting firm (for IFRS component)	Individual consultant selection and quality- and cost-based selection (90:10) Consultants: procurement, project management, safeguards, and financial management	\$1.5 Million (\$0.9 million for individual consultants and \$0.6 for IFRS consultant)
Advance contracting	Advance action for both goods and consulting contracts.		
Disbursement	The loan proceeds will be disbursed following ADB's <i>Loan Disbursement Handbook</i> (2017, as amended from time to time) and detailed arrangements agreed between the government and ADB. Direct payment and commitment procedures will be used for all expenditure categories.		

ADB = Asian Development Bank, IFRS = International Financial Reporting Standards, SCADA = supervisory control and data acquisition.

^a Procurement will be in accordance with the ADB Procurement Policy (2017, as amended from time to time) and Procurement Regulations for ADB Borrowers (2017, as amended from time to time). ADB will engage consulting firms and individual consultants in accordance with the ADB Procurement Policy and the associated project administration instructions and technical assistance staff instructions. The Japan Fund for Poverty Reduction technical assistance will be implemented over 30 months.

Source: Asian Development Bank.

30. Under advance procurement action, Turkmenenergo has prepared the detailed design, including the technical specifications and bill of quantities, through Turkmenenergotaslama, the

government-owned design institute operating under the MOE subsidiary network. The PMU expects to issue an invitation for bid in October 2018.

III. ATTACHED TECHNICAL ASSISTANCE

31. The attached Transaction Technical Assistance (TRTA) for Improving Energy Efficiency and Capacity will contribute to a sustainable and efficient energy sector in Turkmenistan through (i) assistance with the development of a road map on energy efficiency; (ii) capacity development on financial management, especially assisting Turkmenenergo's transition toward International Financial Reporting Standards; and (iii) capacity enhancement of the MOE and Turkmenenergo on project development and implementation, including procurement, engineering, and environment. The TA is estimated to cost \$1.5 million, which will be financed on a grant basis by the Japan Fund for Poverty Reduction and administered by ADB.

32. ADB will recruit consultants financed by the Japan Fund for Poverty Reduction to support the capacities of the PMU and PIU.

33. The MOE will provide counterpart support in the form of office accommodation, counterpart staff, and other in-kind contributions. The MOE will be the executing agency. The TA will be implemented over 30 months from November 2018 to May 2021.

IV. DUE DILIGENCE

A. Technical

34. Due diligence, including supply–demand and power system analysis, confirmed the technical viability of the project and the suitability of the specific components of the project within the power transmission system. The analysis confirmed sufficient project benefits: increased export capacity, reduced losses, and improved reliability. Site visits by ADB staff confirmed the technical merits of components, and dilapidated state of some substations component confirmed that they need to be urgently replaced. The technical design of recently installed facilities conforms to the International Electrotechnical Commission standard. This should enable participation of all major power equipment manufacturers to supply equipment to the country's power transmission system. A site visit to the Central Dispatch Center confirmed that Turkmenenergo has the necessary technical capacity and experienced staff to operate and maintain the transmission infrastructure.

B. Economic and Financial

35. The economic and financial analyses were based on system loss reductions, reduced outages, and increased electricity exports. The benefits stream also assumed that Turkmenistan will increase electricity exports as a result of the project beginning in 2022 to southern neighbors, and to the CAPS through a connection in Uzbekistan.

36. The economic analysis was completed in accordance with ADB's Guidelines for the Economic Analysis of Projects.¹⁹ The economic internal rate of return for the project is calculated at 11.3% in real terms, which is above the economic viability threshold level of 9%. The corresponding economic net present value is calculated to be \$150 million. Therefore, the project

¹⁹ ADB. 2017. Guidelines for the Economic Analysis of Projects. Manila (Appendix 7).

is viable from an economic perspective. Sensitivity analysis was carried out to test the impact of an increase in the project's capital cost, a decrease in electricity export revenue, a decrease in loss reduction, and a 1-year delay in project implementation. The project's economic internal rate of return is most sensitive to export revenues.

37. A financial evaluation was carried out in accordance with ADB's Guidelines for the Financial Management and Analysis of Projects.²⁰ The financial internal rate of return for the project is 6.3%, which is greater than the weighted average cost of capital at 2.3%. The net present value was \$575 million over a 40-year period. The project is financially viable. Sensitivity analysis was carried out to test the impact of an increase in the project's capital cost, a decrease in electricity export revenue, a decrease in loss reduction, and a 1-year delay in project implementation. The project's financial internal rate of return is most sensitive to the electricity export revenues.

38. The project is financially sustainable as Turkmenenergo generates stable operational revenue, which sufficiently covers its operational costs. Turkmenenergo generated positive profit from 2013 to 2017 and has access to revenue denominated in United States dollars through electricity exports. Turkmenenergo's financial operations are expected to grow because of electricity exports to Afghanistan and Iran, and electricity exports through Uzbekistan to Kazakhstan, the Kyrgyz Republic, and Tajikistan after the project is completed.

C. Governance

39. **Financial management.** The financial management assessment was conducted in April 2018. Turkmenenergo's pre-mitigation risks are substantial because Turkmenenergo's staff is not familiar with ADB's financial reporting requirements and the external auditor's procedure and requirements for audited project financial statements. The attached TA (para. 31) will assist Turkmenenergo in strengthening its financial management and staff capacity, and support Turkmenenergo to transition from national accounting standards to IFRS. This will allow Turkmenenergo to comply with a recent government policy that requires all state-owned enterprises to apply IFRS starting on 1 January 2019.

40. **Procurement.** The MOE has procured and Turkmenenergo has implemented large contracts for transmission lines and substations, which were all turnkey contracts executed by contractors. The limited experience of Turkmenenergo to execute supply contracts is a major risk. A team of individual international experts will assist in the bidding process and contract management. The overall risk rating is categorized *substantial*. Although the risks of limited experience could cause adverse impacts on project implementation, they are unlikely to occur (or if they occur the impact would be low) as Turkmenenergo will use individual technical experts to supplement their own expertise.

41. ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the government and the MOE. The specific policy requirements and supplementary measures are described in the PAM (footnote 17).

D. Poverty, Social, and Gender

42. The increased efficiency and reliability brought by the rehabilitation will have a positive impact on economic growth and social services such as schools and health care facilities, leading to increased community welfare in Turkmenistan and even more so in neighboring Afghanistan.

²⁰ ADB. 2005. Financial Management and Analysis of Projects. Manila (Appendix 8).

Improved energy supply will boost business development activities and new job growth. Electricity delivery will equally benefit households and businesses run by women and men.

E. Safeguards

43. **Environment (category B).** The sites selected for new substations and transmission lines are barren land away from habitation and devoid of any vegetation or faunal movement, with most of the transmission line alignment passing through desert areas with minimal impacts on the environment. The initial environmental examination found that the project impacts during the construction stage are expected to be limited, insignificant, and site-specific because of civil works and inappropriate disposal of waste. These impacts will be minimized by the use of effective waste management and good site management practices. Impacts during the operation stage are related to electrocution or collision of birds and will be minimized with design measures. Occupational health and safety risks are also anticipated during the construction stage, and maintenance activities are addressed in the EMP. A full-time environment staff position in the PMU will be recruited. The TA will provide training to PMU and PIU staff for capacity building in environmental management to ensure full compliance with ADB's Safeguard Policy Statement (2009) requirements.

44. **Involuntary resettlement (category C).** A due diligence report was conducted to support the C categorization. All civil works in substations will be implemented within the confines of existing substations, or on unencumbered land where no involuntary land acquisition or livelihood impacts will occur. The transmission lines will be parallel to existing lines and located in the Karakum Desert, which dominates central Turkmenistan. The scarcity of settlements and arable land is such that the project will not require any land acquisition or impact any assets. The transmission line route design had sufficient flexibility to avoid any land acquisition along the transmission routes. Should monitoring during project implementation reveal any unanticipated and unavoidable impacts, a land acquisition and resettlement plan will be prepared.

45. **Indigenous peoples (category C).** The project will not have any negative impact on indigenous people. Consultations with key stakeholders in Dashoguz and Serdar, and with some local community members, confirmed that no indigenous people live in the project area.

F. Summary of Risk Assessment and Risk Management Plan

46. Significant risks and mitigating measures are summarized in Table 4 and described in detail in the risk assessment and risk management plan.²¹

Table 4: Summary of Risks and Mitigating Measures

Risks	Mitigation Measures
Delays in power export agreements results in lower volume of power trade	<p>ADB supported long-term power purchase agreements between AFG and TKM (para. 8) reduces the risk substantially.</p> <p>The high-level announcements (para. 10) and ongoing efforts on CAPS resurrection have reduced associated risks.</p>

²¹ Risk Assessment and Risk Management Plan (accessible from the list of linked documents in Appendix 2).

Risks	Mitigation Measures
Quality of construction not in accordance with internationally accepted standards because of lack of dedicated project implementation consultants	Requirement in the bidding document for suppliers to supervise the installation of critical equipment On-the-job or practical training to Turkmenenergo on contract management and construction supervision ahead of procurement
Inadequate procurement capacity (workforce, machinery) to implement project on schedule	Turkmenenergo may subcontract part of the works to qualified subcontractors Project implementation units will have individual consultants to closely monitor construction work at each site, and the project will finance new construction equipment
Delayed and incomplete submission of financial information	Capacity building support will improve timely financial reporting for the project and assist Turkmenenergo to convert its financial statement prepared under national accounting standards to International Financial Reporting Standards
Delays due to limited experience with the ADB's requirements and disbursement procedures	Disbursement and financial management training Financial management consultant will support Turkmenenergo to prepare withdrawal application and financial reporting

ADB = Asian Development Bank, AFG = Afghanistan, CAPS = Central Asian Power System, TKM = Turkmenistan.
Source: Asian Development Bank.

V. ASSURANCES AND CONDITIONS

47. The government and Turkmenenergo have assured ADB that implementation of the project shall conform to all applicable ADB policies, including those concerning anticorruption measures, safeguards, gender, procurement, consulting services, and disbursement as described in detail in the PAM and loan documents.

48. The government and Turkmenenergo have agreed with ADB on certain covenants for the project including the execution of the subsidiary loan agreement, which are set forth in the draft loan agreement and project agreement.

VI. RECOMMENDATION

49. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve the loan of \$500,000,000 to Turkmenistan for the National Power Grid Strengthening Project, from ADB's ordinary capital resources, in regular terms with interest to be determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility; for a term of 25 years, including a grace period of 5 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft loan and project agreements presented to the Board.

Takehiko Nakao
President

17 October 2018

DESIGN AND MONITORING FRAMEWORK

Impacts the Project is Aligned with			
Energy exports diversified and capacity improved (National Programme for Socio- Economic Development of Turkmenistan, 2011–2030)			
Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
Outcome Reliability of power supply improved and export volume of electricity increased	By 2022: a. Power outages reduced to 2.7 hours per year (2017 baseline: 3.8 hours) b. Transmission losses reduced to 3.8% per year (2017 baseline: 4.6%) c. Power export is increased to more than 6 TWh (2017 baseline: 3.4 TWh)	a–c. Annual statistics published by the Ministry of Energy, Turkmenenergo, and the Central Dispatch Center of Turkmenistan	Delays in power export agreements results in lower volume of power trade
Outputs 1. Power transmission infrastructure strengthened	By 2021: 1a. 450 km of new 220 kV double-circuit transmission line from Ahal to Balkan installed and commissioned (2017 baseline: 0 km) 1b. 560 km of new 500 kV single-circuit transmission line from Balkan to Dashoguz installed and commissioned (2017 baseline: 0 km) 1c. 25 km of new 220 kV single-circuit transmission line between 500 kV and 220 kV substations in Dashoguz installed and commissioned (2017 baseline: 0 km) 1d. 500 kV substations in Balkan and Dashoguz constructed and commissioned (2017 baseline: 0) 1e. 220 kV substations in Ahal, Balkan, and Dashoguz constructed and commissioned (2017 baseline: 0)	1a-e. Turkmenenergo's annual project progress report	Delays in project construction and quality of work.
2. Project and financial management capacity of executing agency and implementing agency	2a. Annual financial statement based on IFRS prepared independently by implementing agency from 2021 onwards (2017 baseline: Not applicable)	2a. Turkmenenergo annual audited financial statement	Trained staff in EA/IA do not stay long enough to provide the expected support.

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
improved (under attached TA)	2b. At least 30 executing agency and implementing agency staff, at least 30% of whom are women, have increased knowledge and skills on financial management, procurement, project implementation, and environmental safeguards (2017 baseline: 0)	2b. Survey of training participants	
3. Regulatory framework and awareness of energy efficiency in Turkmenistan improved. (under attached TA)	3a. By 2021, road map for higher energy efficiency submitted to and adopted by the government (2017 baseline: Not applicable) 3b. By 2020, a law and regulations related to energy efficiency drafted (2017 baseline: Not applicable)	3a. Energy efficiency road map adapted by the government 3b. Draft law and regulations	Energy efficiency demand remains weak because of low domestic energy prices, and supply-side options continue to be overemphasized

Key Activities with Milestones

1. Power transmission infrastructure strengthened

- 1.1 Issue invitation for bids (Q4 2018)
- 1.2 Award contracts for goods and related services (Q1 2019)
- 1.3 Deliver goods and complete related services (Q1 2019–Q2 2020)
- 1.4 Award contract for SCADA system (Q1 2020)
- 1.5 Complete civil works and installation services (Q1 2020–Q4 2021)
- 1.6 Supply and install SCADA system (Q1 2020–Q4 2021)

2. Project and financial management capacity of executing and implementing agency improved

- 2.1 Recruit individual consultant and consulting firm (Q4 2018–Q2 2021)
- 2.2 Conduct four workshops and trainings (Q2 2019–Q1 2021)
- 2.3 Submit annual audited project financial statement based on IFRS (every year)
- 2.4 Submit annual audited financial statement based on IFRS (every fiscal year)
- 2.5 Submit TA completion report (Q2 2021)

3. Regulatory framework and awareness of energy efficiency in Turkmenistan improved

- 3.1 Recruit individual consultant (Q4 2018–Q4 2021)
- 3.2 Complete assessment of energy efficiency potential (Q3 2019).
- 3.3 Develop road map for higher energy efficiency (Q4 2019)
- 3.4 Draft relevant law and regulations (Q1 2020)
- 3.5 Conduct workshop and training on energy efficiency (Q2 2020)

Inputs

Asian Development Bank: \$500,000,000 (regular ordinary capital resources loan)

Turkmenenergo: \$175,000,000

Japan Fund for Poverty Reduction: \$1,500,000

Assumptions for Partner Financing

Not applicable

EA = executing agency, IA = implementing agency, IFRS = International Financial Reporting Standards, km = kilometer, kV = kilovolt, Q = quarter, SCADA = supervisory control and data acquisition, TA = technical assistance, TWh = terawatt hours.

Source: Asian Development Bank.

LIST OF LINKED DOCUMENTS

<http://www.adb.org/Documents/RFPs/?id=49370-002-3>

1. Loan Agreement
2. Project Agreement
3. Sector Assessment (Summary): Energy
4. Project Administration Manual
5. Contribution to the ADB Results Framework
6. Development Coordination
7. Financial Analysis
8. Economic Analysis
9. Country Economic Indicators
10. Summary Poverty Reduction and Social Strategy
11. Risk Assessment and Risk Management Plan
12. Attached Technical Assistance Report
13. Initial Environmental Examination

Supplementary Documents

14. Technical Due Diligence Report
15. Social Due Diligence Report
16. Load-Flow Analysis with and without the Project