Report and Recommendation of the President to the Board of Directors

Project Number: 45120
October 2013

Proposed Loans
Republic of Uzbekistan: Samarkand Solar Power Project

Asian Development Bank

CURRENCY EQUIVALENTS
(as of 18 October 2013)

Currency unit	–	sum (SUM)
SUM1.00	=	$0.0004621435
$1.00	=	SUM2,163.83

ABBREVIATIONS

ADB	–	Asian Development Bank
ADF	–	Asian Development Fund
COBP	–	country operations business plan
DMC	–	developing member country
EMP	–	environmental management plan
EPC	–	engineering, procurement, and construction
IEE	–	initial environmental examination
GDP	–	gross domestic product
GHG	–	greenhouse gas
ISEI	–	International Solar Energy Institute
LARP	–	land acquisition and resettlement plan
LEC	–	levelized energy cost
O&M	–	operation and maintenance
PAM	–	project administration manual
PMU	–	project management unit

WEIGHTS AND MEASURES

BTU	–	British thermal unit
GW	–	gigawatt
GWh	–	gigawatt-hour
ha	–	hectare
km	–	kilometer
kV	–	kilovolt
kWh	–	kilowatt-hour
MW	–	megawatt
TWh	–	terawatt-hour

NOTE

In this report, "$" refers to US dollars.

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PROJECT AT A GLANCE

1. Project Name: Samarkand Solar Power Project **2. Project Number:** 45120-003

3. Country: Uzbekistan **4. Department/Division:** Central and West Asia Department/Energy Division

5. Sector Classification:

Sectors	Primary	Subsectors
Energy	√	Renewable energy

6. Thematic Classification:

Themes	Primary	Subthemes
Economic growth	√	Promoting economic efficiency and enabling business environment
Environmental sustainability		Eco-efficiency
Capacity development		Institutional development

6a. Climate Change Impact		6b. Gender Mainstreaming	
Adaptation		Gender equity theme (GEN)	
Mitigation	High	Effective gender mainstreaming (EGM)	
		Some gender elements (SGE)	√
		No gender elements (NGE)	

7. Targeting Classification:

General Intervention	Targeted Intervention		
	Geographic dimensions of inclusive growth	Millennium development goals	Income poverty at household level
√			

8. Location Impact:

National	High
Regional	Low
Rural	Medium
Urban	Low

9. Project Risk Categorization: Low

10. Safeguards Categorization:

Environment	B
Involuntary resettlement	B
Indigenous peoples	C

11. ADB Financing:

Sovereign/Nonsovereign	Modality	Source	Amount ($ Million)
Sovereign	Project loan	Asian Development Fund (regular term)	101.1
		Asian Development Fund (hard-term)	8.9
Total			110.0

12. Cofinancing: No Cofinancing available.

13. Counterpart Financing:

Source	Amount ($ Million)
Fund for Reconstruction and Development	130.0
Government	44.0
Uzbekenergo	26.0
Total	200.0

14. Aid Effectiveness:

Parallel project implementation unit	No
Program-based approach	No

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on proposed loans to the Republic of Uzbekistan for the Samarkand Solar Power Project.[1]

2. The project will increase renewable energy generation and reduce greenhouse gas (GHG) emissions in Uzbekistan. The project has three main components: (i) construction of a 100 megawatt (MW) photovoltaic[2] power plant including transmission and support facilities, (ii) institutional capacity development for Uzbekenergo, and (iii) institutional capacity development for solar energy stakeholders.

II. THE PROJECT

A. Rationale

3. Uzbekistan is one of the most energy- and carbon-intensive countries in the world,[3] both over six times the world average, calling for drastic increases in energy efficiency and renewable energy. Despite the huge potential, renewable energy supplies less than 11% of demand, and only from hydro resources, which are fully tapped. Over 89% of Uzbekistan's 12.6 gigawatts (GW) of installed capacity are aging carbon-emitting fossil-based power plants, in poor condition, and require huge investments for replacement or rehabilitation. This is intensified by grid losses of about 20%, which are partly due to transmission over long distances. The inefficient energy sector emitted 88% of Uzbekistan's 200 million tons of carbon dioxide equivalent GHG emissions in 2005.[4] The project's expected 159 GW hours (GWh) of clean energy production will avoid about 88,000 tons of carbon dioxide equivalent emissions annually. By supplying electricity where it is consumed, the project will also reduce grid losses.

4. While Uzbekistan is almost 100% electrified, its aging and overloaded power system causes a supply-demand gap, resulting in prolonged and frequent outages especially in rural areas. This affects quality of life, economic activities, and the delivery of social services. Some areas in Samarkand have grid electricity for only 1-2 hours in winter and 16-18 hours in summer. Energy supply is further threatened given the country's depleting fossil-fuel reserves. The reserve to production ratio is 10-12 years for oil, 28-30 years for natural gas, and 40-50 years for coal. Continued reliance on gas accelerates its depletion and hampers diversification of the energy mix. It also equals lost export revenues, estimated at $900 million for 2012 alone.[5]

5. With Uzbekistan's high solar irradiance and abundant land for solar development, solar energy is found the most suitable sustainable resource that could quickly bridge the supply-demand gap, diversify the mix, and reduce emissions. Recognizing this, the government's Welfare Improvement Strategy II[6] mandates accelerated development of indigenous renewable

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[1] The design and monitoring framework is in Appendix 1. In addition to a project preparatory technical assistance (TA), a policy advisory TA helped prepare the project.

[2] Mono- and poly-crystalline silicon could be proposed by the engineering, procurement, and construction contractor, who will only need to guarantee the output.

[3] International Energy Agency. 2011. *Key World Energy Statistics 2011*. Paris. Energy intensity: Total energy supply in tons of oil equivalent per gross domestic product (GDP) is 1.97. The world average is 0.31. Carbon intensity is a measure of how much GHG an economy emits for every dollar of GDP produced, expressed in kilograms of carbon dioxide equivalent per GDP. The world average is only 0.73, while Uzbekistan's is 4.53.

[4] Centre of Hydrometeorological Service, 2010. *Second National Communication of the Republic of Uzbekistan under the United Nations Framework Convention on Climate Change*. Tashkent.

[5] TA consultant estimates. In 2012, Uzbekenergo's average purchase price was $1.46 per million British thermal units, against the average international wholesale price of $3.24 per million British thermal units.

[6] Government of Uzbekistan. 2013. *Welfare Improvement Strategy of Uzbekistan II, 2012–2015*. Tashkent.

energy, especially solar. Expertise on the Soviet era solar furnace needs to be enhanced and modern solar applications and industries need to be developed. Thus, Presidential Decree 4512[7] mandated the creation of advanced solar industries. Uzbekistan's objective is to become the region's solar knowledge and technology hub, and it is targeting 21% renewable energy capacity by 2031, with at least 4 GW of solar capacity. The project, being the first of its kind in Central Asia, brings the needed demonstration, technology transfer, and holistic institutional capacity development for Uzbekenergo and other stakeholders. The government will implement the solar energy development road map[8] to achieve a favorable policy framework.

6. Aware of the need, the Asian Development Bank (ADB) helped Uzbekistan create the International Solar Energy Institute (ISEI) through a capacity development technical assistance (TA).[9] ISEI links research with industry. Another ADB TA project[10] is conducting feasibility studies for solar projects, including all required due diligence for the project. A project preparatory TA (PPTA)[11] is assisting in bidding documents preparation and procurement.

7. The project is aligned with ADB's Strategy 2020,[12] and with the Energy Policy 2009.[13] The project directly supports Uzbekistan's clean energy and energy security targets as prioritized under the country partnership strategy, 2012–2016 for Uzbekistan[14] and is included in the country operations business plan, 2012–2014 for Uzbekistan.[15]

B. Impact and Outcome

8. The plant will be located in the Samarkand Province of Uzbekistan, 13 kilometers (km) southwest of Samarkand city, and 4 km to the north of the regional center of Sazagan. The expected project impact is improved sustainability of the energy supply in Uzbekistan, and the expected outcome is increased renewable energy generation in Uzbekistan.

C. Outputs

9. The project will have three main outputs: (i) the construction of a 100 MW[16] photovoltaic power plant including transmission and support facilities; (ii) institutional capacity development for Uzbekenergo; and (iii) institutional capacity development for solar energy stakeholders.

10. **Clean and reliable energy.** The project will construct a 100 MW photovoltaic power plant, a transmission line, and support facilities in Samarkand Province. This physical component is divided into two contracts: (i) a turnkey contract for the engineering, procurement, and construction (EPC) of the solar power plant including the provision of operation and maintenance (O&M) services for 3 years; and (ii) a contract for the supply of goods for the transmission line. Uzbekenergo will prepare the site; install the transmission line; and construct the access road, perimeter fence, wells, and raw water supply facilities.

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[7] On measures to further promote the development of alternative energy sources, signed 1 March 2013.
[8] Pending final review and acceptance by the government.
[9] ADB. 2011. *Technical Assistance to the Republic of Uzbekistan for the Design and Strengthening of the Solar Energy Institute*. Manila. ISEI was officially established in March 2013.
[10] ADB. 2011. *Technical Assistance to the Republic of Uzbekistan for Solar Energy Development.* Manila.
[11] ADB. 2013. *Technical Assistance to the Republic of Uzbekistan to Prepare the Samarkand Solar Power Project*. Manila.
[12] ADB. 2008. *Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank*, *2008–2020*. Manila.
[13] ADB. 2009. *Energy Policy*. Manila
[14] ADB. 2012. *Country Partnership Strategy: Uzbekistan*, *2012–2016*. Manila.
[15] ADB. 2012. *Country Operations Business Plan: Uzbekistan, 2012–2014*. Manila.
[16] To achieve 100 MW alternating current at the power plant boundary, the feasibility study estimates a nominal peak direct current installed capacity of 115 MW will be needed. This is subject to detailed design.

11. **Institutional capacity development for Uzbekenergo.** An implementation consultant, with technical and training specialists, will provide project management and supervision support to Uzbekenergo and provide training on procurement, financial management, governance, construction, solar power grid integration, and O&M. Subject to Uzbekenergo and ADB approval, the capacity development plan prepared under the PPTA will be updated and implemented by the implementation consultant. The plan will be harmonized with the capacity development programs of Uzbekenergo under ongoing ADB TA and loan projects.

12. **Institutional capacity development for solar energy stakeholders.** A solar capacity development plan, to be implemented by the implementation consultant and subject to Uzbekenergo and ADB approval, will support the action plan recommended in the solar energy development road map. The program will cover (i) design, specifications, costing, and grid integration of solar power plants for ISEI and design institutes—Uztyazhneftgazkhimproyekt, Teploelectroproyekt, and Sredazenergosetproyekt; (ii) solar applications, technologies, resource assessments, modeling and simulation, research and development, technology incubation, financing, and business development for scientific institutes and industries including ISEI, Physics Sun, Uzhydromet, academic institutions, government agencies, and private manufacturing industries; (iii) governance, financing, and enabling regulatory and policy frameworks; and (iv) environmental and social safeguards, and social development and gender, including information campaigns. Funding under the project has been earmarked for the necessary equipment, licenses, software, materials, manuals, training, and consulting services.

D. Investment and Financing Plans

13. The project is estimated to cost $310 million (Table 1).

Table 1: Project Investment Plan
($ million)

Item			Amount[a]
A.	**Base Cost**[b]		
	1.	Clean and reliable energy	259.4
	2.	Institutional capacity development for Uzbekenergo	6.0
	3.	Institutional capacity development for solar energy stakeholders	3.4
		Subtotal (A)	**268.8**
B.	**Contingencies**[c]		**33.0**
C.	**Financing Charges During Implementation**[d]		**8.2**
		Total (A+B+C)	**310.0**

[a] Includes taxes and duties of $44 million to be exempted by government.
[b] In mid-2013 prices.
[c] Physical contingencies computed at 10% for the turnkey contract. Price contingencies computed at 1.9% on foreign exchange costs and 10.1% on local currency costs; includes a provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.
[d] Includes interest during construction for ADB loan(s) computed at 2% plus relending margin of [0.20–0.50%].
Source: Asian Development Bank.

14. The government has requested a loan in various currencies equivalent to SDR65,822,000 from ADB's Special Funds resources (regular-term loan) and another loan equivalent to SDR5,794,000 from ADB's Special Funds resources (hard-term loan) to help finance the project. The loans will each have a 25-year term, including a grace period of 5 years, an interest rate of 2.0% per annum during the grace period and thereafter, and such other terms and conditions set forth in the draft loan and project agreements. The loans proceeds will be relent to Uzbekenergo under a subsidiary loan agreement. The relending will be on the same terms as the loans plus a margin of 0.2%–0.5% per annum. The foreign exchange risk will be assumed by Uzbekenergo. The loans will cover part of the cost of the solar EPC contract, consulting services, and related contingencies.

15. The government will fund an equivalent of $44 million for taxes and duties. Uzbekenergo will fund an equivalent of $26 million for the transmission line supply and installation, supporting infrastructure, recurrent costs, land acquisition and resettlement, and financial changes during implementation.[17] To fund a portion of goods and civil works, the Fund for Reconstruction and Development of the Republic of Uzbekistan[18] will lend an equivalent of $130 million[19] to Uzbekenergo through a subsidiary loan agreement. The financing plan is in Table 2.

Table 2: Financing Plan

Source	**Amount** ($ million)	**Share of Total** (%)
Asian Development Bank	110.0	35.5%
Special Funds resources (regular-term loan)	101.1	32.6%
Special Funds resources (hard-term loan)	8.9	2.9%
Government[a]	200.0	64.5%
Total	**310.0**	**100.0%**

[a] Includes contributions from the government ($44 million), Uzbekenergo ($26 million), and the Fund for Reconstruction and Development of the Republic of Uzbekistan ($130 million), subject to the approval of the Government of Uzbekistan.

Source: Asian Development Bank.

E. Implementation Arrangements

16. The implementation arrangements are summarized in Table 3 and described in detail in the project administration manual (PAM).[20]

Table 3: Implementation Arrangements

Aspects	**Arrangements**		
Implementation period	February 2014–March 2019		
Estimated completion date	31 March 2019		
Management			
(i) Executing agency	Uzbekenergo		
(ii) Project management unit	Samarkand Solar Power Project Management Unit, established within Uzbekenergo (more than 10 full-time staff)		
Procurement[a]			
Construction of 100 MW photovoltaic power plant in Samarkand	ICB	One Plant–Design, Supply, and Install Contract	$200 million
Supply of goods for transmission line[b]	Government procedures	One Transmission Line Supply Contract	$9.6 million
Consulting services[a]			
Implementation consultant	QCBS (90:10)	One contract for 323 person-months	$7 million
Advance contracting[c]	Advance contracting is requested for works, goods, and services.		
Disbursement	The loan proceeds will be disbursed in accordance with ADB's *Loan Disbursement Handbook* (2012, as amended from time to time) and detailed arrangements agreed upon between the government and ADB[d]		

ADB = Asian Development Bank, ICB = international competitive bidding, QCBS = quality- and cost-based selection.

[a] Procurement and consultant recruitment will be in accordance with the Procurement Guidelines (2013, as amended from time to time) with such modifications as may be approved by ADB's Board.

[b] Financed by Uzbekenergo.

[c] Approval of advance contracting does not commit ADB to subsequently approve the project or finance procurement.

[d] The borrower agreed with the disbursement period to extend beyond the first principal repayment date.

Source: Asian Development Bank.

[17] Interest during the O&M period is excluded from the project cost.

[18] A sovereign fund established in 2006 to finance projects with major contributions to economic development.

[19] Subject to the approval of the government.

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

17. The executing agency will be Uzbekenergo, which will assume overall responsibility of project implementation. Uzbekenergo has established a dedicated full-time project management unit (PMU) staffed with qualified personnel with experience in conventional power plants. The PMU, funded by the executing agency's internal resources, will administer all consulting and procurement contracts on the executing agency's behalf. It will be responsible for preparing project plans, bid evaluation reports, progress reports, applications for the withdrawal of funds, and any other reports required by ADB.

18. Uzbekenergo will employ a turnkey contractor for the photovoltaic power plant EPC and O&M services in accordance with ADB's Procurement Guidelines (2013, as amended from time to time). The procurement will follow ADB's international competitive bidding procedure using a single-stage two-envelope bidding method without prequalification. For the bidding, ADB's User's Guide and Extended Standard Bidding Documents for Plant–Design, Supply, and Install[21] will be used, and the turnkey contract shall use International Federation of Consulting Engineers Conditions of Contract for Design, Build and Operate Projects (general conditions, particular conditions and sample forms). The transmission line supply contract will follow government procedures since this will be financed by Uzbekenergo.

19. Uzbekenergo will recruit an implementation consultant (a firm) in accordance with ADB's Guidelines on the Use of Consultants (2013, as amended from time to time) to assist the PMU in project management and to implement the institutional capacity development plans.

III. DUE DILIGENCE

A. Technical

20. The proposed photovoltaic plant uses a proven technology based on crystalline or polycrystalline modules on a fixed structure, compatible with local conditions. The gross estimated output is equal to 159 GWh per year[22] measured in the high voltage output terminals of the main transformer under standard conditions.[23] A 220-kilovolt (kV) transmission line will be built to enable grid integration. A 4-km access road will be constructed from the plant to the existing road.[24] The construction of the proposed photovoltaic plant will take about 18 months. Given the executing agency's lack of experience and knowledge in photovoltaic, the EPC contractor will continue to operate and maintain the plant for 3 years after being commissioned. The implementation consultant will assist in enhancing the O&M skills of Uzbekenergo during the first year of operation.

21. The power plant primary energy source, solar irradiation, has been estimated from 12 years of satellite data and correlated with ground meteorological data to reduce uncertainty. The power plant will be designed, operated, and maintained to guarantee at least 25 years of operation with a 0.5 % per year degradation on energy output.

[21] ADB. 2010. *User's Guide: Procurement of Plant–Design, Supply, and Install.* Manila.

[22] Gross annual estimated output is calculated using available irradiation data. The policy and advisory TA consultant developed a preliminary design, which is subject to modification by the project preparatory TA consultant and the detailed design of the EPC contractor. The information used to prepare the figures is not contractual.

[23] Standard conditions according to International Electrotechnical Commission 60721-2-1. Standard Test Conditions are defined by a module (cell) operating temperature of 25^{o} C (77 ^{o}F), and incident solar irradiant level of 1000 Watt per square meter and under Air Mass 1.5 spectral distribution. The software and model used took into account hourly temperature variations.

[24] Separately, the government will rehabilitate the 9-km road connecting the access road to the main road prior to power plant construction, confirmed by the Samarkand Regional Road Authority to Uzbekenergo on 18 June 2013.

B. Economic and Financial

22. The project is economically viable.[25] The economic benefits are incremental as a result of increased electricity consumption. The economic internal rate of return is 16.1%, which is greater than the economic opportunity cost of capital (12%). Given the carbon-intensive power mix of Uzbekistan, the project will avoid 88,000 tons of carbon dioxide equivalent GHG emissions in the first year of operation alone. The price of carbon reduction and the environmental and health benefits are not considered in the financial and economic analyses.

23. The levelized energy cost[26] (LEC) for the overall project is $0.118 per kWh inclusive of taxes and $0.079 per kWh exclusive of taxes.[27] When the 159 GWh[28] generated from the power plant is added to the national grid, the overall average cost of generation will increase by 0.5%. Uzbekenergo is able to absorb this increase in the weighted average cost of generation.

24. Uzbekenergo has operated profitably over the last 5 years. Financial projections for 2013–2018 indicate that the financial base remains stable provided that the tariff adjustment remains in sync with inflation and gas prices. The project's capacity development program, addressing tariff policy and determination methods, among others, will ensure the sustained profitability of Uzbekenergo and enhance its capability in the commercial debt market.

C. Governance

25. Uzbekenergo needs to strengthen its financial management capacity. Uzbekenergo's accounting policies, procedures, and financial reporting have followed the National Accounting Standards of Uzbekistan and National Standards on Auditing. However, in order to enhance its financial management, Uzbekenergo undertook an external audit based on International Standards on Auditing issued by the International Assurance Auditing Standards Board of its financial statements from the fiscal year ending 31 December 2011. The results indicate the need for further improvements, such as, in the classification methods and impairment provisions on account receivables, the scope of account consolidation, and the accounting system. For the fiscal year ending 31 December 2012, Uzbekenergo has started to adopt International Financial Reporting Standards (IFRS) conversion with the plan for full conversion to cover all subsidiaries for the fiscal year ending 31 December 2013. The capacity development plan under other ADB loan projects will address the training of the IFRS specialists as well as the strengthening of Uzbekenergo's information systems with the objective of improving its financial management capability.[29] Uzbekenergo's financial management risk after mitigation is moderate.

26. Uzbekenergo's procurement capacity was assessed as average risk. As an institution, it has experience with multilateral and bilateral financing institutions including ADB. However, the PMU capacity is weak. The PPTA[30] consultant will assist in preparing bidding documents and in procurement. An implementation consultant will be recruited to provide project management and supervision support, and to implement the capacity development component to build executing agency capacity. Training on procurement and financial management will be conducted by

[25] The analysis is carried out in accordance with ADB's Financial Management and Analysis of Projects and Guidelines for the Economic Analysis of Projects.
[26] The LEC is the constant price per unit of energy that causes an investment or a payment stream to just break even.
[27] The effective LEC for the solar EPC contract, excluding taxes expected to be exempted, is $0.066 per kWh.
[28] The expected underated power generation is 159 GWh. The power plant is expected to be derated by 0.5% per annum, and this is assumed in the model. The power generation forecasted in 2016 in Uzbekistan is 52,800 GWh.
[29] ADB. 2010. *Report and Recommendation of the President to the Board of Directors: Proposed Loans to the Republic of Uzbekistan for the Talimarjan Power Project*. Manila.
[30] ADB. 2013. *Technical Assistance to the Republic of Uzbekistan for the Samarkand Solar Power Project*. Manila.

international and national experts during the project preparatory TA and implementation stages of this project and other ADB projects with Uzbekenergo. An early warning system will be established to ensure timely procurement and project implementation.

27. ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the government and Uzbekenergo. The specific policy requirements and supplementary measures are described in the PAM (footnote 19).

D. Poverty and Social

28. The project will provide employment[31] and will impact income growth and poverty reduction in Samarkand district. Indirect impacts on the residents' living standards and well-being will be significant.[32] Power outages last longer in rural areas compared to urban areas. The households will benefit from reliable access to energy and improved public services, which will improve the economic and social activities of households, and improve living conditions.

29. The project will provide positive impacts through general intervention to the poor and vulnerable groups through several channels:

(i) **Employment**. Employment and poverty are interrelating indicators. In the project area, most of the household income comes from employment. Proper power supply service will improve enterprise operation and create new business opportunities, which will in turn improve the employment market and lead to an increase in income of the population.

(ii) **Education**. The household survey showed a direct connection between education levels and poverty. Educational services, which suffer greatly from frequent power interruption, will improve with the enhanced electricity services.

(iii) **Health**. A poor power supply results in poor winter heating and poor health care service, and handicaps the potable water system. This leads to higher rates of intestinal infections and cold-related diseases. Reducing bouts of disease will reduce medical expenses and increase the economic activity of households, including those of women.

30. **Gender.** In Uzbekistan, like in many countries, the energy sector is male-dominated, with a low representation of women in decision making. Women occupy relatively lower-paid positions, have limited training opportunities, and bear the double burden of unpaid household responsibilities. The number of female employees varies from 2.2% (Joint Stock Company Samarkand Electric Networks) to 26% (Dustlik Power Distribution Networks). The gender and development capacity of stakeholders needs to be strengthened. Analyses of sex-disaggregated data, information campaigns, and collaboration with women's organizations, schools, and technical colleges are needed to increase women's participation in the project's capacity development activities. To address gender issues, the sanitary and hygiene facilities of the power plant need to be improved for both men and women.

31. A rapid gender assessment is reflected in the Summary Poverty Reduction and Social Strategy.[33] The project will increase local energy supply, which will improve living and working opportunities, especially for women. Gender elements include capacity development with a special focus on women.

[31] Local labor regulations prohibit exploitive labor practices, including the use of child labor. Adherence to core labor standards is included as a loan covenant.
[32] Policy and advisory TA consultant estimates.
[33] Summary Poverty Reduction and Social Strategy (accessible form the list of linked documents in Appendix 2).

E. Safeguards

32. **Environment.** The project is a category B project following ADB's Safeguard Policy Statement (2009) and will involve the construction of a new photovoltaic plant and its supporting facilities, which include an access road and a transmission line.

33. The initial environmental examination (IEE) for the construction of the new plant and its supporting facilities was carried out to assess impacts, and the environmental management plan (EMP) was prepared to provide guidance for minimizing any adverse impacts. Public consultations were carried out on 31 May 2013 in Samarkand city. The IEE report was disclosed on the ADB website on 16 September 2013. The project will not cause any significant environmental impacts. Minor and transient environmental disturbances may occur during the construction and operation phases. Appropriate mitigation measures have been developed in the EMP, which is subject to updating after the completion of the conceptual system design to include all technical aspects and to incorporate recommendations from the Samarkand Province Nature Protection Committee.[34] The updated IEE and its EMP will need to be submitted to ADB.

34. The PMU on behalf of the executing agency has overall responsibility for implementing the EMP throughout project implementation and completion. The contractor will implement the EMP to mitigate all impacts related with construction activities. The PMU and the implementation consultant teams will each have an environmental specialist to supervise the contractor implementing the EMP. A grievance redress mechanism will be established within the PMU under Uzbekenergo to resolve complaints, if any. The Uzbekenergo Environment, Health and Safety Unit will oversee the implementation of the EMP.

35. **Social safeguards.** The project will require land acquisition for three types of components: (i) construction of the photovoltaic power plant, (ii) construction of the 220-kV transmission line to the national power grid, and (iii) widening of the 4-km access road from the power plant up to the existing paved road. The project is categorized as a B project for involuntary resettlement in accordance with ADB's Safeguard Policy Statement.

36. The resettlement plan, presented as the Land Acquisition and Resettlement Plan (LARP), was prepared in close consultation with affected people. The total land to be acquired is 410.56 hectares (ha), of which total permanent land acquisition is 407.8 ha and temporary acquisition 2.76 ha. The permanent acquisition will be used for the power plant (405 ha), access road (1.96 ha), and transmission line (0.84 ha). The temporary land acquisition (2.76 ha) will be required only during construction of the transmission line. This land acquisition will affect 17 households with a total of 109 persons. The land acquisition for the power plant will have three households; these households belong to farmers and will be impacted severely because they will lose 29.1% to 41.5% of their productive land. The expansion of the access road and the transmission line will not cause any severe impact. None of the three project facilities (power plant, access road, and transmission line) will result in any physical displacement of residential assets or cause unemployment in affected farms. However, a 675-square-meter structure used for keeping livestock and hay will need to be demolished to construct the power plant. During consultation, two of the 17 households expressed willingness to give up land for compensation. They requested appropriate changes in their lease agreements to reduce their tax payments.

[34] Under the government environmental impact requirement, the project falls within category 3 and the updated IEE will require clearance (in the form of an opinion from ecological experts) from the Samarkand Province Nature Protection Committee.

37. The LARP for this project was prepared in line with national laws and regulations and ADB's Safeguard Policy Statement. The LARP study was carried out from May to July 2013. Six consultations were carried out in May, and three in July. The consultations were with affected people, local government agencies, and local communities. The estimated compensation costs for land acquisition is around $240,000. Uzbekenergo has adequate experience in implementing a LARP and will be assisted by the PMU. The PMU will include a social safeguards and gender specialist to coordinate with local agencies to implement the LARP and submit reports to ADB. The established grievance redress mechanism will address both environmental and social complaints, if any. The LARP was disclosed through the ADB website on 16 September 2013.

38. The survey for poverty and social assessment found that there is no community or group in the project area that maintains any particular culture, language, or properties distinct from the general population. There are four ethnic groups within the local community namely Uzbeks, Kazakhs, Russians, and Tajiks. None meet the ADB definition of vulnerable indigenous peoples, and therefore the project is categorized as a C project for indigenous people or ethnic minority requirements in accordance with the Safeguard Policy Statement. No further study is needed.

39. **Safeguards capacity development**. Uzbekenergo has experience implementing ADB's requirements for both environmental and social safeguards. However, as this will be the first solar power plant in the country, capacity development will be provided to strengthen Uzbekenergo's capacity and to ensure adequate resources and institutional capacity are in place to manage environmental and social impacts associated with the plant. Capacity development will include a series of awareness campaigns and hands-on practical seminars for relevant agencies and other stakeholders.

F. Risks and Mitigating Measures

40. Major risks and mitigating measures are summarized in Table 4 and described in detail in the risk assessment and risk management plan.[35] Technical risks are mostly low category, and recommended measures are expected to mitigate medium category financial and governance risks. The integrated benefits and impacts are expected to outweigh the costs.

Table 4: Summary of Risks and Mitigating Measures

Risk	Mitigating Measure
Procurement delays	Advance contracting will be adopted. Training on ADB procurement and consultant recruitment procedures has been carried out. Procurement assistance is provided under the project preparatory TA and is included in the terms of reference of the implementation consultant.
Financial management and administrative risks	ADB direct payment procedures will be used and no imprest account will be established. An accounting system compliant with National Accounting Standards will be established and maintained. The PMU will be supported by international consultants. Training on ADB procedures will be provided. Recruitment and training of staff for international financing reporting standards will be implemented by Uzbekenergo with the help of the international consultant.
Delay in contract registration	Continuous dialogue will be held between the executing agency and the Ministry of Foreign Economic Relations, Investment, and Trade to ensure that (i) contract registration does not cause unnecessary procurement delays, and (ii) procurement complies with the ADB Procurement Guidelines (2013, as amended from time to time) and price verification is not applied.
Compromised procurement integrity	Project preparatory TA consultants are involved in the procurement and will review the authenticity of proposals. ADB will conduct parallel reviews of eligibility documents and expressions of interest and proposals for the EPC and consulting services contracts.

ADB = Asian Development Bank, EPC = engineering, procurement, and construction, PMU = project management unit, TA = technical assistance.
Source: Asian Development Bank.

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

IV. ASSURANCES AND CONDITIONS

41. The government and Uzbekenergo 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 project administration manual and loan documents.

42. The government and Uzbekenergo have agreed with ADB on certain covenants for the project, which are set forth in the loan agreement and project agreement.

43. Loan proceeds will not be disbursed until a subsidiary loan agreement between the government and Uzbekenergo for the relending of the ADB loans has been signed and become effective in accordance with its terms. In addition, no disbursement for the turnkey contract will be made until a loan agreement between the Fund for Reconstruction and Development of the Republic of Uzbekistan and an eligible commercial bank, and a related subsidiary loan agreement between such bank and Uzbekenergo, both for the purposes of the project and in form and substance satisfactory to ADB, have been signed and become effective in accordance with their terms.

V. RECOMMENDATION

44. I am satisfied that the proposed loans would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve:

(i) the loan in various currencies equivalent to SDR65,822,000 to the Republic of Uzbekistan for the Samarkand Solar Power Project, from ADB's Special Funds resources (regular term), with an interest charge at the rate of 2.0% per annum during the grace period and 2.0% per annum thereafter; 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; and

(ii) the loan in various currencies equivalent to SDR5,794,000 to the Republic of Uzbekistan for the Samarkand Solar Power Project, from ADB's Special Funds resources (hard term), with an interest charge at the rate of 2.0% per annum during the grace period and 2.0% per annum thereafter; 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

25 October 2013

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
Impact Improved sustainability of the energy supply in Uzbekistan	Total domestic power generated increased from 52 TWh (2010) to 65 TWh in 2020 Sustained outage decreased from seven times per year in 2011 to three times per year in 2020 Total GHG emission intensity reduced from 4.53 kg CO_2e/GDP (2009) to 3 kg CO_2e/GDP in 2020	Uzbekenergo's annual performance report Central Dispatch Center statistics IEA key world energy statistics	**Assumptions** Stable economic growth and power demand grows by 2%–3% per annum Electricity tariffs regularly adjusted to cover costs Global and country investment climate remains robust
Outcome Increased renewable energy generation in Uzbekistan	At least 159 GWh of solar power generated by 2017 At least 88,000 tons CO_2e emissions avoided by 2017	Uzbekenergo annual report	**Assumption** Gas-fired power plants continue to dominate the energy mix and provide base-load power
Outputs 1. Solar power plant, transmission, and support facilities operational 2. Institutional capacity of Uzbekenergo developed 3. Institutional capacity of solar energy stakeholders developed	Grid-connected 100 MW solar photovoltaic plant commissioned by 2016 A solar power project pipeline developed and three project designs prepared by 2017 At least five capacity development training and seminars for at least 100 Uzbekenergo staff and experts, including 100% of Uzbekenergo women staff in relevant departments conducted by 2017 At least 10 solar capacity development activities (training, workshops, and technical visits) for at least 150 participants from 10 solar energy stakeholders, including at least 10% women trained by 2017 At least three solar-related training workshops for at least 30 participants from 10 manufacturing industries and entrepreneurs, involving at least 10% women participants	Contractor as-built drawings and commissioning report Uzbekenergo annual reports Training reports Training reports, Uzbekenergo annual reports	**Assumptions** All trained staff are retained at least throughout the duration of project implementation Nine kilometer road linking the project access road to the main road is rehabilitated by government as planned

	At least two safeguards and gender awareness workshops conducted for at least 20 staff and experts and two information campaigns to increase women's participation in solar energy development conducted by 2017		
Activities with Milestones **1. Solar Power Plant, transmission and support facilities operational** 1.1 Executing agency recruits and mobilizes implementation consultant (January–September 2014) 1.2 Executing agency procures contractors for the construction and installation of the solar power plant and transmission line supply (November 2013–November 2014) 1.3 Contractor completes detailed engineering design for the solar power plant and associated facilities (October 2014–March 2015) 1.4 Procurement of equipment and materials (September 2014–June 2015) 1.5 Uzbekenergo constructs, installs, and commissions the transmission line and support infrastructure (July–October 2015) 1.6 Contractor constructs, installs, and commissions the solar power plant (January 2015–March 2016) 1.7 Contractor provides operation and maintenance services (April 2016–March 2019) **2. Institutional capacity of Uzbekenergo developed** 2.1 ADB and the executing agency approve the capacity development plan (December 2013) 2.2 Project preparatory TA consultant conducts trainings and produces manuals consistent with the approved capacity development plan (December 2013–March 2014) 2.3 Implementation consultants provide project management and supervision support to the executing agency (September 2014–March 2017) 2.4 Implementation consultant updates and implements capacity development plans (September 2014– March 2017) **3. Institutional capacity of solar energy stakeholders developed** 3.1 ADB and the executing agency approve the solar capacity development plan (December 2013) 3.2 Implementation consultant updates and ADB and the executing agency approve the solar capacity development plan (September-December 2014) 3.3 Implementation consultant implements the capacity development plans (December 2014– March 2017)		**Inputs ($ equivalent)** ADB $110 million ADF $101.1 million ADF hard term $8.9 million Government $44 million Uzbekenergo $26 million UFRD $130 million[a]

ADB = Asian Development Bank, ADF = Asian Development Fund, CO_2e = carbon dioxide equivalent, GDP = gross domestic product, GHG = greenhouse gas, GWh = gigawatt-hour, IEA = International Energy Agency, kg = kilogram , MW = megawatt, TA = technical assistance, Twh = terawatt-hours, UFRD = Fund for Reconstruction and Development of the Republic of Uzbekistan.

[a] Subject to government approval.

LIST OF LINKED DOCUMENTS
http://www.adb.org/Documents/RRPs/?id=45120-003-3

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. Initial Environmental Examination
12. Resettlement Plan
13. Risk Assessment and Risk Management Plan

Supplementary Documents

14. Feasibility Study Report
15. Roadmap to Solar Energy Development in the Republic of Uzbekistan
16. Financial Management Assessment
17. Procurement Capacity Assessment
18. Financial Performance Projections