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Report No: 185099-UZ

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED IBRD PAYMENT GUARANTEE

IN THE AMOUNT OF UP TO US$12 MILLION

TO THE REPUBLIC OF UZBEKISTAN

FOR THE

UZBEKISTAN SOLAR AND RENEWABLE ENERGY STORAGE (USRES) PROJECT

DECEMBER 5, 2023

Energy and Extractives Global Practice
Europe and Central Asia Region

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CURRENCY EQUIVALENTS

Exchange Rate Effective November 30, 2023

Currency Unit	=	Uzbekistan Sum (UZS)
UZS 12,280.49	=	US$1

FISCAL YEAR
July 1 – June 30

Regional Vice President: Antonella Bassani
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ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
ADSCR	Average Debt Service Coverage Ratio
AIIB	Asian Infrastructure Investment Bank
ASA	Advisory Services and Analytics
BESS	Battery Energy Storage System
Capex	Capital Expenditure
CCGT	Combined-Cycle Gas Turbine
CCS	Carbon Capture and Storage
CESMP	Construction Environmental & Social Management Plan
CHSMP	Community Health and Safety Management Plan
CLO	Community Liaison Officer
COD	Commercial Operations Date
COVID-19	Coronavirus Disease 2019
DFI	Development Finance Institution
DPO	Development Policy Operation
DSCR	Debt Service Coverage Ratio
EBIT	Earnings Before Interest and Tax
EBITDA	Earnings Before Interest, Tax, Depreciation, and Amortization
EBRD	European Bank for Reconstruction and Development
ECCH	Emirates Centre for the Conservation of the Houbara
EHS	Environmental, Health, and Safety
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EIRR	Economic Internal Rate of Return
ENPV	Economic Net Present Value
EPC	Engineering, Procurement, and Construction
EPRP	Emergency Preparedness and Response
ERR	Economic Rate of Return
ESAP	Environmental and Social Action Plan
ESHS	Environmental, Social, Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMAP	Energy Sector Management Assistance Program
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
FM	Financial Management
GBV	Gender-Based Violence
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GoU	Government of Uzbekistan
GSA	Government Support Agreement
IFC	International Finance Corporation
IFI	International Financial Institution

IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
IPP	Independent Power Producer
IRR	Internal Rate of Return
ISA	International Standards on Auditing
ISCR	Interest Service Coverage Ratio
L/C	Letter of Credit
LCP	Least-Cost Power
MDB	Multilateral Development Bank
MIIT	Ministry of Investments, Industry and Trade
MIGA	Multilateral Investment Guarantee Agency
MoE	Ministry of Energy
MoEF	Ministry of Economy and Finance
NDC	Nationally Determined Contribution
NDS	National Development Strategy
NEGU	National Electric Grid of Uzbekistan Joint-Stock Company (Formerly “National Power Networks of Uzbekistan Joint-Stock Company”)
NPV	Net Present Value
O&M	Operations and Maintenance
PAD	Project Appraisal Document
PDO	Program Development Objective
PLR	Performance Learning Review
PPA	Power Purchase Agreement
PPL	Public Procurement Law
PPP	Public-Private Partnership
PS	Performance Standards
PV	Photovoltaic
RFQ	Request for Qualification
SCP	Shadow Price of Carbon
SEP	Stakeholder Engagement Plan
SOE	State-Owned Enterprise
SPV	Special-Purpose Vehicle
TPP	Thermal Power Plant
UE	UzbekEnergo
UGT	UzGazTrade
UNFCCC	United Nations Framework Convention on Climate Change
UNG	UzbekNefteGaz
UPT	UzPowerTrade

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DATASHEET

BASIC INFORMATION

Country(ies)	Project Name	
Uzbekistan	Uzbekistan Solar and Renewable Energy Storage (USRES) Project	
Project ID	**Financing Instrument**	**Environmental and Social Risk Classification**
P181434	Investment Project Financing/Guarantee	Moderate

Financing & Implementation Modalities

[ ] Multiphase Programmatic Approach (MPA)	[ ] Contingent Emergency Response Component (CERC)
[ ] Series of Projects (SOP)	[ ] Fragile State(s)
[ ] Disbursement-linked Indicators (DLIs)	[ ] Small State(s)
[ ] Financial Intermediaries (FI)	[ ] Fragile within a non-fragile Country
[X] Project-Based Guarantee	[ ] Conflict
[ ] Deferred Drawdown	[ ] Responding to Natural or Man-made Disaster
[ ] Alternate Procurement Arrangements (APA)	

Expected Approval Date	Expected Closing Date
03-Jan-2024	31-Dec-2025

Bank/IFC Collaboration

Yes

Proposed Development Objective(s)

The development objective is to increase private sector led renewable energy supply in Uzbekistan.

Components

Component Name	Cost (US$, millions)

Component 1: Construction and operation of a 250 MW solar power plant and 63 MW/ 126 MWh of Battery Energy Storage System (BESS) by Abu Dhabi Future Energy Company PJSC - Masdar at Bukhara site and power purchase by the state-owned off-taker (NEGU) supported through IBRD project-based payment guarantee	316

Organizations

Borrower:	Republic of Uzbekistan
Implementing Agency:	Ministry of Economy and Finance (MoEF)

PROJECT FINANCING DATA (US$, Millions)

SUMMARY

Total Project Cost	316
Total Financing	328
of which IBRD/IDA	12
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Bank for Reconstruction and Development (IBRD)	12.0

INSTITUTIONAL DATA

Practice Area (Lead)

Energy & Extractives

Contributing Practice Areas

Climate Change, Public-Private Partnerships

Climate Change and Disaster Screening

Screened

Gender Tag

Does the project plan to undertake any of the following?	
a. Analysis to identify Project-relevant gaps between males and females, especially in light of country gaps identified through SCD and CPF	No. WB guarantee operations are not subject to the Gender Tag.
b. Specific action(s) to address the gender gaps identified in (a) and/or to improve women or men's empowerment	No
c. Include Indicators in results framework to monitor outcomes from actions identified in (b)	No

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	Moderate
2. Macroeconomic	Moderate
3. Sector Strategies and Policies	Substantial
4. Technical Design of Project or Program	Moderate
5. Institutional Capacity for Implementation and Sustainability	Moderate
6. Fiduciary	Low
7. Environment and Social	Moderate
8. Stakeholders	Moderate
9. Other	Moderate
10. Overall	Moderate

COMPLIANCE

Policy

Does the project depart from the CPF in content or in other significant respects?

[ ] Yes [X] No

Does the project require any waivers of Bank policies?

[ ] Yes [ ] No

Performance Standards

Performance Standards	Yes	No
PS 1: Assessment and Management of Environmental and Social Risks and Impacts	X	
PS 2: Labor and Working Conditions	X	
PS 3: Resource Efficiency and Pollution Prevention	X	
PS 4: Community Health, Safety, and Security	X	
PS 5: Land Acquisition[a] and Involuntary Resettlement	X	
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	X	
PS 7: Indigenous Peoples		X
PS 8: Cultural Heritage		X

For further information regarding the World Bank's due diligence assessment of the Project's potential nmental and social risks and impacts, please refer to the Project's Appraisal Environmental and Social Review ary (ESRS).

Legal Covenants

Guarantee Legal Covenants[1]			
Name	**Recurrent**	**Due Date**	**Frequency**
Usual and customary covenants for project financings of this nature.	Yes	n/a	Ongoing

Description of Covenants

Usual and customary covenants for project financings of this nature (See term sheet in Annex 1).

The Project Company will covenant that they will, among other actions:

a. comply with applicable laws (including environmental and social laws) and applicable environmental and social safeguard requirements, including the World Bank Performance Standards (PS), the World Bank Group (WBG) Environmental, Health, and Safety Guidelines, and other applicable requirements, including as to the use of forced labor;
b. provide annual audited financial statements and other reports to IBRD;
c. provide certain notices and other information to IBRD;
d. provide IBRD access to the Project;

[1] Please note that the legal documents are still under negotiation (which is regular practice and expressly permitted in World Bank guarantee operations, even while proceeding with Board presentation of the guarantee).

e. not engage in (or authorize or permit any affiliate or any person acting on their behalf to engage in) any Sanctionable Practices[2] in connection with the Project;
f. comply with the World Bank requirements relating to Sanctionable Practices regarding individuals or firms included in the WBG list of firms debarred from WBG-financed contracts; and
g. obtain IBRD's consent prior to agreeing to any change to any material Project-related transaction document to which the relevant Project Company is a party that would materially affect the rights or obligations of IBRD under the Guarantee Agreement.

Conditions

Guarantee Conditions[3]

Source of Funds	Name	Type
IBRD Guarantee	Conditions precedent to effectiveness	Usual and customary conditions precedent to effectiveness of guarantees for project financings of this nature.

Description of Conditions

Usual and customary conditions precedent to effectiveness of guarantees in support of project financings of this nature, among others:

a. Firm commitment for the financing necessary to complete construction of the Project, including satisfactory contribution of equity;
b. Execution, delivery, and effectiveness of all commercial and financing documents, including the Indemnity Agreement, the Project Agreements, and the Cooperation Agreement, in form and substance satisfactory to IBRD;
c. Payment in full of fees and expenses of IBRD's external counsel;
d. Provision of satisfactory legal opinions;
e. Payment in full of the Initiation Fee, Processing Fee (if invoiced), Front-end Fee, and the first installment/s of the Standby Fee and / or Guarantee Fee (if invoiced); and
f. Satisfactory integrity due diligence of the Project Company (and related parties) and the guaranteed party.

PROJECT TEAM

World Bank Staff

Name	Role	Title	Unit
Ferhat Esen	Team Leader (ADM Responsible)	Senior Energy Specialist	IECE1
Maksudjon Safarov	Team Leader	Senior Energy Specialist	IECE1
Philip Lam	Team Leader	Senior Infrastructure Finance Specialist	IPGFG
Manuel Berlengiero	Team Member	Lead Energy Specialist	IECE1

[2] "Sanctionable Practices" means any fraudulent, coercive, corrupt, collusive, obstructive, or fraudulent practice, as defined in the World Bank's Anti-Corruption Guidelines for World Bank Guarantee and Carbon Finance Transactions.
[3] Please note that the legal documents are still under negotiation (which is regular practice and expressly permitted in World Bank guarantee operations, even while proceeding with Board presentation of the guarantee).

Bahodir Amonov	Team Member	Energy Specialist	IECE1
Juliana Victor	Team Member	Senior Operations Officer	ECADE
Elcin Akcura	Team Member	Senior Energy Economist	IEEGK
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Alexandra Bezeredi	Team Member	Lead Social Development Specialist	SCASO
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Zafar Khashimov	Team Member	Senior Country Officer	CATUZ
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IFC Staff (Investment)			
Mark Sorial	Team Member	Senior Investment Officer	CN5MI
Ekaterina Dolinina	Team Member	Investment Officer	CN5CT
Alexander Matveenko	Team Member	Associate Investment Officer	CN5CT

I. STRATEGIC CONTEXT

1. **The Uzbekistan Solar and Renewable Energy Storage (P181434; USRES)** is a major milestone for Uzbekistan to further scale up renewable energy (RE) capacity through the addition of a new solar photovoltaic (PV) plant and a Battery Energy Storage System (BESS) procured through competitive tender with the private sector and low tariffs secured as a result. The USRES represents an opportunity to further strengthen the security of energy supply with innovative solutions, while sector reforms are continuing to advance. The project hence contains the first BESS application in Uzbekistan and Central Asia and is the first World Bank (WB) operation supporting a BESS through a WB/International Bank for Reconstruction and Development (IBRD) guarantee globally. The WB guarantee for the project aims to: (i) expand access to international market players by reducing risk perception while increasing competition; (ii) further improve financing terms to lower transaction costs of renewable/solar energy and innovative technologies; (iii) support learning and market development through collection of data on technical and economic performance; and (iv) provide international best practices in RE deployment through BESS and private sector participation. The project's innovative BESS component aims to improve efficiency and flexibility of the power system and promote the renewable energy integration providing multiple grid services.

2. **As part of Uzbekistan's clean energy transition and decarbonization agenda, the Government of Uzbekistan (GoU) has increased its ambitious RE target** of scaling up solar (7,000 MW) and wind (5,000 MW) generation capacities, representing 30 percent of power mix by 2030, to 25 GW[4]. In addition, the GoU has embarked on new wave of energy sector reforms towards liberalization of energy markets, promotion of private sector involvement and infrastructure investment to facilitate RE integration. In this context, the WB and International Finance Corporation (IFC) have been already assigned to develop 2,000 MW of solar and 500 MW of wind developments on competitive basis with private sector participation, similar to 2,000 MW of RE deployment with Asian Development Bank (ADB) and European Bank Reconstruction and Development (EBRD). So far, the WB and IFC supported large-scale solar and wind projects[5], including USRES representing in total 7.1 percent of the installed generation capacity, have attracted global private developers in Uzbekistan and strengthened its track record to develop new innovative projects such as USRES included in Uzbekistan's decarbonization pathway towards a lower-carbon power system with reduction in carbon-footprint. The proposed project further demonstrates the renewable energy market development with its scale, design and solar PV and BESS components realized by the private sector interest strengthened through the GoU sector reforms and WB support in the form of technical assistance and IBRD guarantee as well as IFC financing.

Table 1. World Bank and Development Partners' Support on Renewable Energy Deployment *(competitive basis)*

Institution	Project	Capacity, MW	Status
WB	Navoi Scaling Solar 1	100	Operational
WB	Scaling Solar 2 (Samarkand, Jizzakh sites)	440	Under construction
WB	Uzbek Solar 3 (Bukhara Solar IPP with a pilot BESS; USRES, the proposed Project)	250 and 63/126 MWh (BESS)	Financial close in 2023

[4] "Uzbekistan - 2030" Presidential Decree dated 11 September 2023 No. UP-158.
[5] Navoi Scaling Solar 1 (P170598), Zarafshan Wind Power (44364) and Scaling Solar 2 (P174322) projects approved by the World Bank/IFC board in 2020, 2022 and 2023 respectively.

Institution	Project	Capacity, MW	Status
WB	ECARES[6]: Khorezm Solar IPP	100	Financial close in 2024
WB	Uzbek Solar 4	1,000	Preparation stage
WB	Scaling Wind	500	Preparation stage
ADB	Solar Power Assignment	1,000	Bidding, Commercial/Financial close, and Construction Stages
EBRD	Wind Power Assignment	1,000	Bidding, Commercial/Financial close, and Construction Stages
	Total	**4,453**	

A. Country Context

3. **The GoU has recently announced the "Uzbekistan – 2030" Strategy,** which aims to reduce the poverty rate by half by 2026 and enable the country to reach upper middle-income status by 2030. With more than 36 million people, Uzbekistan is the most populous of the Central Asia region. Combined with the proximity to some of the largest and most rapidly growing economies in the world, this presents an opportunity for the country to evolve from its reliance on natural resource use and minerals extraction and become a hub for economic growth, trade and energy. Despite global uncertainties and challenges, structural reforms and effective economic management thus far have helped maintain macroeconomic stability and an environment to further accelerate market transition through the next phase of structural reforms. Over the past decade, Uzbekistan has maintained high and stable economic growth at 5.8 percent on average. Reforms to liberalize trade, exchange rate, domestic prices and the tax system have supported Uzbekistan's continued economic growth and the reduction of resource misallocations in the economy. As a result, notwithstanding the COVID-19 pandemic, Uzbekistan has maintained an economic growth of 2.0 percent in 2020 and a further growth rebound of 7.4 percent in 2021. Economic growth in 2022 moderated to 5.7 percent led by strong remittances, consumption, and exports. Growth is expected to be 5.5 percent in 2023 and accelerate gradually in the medium term. The WB projections suggest that the national poverty rate fell from 22.8 percent in 2019 to 14.2 percent in 2022.

4. **The reform path, in addition to navigating a difficult economic transition, must also successfully manage the growing need to tackle climate change for the country to achieve a sustainable development path.** Uzbekistan has demonstrated increased commitment to climate initiatives by presenting its updated Nationally Determined Contributions (NDCs) with a target to reduce greenhouse gas (GHG) emissions per unit of GDP by 35 percent by 2030 compared with the 2010 levels (against the previous target of 10 percent). To this end, a Presidential Resolution dated October 5, 2019, approved the Strategy for Uzbekistan's Transition to a Green Economy over the period of 2019–2030. Additionally, in May 2022, Uzbekistan joined the Global Methane Pledge initiative to achieve a collective goal of reducing methane emissions by at least 30 percent by 2030 compared with the 2020 level.

[6] Europe and Central Asia Renewable Energy Scale-up (ECARES) Multiphase Programmatic Approach (MPA) (ECARES, P502473)

5. **Uzbekistan is vulnerable to climate change with potentially significant impacts on energy infrastructure and supply.** Over the past century, average annual air temperatures have risen steadily and significantly in Uzbekistan, coupled with more frequent heat waves, droughts, and flooding. Climate change can impact negatively on energy supply, through potential damages of power infrastructure in certain regions of the country, river flows change that can reduce hydro power generation and create large energy shortage during summer, mainly due to heat and drought. Furthermore, Uzbekistan's ageing physical infrastructure makes it more challenging to provide undisrupted power for the fast-growing domestic electricity demand. Without support to adapt and reduce disaster risks, climate change impacts are likely to be unequal, affecting Uzbekistan's poor and marginalized communities most.

B. Sectoral and Institutional Context

6. **Uzbekistan remains one of the most energy-intensive economies in the world**. Energy use is largely based on fossil fuels, although the country has significant RE potential in solar and wind. Natural gas, of which domestic production is depleting, makes up to 83 percent of total primary energy consumption and more than 80 percent of the electricity mix. These characteristics have contributed to Uzbekistan's energy-intensive economy, where GDP energy intensity is about 50 percent higher than that of neighboring Kazakhstan and around three times higher than that of Türkiye. While the country accounts for around 0.3 percent of global emissions, its energy sector accounts for three-quarters of the country's total GHG emissions. The energy system is also characterized by high losses and low reliability of supply, with transmission and distribution losses estimated at around 20 percent in net power generation and around 30 percent in domestic gas production. This level is more than twice as high as electricity losses in high-income and some middle-income countries and in its current condition the energy system cannot sustain the planned high penetration of RE.

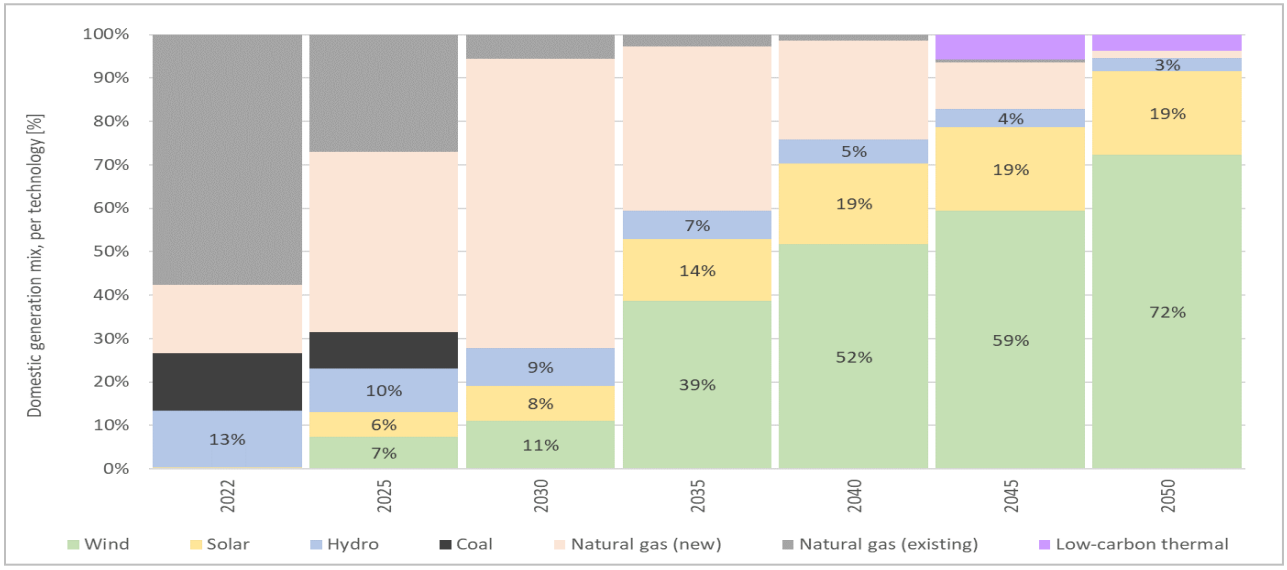
7. **The demand for electricity is expected to continue growing steadily in conjunction with economic growth, development trends, and changes in the structure of the national economy.** The demand for electricity is expected to almost double to above 130 TWh in 2030, according to the WB-supported Least-Cost Generation Expansion Plan (least-cost power [LCP]; base case scenario). In terms of electricity consumption, the industrial sector currently represents the largest customer segment (41 percent), followed by residential (24 percent), agriculture (21 percent), commercial (11 percent), and others. Power generation growth rates from 2012-2019 were recorded at 2.6 percent per year on average. However, the demand for electrical power was not satisfied in full, with unmet demand averaging at about 8 percent of demand. As a result, the country experienced severe energy supply shortages during the winter 2022/2023; the WB has been providing technical assistance (TA) support to better develop emergency response and sound investment planning.

8. **Renewable energy scale-up is therefore the centerpiece of the energy sector reform[7], security of supply and power sector carbon-neutrality by 2050,** especially following the recent energy crisis in the country. Installed capacity of power generation in the country is 18,108 MW as of September 2023, combining thermal power (15,461 MW, representing 85 percent of the power mix), hydro power (2,225 MW, 12 percent) and solar power (200 MW, one percent) plants as well as block stations (222 MW, one percent), however available capacity of power generation is limited to 12,815 MW. State owned generation company "Thermal Power Plants" JSC is primarily responsible for generating electricity and heat to meet the needs of the economy and the population of the country. The company has eight thermal power plants and three combined heat plants (CHPs) with a total capacity of 14,042 MW all using fossil fuels. In this regard, with support from the WB, the GoU has recently

[7] The Uzbekistan energy sector reforms and WB engagement are further detailed in Annex 6.

developed an Energy Sector Decarbonization Pathways Assessment Study, that suggests that a significant expansion of renewables capacity between 2022 and 2050 is part of the least-cost pathway for power sector decarbonization in Uzbekistan. Renewables, including hydropower, are expected to account for 95 percent of the electricity generation in 2050, in the Decarbonization 2050 scenario. Batteries, mainly BESS, hydropower, and efficient thermal power plants, including plants with carbon capture and storage (CCS) and running on hydrogen in later years, support the scaling-up of renewables from 2022 to 2050. This will help Uzbekistan reduce its reliance on gas-based generation from over 80 percent in 2022 to 56 percent by 2030. In this context, the Project will provide a replicable and commercially viable solar project coupled with BESS as part of the country's 2050 carbon neutrality target 2050.

Figure 1: Power Generation Mix under Decarbonization Scenario 2050



Source: Energy Sector Decarbonization Pathways Assessment Study, Decarbonization 2050 scenario

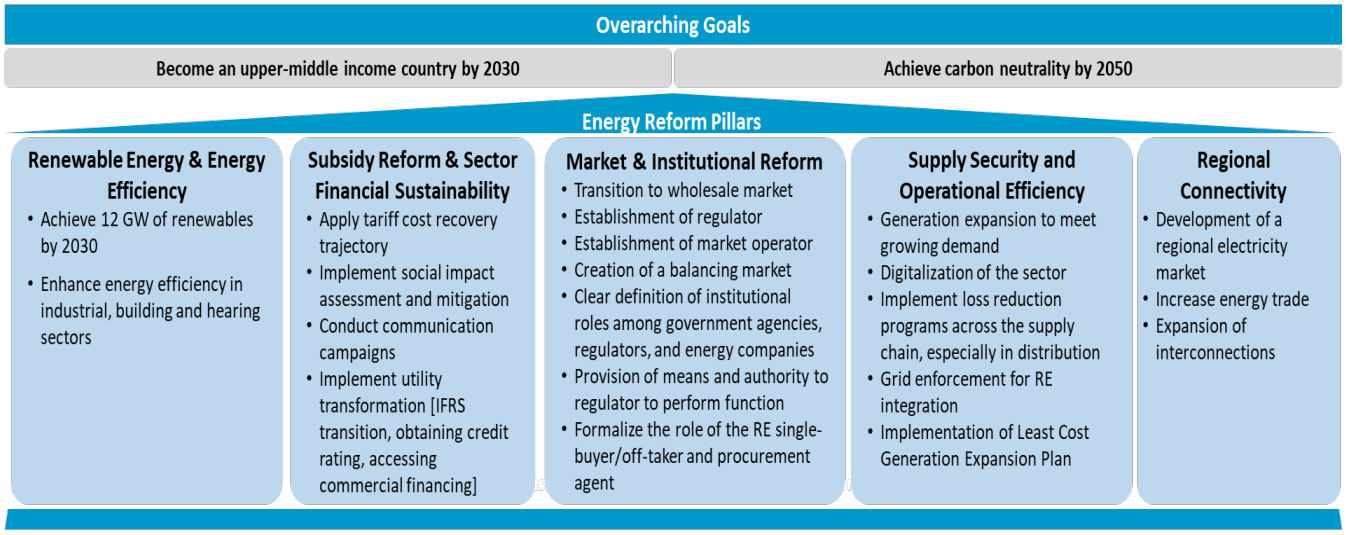
9. **In addition to scaling up RE, other measures will be required to achieve carbon neutrality in the power sector by 2050.** The GoU policy priorities include: (i) replacing inefficient old coal and gas equipment with low-carbon and gas-efficient modern technologies, while continuing large-scale deployment of clean energy resources; (ii) reducing the carbon footprint (gas flaring and venting) of the gas value chain, which today accounts for about 30 percent; (iii) deploying gas as a feedstock for hydrogen production in conjunction with CCS (blue hydrogen) while transitioning to green hydrogen in the long run; and (iv) leveraging private sector knowledge, technology, and financing in power sector. These actions will collectively result in diversification of the energy mix, while reducing the reliance on coal and inefficient gas. In parallel, substantial investments will also be required to strengthen the electricity grid system. On average, two-thirds of the transmission and distribution assets are beyond their useful lifetime.

10. **The next wave of energy sector reforms** includes acceleration of solar and wind energy scale-up, further enhancing demand-side energy efficiency, establishment of a separate energy sector regulator to consolidate all the regulatory functions, unbundling of the power transmission company to separate its transmission and single buyer functions, transitioning towards a competitive market, and carrying out of subsidy reforms with the objective to achieve cost recovery by the end of 2026[8] (see Annex 3 for further details). Energy efficiency is also

[8] Presidential Decree No.166 "On the Implementation of the Next Stages of Energy Sector Reforms", dated 28.09.2023.

part of the ambitious sector reforms in Uzbekistan. The GoU declared its commitment to improve energy efficiency of the overall economy, including reduction of GDP energy intensity by 50 percent by 2030 (with 2015 as the baseline year), twofold increase in energy efficiency and decrease in carbon intensity per unit of GDP by 35 percent from the level of 2010. In this context, the WB has supported the country with three major energy efficiency investments in the industrial, buildings and district heating segments with a total portfolio of US$483 million[9].

Figure 2. Energy Sector Reforms in Uzbekistan



Note: IFRS = International Financial Reporting Standards.

11. **The recent and planned developments in the country's energy sector are expected to improve state-owned National Electric Grid of Uzbekistan's (NEGU) financial standing**. These developments include recent tariff increases amongst selected non-residential customers in August 2022 that also positively affected transmission tariffs. Moreover, electricity tariffs for non-residential consumers increased by 36-127 percent effective October 1, 2023, thereby bringing the tariff cost recovery level to around 75 percent. The GoU is evaluating the possibility of another tariff adjustment for all consumer groups in 2024. The tariff adjustment trajectory indicates a continual rise in tariffs, with full cost recovery anticipated by the end of 2026, and helps reverse the deterioration of NEGU's financial standing (see Annexes 3 and 5 for further details). The planned sector reforms and tariff initiatives will also be supported through the WB-financed "Innovative Climate and Carbon Finance for Energy Reforms Project" (iCRAFT, P180432) approved in June 2023 along with the programmatic Development Policy Operation (DPO) engagement (P180470) to support Uzbekistan's transition to an inclusive and resilient market economy through: (i) creating markets, (ii) improving fiscal risk management and public procurement, and (iii) supporting social inclusion and green resilience. The proposed DPO is the first in a series of two operations. With these planned reforms, NEGU's financial projections estimate a gradual improvement in operational profitability and financial sustainability during 2023-2025. As end-consumer tariffs become more cost reflective, NEGU's payables to state-owned generation entities are expected to come down in line with enhanced revenue collections. Lastly, the

[9] Uzbekistan Energy Efficiency Facility for Industrial Enterprises Project, Phase 3 (UZEEF, P165054; District Heating Energy Efficiency Project (DHEEP, P146206) and Clean Energy for Buildings in Uzbekistan Project (CEBU, P176060).

implementation of IPPs, most of which have a lower cost than the current inefficient generation fleet, is expected to improve NEGU financials.

12. **As part of the sector reforms under implementation in 2023/24, electricity and natural tariffs are set to be adjusted by an independent energy regulator,** which has been already introduced through the recent Presidential decree supported by the WB's DPO dialogue, and likely generating negative poverty impacts unless any compensation measures for vulnerable households are accompanied**.** Increases in electricity and natural gas tariffs for legal entities would reduce household purchasing power through direct and indirect channels. The WB has been supporting the GoU on a comprehensive tariff/subsidy reform initiative, including social protection measures and comprehensive communication campaign. The authorities have several mitigation options available to address negative impacts and have also requested technical assistance from the WB and other development partners to design and implement support programs.

13. **The undergoing sector reforms are also expected to create the enabling environment to foster private sector participation.** Various PPP units have also been set up within sector ministries such as energy and transport. The PPP Law enacted in June 2019 aims to provide a consolidated legal framework for PPP investments to reduce risks and increase clarity for investors. The successful implementation of PPP/IPP solar power transactions would hence help free up scarce public financial resources for other GoU priorities. Uzbekistan has succeeded in attracting private sector investment in renewable electricity generation, through both competitively tendered and bilateral deals. In 2020-2021, the GoU signed approximately 6 GW of bilaterally negotiated projects in the power generation sector with associated challenges regarding pricing, risk allocation, and alignment with sector plans. The latter can be mitigated through competitive processes and screening of unsolicited proposals. The WB has been supporting the GoU/ Ministry of Economy and Finance (MoEF) through a Fiscal Impact Assessment of Energy PPP/IPPs using the analysis tool (PFRAM)[10] to better monitor risks and develop necessary mitigation. The WB's technical assistance "Advancing Sustainable Uzbek PPP Agenda and Investments" also aim to support the PPP agenda, including capacity building, PPP pipeline prioritization, PFRAM model update, among others.

II. PROJECT DESCRIPTION

A. Project Development Objective

14. **The project development objective** is to increase private sector led renewable energy supply in Uzbekistan.

15. **The proposed PDO indicators** for the USRES Project are:

    (a) Electricity supplied by Solar PV plant into the grid (renewable/solar, TWh);

    (b) BESS capacity available to provide grid services and electricity backup into the grid (MW);

    (c) Private capital mobilized (equity/debt, US$); and

    (d) Greenhouse gas emissions avoided (tCO_2/year).

16. **The project's intermediate indicators** are:

    (a) Physical implementation progress in solar PV plant (percentage);

10 The Public-Private Partnerships Fiscal Risk Assessment Model (PFRAM) developed by the International Monetary Fund and the WBG, is an analytical tool to assess fiscal costs and risks arising from public-private partnership (PPP) projects.

(b) Physical implementation progress in BESS (percentage);

(c) Solar PV plant commissioning completed (Y/N); and

(d) BESS commissioning completed (Y/N).

B. Project Components

17. **The USRES Project will be supported by an IBRD payment guarantee and comprises one hybrid power plant containing solar PV plant (250 MW) with BESS component of (63 MW/126 MWh).** A Special Purpose Vehicle namely "Nur Bukhara Solar PV" Foreign Enterprise LLC**,** incorporated by the sponsor (i.e. Masdar) in Uzbekistan, will develop the hybrid power plant. The power plant site covers 691-hectares (ha) in Alat District of the Bukhara region. In addition to providing RE generation, the Bukhara Solar IPP will be a first-of-its-kind project to solve the intermittency issues resulting from renewable integration by coupling the 250 MW solar PV plant with 63 MW/126 MWh of BESS. The RE generation over 25 years is expected to be on average 606 GWh/year (250MWac/290MWp, with 25.2 percent capacity factor), while BESS operation is expected to be up to 600 cycles per year. The Project is expected to avoid 68.3 thousand tons GHG emissions per year on average during its lifetime[11]. IFC Transaction Advisory assisted the GoU with the due diligence process, transaction structure and tendering processes. The commercial close for the project was completed in April 2023 with an expected financial close date of January 2024. The private developer Masdar won the bid with a tariff of US¢3.044 per kWh for the Solar PV and USD 16.555 per MW per hourly availability for the BESS component under a 25-year PPA term with a 10-year operating term for the BESS component, under the same PPA.

18. **The amount of equity to be provided to the "Nur Bukhara Solar PV" Foreign Enterprise LLC (Project Company) by Masdar is expected to be approximately US$119 million.** A total debt financing package of US$197 million is expected to be provided by DFIs and bilaterals including IFC, ADB and FMO. The provision of the up to US$12 million as WB-guaranteed LC (sized based on peak 3-month revenues for the Solar PV and BESS components) is a condition precedent to the disbursement of the senior debt and a critical element of the Project's bankability, as the sponsor indicated the need for the guarantee during the bid stage and will be paying for the provision of the guarantee. The table below reflects indicative project costs, financing structure, and the IBRD guarantee for the Project.

Table 2. Indicative Project Costs, Financing Structure, and IBRD Guarantees (US$ million)

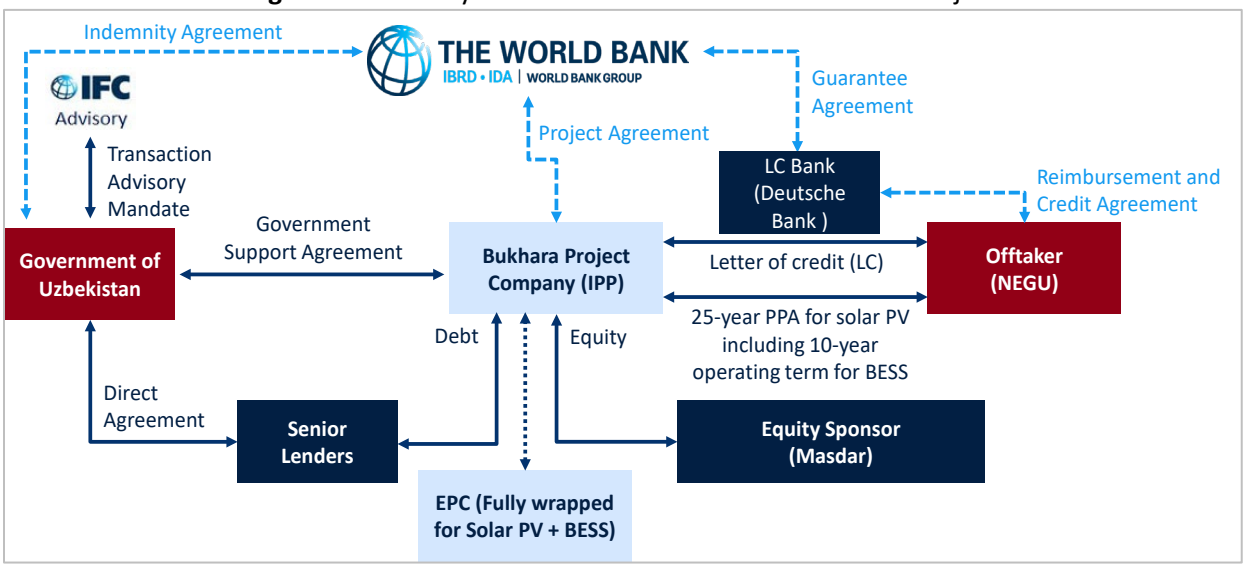
Components	Bukhara Solar IPP Project
Solar Power Plant + BESS Size	250 MW + 63 MW/ 126 MWh
Estimated Project Costs incl. contingency*	316
Estimated Equity	119
Estimated Debt	197
Estimated Private Capital Mobilized**	132
Estimated Payment Guarantee	12

* Note: Excludes IBRD payment guarantee of US$12 million. ** Includes estimated equity and LC amount.

[11] The methodology accounts for the emissions of displaced higher-emitting thermal generation that would have otherwise been built.

19. **Following the standard project documents package in Uzbekistan IPPs program procured under the WBG Scaling Solar[12] template**, the Project Company will sign PPA and GSA with the government counterparts, with additional terms for the BESS component therein. The solar PV will have a 25-year PPA term and a flat USD-denominated tariff and guaranteed dispatch, signed with the sole off-taker, NEGU. The BESS component will have a fixed tariff based on availability over an operating life of 10 years under the same PPA. The GSA will be signed with the MoEF representing the GoU. Off-taker payments will be supported by an LC covering 3 months of revenues, which the GoU will have the obligation to top-up in case of a drawdown and failure to replenish by the off-taker. The GoU's LC backstop obligations will be backed by an IBRD payment guarantee. Summary of the Contractual Structure of USRES is provided below. Also, see Annex 1 (IBRD Payment Guarantee Term Sheet) for additional details. These steps tested through existing WB/IBRD guarantees provided in Uzbekistan since 2020 will ensure timely effectiveness of the project.

Figure 3. Summary Contractual Structure for the USRES Project



Note: EPC = Engineering, procurement, and construction; LC = Letter of Credit

20. **Following the same principles as under prior Scaling Solar operations in Uzbekistan, the proposed IBRD payment guarantee backstops certain payment obligations of the off taker (NEGU)**. Under the PPA (solar PV and BESS), NEGU will provide payment security for the Project in the form of a Letter of Credit (L/C), issued through a commercial bank in favor of the Project Company for the amount corresponding to three peak-monthly PPA payment obligations of the off-taker. Deutsche Bank AG (DB), a global financial institution rated A1 (Moody's)/A (Fitch) and a publicly traded company listed in Germany and U.S.A., was selected as the L/C bank through a competitive procurement process undertaken by NEGU in September/October 2023. The L/C to be issued by DB may be drawn in the event NEGU fails to make timely PPA payments to the Project Company, subject to certain grace periods. Following a draw under the L/C, NEGU/GoU[13] would be obligated under the Reimbursement and

[12] The WBG Scaling Solar Program, of which principles have been applied in the project, brings together a suite of World Bank, IFC, and Multilateral Investment Guarantee Agency (MIGA) services and instruments under a single engagement aimed at creating viable markets for grid-connected solar PV power plants. It is an open, competitive, and transparent approach that facilitates the rapid development of privately owned utility-scale solar PV projects.

[13] The GoU supports the PPA payment by committing separately through the GSA to fully replenish the L/C balance if the L/C is drawn by the Project Company within 44 days of receiving notice of such draw event.

Credit Agreement (to be entered into between NEGU and DB) to repay the L/C bank any amounts drawn under the L/C (plus accrued interest) within 12-months. If NEGU/GoU repays such amount within that agreed period, the L/C would be reinstated to the amount repaid. However, if NEGU/GoU fails to repay DB within this period, the L/C bank would have recourse to the IBRD guarantee for the drawn amounts (plus any accrued interest) under the Guarantee Agreement (to be entered into between IBRD and the DB). In case of such a call on the guarantee, the maximum L/C amount and the corresponding IBRD guarantee would be reduced by the amount of payment made by IBRD to the L/C bank under the guarantee.

21. **BESS.** The proposed Project also aims to pioneer the introduction of a Battery Energy Storage System (BESS) in Central Asia. The incorporation of BESS is driven by several key factors including (a) the need for integrating disruptive technologies to facilitate the large-scale integration of renewable energy; (b) inflexibility of the existing aged generation fleet; (c) replacing fossil-fuel based grid services with cleaner and more flexible technologies; (d) responding to the escalating share of intermittent renewable sources, projected to increase from 1 percent in 2022 to 30 percent by 2030; and (e) fostering the development of institutional and human capacity to operate and manage such modern technologies, thereby providing a sustainable learning curve.

22. **Past international experience and global challenges have showed that the WBG Scaling Solar and the WB/IBRD payment guarantee are effective instruments** to initiate renewable energy development and particularly relevant in countries where the off taker has limited track record and/or creditworthiness, or where the government undertakes market reforms with a high degree of global, regional, macro, regulatory, and institutional uncertainties. As the Uzbekistan energy sector moves forward with its sectoral reform agenda, with regulations, institutional capacity, and payment track records that are not yet fully established, the GoU and IBRD consider the deployment of IBRD guarantees critical to mitigate perceived risks and challenges in global markets to signal to international renewable-energy private investors on the government's commitment to stabilizing and implementing further reforms. As such, even though the Uzbekistan guarantee projects have demonstrated greater investor risk tolerance over the years, it is expected that investors will continue to consider payment guarantees to be necessary in the near to medium term, while the reforms are implemented, and payment track record is established.

C. Project Beneficiaries

23. **The direct project beneficiaries are** (a) NEGU as the project off-taker, and (b) Bukhara Solar IPP Project Company, which is the special-purpose vehicles (SPV) established by the IPP investor Masdar (the Sponsor).

24. **NEGU** was established in June 2019 as a JSC with 14 regional transmission branches and a number of engineering, construction, and social subsidiaries and units. The sole shareholder of NEGU is the Ministry of Economy and Finance. The NEGU will benefit from the proposed IBRD payment guarantee under the USRES Project (a) for its payment obligations under the PPA signed with the Bukhara Solar IPP Project Company to cover the risk of NEGU's non-payment of three months' equivalent of energy and BESS payments; and (b) through lower bid prices facilitated by the proposed WB support which includes the IBRD guarantee.

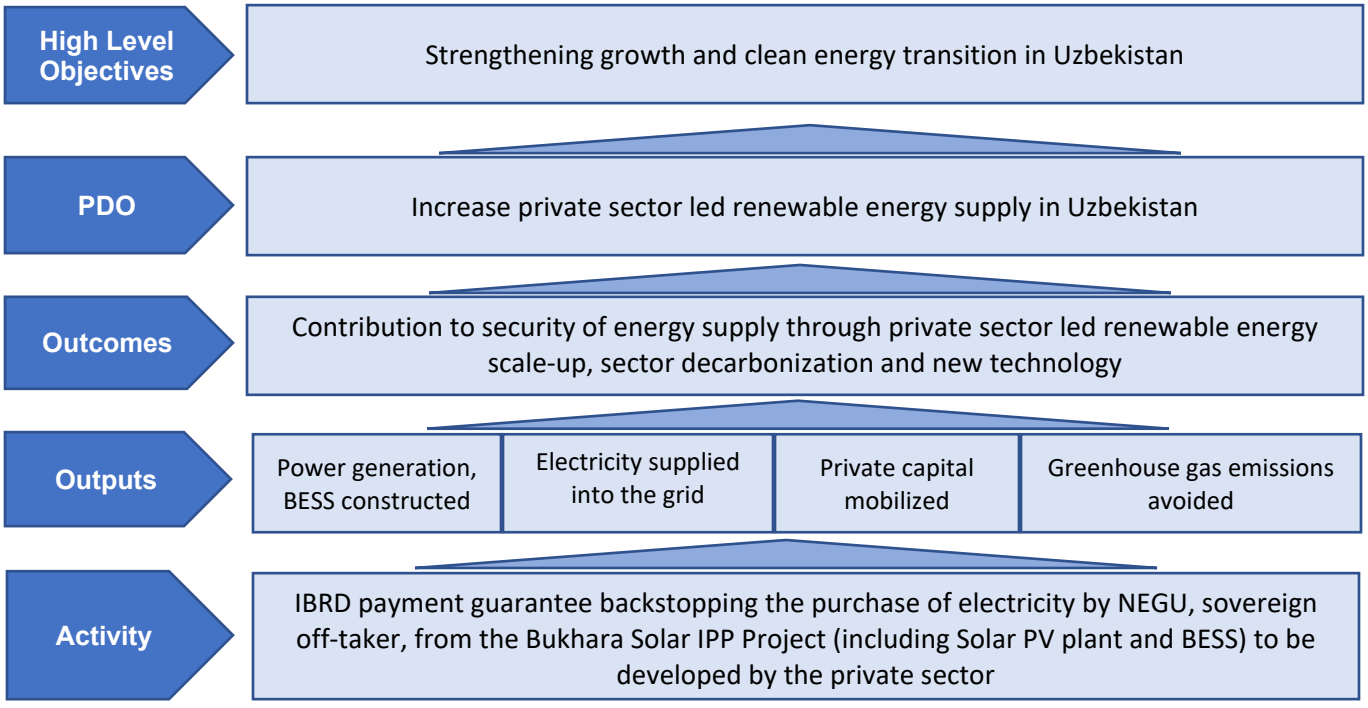
25. **Masdar** is a global developer in renewables and is owned by Mubadala Investment Company PJSC (33%), Abu Dhabi National Energy Company (TAQA) (43%) and Abu Dhabi National Oil Company (ADNOC) (24%), which are all strategically important companies of the Government of Abu Dhabi. Masdar was formed in 2006 to promote RE and sustainable urban development. Masdar is active in over 40 countries and has investments in clean energy projects with a gross capacity of over 15GW installed or under development.

26. **Ultimate project beneficiaries** will be electricity consumers in Uzbekistan, including households and private and public sector consumers, since the project will contribute to diversify the power mix and increase cleaner and sustainable power supply in Uzbekistan, which will be reinforced by the project's low competitive tariff as a substantial benefit for the country's citizens and businesses.[14]

D. Results Chain

27. **Past international experience has showed that the WB Scaling Solar approach and payment guarantee** are effective and efficient tools promote RE development as they mobilize much-needed capital, technology, and management expertise from the private sector into frontier markets. The Project and its payment guarantee as an effective instrument will support the scale up of Uzbekistan's IPP program, particularly for adoption of nascent technologies such as BESS. Guarantees are particularly relevant in countries undertaking market reforms and that have a high degree of macro, regulatory, and institutional uncertainty. As the Uzbekistan energy sector moves forward with its reform agenda, with regulations, institutional capacity, and payment track records that are not yet fully established, demand for IBRD guarantees will exist as they are critical to mitigate (perceived) risks and to signal to international private investors the government's commitment to stabilizing and implementing further reforms.

Figure 4. Theory of Change



E. Rationale for Bank Involvement and Role of Partners

[14] The Project is estimated to produce clean renewables energy, enough to supply approximately 110,000 households.

28. **The USRES Project benefits from the WB support, including IFC Advisory and Investment and IBRD guarantees and programmatic technical assistance.** Similar to the currently operational Navoi Scaling Solar 1 IPP (operational) and Scaling Solar 2 (under construction) projects, supported by the WB, the GoU requested the WB to support the USRES project preparation and NEGU's offtake obligations. The WB instruments increase the attractiveness of the renewable IPP investment opportunity in the country and demonstrate the preparation and implementation of innovative BESS with private sector participation, which in turn helps mobilize quality international investors, resulting in enhanced energy supply sustainability and increased competition and lower tariffs, which have been key factors for the GoU and private sector to develop this PPP given limited-track record in the country and region.

29. **The project builds on the WB's energy program in Uzbekistan**. The GoU requested the WB to lead key energy sector reform areas, including the institutional, regulatory and market reforms, and RE development, which are crucial for the security of supply and supporting the economic growth in Uzbekistan. In this context, the project contributes to the GoU's initiatives on clean energy transition, demonstration of benefits of competitive and transparent processes, leveraging private and commercial financing to meet the sector's significant investment needs, and institutional capacity building for designing and implementation of PPP projects. In terms of complementarity, the WB support will be provided through multi-pronged instruments, including the Energy Strategy Programmatic ASA, investment projects (Navoi IPP – Scaling Solar 1 IPP, Scaling Solar 2), including the current USRES Project, Innovative Carbon Resource Application for Energy Transition (iCRAFT), Modernization and Upgrade of Transmission Substations (MUTS), Electricity Sector Transformation and Resilient Transmission (ESTART) Project, and series of DPOs to further accelerate the energy reforms, facilitate clean energy transition and strengthen regional connectivity and trade. As major infrastructure investment in the amount of US$577 million, the MUTS and ESTART projects under implementation, focused on the strengthening of the Uzbekistan electricity transmission grid and related sector reforms, will further facilitate the integration of new RE capacities, including USRES project.

30. **The project is aligned with the goals of the Paris Agreement guidelines on both mitigation and adaptation**. The underlying technologies – solar photovoltaic generation and batteries to control the time of injection of this generation into the grid – are categorized as universally aligned technologies. As per the latest Nationally NDC submitted to United Nations Convention on Climate Change (UNFCCC) in 2021, Uzbekistan committed to reducing 35 percent of its GHG emissions by 2030. Among the key mitigation actions identified in the 2021, NDC is to increase the share of RE sources to 30 percent of total power generation capacity. The achievement of this long-term goal will be with the support of international organizations, gaining access to advanced energy-saving and environmentally friendly technologies, climate finance resources. The project is also aligned with the Paris Agreement guidelines for adaptation. The main components under this project have gone through a climate and disaster risk assessment and were found to be moderately affected by potential climate change related hazards, including frequent heat waves, flooding, droughts, wildfires that may threaten water supply service. However, the risks were reduced to acceptable levels by taking measures such as choosing project equipment designed to withstand heatwaves. In addition, the selected project site is surrounded by parse vegetation to prevent the spread of potential wildfires. Thanks to these measures, residual risks of climate change related hazards have become low. Therefore, the project is aligned with adaptation goals of the Paris Agreement. The country does not yet have National Adaptation Plan (NAP), nevertheless, the adaptation priorities identified in Uzbekistan's National Communication to the UNFCCC include support to the understanding of climate change impacts across key sectors such as agriculture, water resource management, population health, disaster risk reduction, and energy. The proposed operation's compliance with adaptation is not expected to pose a significant risk for Paris Alignment.

31. **As development partners, ADB and EBRD have also entered commitments with the GoU to support development of 1,000 MW of solar and 1,000 MW of wind capacities on competitive basis, respectively**. In this context, ADB has tendered the 457 MW Sherabad Solar PV Park and EBRD has proceeded with the 100MW Karauzak Wind project (both at financial close stage) resulting in low tariffs, which demonstrate the benefits of private-sector participation and competitive processes as well as continuous IFIs support to accelerate the implementation of the GoU sector reforms and targets. In addition, ADB, EBRD, IFC and Japan International Cooperation Agency (JICA) have supported the Zarafshan Wind Project (500 MW, at financial close stage as a negotiated project). On the efficient thermal power generation side, EBRD, AIIB, OPEC Fund and Multilateral Investment Guarantee Agency (MIGA) have supported the ACWA Syrdarya 1 Combined Cycle Gas Turbine (CCGT) IPP (1,500MW, at early operation stage) on negotiated basis.

C. Relevance to Higher Level Objectives

32. **The proposed project is consistent with the new Country Partnership Framework (CPF)**[15] **for Uzbekistan (FY2022–FY2026) considered on May 24, 2022**. Specifically, the Project contributes to the Objectives 1.1 (Expand competitive access to market), 1.2 (Enable private sector growth and investment), and 1.4 (Improve the infrastructure for competitiveness and connectivity) under HLO1, and Objective 3.1 (Decarbonization and the greener development of industry and the economy) and Objective 3.2 (More efficient use of natural resources) under HLO3. Moreover, the project will contribute to the achievement of several CPF objectives indicators, including: (i) estimated US$132 million of private sector investment in RE projects enabled; (ii) 250 MW of additional generation capacity and 63 MW of BESS to be installed by private sector with WB support; and (iii) increasing the share of RE supported by WB in power generation mix to 4.3 percent. The Project is not only attracting the private sector capital, but also a crucial driver of integrated green, resilient, and inclusive development in Uzbekistan. The project's alignment with the WB's GRID approach signifies a commitment to sustainable and inclusive growth while transitioning to cleaner energy sources.

33. **The proposed project will contribute to the WB Climate Change Action Plan** commitment to increase climate financing to 35 percent of total financing and the GoU's updated NDC target. Deployment of RE will be among the key drivers facilitating the climate targets. Furthermore, the Project will leverage private and commercial financing to meet huge financing needs for the clean energy transition.

F. Lessons Learned and Reflected in the Project Design

34. The key lessons learned from the WB's energy-sector operations and project-finance transactions that are relevant to this project include the following:

a. **A comprehensive power-sector reform program must be initiated in advance of major new PPP investments.** This approach helps establish a sound legal and regulatory framework and underpins the financial viability and sustainability of the power sector and new investments. Achieving sound institutional and governance arrangements has been a key focal point of the reform program in Uzbekistan. The project design and preparation benefit from the WB/IBRD guarantees provided to support the Navoi Scaling Solar 1 and Scaling Solar 2 projects in Uzbekistan and as well as similar operations in other countries where the WBG Scaling Solar initiative has been applied so far.

b. **Successful IPP development requires not only risk-mitigation instruments to attract private capital, but also a financially viable power sector that is able to pay for PPAs in a sustainable manner**. Past WB experience in

[15] Uzbekistan - Country Partnership Framework for the Period FY2022-FY2026, May 24, 2022, Report Number 170931.

developing RE IPPs in Zambia, Kenya, and Armenia affirm this requirement. A robust risk-mitigation package is necessary to attract private capital in newly opened markets that do not have a track record of IPPs; however, that package cannot guarantee the success of a project in the operation phase over 25-30 years if the power market is structurally unsustainable. For this reason, in addition to the risk-mitigation package developed to support the solar IPPs under this project, continued support for implementation of Uzbekistan's power-sector reform program and improvement of sector/NEGU financials is needed.

c. **IPPs have made significant contributions to power-generation capacity and are linked to the spread of RE in both the developing and developed worlds.** The risk of IPP mismanagement due to governance deficiencies are a lot more pronounced through unsolicited proposals and directly negotiated deals. In this context a transparent and competitive procurement process is strongly encouraged in Uzbekistan. It is further recommended that the Government should seek out best practice[16] to manage unsolicited proposals.

d. **Adequate sector planning is among the key factors in the success of RE deployment**. Comprehensive generation and transmission development planning should accompany large-scale RE scale-up to enhance the power/grid system to facilitate the integration of variable energy sources. With support from the WB, the GoU finalized a Least-Cost Generation Expansion Plan in 2019. NEGU, with support from the WB, has also prepared a Long-Term Transmission Development Plan, which suggests around US$5 billion investment needs in the transmission network to ensure supply reliability and grid integration of 12 GW of solar and wind energy as per the Government target. Upon the request from the GoU, WB will continue providing lead support to critical reforms and priority investments in the transmission segment.

e. **For countries with a robust IPP pipeline where a number of guarantees could be needed, consider a platform approach where multiple projects benefit from procurement and processing efficiencies.** Considering a platform of guarantees helps increase the size of the LC offering to banks, which should result in greater interest amongst LC banks since small LC exposure size is a known constraint. Further, having the same legal counsel and LC bank across transactions could help ensure timeline delivery and execution. Overall, such approach also encourages the competitive procurement given its low tariff track record experienced in the WB guarantee-supported projects and further streamlining of the project preparation and decision-making processes.

III. IMPLEMENTATION ARRANGEMENTS

A. Institutional and Implementation Arrangements

35. **The Bukhara Solar IPP Project Company namely Nur Bukhara Foreign Enterprise (FE) LLC is an SPV (Project Company or USRES IPP) incorporated and registered in Uzbekistan to develop, finance, build, own, operate, and maintain the Bukhara Solar IPP Project.** Masdar will bring in long tenured and experienced staff to the board and management of the SPV. The construction and operation of the solar PV power plant combined with BESS at the Bukhara site will be implemented through engineering, procurement and construction (EPC) and operations and maintenance (O&M) contracts. The EPC contracts are being procured competitively by Masdar (already awarded for PV and being reviewed for BESS) and will be agreed and signed as a prior condition to financial close.

[16] Policy Guidelines for Managing Unsolicited Proposals in Infrastructure Projects: https://ppp.worldbank.org/public-private-partnership/library/policy-guidelines-managing-unsolicited-proposals-infrastructure-projects.

36. **For the proposed project, the roles and responsibilities of the GoU (through its agencies and SOEs) and of the Governor (Khokimiyat) of the Bukhara Region is described below.** These arrangements largely follow tested implementation arrangements from previous IPP transactions.

a. The Ministry of Economy and Finance (MoEF) is the implementing agency for the USRES. It represents the GoU under the Government Support Agreement (GSA) signed with the Project Company and will also enter into the GSA Direct Agreement with the Project lenders. Established[17] through the merger of the Ministry of Economy and the Ministry of Finance, MoEF is the GoU agency responsible for developing long and medium-term socio-economic priorities for the country; management of key functions including budget, taxation and custom tariffs, accounting and financial reporting and price setting, as well as ensuring that macroeconomic indicators are achieved for GoU; and project coordination with IFIs and the GoU.
b. The MoEF, on behalf of the GoU, will enter into an Indemnity Agreement with IBRD (by which the GoU commits to reimburse IBRD for any payment under the proposed guarantees in case of a call on the guarantees). The MoEF has been involved in the preparation of the USRES IPP, particularly in relation to the fiscal impact of the transaction and the GoU financial obligations arising out of the project contracts (such as early-termination payments pursuant to the GSA signed by MoEF). The MoE provides policy direction on sector development, and on planning and procurement of power-generation capacities.
c. NEGU, as the single purchaser of electricity from generation companies, including IPPs, is the off taker for the project's electricity and has entered into PPA with the Project Company. An independent engineer will be jointly arranged by NEGU and the Project Company to check the plant performance and monitor compliance with technical specifications under the PPA.
d. The Governor (Khokimiyat) of the Bukhara Region is the party to the Land Lease Agreements signed with Masdar in relation to the long-term leases (for a duration equal to the terms of the PPAs and an additional six months) of the project site.

B. Results Monitoring and Evaluation Arrangements

37. **Overall monitoring of the project outcomes and results indicators and reporting to the WB will be undertaken by MoEF (implementing agency)** based on reporting by NEGU/the MoE and the Project Company. These arrangements follow those from previous three IBRD guarantee and investment operations as follows: IBRD will supervise the project with MoEF based on mandatory reporting by: (i) the USRES IPP Project Company as required under the IBRD Project Agreement; (ii) NEGU/the PPA off-taker as required under the Cooperation Agreement; and (iii) the GoU as required under the Indemnity Agreement; as well as (d) through regular IBRD implementation support and supervision missions and field visits until the expiry of the proposed IBRD guarantee. Evaluation of results indicators will be part of regular IBRD supervision missions. Section VII below presents the Project Results Framework that defines specific outcomes and results with indicators to be monitored.

38. **As part of the monitoring and capacity building plans, the WB will pay special attention to NEGU's credit risk and GoU/MoEF's PPP assessment.** The ability of NEGU to make timely PPA payments to the Project Companies is highly correlated to the overall success of the power-sector reform, including, among other elements, achieving a cost-recovery tariff, successful implementation of the IPP program to establish a competitive cost of generation, reduction of technical and commercial losses, as well as maintaining the high collection rates achieved so far (see Annex 4). As part of the IBRD monitoring arrangements, the WB will monitor these key parameters of NEGU's financial position, payment discipline, and contract compliance, as well as sector-

[17] Pursuant to Presidential Decree No. PF-269 dated December 24, 2022.

reform progress as part of its regular project supervision. NEGU will be required to supply key financial information to the WB. During this transition period through 2026, the WB also conduct regular meetings with government stakeholders including MoEF, MoE, and Ministry of Investment, Industry and Trade (MIIT) to discuss the provision of sufficient government resources for NEGU under this project. In addition, the WB will continue to provide capacity building to the GoU and implementing agency (MoEF) through the WB's Programmatic Energy Sector Reform technical assistance activity (PASA, P168487) and PFRAM exercise developed for WB guarantees to monitor energy PPPs and their impact on the sector and economy.

C. Sustainability

39. **The successful implementation of this transaction will be critical to the success of both the power-sector reform, decarbonization and the PPP agendas in Uzbekistan**, since it will confirm the viability of the financial, transactional, and regulatory systems put in place under the reform program and ensures efficiencies and savings, including natural gas being substantially used for efficient power generation through CCGTs. The project will contribute to a low-cost base for new generation capacity while the GoU concurrently implements major sectoral reforms. In the longer term, as Uzbekistan's power-sector reforms progress, it is expected that the need for risk mitigation and transaction costs would decrease as electricity utilities (particularly NEGU) establish a track record of successful financial and operational performance, and the overall policy, institutional, and regulatory environment improves in line with progress in the implementation of power-sector reforms in Uzbekistan. The success of the Project will also strengthen the GoU's position to address the need for (i) diversifying the power generation mix, (ii) mobilizing the experience of private sector not only in operating PV plants but also most importantly in constructing and operating the first BESS in the country, and (iii) improving the experience of the country in mobilizing the private sector investment in new products such as PV+BESS through transparent tender process. The project would be recognized as contingent liability on the balance sheet of the GoU whereas it would be direct liability if it were implemented on its own. Also, the GoU will benefit from the project through gas savings accruing due to avoided electricity generation from fossil-fuel based power plants and would have an opportunity to further reduce GHG emissions. Based on the available storage capacity provided by the private partner, the BESS also ensures that NEGU is able to access cheap, reliable power supply at a fixed rate and at a time of their choosing/ requirement. Hence the IPPs and NEGU together create a steady, sustainable market equilibrium.

40. **The project is financially sustainable on account of the attractive bids of US¢3.04 per kWh.** This sustainability is owed in part to the Government's direct and indirect contributions to the project. The GoU has made public land available to the private developer, established a favorable investment regime through a presidential decree, and requested IBRD guarantees to mitigate project-specific risks. These measures, combined with the overall market opening, sector reform, and competitive terms of DFI financing, created the conditions for the lowest tariffs in the region. The Project will continue to scale the RE sector in Uzbekistan and build on the gains derived from the 100-MW Navoi Scaling Solar and 440-MW Scaling Solar 2 Projects supported by the IBRD guarantees. As such, it will have a strong and continued demonstration effect for future IPPs, in Uzbekistan, Central Asia and beyond. The project alone represents a relatively small portion (1.8 percent) of the current total installed capacity in Uzbekistan and of the developer's global projects portfolio, but it is still an important achievement in initiating diversification of the power mix and attracting the private sector to take risks in entering a new market. The low-cost energy generation achieved through a competitive tender sets a good example for future PPP procurement.

Fiscal Impact Assessment

41. **The USRES Project will have limited fiscal impact.** Infrastructure projects developed in the form of PPPs generally create contingent liabilities for a country. For the USRES IPPs, the GSAs provide for the Project

Companies' recourse to the Government in respect of termination payments and also include obligations for the Government's support to ongoing PPA payments. This Government support for ongoing PPA payments and termination payments creates contingent liabilities for the Government based on International Public Sector Accounting Standards[18]. Preliminary calculations of the WB indicate that the annual average gross PPA payments for energy sector projects consist of about US$1.3 billion between 2026-2035, with peak termination payment reaching about US$11.6 billion in 2029 in certain scenarios. However, due to its limited size compared to Uzbekistan's energy system, the USRES Project will have a limited impact on the Government's contingent liabilities. It involves annual PPA payments of about US$27 million and peak termination payments of about US$300 million in certain scenarios.

42. **The GoU has an ambitious PPP agenda, including the development of about 14 GW of IPPs over 5 years.**[19] An impact assessment of these IPPs (solar, wind, and CCGT projects) has demonstrated that they could have a potentially significant impact on the Government's contingent liability and fiscal situation. Such a stress analysis on fiscal impact assumed certain project costs and tariff structures based on estimates and public information and was carried out under a project risk-allocation profile similar to the proposed USRES project. The stress analysis indicates that if all contingent liabilities from every contract materialize (i.e., every PPA is terminated) in a particular year, the overall IPP pipeline will have a material impact on the Government's debt-to-GDP ratio. For instance, in 2026, if every PPA is terminated, total termination payments could be as high as US$ 10.8 billion, increasing the debt-to-GDP ratio by about 8 percent (from 33 percent to 41 percent). After 2026, because of GDP growth and amortization of project costs, the total contingent liabilities will have a less incremental impact.

43. **The stress analysis considers a highly unlikely scenario in which all PPA contracts would be terminated in the same year.** Historically, the default rate of project-finance loans was about an accumulative 10 percent over a 10-year period for all projects in low-middle-income countries,[20] and the likelihood of a default involving an actual PPA termination is even smaller. The scenario of every PPA in a country terminating in the same year (for example, national expropriation) is an even more remote event. Furthermore, in some default scenarios, termination is at the option of the GoU and in all cases where GoU makes a termination payment, it acquires the asset. Even under such a stress-case scenario, the GoU's debt-to-GDP ratio, while increasing significantly, would be within acceptable levels, partially due to its relatively low level of public debt today. Despite the comfort of the stress analysis result, the GoU, with the assistance of the WB, is developing tools and policies to institutionalize the monitoring of the contingent liabilities generated by its ambitious PPP/IPP program.

IV. PROJECT APPRAISAL SUMMARY

A. Technical, Economic and Financial Analysis

Technical

44. **The Project consists of a conventional solar PV plant with a nominal capacity of 250 MW/290MWp, using bifacial modules, and BESS component with a storage capacity of 63 MW/126 MWh.** The PV modules are oriented in rows using a single axis tracking system. Tilt angles are typically chosen based on optimization

[18] International Public Sector Accounting Standards (IPSAS) 32.
[19] The timeline is based on publicly available information and government's estimation.
[20] Based on a Moody's study on Project Finance default
https://www.moodys.com/researchdocumentcontentpage.aspx?docid=PBC_1114036

simulations that consider site location and shading between panel rows. Technical details of the project's solar PV plants could be found in Annex 2. The Sponsor will be using a single turnkey Engineering, Procurement, and Construction (EPC) contract for the supply, installation and testing of the Project. The EPC contractor will be a joint venture (JV) from India comprising of Jackson Limited (leading the JV), Jackson Green and Rail Vikas Nigam Ltd. Masdar has selected EPC contractor after a competitive bidding process, based on their track record in RE projects as well as cost competitiveness. Masdar Specialized Technical Services (MSTS) will provide operation and maintenance (O&M) services starting from the commercial operation date (COD). All civil works will be designed to be capable of withstanding the effects of water, extreme winds, and other natural disasters, including the impacts of climate change, including extreme heat, droughts, floods, etc.

45. **The BESS will be installed outdoors and will include typical major components within a containerized enclosure,** including i) Battery system, consisting of the battery modules and racks, ii) balance of system (BOS), consisting of the DC cabling, liquid cooling, fire suppression, battery enclosure, and other electrical components within the enclosure, iii) power equipment, including the Power Conversion System (PCS or inverters), switchgear panel, transformer bay and AC cabling (including the wiring, earthing and lightning and protection), iv) control equipment, including the Battery Management System (BMS) and Energy Management System (EMS) software, SCADA and control equipment including the Power Plant Controller (PPC), BMS, and EMS.

Project Economic Analysis

46. **The economic rate of return (ERR) and net present value (NPV) of benefits are calculated using the WB's standard cost-benefit analysis methodology**.[21] The country-specific economic discount rate is at 8 percent per year following the WB guidelines for economic analyses. All monetary values presented in this section are expressed in constant US dollars of 2021 and this is the reference date used for the economic analysis. All discount rates are presented in real terms. A detailed economic analysis of the project was conducted with the assumptions described in Annex 4.

47. **Economic costs and benefits**. The economic cost of the USRES captures (a) EPC cost, (b) project development and financing costs (linked to EPC), and (c) O&M costs during the economic life of the plants. The main economic benefits are: (a) avoided operation costs of the power plants displaced by this project; and (b) avoided costs of greenhouse gas (GHG) emissions. Avoided operation costs are estimated assuming a simplified counterfactual scenario where the absence of the project results in increased dispatch of a CCGT running on natural gas with 61.7 percent efficiency time that would deliver the same amount of yearly energy as the Project. Moreover, operation cost for BESS technology is also considered under the assumption that BESS would be used during peak (two) hours that would replace counterfactual firm capacity that would be provided by Open Cycle Gas Turbine (OCGT). Avoided costs of GHG emission are estimated using: (a) the methodology of UNFCCC's "Tool to Calculate the Emission Factor for an Electricity System", based on the initial results of the Decarbonization 2050 scenario of the least-cost expansion plan available when this document was produced and complemented by the assumptions described in Annex 4, to estimate the amount of avoided emissions; and (b) the shadow prices of carbon (SPCs) of the *low* and the *high* scenarios defined in the WB "Guidance Note on Shadow Price of Carbon in Economic Analysis". Detailed description of the methodology for benefits is provided in the Annex 4.

48. **Results of economic analysis.** Economic analysis confirms the viability of the USRES. The analysis indicates that the project is economically viable when avoided emissions are valued at the *low* and the *high* scenarios of SPCs, and also when avoided emissions are not valued at all. The economic rate of return (ERR) for the Bukhara solar power plant combined with BESS is 11.8 percent per year if emissions are valued at the *low* SPCs, 15.5

[21] Guidelines for Economic Analysis – Power Sector Investment Projects and Social Value of Carbon in Project Appraisal, 2014.

percent per year for the *high* scenario, and 8.2 percent per year if emissions are not valued at all. Table 3 provides a summary of the economic analysis of the project, showing ERR and Economic Net Present Value (ENPV).

49. **Sensitivity analysis.** A sensitivity analysis was conducted for the following key cost-and-benefit drivers in the economic analysis: (a) discount rate; (b) O&M costs of the plants; (c) capital cost of the plants, and (d) generation output of the plants. The economic performance of the project is generally robust in all scenarios, details of the sensitivity analysis are presented in Annex 4.

50. **Avoided GHG emissions.** The project is expected to contribute to the reduction in total of about 1,709 thousand tons of CO2 emissions over its lifetime; with an annual average of about 68 thousand tons of avoided CO2 emission during 25 years of the Project operation.

Project Financial Analysis

51. **A Project financial analysis** was conducted to assess financial viability from (a) the Sponsor/SPV perspective and (b) a sector perspective. The analysis indicated that the project is expected to generate sufficient cashflows to recover capital expenditure and meet operational and maintenance expenditures. Furthermore, after meeting debt-service costs, the cash flows for the project allow for regular dividend payments, providing the equity shareholders with a reasonable return for a project of this nature. The lenders' base case further confirmed an Average Debt Service Coverage Ratio (ADSCR) of 1.15x for the project (under P90 level of generation), indicating adequate comfort for the lenders comprising the debt syndicate. The Project will contribute to power sector financial sustainability by reducing the average power purchase cost for NEGU as off-taker. The project's tariffs are lower than the weighted-average electricity purchase cost of NEGU from state-owned power plants. The savings from the project are thus expected to deliver a positive NPV for NEGU and the sector at about US$12 million from 2025-30[22], which also contributes to the affordability of power supply for end-users.

NEGU Financial Analysis

52. **NEGU is a strategically important state-owned enterprise (SOE) fully owned by the GoU through the Ministry of Economy and Finance (MoEF).** As Uzbekistan's transmission-system operator and single electricity buyer/seller, NEGU operates as a monopoly and is therefore not expected to earn substantial profits, but rather operate on a cost-recovery basis, generating adequate revenues to meet operating expenses and capital expenses to the extent envisaged under its development plan. Given the critical role it plays in the country's energy sector, NEGU has significant financial, operational, and managerial linkages with the GoU.

53. **NEGU has faced a challenging financial situation over the last three years, failing to breakeven on an operating cost basis in 2022**. In the absence of a regulated cost-plus transmission tariff regime, NEGU's revenues did not rise enough to offset increases in operating costs in 2022, which grew by 17 percent per cent, primarily driven by cost of electricity purchased as a result of an increase in generation tariffs for domestic power plants. On the other hand, NEGU's revenues witnessed an increase of 13 percent driven by recovery in demand from COVID-19 pandemic, tariff increases (e.g. amongst some categories of non-residential consumers – who pay higher tariffs than residential consumers – in May 2022), balanced by decrease in export revenues by 31 percent. Notably, operating costs represented 107 percent of total revenues in 2022, resulting in Earnings Before Interest Taxes Depreciation and Amortization (EBITDA) of UZS -1,424.5 billion (~US$ -127 million equivalent) at an EBITDA (operating) margin of negative seven per cent.

[22] Assuming a discount rate of 6 percent.

54. **The GoU is fully aware of NEGU's current challenging financial situation, and has guaranteed all ongoing liabilities, including payments to IPPs, and debt obligations of NEGU.** Recent developments in the country's energy sector are also expected to improve NEGU's financial standing. These include rebound of economic activity post COVID-19 leading to rise in electricity demand, recovery of tariff increases, and initiatives such as smart metering that will help maintain high bill collection efficiency rates, which are expected to further improve through advanced metering. As end-consumer tariffs become more cost reflective, NEGU's payables to state-owned generation entities are expected to come down in line with enhanced revenue collections. Lastly, the implementation of IPPs, which have a lower cost than Uzbekistan's current inefficient generation fleet, is also expected to improve NEGU profitability.

55. **Despite the current situation at NEGU and the risks highlighted above,** the risk of a draw on the WB-guaranteed LCs and therefore a call on the WB payment guarantees under the USRES project is mitigated through the following:

a. Expected improvement in NEGU's financial performance: Scheduled commercial operation date for the USRES Project is 2025, at which time it is expected that tariffs would have continued to rise towards cost-recovery levels. Based on the projections above, NEGU will be generating positive EBITDA by that time and will be further advanced on its path towards financial sustainability as demonstrated by healthy leverage and profitability ratios.
b. The GoU commitment for NEGU's foreign-currency liabilities: GoU is committed to a growing electricity sector and recognizes the importance of ensuring on-time payments to IPPs. Currently, NEGU's cash waterfall characterizes IPP payments as the top priority only after external debt payments, and both are sovereign guaranteed. In addition, MoEF is in the process of creating a fund capitalized by SOE-privatization proceeds to help backstop IPP payments. NEGU's financial condition is tied to the decision-making of MoEF (including in relation to tariffs), which is unlikely to allow such a vitally important entity to fail or fall short of its external obligations.
c. Project Participants: With the participation of Masdar as sponsor, which have capacity of over 1 GW of power projects in operation or under development in Uzbekistan, as well as the involvement of IFC, ADB and FMO, the likelihood of unrectified payment issues is reduced.
d. Cure Period: A call on the WB guarantees would materialize only if NEGU (or its successor) fails to pay the L/C bank one year after the date on which the L/Cs are drawn. This one-year period is critically important to allow NEGU (and MoEF) to rectify the issue (and the WB to support that process and help avoid a call on its guarantees).

56. **The GoU is committed to pursuing further reform initiatives, including cost recovery and sector sustainability.** These initiatives will be implemented as part of a broader reform program to sustain sector reforms: (a) tariff cost-recovery trajectory by end-2026; (b) establishment of a sector regulator as well as a separate regulated tariff for NEGU; (c) implementation of loss-reduction programs, especially in the distribution segment, to improve sectoral operational efficiency; and (d) maintenance of state ownership over the transmission segment as the backbone of the sector, while promoting private-sector participation in generation and distribution, among others segments. As part of the ongoing policy dialogue, and upon request from the GoU, the WB will continue to support the GoU and NEGU reform initiatives to (a) design and implement a cost-recovery trajectory while protecting vulnerable households and designing communication strategies to strengthen citizen engagement on sector, subsidy and tariff reforms; (b) establish and operationalize a sector regulator as well as a separate regulated tariff for NEGU; (c) demonstrate, introduce, and prioritize, including through the proposed project, the benefits of transparent and competitive selection of private investors; and (d) improve the energy sector's operational efficiency, financial sustainability, and capacity. The WB support will be provided through the

pipeline iCRAFT Technical Assistance, the ongoing MUTS, and ESTART projects, and series of DPO engagements. For details of the economic and financial analyses, including sensitivity scenarios, see Annex 4.

B. Fiduciary

(g) *Financial Management*

57. **The USRES project will benefit from an IBRD payment guarantee.** In the event a guaranteed event takes place, and the L/C bank submits a valid demand notice to the WB under the guarantee, the WB will make the relevant payment to the L/C bank. There are no payments to the GoU and/or its agencies. On this basis, the provisions of the paragraph 7. Financial Management of the WB Policy on Investment Project Financing (October 2018) do not apply. Moreover, the overall FM of the project will be undertaken by the Project Company per international best practices and national standards. The Project Companies will hire dedicated financial staff supported by qualified accountants to perform duties including accounting, reporting, and planning, managing auditing and internal controls. The Project Company's annual financial statements will be prepared in accordance with International Financial Reporting Standards (IFRS) and will be audited in accordance with International Standards on Auditing (ISA). The WB requests copies of the authorized audit reports and Management Letters within six months after the end of each reporting period.

(ii) Procurement

58. **The WB Procurement Regulations for IPF Borrowers** (September 2023) do not apply to this project given the WB is providing WB Guarantees, (IPF Procurement Regulations, paragraph 2.2(a)). The GoU (through the MoEF, MoE, and MIIT, as appropriate) has conducted a competitive bidding process for selection of investors to design, finance, construct, and operate the Bukhara Solar IPP Project. IFC Advisory advised the GoU on structuring and tendering the project based on the knowledge and experience of the previous WB Scaling Solar approach projects in Uzbekistan. The prequalification phase was initiated in August 2021. The Request for Prequalification stipulated specific prequalification criteria (including experience, and technical, financial, and legal requirements). The GoU prequalified eleven bidders out of fifteen submitted applications, and the bidding phase was initiated upon the issuance of the Request for Proposal in November 2022.[23] Overall, two bids were received for the Bukhara project. Bidders were well-known global power developers and sponsors. On the basis of an evaluation of the technical (on a pass/fail basis) and financial proposals, Masdar was selected as winning bidder for the Bukhara project. The solar PV tariff bid was US¢3.04 per kWh, while the bid for the Hourly Storage Availability Charge for the BESS component was USD 16.56 per MW per hour, with an operating term of 10 years. Signing of the project documents (PPA and GSA) took place in April 2023.

D. Environmental and Social

59. **Key findings of Environmental and Social (E&S) Due Diligence.** This is a Category B project, as the project activities have the potential to cause limited adverse E&S impacts that are few, site specific, largely reversible and readily addressed through existing mitigation measures and good international industry practices (GIIP). The Bukhara site covers approximately 691 ha of land in the Alat District of the Bukhara region, a region in the southwest of the Republic of Uzbekistan. There are no Associated Facilities for the Project as defined by Lender standards, and the site has been assessed as being located in 'Natural Habitat.'

[23] https://minenergy.uz/en/news/view/1892

Table 4. Applicable Performance Standards (PS)

Performance Standards	Yes	No
PS 1: Assessment and Management of Environmental and Social Risks and Impacts	X	
PS 2: Labor and Working Conditions	X	
PS 3: Resource Efficiency and Pollution Prevention	X	
PS 4: Community Health, Safety, and Security	X	
PS 5: Land Acquisition[a] and Involuntary Resettlement	X	
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	X	
PS 7: Indigenous Peoples		X
PS 8: Cultural Heritage		X

Note: a. Long-term Land Lease Agreements, relating to the project sites and access rights to the sites, are in the process of being concluded between the Project Company and the GoU (represented by the Khokimiyat (Governor) of the Bukhara Region).

60. **Bukhara Solar PV Plant and BESS Site.** IFC has conducted the due diligence and review of the Environmental and Social Impact Assessment (ESIA) and other E&S instruments. The World Bank has also reviewed the instruments, concurs with IFC's review and due diligence and will conduct joint supervision and monitoring of the project with IFC. The Environmental and Social Due Diligence included a 2-day physical site visit completed in July 2023 by IFC, consultations with relevant stakeholders including public stakeholders and Project Affected Persons (PAPs), technical review of project ESIA and associated deliverables, and assessment of Masdar's corporate environmental and social (E&S) capacity. An Environmental and Social Action Plan (ESAP) was developed to mitigate E&S risks which supplements mitigation measures identified via the project ESIA. An Independent Environmental & Social Consultant (IESC) has been engaged on behalf of the Lenders to verify compliance against the ESAP and monitor E&S performance. The Appraisal ISDS includes the Environmental and Review Summary and ESAP for the Bukhara site. The E&S instruments were disclosed at IFC's website on October 10, 2023[24]; they were disclosed in-country by Masdar in August 2023.[25] Related E&S risks and mitigation are detailed in Annex 6.

V. GRIEVANCE REDRESS SERVICES

61. **Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS).** The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS),

[24] https://disclosures.ifc.org/project-detail/SII/47285/uz-solar-3

[25] The E&S instruments include the ESIA, Critical Habitat Assessment Report, Climate Change Risk Assessment Report, Human Rights Risk Assessment Report, Livelihood Restoration Plan Summary, Environmental and Social Monitoring Plan and Stakeholder Engagement Plan.(E&S instruments are available at *https://masdar.ae/en/renewables/our-projects/nur-bukhara-pv*). The ESIA, SEP and Livelihood Restoration Plan have also been disclosed at the World Bank's external website in November 2023.

please visit *http://www*.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service. For information on how to submit complaints to the World Bank Inspection Panel, please visit *www.inspectionpanel.org*.

VI. KEY RISKS

62. **The overall risk of the project is *Moderate*, considering the following factors:** (a) it supports a utility-scale variable renewable/solar power generation (250MW) and BESS (63MW/126MWh) investment in Uzbekistan with an environment, in which institutional and technical capabilities are still under development; (b) subsequent solar PV project similar to the first project – Navoi Scaling Solar IPP (P170598) and the first scale-up, Scaling Solar 2 IPPs (P174322) projects; the project design and structuring hence will build upon the experience and lessons learned in Uzbekistan and globally for BESS. It is also worth noting that the risks to the project and the WB guarantees are reduced as the PPA tariffs are lower than the expected generation tariff in the country and the size of the off-taker's PPA payments under the project is relatively small for the sector from operational and financial sustainability point of view.

63. **Sector strategies and policies** – *Substantial.* Uzbekistan is undertaking ambitious energy sector reforms, opening the hitherto state-dominated sector for private sector participation. High pace and sequencing of priority reforms could become a risk, if not managed well by the GoU going forward. Broader sector reforms currently remain of high priority and in progress, and the GoU is committed to further pursue initiatives including, among others, establishment of a regulator, unbundling of NEGU and transition to a competitive market. These initiatives are complex and involve and affect many stakeholders. The WB as a trusted long-term partner of the GoU for the design and implementation of the reform will continue to support the GoU in navigating the design and implementation stages of the reform to achieve transitions in a coherent manner. In this regard, the WB's active role in design and implementation of the GoU's Electricity Sector Reform Implementation Plan will be instrumental to strengthen the sector policies and strategies. On the financial viability side, NEGU financial sustainability has deteriorated and is currently loss making on a standalone basis. The prevailing electricity tariff is still below cost recovery level and NEGU does not have a long track record of dealing with IPPs. As part of the ongoing WB support to the energy-sector reform, the WB will continue to support the GoU in broader electricity sector reform, including on establishment of the regulator and cost-recovery initiatives through implementation of the adopted electricity tariff-setting methodology, as well as undertaking of tariff adjustments on a regular basis to be deployed jointly with social protection and cost mitigation measures for the poor and vulnerable as well as sound communication strategies (see Annex 3 for further details). While these reforms are being implemented, it is expected that NEGU will benefit from external liquidity support as has been provided in the past. Additionally, it is expected that low-cost generation, such as that under the project, will improve the financial standing of the sector.

64. **Technical** – *Moderate.* While the solar generation components of the Project are not new for Uzbekistan, its energy sector will be incorporating large amounts of RE capacity in the near term. Also, BESS is a proven technology that has been tested across a global market, while in Uzbekistan the BESS component of the Project is novel and will be first such asset connected to the grid. This aspect may introduce unforeseen aspects of BESS operations, but the PPA is well defined in this regard, and Masdar has significant BESS experience from implementation and operational points of view. The Lenders' independent technical due diligence report for the Bukhara Solar IPP Project did not identify any material red flags and found the project to be well planned and designed.

65. **Environmental and Social** – Category B (*Moderate*). The project will be prepared in accordance with the WB Environmental and Social Performance Standards, with an assessed environmental and social risk rating of Category B (Moderate), as the project activities have the potential to cause limited adverse E&S impacts that are few, site specific, largely reversible and readily addressed through existing mitigation measures and good international industry practices (GIIP). During operations, the project will generate green energy and contribute to reduced carbon intensity of the Uzbek national grid, and a detailed carbon footprint and impact on climate change of project activities have been assessed as part of the due diligence on the project. The project location and landscape are vulnerable to climate and geophysical hazards; however, climate and disaster risk screening of project implementation has been conducted during the project preparation. The project will result in minor economic displacement and impacts (loss of grazing and agricultural land, and assets, or limited access to assets, leading to loss of income sources or other means of livelihood) at the solar-panel installation sites and under the transmission lines, although the number of project-affected persons will not be significant. Other potential social risks and impacts relate to establishment of a working Environmental and Social Management System, including E&S capacity, community concerns, including solar-panel installation impacts on the neighborhoods in the aesthetic sense and lack of access to project benefits, contractor management and labor conditions, and child and forced-labor risks among project workers, including solar panel supplier workers. These impacts are site-specific, with limited areas of influence, and easily identified, and can be addressed through the implementation of effective mitigation measures.

66. A preliminary screening for climate change and disaster risks was conducted for the project's main components, and the project's overall risk rating was found to be moderate. The identified risks included droughts and heatwaves, whose frequency and intensity may be increased by climate change, that may threaten water supply service. Additionally, the majority of Uzbekistan is at high risk of both river and flash flooding. Climate change is likely to increase the likelihood of floods.

67. The WB notes, in light of the procurement of solar panels under the project, that there are allegations of forced labor risks associated with polysilicon suppliers (polysilicon being a key raw material in the solar-panel production chain). Accordingly, the following mitigation measures (among others) will be adopted for the project: The Project Company (Masdar) has demonstrated to IFC and will be providing to the Bank contractual assurances that they have not used or engaged forced labor and will not use or engage forced labor in their operations; and Masdar will require the same contractual assurances from the related entity charged with the procurement of solar modules for the project, which will, in turn, require the same from its primary (direct) supplier/s of solar modules, once they have been selected.

68. **Other –** *Moderate*. Other risk comprises the potential impact of Russia's invasion of Ukraine to the project. While the project marginally be impacted by potential supply chain and logistical disruptions caused by the ongoing invasion, investors and the GoU are aware of potential risks and have prepared potential mitigation measures, including through alterative supply routes. The WB will closely monitor the situation to provide timely support to the GoU to mitigate potential arising risks. Furthermore, as evidenced by this project, disruptions in global solar market (PV module and associated commodities' price increases, etc.) and logistics industry may potentially lead to *inter alia* project implementation and procurement delays, contract renegotiations, force-majeure declarations. WB will continue supporting the GoU in improving the PPP legal and regulatory framework, clarity and transparency of decision-making process, enhancing the design of pipeline PPP projects and strengthening institutional and human capacity of the involved stakeholders.

VII. RESULTS FRAMEWORK AND MONITORING

Results Framework

UZBEKISTAN
Uzbekistan Solar and Renewable Energy Storage (USRES) Project
(Bukhara Solar IPP)

Project Development Objectives

The Project Development Objective (PDO): is to increase private sector led renewable energy supply in Uzbekistan.

Project Development Objective Indicators

PDO Indicator Name	Core (Yes/No)	Unit of Measure	Baseline (FY24)	End Target (FY26)	Frequency	Data Source / Methodology	Responsibility for Data Collection
Indicator 1: Electricity supplied by the Solar PV plant into the grid (renewable/solar)	Y	TWh	0	586	Annually	MoE/NEGU Statistics, IPP SPV Reports	MoEF
Indicator 2: BESS capacity available to provide grid services and electricity backup into the grid (MW)	Y	MW	0	63	Annually	MoE/NEGU Statistics, IPP SPV Reports	MoEF
Indicator 3: Private capital mobilized	Y	US$ million	0	132	At financial close	MIIT statistics, IPP SPV Reports	MIIT

(equity/debt)							
Indicator 4: Greenhouse gas emissions avoided	Y	tCO_2e/year	0	68,359	Annually	MoE statistics, NEGU, IPP SPV Reports	MoEF

Intermediate Results Indicators

Intermediate Indicator Name	Core (Yes/ No)	Unit of Measure	Baseline	End Target	Frequency	Data Source / Methodology	Responsibility for Data Collection
Intermediate Indicator 1: Physical implementation progress in solar PV plant	N	percentage	0	100	Annually	MoE/MIIT statistics, IPP SPV Reports	MoEF
Intermediate Indicator 2: Physical implementation progress in BESS	N	percentage	0	100	At commercial operation date	NEGU Statistics, IPP SPV Reports	MoEF
Intermediate Indicator 3: Solar PV plant commissioning completed	N	Y/N	N	Y	At commercial operation date	NEGU Statistics, IPP SPV Reports	NEGU
Intermediate Indicator 4: BESS commissioning completed	N	Y/N	N	Y	At commercial operation date	NEGU Statistics, IPP SPV Reports	NEGU

ANNEX 1: IBRD PAYMENT GUARANTEE TERM SHEET

Uzbekistan Solar and Renewable Energy Storage (USRES) Project
(Bukhara Solar IPP)

*This term sheet contains a summary of indicative terms and conditions of a proposed guarantee ("**Guarantee**") from the International Bank for Reconstruction and Development ("**IBRD**") for discussion purposes only and does not constitute an offer to provide a Guarantee. The provision of a Guarantee is subject, inter alia, to satisfactory appraisal by IBRD of the proposed USRES/Bukhara Solar IPP Project ("**Bukhara Solar IPP Project**") in Uzbekistan, compliance with all applicable policies of the World Bank, including those related to environmental and social safeguards, review and acceptance of the ownership, management, financing structure (including in connection with shareholders, suppliers, equipment, and Project design, and contracts proposed by the winning bidder), review and acceptance of project / transaction documentation by IBRD, and the approval of the management and Executive Directors of IBRD in their sole discretion. Without limiting the generality of the foregoing, IBRD is highly selective with regard to the clients and beneficiaries it works with and is diligent about Know-Your-Customer requirements for all project participants (equity investors, ultimate shareholders, lenders, contractors, advisors) and will undertake an appraisal of the Bukhara Solar IPP Project and the Bukhara Solar IPP Project Company, including an assessment along these parameters.*

Any beneficiary of an IBRD guarantee must be in compliance with IBRD's requirements for tax transparency and integrity in the use of intermediate jurisdictions and must cooperate in any due diligence as to corporate structure and integrity, as well as in any remedial measures, that IBRD may require, before IBRD can provide its Guarantee. In order for IBRD to commence that assessment, potential beneficiaries of the IBRD Guarantee must inform IBRD if any affiliate or other related party will also be participating in the transaction and provide details of its/their domiciliation and relationship to the potential Guarantee beneficiary, or confirm that no such entity will be involved. Any beneficiary of an IBRD guarantee must also be in compliance with IBRD's requirements regarding private ownership or control.

*This term sheet is based on executed versions of the Power Purchase Agreement ("**PPA**") and Government Support Agreement ("**GSA**") dated April 2023 for the Bukhara Solar IPP Project and is designed to support obligations under those documents.*

IBRD-Guaranteed Letter of Credit ("L/C")	
L/C Applicant:	**National Electric Grid of Uzbekistan JSC** (NEGU), a company owned by the Government of the Republic of Uzbekistan (GOU), as Purchaser under the PPA
L/C Beneficiary:	**Project Company,** which is the **Bukhara Solar IPP Project Company** for the **Bukhara Solar IPP Project** (a privately-owned company responsible for the implementation of the project).
L/C Bank:	A commercial bank acceptable to IBRD (as Guarantor under the Guarantee Agreement) and the L/C Applicant. An acceptable L/C Bank will be selected by the L/C Applicant, GOU, and IBRD following a competitive selection process.
Maximum L/C Amount:	The maximum amount available for draw under the L/Cs shall not exceed USD [11,851,352] million for the Bukhara Solar IPP Project.[26]

[26] Per the current PPA, the amount of the payment security is US$ 11,851,352 for the Bukhara Solar IPP Project, although this figure is still under consideration. Note that the L/C Amount for the Project is projected to be US$ 11,851,352 for the first ten (10) years of the project's

	The Maximum L/C Amount may be reduced from time to time in accordance with the terms of the L/C and the Guarantee Agreement.
L/C Effective Date:	A date following commercial close (PPA signing) and fulfilment of the conditions precedent established by the L/C Bank for issuance of the L/C.
L/C Validity Period	Up to [21] years, though with L/C Availability up to 20 years from when the project reaches Commercial Operations Date ("L/C Availability Date")
Guaranteed L/C:	Revolving standby irrevocable letter of credit issued in favor of the L/C Beneficiary (Project Company) by the L/C Bank at the request of the L/C Applicant (Purchaser) to backstop the monthly payment obligations of the L/C Applicant (Purchaser) under the PPA following the occurrence of a Guaranteed Event (as defined below). Any amounts drawn by the L/C Beneficiary (Project Company) under the L/C that are repaid by the L/C Applicant (Purchaser) to the L/C Bank (within the L/C Reimbursement Period (as defined below) (or amounts by which Member Country replenishes the L/C balance pursuant to the GSA) would be reinstated. The obligation of the L/C Applicant (Purchaser) to repay the L/C Bank amounts drawn under the L/C would be guaranteed by IBRD (as Guarantor under the Guarantee Agreement) up to the Maximum Guaranteed Amount. Any amounts drawn by the L/C Beneficiary (Project Company) under the L/C that are subsequently repaid by IBRD (as Guarantor under the Guarantee Agreement) to the L/C Bank under the Guarantee would not be reinstated. That is, any principal amount repaid by IBRD would be deducted from the Maximum L/C Amount.
Guaranteed Events (Permitted Drawdown under L/C):	Failure by the Purchaser to pay any amount due and payable to the L/C Beneficiary (Project Company) pursuant to a monthly invoice according to the terms of the PPA.
L/C Fees:	To be payable by the L/C Beneficiary (Project Company) to the L/C Bank. Level of L/C Fees must be acceptable to the L/C Applicant (Purchaser) and IBRD.
Practice Rules and Governing Law	ISP 98; as to matters not governed by ISP 98, English law or New York Law.
L/C Reimbursement and Credit Agreement (RCA)	
Borrower (of the L/C loan):	**L/C Applicant** (NEGU), as Purchaser under the PPA
Lender (of the L/C loan):	**L/C Bank**, as guaranteed lender
L/C Reimbursement Period:	Following a draw under the L/C by the L/C Beneficiary, the L/C Applicant would be obligated to repay the L/C Bank the amount drawn under the L/C, together with accrued interest thereon, within a period of twelve (12) months (the "**L/C Reimbursement Period**") from the date of each draw, pursuant to the RCA.

operations, while the L/C Amount is projected to be US$ 6,856,320 during the remaining term of the L/C. This expected change in L/C Amount is to account for the ten (10)-year operating term (subject to possible extension) of the battery-storage component of the Bukhara Solar IPP Project. That said, any changes in respect of the L/C Amount shall be agreed upon among NEGU, the Bukhara Solar IPP Project Company, the L/C Bank, and IBRD.

	In the event of a timely repayment, the L/C will be reinstated by the amount of such repayment. In the event of a partial repayment, the L/C will only be reinstated by the portion thereof which represents the original principal (and excluding the portion which represents capitalized or other interest). In the event of non-payment on the due date, the L/C Bank would have the right to call on the Guarantee for principal amounts plus accrued interest due from the L/C Applicant (Purchaser) under the RCA.
Interest Rate Charged by the L/C Bank:	An appropriate margin[27] above SOFR acceptable to the L/C Bank, the L/C Applicant (Purchaser), and GOU, and agreed by IBRD (as Guarantor under the Guarantee Agreement). The maturity of the selected SOFR base rate should follow current market standards, with a preference for short-term base rates.
Governing Law:	English law or New York Law.
IBRD Guarantee Agreement	
Guarantor:	**IBRD**
Guarantee Beneficiary:	**L/C Bank**, as guaranteed lender
Guarantee Face Value:	Up to USD [11,851,352] for the Bukhara Solar IPP Project (potentially declining after 10 years, as indicated herein)
Guarantee Support (Scope):	IBRD (as Guarantor) will backstop the payment obligations of the L/C Applicant (Purchaser) under the RCA to the extent that (i) the said obligations result from a Permitted Drawdown under the L/C and (ii) the L/C Applicant has failed to repay the L/C Bank in accordance with the RCA, provided that Member Country has not replenished the L/C balance pursuant to the GSA. That is, if the amount remains unpaid after the expiry of the L/C Reimbursement Period, the L/C Bank would have the right to call on the Guarantee for the principal amount (equal to the amount drawn under the L/C), plus accrued interest, due from the L/C Applicant.
Maximum Guaranteed Amount:	Maximum Guaranteed Principal plus accrued interest thereon in accordance with the RCA. IBRD (as Guarantor) may cover compound interest, but will not cover penalty interest, default interest, or charges of a similar nature.
Maximum Guaranteed Principal:	The Guarantee Face Value. Any principal amount paid by IBRD (as Guarantor) to the L/C Bank under the IBRD Guarantee would be deducted from the Maximum Guaranteed Principal, and those amounts would not be reinstated.
Maximum Guarantee Period:	The L/C Validity Period plus 14 months.
IBRD Financial Exposure Limits:	The average life of the financial exposure of IBRD under the Guarantee will not exceed twenty (20) years and the Maximum Guarantee Period will not exceed thirty-five (35) years. The financial exposure of IBRD under the Guarantee will start on the L/C Availability Date.
Signing:	If the Guarantee-related legal agreements are not signed within twenty-four (24) months

[27] The interest rate may comprise only the following two (2) components, namely, (i) a benchmark interest rate utilizing the Secured Overnight Financing Rate ("SOFR"), and (ii) an appropriate margin over SOFR.

	following approval of the Guarantee by the Board of Executive Directors of IBRD, IBRD (as Guarantor) may withdraw the offer of the Guarantee.
Exclusions, Withholding, Limitation/Suspension & Termination Events:	Standard exclusion, withholding, limitation / suspension, and termination events for transactions of this nature.
Substitution of Guarantee:	If IBRD (as Guarantor) exercises remedies against the L/C Bank under the Guarantee Agreement for reasons attributable to the L/C Bank, IBRD may enter into a new Guarantee Agreement with a substitute L/C Bank on substantially the same terms and conditions as the Guarantee Agreement and for the remaining term of the Maximum Guarantee Period.
Conditions Precedent to Effectiveness of the IBRD Guarantee:	Usual and customary conditions for financing of this type, including but not limited to the following: (a) Firm commitment of (signing of legal documents for) sufficient financing to complete the construction of the Projects, including satisfactory contribution of equity; (b) Execution, delivery, and effectiveness of all Project and financing agreements, in form and substance satisfactory to IBRD, including the Indemnity Agreement and the Project Agreement; I Delivery of all relevant host-country environmental approvals required for the operation of the Projects, and compliance with all applicable World Bank requirements relating to Sanctionable Practices and environmental and social aspects, including the World Bank Performance Standards and as to the use of forced labor; (d) Effectiveness of all required insurance (to include IBRD as an additional insured on third-party liability insurance); € Satisfaction of all conditions precedent to first disbursement under the financing documents, save for any condition that requires the effectiveness of the Guarantee Agreement to have occurred; (f) Provision of satisfactory legal opinions; (g) Payment in full of the Initiation Fee, Processing Fee, Front-end Fee, the first installments of the Standby Fee and Guarantee Fee (as applicable), and the fees and expenses of IBRD's external counsel; and (h) Satisfactory integrity due diligence of the Project Company (and related parties) and guaranteed party.
Subrogation:	If and to the extent IBRD (as Guarantor) makes any payment under the Guarantee, IBRD will have an immediate and automatic right of subrogation to the extent of such unreimbursed payment to the L/C Bank's rights under the RCA.
Governing Law:	English law or New York Law.
Indemnity Agreement	
Parties:	IBRD and Republic of Uzbekistan (the "Member Country")
Indemnity:	The Member Country will reimburse and indemnify IBRD (as Guarantor) on demand, or as IBRD may otherwise direct, for all payments under the Guarantee and all losses, damages, costs, and expenses incurred by IBRD relating to or arising from the Guarantee.
Covenants:	Usual and customary covenants included in agreements between IBRD member countries and IBRD. Specific covenants, if any, will be determined during the Guarantee-documentation phase.
Remedies:	If the Member Country breaches any of its obligations under the Indemnity Agreement, IBRD may suspend or cancel, in whole or in part, the rights of the Member Country to make

	withdrawals under any other loan, credit, or grant agreement with IBRD or IDA, or any IBRD loan or IDA credit to a third party guaranteed by the Member Country, and may declare the outstanding principal and interest of any such loan or credit to be due and payable immediately. A breach by the Member Country under the Indemnity Agreement will not, however, discharge any guarantee obligations of IBRD under the Guarantee.
Governing Law:	The Indemnity Agreement will follow the legal regime, and include dispute settlement provisions, usual and customary for agreements between IBRD member countries and IBRD.
Project Agreement	
Parties:	**IBRD** and the **L/C Beneficiary** (**Bukhara Solar IPP Project Company**, a privately-owned company responsible for implementation of the Project)
Representations and Warranties:	The L/C Beneficiary will represent, among other standard and Project-specific provisions, as of the Project Agreement effective date, that: (a) it is in compliance with applicable environmental laws and the applicable World Bank guidelines and environmental and social safeguards requirements, including the World Bank Performance Standards and other applicable requirements; and (b) neither it (nor its direct and indirect shareholders and any other relevant Project participants, as determined by IBRD), nor any of its affiliates has engaged in any Sanctionable Practices in connection with the Project. Note: "**Sanctionable Practices**" comprises corrupt, fraudulent, collusive, coercive, or obstructive practices, as defined in IBRD's Anti-Corruption Guidelines.
Covenants:	The L/C Beneficiary will covenant, among other things, that it will: (a) comply with applicable laws, including environmental laws, and the applicable environmental and social safeguards requirements under the World Bank Performance Standards and other applicable requirements, including as to the use of forced labor; (b) provide IBRD annual audited financial statements and other reportI(c) provide IBRD certain notices and information; (d) provide IBRD access to the ProIt; (e) not engage in (or authorize or permit any affiliate or any other Person acting on its behalf to engage in) any Sanctionable Practices in connection with the Project; (f) comply with World Bank requirements relating to Sanctionable Practices regarding individuals or firms included in the World Bank Group list of firms debarred from World Bank Group-financed contracts; and (g) obtain IBRD's consent prior to agreeing to any change to any transaction document which would affect the rights or obligations of IBRD under the Guarantee Agreement or any other Guarantee-related agreement.
Payment of Fees to IBRD:	Payment of fees due to IBRD is the obligation of the L/C Beneficiary (Project Company). However, if the L/C Beneficiary fails to pay any installment of the fees due to IBRD in full or when due, [Other Party*, subject to acceptance by Member Country and IBRD*] may elect to pay the unpaid amount of the fees and seek reimbursement from the L/C Beneficiary. Fees due to IBRD will not be payable by Member Country.
Initiation Fee:	15 bps of the Guarantee Face Value (but not less than USD 100,000)
Processing Fee:	50 bps of the Guarantee Face Value (In exceptional cases, projects may be charged over 50 bps of the Guarantee Face Value)
Front-end Fee:	25 bps of the Guarantee Face Value
Standby Fee:	25 bps per annum, charged periodically and applied to that portion of the guaranteed amount

	that IBRD has contractually committed and for which IBRD does not yet have financial exposure under the Guarantee. The IBRD standby fee is normally charged semi-annually and accrues sixty (60) days after the date of signing of the agreement providing for IBRD's Guarantee. The Standby Fee must be paid in advance on regular payment dates.
Guarantee Fee:	[50-100] basis points per annum (depending on the Guarantee average life resulting from the winning bidder's proposal – *See* separate pricing table below). The IBRD Guarantee Fee is charged on that portion of the guaranteed amount that IBRD has contractually committed and for which IBRD has financial exposure under the Guarantee (Maximum Guaranteed Principal). The Guarantee Fee must be paid in advance semi-annually on regular payment dates. The Guarantor will have the right to terminate the Guarantee in the event of non-payment of the Guarantee Fee or Standby Fee in full when due.
External Legal Costs:	Fees and expenses of IBRD's external counsel will be borne by the L/C Beneficiary.
Cooperation Agreement	
Parties:	**IBRD** and **NEGU** (as Purchaser under the PPA, and as L/C Applicant)
Cooperation Agreement:	NEGU will covenant, among other things, that ill: (g) (i) comply with all its obligations under the transaction documents; (ii) obtain IBRD's consent prior to agreeing to any change to any transaction document which would materially affect the rights or obligations of IBRD under the Guarantee Agreement or any other transaction document; (iii) provide certain notices to IBRD; (iv) take all action necessary on its part, in accordance with and as required by the terms of the Project-related agreements to which it is a party, to enable the L/C Beneficiary (Project Company) to perform all of the L/C Beneficiary's obligations under the Project Agreement with IBRD, and other relevant transaction documents; and (v) cooperate with IBRD and furnish to IBRD all such information related to such matters as IBRD shall reasonably request; and promptly inform IBRD of any condition which interferes, or threatens to interfere, with such matters.

Guarantee fee applicable to IBRD Guarantees per average maturity

IBRD Guarantee Average Life	IBRD Guarantee Fee
Up to 8 years	50 bps
From 8 to 10 years	60 bps
From 10 to 12 years	70 bps
From 12 to 15 years	80 bps
From 15 to 18 years	90 bps
From 18 to 20 years	100 bps

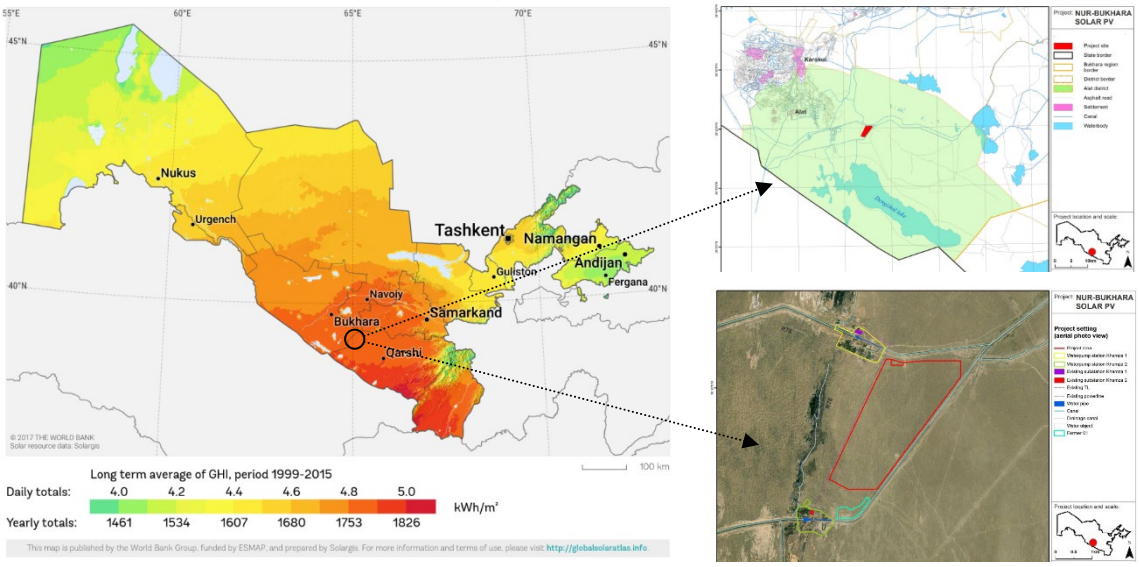
ANNEX 2: PROJECT DESCRIPTION

UZBEKISTAN
Uzbekistan Solar and Renewable Energy Storage (USRES) Project
(Bukhara Solar IPP)

Bukhara Solar IPP – PV plant

1. **Location/Land:** The project site is located 24 km south-east of the town of Alat, Bukhara region, close to the border with Turkmenistan, which at the closest point lies around 25 km south-east of the Site. The proposed Site is flat and is surrounded by the Amu-Bukhara canal to the north, south and east. The location of the Project is illustrated in the figure below:

Figure 5. USRES Project: Bukhara Solar IPP site



2. ***Access:*** The site is accessible by well paved tarmac road served by the highway M37 (two lane) road and R-78 (single lane) providing last mile connectivity. R-78 runs parallel along the complete northern side of the site. LTA do not foresee any issues with respect to site access and material transportation during project development.

3. ***Electrical Interconnection:*** Power from the Solar PV plant shall be evacuated through a 220kV double circuit 39of approx. 300m to the existing 220kV lines connecting "Korakol 500 (Khamza 3SS)" - "Khzmza-2 SS". EPC Contractor shall undertake further investigation on any strengthening required for the entire infrastructure including substation and transmission line and also carry out detailed Grid impact studies. LTA has confirmed that no major risks are identified at this stage.

4. ***Water Connection:*** EPC Contractor plans to utilize ground water through borewells during construction phase and source water from the nearby canal during operations. LTA does not foresee any risks specific to source of water.

Battery Energy Storage System (BESS)

5. **In practice, BESS has several key advantages that it can offer to Uzbekistan's energy system, including but not limited to:**

- **Firming up renewable generation**: Large RE capacity in small grids can disrupt stability due to the unpredictable nature of wind and solar. Connecting a BESS to these RE sources can provide consistent power, stabilizing the grid;
- **Matching demand and supply:** Urban areas often see high power demand in the evenings, which solar-heavy grids struggle to meet. BESS units, becoming popular worldwide, store excess solar power during the day and release it during peak times;
- **Additional benefits for the grid:** BESS helps to control frequency, provides reactive power compensation, restart grids after shutdowns, and manage power quality, especially when wind and solar contribute significantly to the grid; and
- **Reducing import/export and dependence on coal and gas:** Power generation relying heavily on coal or natural gas is sensitive to fluctuating commodity prices, complicating long-term financial planning. However, BESS plants linked with solar and/or wind projects offer a predictable cost structure, aiding utilities like NEGU in financial planning, setting consistent tariffs, and enhancing financial performance over time.

Bukhara Solar IPP - BESS

6. **Bukhara Solar IPP project consists of PV solar with a nominal capacity of approximately 250 MWac (290 MWp) and BESS capacity of 63 MW/126 MWh.** The Project's design is based (as a preferred supplier) on BESS by BYD. However, other approved suppliers are included in the EPC contract and the Lender's Technical Advisor ("LTA") report. Final equipment selections and design basis should be subject to review by the LTA and lenders ahead of commitment.

7. ***BESS Performance Projections:*** the three main performance tests captured in the PPA are the BESS Roundtrip Efficiency ("RTE"), Availability and City:

(i) RTE measures the energy a battery can discharge as a percentage of the energy used to charge it. The PPA specifies an RTE of 85 percent over the 10-year period.

(ii) The proposed BESS Availability guarantees 97 percent in the first five years and 96.5 percent thereafter. A Seller EoD is triggered if the BESS Availability drops below 75 percent for two consecutive years. The PPA requires a 97 percent annual guarantee throughout its life.

(iii) At the Commercial Operation Date ("COD") and at end of each contract year Storage Capacity is tested. PPA states annual contracted capacity to be met for each year: 63 MW/126 MWh in the first year, and then including a 2 percent yearly implied degradation.

ANNEX 3: UZBEKISTAN ENERGY SECTOR REFORMS AND WORLD BANK GROUP ENGAGEMENT

UZBEKISTAN
Uzbekistan Solar and Renewable Energy Storage (USRES) Project
(Bukhara Solar IPP)

1. The GoU has initiated ambitious energy sector reforms that envisage introducing market-based principles in sector management and operations with the support of IFIs, including the WBG. In late 2016, major reforms were launched to reorient the economy toward a more open and private sector-led model. The energy sector, as a backbone of the economy was chosen as one of the key reform areas. The WBG, as a lead partner has been supporting the GoU in designing, prioritization and implementation of energy reforms and the Public-Private Partnership (PPP) agenda as follows:

a) Five-year Development Strategy for 2017–2021 stipulating a broad market-oriented reform in the country's governance and all key areas of the economy;
b) Establishment of the MoE assuming consolidated responsibilities for policy-making and regulatory functions in relation to gas, coal, nuclear power, and electricity, while day-to-day operations are delegated to the sector entities such as UzbekEnergo (UE) and UzbekNefteGaz (UNG);
c) Unbundling of the vertically integrated UE into separate functions: generation ('Thermal Power Plants' Joint-stock Company), transmission ('National Electric Grid of Uzbekistan' Joint-stock Company or NEGU), and distribution ('Regional Electric Network' Joint-stock Company). The same approach was adopted with UNG unbundling in June 2019;
d) Adoption of a new electricity tariff methodology and establishment of a separate tariff commission setting out a path for tariffs to be systematically adjusted to full cost recovery levels on regular and systematic basis. The GoU executed three tariff adjustments in 2018-2019, doubling the weighted-average tariff of electricity and gas;
e) Adoption of a Renewable Energy Law and Grid Code with an explicit focus on increasing private investment in renewable energy generation;
f) Adoption of measures requiring its two largest (and costliest in terms of explicit and quasi-fiscal deficits) SOEs—UE and UNG—to adopt International Financial Reporting Standards (IFRS) and produce updated audited financial statements compliant with the new standards; and
g) Development of electricity transmission expansion and rehabilitation plans to 2030 and energy sector digitalization strategy aimed at improving the grid reliability, facilitating grid integration of large-scale renewable energy planned for development, and strengthening regional connectivity.

2. Upon implementation of the sector reforms and lessons learned since 2017, the GoU has recently developed and commenced the next wave of energy reforms aligned with its commitment to transitioning towards cleaner energy and decarbonization. The proposed reforms will revolve around six main principles:

(a) implementing market and institutional changes to transition towards a competitive wholesale electricity market structure and establishment of an energy regulator;
(b) progressing energy subsidy reforms with the aim of achieving cost recovery by 2026 while protecting the poor;
(c) fostering increased private sector investment in the sector;
(d) improving energy efficiency and expanding the use of renewable energy sources;
(e) ensuring reliable energy supply and operational efficiency; and

(f) strengthening regional connectivity and trade.

3. The new wave of sector reform program aims to accelerate the targeted clean energy transition with private sector participation and contribute to the Government's sustainable development and climate commitments. In this context, the GoU has already adopted three new Presidential Decrees as follows: *(i)* Presidential Decree No. 166 (dated 28.09.2023) on the next wave of the energy sector reforms that covers establishment of a separate energy sector regulator to consolidate all the regulatory functions and unbundling of the power transmission company to separate its transmission and single buyer functions; *(ii)* Decree of the Cabinet of Ministers No. 475 (dated 01.10.2023) paving the way to carry out of tariff/subsidy reform by increasing, as of October 1, 2023, electricity and natural gas tariffs for legal entities. Specifically, prices for state-owned mining, metallurgical companies, and budget organizations will rise from 450 UZS to 1000 UZS (a 120 percent increase) for electricity, and from 660 UZS to 1800 UZS (a 170 percent increase) for natural gas. For other legal entities, electricity prices will increase from 450 UZS to 900 UZS (a 100 percent increase), and natural gas tariffs will rise from 660 UZS to 1500 UZS (a 130 percent increase) per cubic meter; and *(iii)* Presidential Decree No. 300 (dated 11.09.2023) on the Strategy of Uzbekistan by 2030 increasing the renewable energy target to 25GW by 2030.

4. In order to strengthen the sector reform process, the World Bank has been providing support in each direction as below.

Table 9. World Bank's financing portfolio supporting energy sector reforms in Uzbekistan

Project name	Sub-sector / complementarity	Support type	World Bank financing / PCM by guarantee (US$ million)
Navoi Scaling Solar IPP (100 MW) - P170598	Power generation/ Renewables with PPP	Guarantee	5.1 /50
Scaling Solar 2 (Jizzakh and Samarkand, 2x220 MW) - P174323	Power generation/ Renewables with PPP	Guarantee	12 /205
Uzbekistan Syrdarya Efficient Power Generation Project / Syrdarya 2 CCGT IPP (1,573 MW) - P174323	Power generation / Efficient power generation to sustain the security of supply and renewable integration with PPP	Guarantee	29 /517
Innovative Carbon Resource Application for Energy Transition - P190432	Climate and carbon finance / sector reform crediting and subsidy-tariff reform	Policy-based financing	46
Electricity Sector Modernization and Sustainability Project - P177871	Electricity transmission / Security of supply, sector sustainability and RE integration	Lending	380
Modernization and Upgrade of Transmission Substations	Electricity transmission / Security of supply, sector sustainability and RE integration	Lending	150
Energy Efficiency Facility for Industrial Enterprises Project, Phase 3	Energy efficiency / sector sustainability and consumption rationalization	Lending	200
District Heating Energy Efficiency	Energy efficiency / sector	Lending	140

	sustainability and consumption rationalization		
Clean Energy for Buildings in Uzbekistan	Energy efficiency / sector sustainability and consumption rationalization	Lending	143
Total			**1,105 / 772**

5. **Uzbekistan's commitment to energy reforms aligned with sustainable development and climate action to address challenges in the energy sector and drive economic growth.** Due to the limited reserves of natural gas, and climate consideration, the Government is focusing on scaling up renewable energy, energy efficiency, and tariff reforms, and is committed towards a sustainable, low-carbon future. The collaborative efforts between the GoU and the Bank serve as a promising model for integrated approaches to achieve a cleaner, more efficient, and sustainable energy landscape. These collective endeavors not only aim to bring economic growth and job opportunities but also ensure a more resilient, environmentally friendly, and energy-secure future for Uzbekistan.

ANNEX 4: PARIS ALIGNMENT ASSESMENT

UZBEKISTAN
Uzbekistan Solar and Renewable Energy Storage (USRES) Project
(Bukhara Solar IPP)

PARIS ALIGNMENT ASSESSMENT	
Step 1: ASSESSING THE CONSISTENCY OF THE OPERATION WITH THE COUNTRY'S CLIMATE STRATEGIES	
Taking into account our climate analysis (e.g., CCDRs), is the operation consistent with the country climate commitments, including for instance, the NDC, NAP, LTS, and other relevant strategies?	
Questions for consideration: ▪ Is the sector for the activities financed by the proposed project included/mentioned in the country's climate strategies? ▪ Are there specific targets or goals mentioned in country's climate strategies or sectoral climate strategies that this project may support in advancing? ▪ If the project's focus sector(s) and/or interventions are mentioned across the strategies, are they consistent with the relevant commitments or priorities?	
Answer (Y/N):	Yes
Rationale:	Among the key mitigation actions identified in the 2021 NDC is to increase the share of renewable energy sources to 25% of total power generation. The Bukhara Solar IPP (250MW) with Battery Energy Storage System (BESS) that will be built under the guarantee of this project will contribute to power generation from renewable energy, thus less reliance on coal and natural gas and subsequently towards **reduced GHG (Green House Gas) emissions in the sector and the country, contributing to Uzbekistan's NDC.**

MITIGATION	
Step M2: Considering its specific context, is the operation at a material risk of having a negative impact on the country's low-GHG-emissions development pathways?	
Assessment result (Y/N) and rationale *(Summary after Steps M2.1-M2.4 are completed)*	**No**
M2.1. Is the IPF operation supporting the activities that are on the Universally Aligned list or Universally Non-Aligned list?	
Question for consideration: ▪ If the operation or activity is listed on the UA list, are there any conditions it must meet to be considered aligned?	
Component 1:	The main activity of this component is to build the Bukhara Solar IPP Project (250MW) with BESS (63MW/126 MWh) plant, that will generate low carbon energy from solar power. This activity is aligned according to the universally aligned list for energy.

Therefore, which activities require further assessment? *(Proceed to M2.2 for these activities)*	N/A
M2.2. Are there other means of achieving the Development Objective(s) with lower GHG emissions given the country's unique circumstances, including consideration of the sector-wide decarbonization pathways, where applicable?	
Answer (Y/N)	**No**
Rationale	The project is expected to contribute to the reduction of about 3.4 million tons of CO2 over its lifetime and an average of about 109,306 tons per year, thanks to power generation from renewable sources. Therefore, the activity already contributes to low carbon pathways.
M2.3. Does the IPF operation prevent the transition to lower-carbon alternatives that can achieve the Development Objective(s) as they become viable?	
Answer (Y/N):	*No*
Rationale:	*The IPF operation's development objective is increase renewable energy generation and storage capacity through private sector participation in Uzbekistan. Through the implementation of solar power plants, the operation will avoid greenhouse gas emissions, contributing to lower-carbon transition goals of Uzbekistan*
M2.4. Is the IPF operation economically viable after accounting for transition risks?	
Answer (Y/N)	Yes
Rationale:	**<u>TEAMS CAN MAKE A QUALITATIVE ASSESSMENT OF TRANSITION RISKS</u>** **Questions for consideration:** ▪ Have you identified transition risks, by considering whether (1) the achievement of the PDO relies on emissive sectors and/or activities, (2) there are factors that may make the project investments uneconomic as the country transitions to a low carbon pathway? The team has not identified any transition risks, the generation of renewable energy through solar PV and collocated battery storage is included in the list of Universally Aligned activities. **Hence, the Project is assessed to be aligned with the climate mitigation goals of the Paris Agreement.**
M3. Considering country's unique circumstances, have measures been incorporated to (i) address constraints and adopt means of achieving the Development Objective(s) with lower GHG emissions, (ii) avoid preventing the transition to lower-carbon alternatives, and (iii) address the transition risks to the economic viability of the operation?	
Answer (Y/N):	*Yes*
Rationale:	The project activities are on the Universally Aligned list.

ADAPTATION	
A2: Are risks from climate hazards likely to have material impact on the operation (including assets, services and the systems as relevant) and its Development Objective(s)?	
Questions for consideration: ▪ What climate hazards is the project exposed to? ▪ What is the vulnerability of the project's activities to climate hazards? ▪ What is the inherent level of risk from climate hazards to the project?	
Answer (Y/N):	No
Rationale:	Uzbekistan is at risk of several climate and climate change related hazards, including frequent heat waves, wildfires, droughts, and flooding, that may threaten water supply service. However, for the main components under this project, a preliminary screening for climate change and disaster risks was conducted for the project's main components and the risks were found to be moderate.
A3: Have measures been incorporated into the design of the operation to reduce material risks from climate hazards to an acceptable level?	
Questions for consideration: ▪ What risk reduction measures are being considered to address the risks identified? ▪ Does the project need to consider additional measures to reduce risks identified? ▪ What are the residual risks, are they acceptable?	
Answer (Y/N):	Yes
Rationale:	The risks from potential climate hazards, such as heatwaves, wildfires and drought, were reduced to acceptable levels by taking the following measures: - The selected project site is surrounded by parse vegetation, which does not provide conditions conducive to the spread of wildfires. A 10m buffer zone will be implemented at the perimeters of the site to protect it from ground-spread wildfires. - The project equipment was designed to withstand heatwaves. - An increased likelihood of wind speeds and water scarcity might cause dust damage to equipment. - Dry cleaning will be used to clean the panel, therefore minimizing water use, to mitigate dust damage to the equipment caused by water scarcity. Thanks to these measures, the project's moderate risks are reduced to acceptable levels, **therefore the project is aligned with the adaptation goals of the Paris Agreement.**

ANNEX 5: ECONOMIC AND FINANCIAL ANALYSIS

UZBEKISTAN
Uzbekistan Solar and Renewable Energy Storage (USRES) Project
(Bukhara Solar IPP)

1. The economic and financial analyses presented in this annex are for the USRES Project at the Bukhara (250 MW Solar PV and 63 MW/126 MWh BESS) site. The analyses are conducted on the basis of certain assumptions described below.

Methodology

2. The economic feasibility of the proposed Project is assessed using a standard cost-benefit analysis. Net economic benefits of the Project are calculated using the total costs (excluding taxes and financial costs) and total benefits. The economic cost for the USRES Project captures the (a) EPC cost, (b) Project development cost, and (c) O&M costs during the economic life of the plant. The total economic benefits are: (a) avoided operation costs of the power plants displaced by this Project; and (b) avoided costs of greenhouse gas (GHG) emissions, except for scenarios described as "excluding GHG impacts".

3. Avoided operation costs are estimated assuming a simplified counterfactual scenario where the absence of the project results in increased dispatch of a CCGT running on natural gas with 61.7 percent efficiency that would deliver the same amount of yearly energy than the solar PV plants in Bukhara site. Also, for BESS component integration, additional assumptions were introduced. Specifically, considering that 63 MW/126 MWh BESS system would be used mainly in peak demand hours, that would mean replacement of counterfactual of OCGT plant that would be used otherwise, as a firm capacity costs. Avoided costs of GHG emission are estimated using: (a) the methodology of UNFCCC's "Tool to Calculate the Emission Factor for an Electricity System" (version 7.0), to estimate the amount of avoided emissions; and (b) SPCs of the *low* and the *high* scenarios defined in the World Bank "Guidance Note on Shadow Price of Carbon in Economic Analysis".

4. When estimating avoided emissions with aid of UNFCCC's methodology indicated above, the following assumptions and input data were used:

(i) The *operation margin* (OM) is defined using the "Average OM" method, based on initial results of the Decarbonization 2050 scenario of the least-cost expansion plan developed by the World Bank. Disaggregated data for each power plant in the system were not available. Rather, projections of domestic generation were only available per classes of assets defined by fuel type. The generation shares per fuel class were used to estimate the OM, and conservative assumption were adopted on average efficiency and heat rate for each class. Emissions per unit of fuel consumed, and global warming potentials of methane and nitrous oxide are defined in accordance with IPCC guidelines.

(ii) As detailed data to determine the *build margin* (BM) based on past capacity additions were not available, the simplified procedure defined in section 6.6.2 of UNFCCC's tool was used for this analysis. The year in which the share of renewable generation capacity was expected to surpass 20 percent was defined based on initial results of the Updated Least-Cost Generation Expansion Plan available when this document was produced.

(iii) The standard weights applicable to solar photovoltaic plants were used to estimate the combined margin as a weighted average of the OM and BM.

5. This procedure leads to a conservative estimation of avoided emissions, in comparison with the situation where baseline emissions had been estimated assuming the dispatch of a CCGT, and partially OCGT during peak demand hours, running on natural gas for the entire horizon. On the other hand, using the avoided dispatch (i.e., only variable production costs) of a gas fired efficient CCGT to estimate avoided generation costs in the counterfactual scenario is also a conservative choice, in comparison with a situation where the full marginal expansion and operation costs were used. These conservative choices were made because full output information of the power system analyses to allow the determination of the marginal technology mix were not available when the analyses were prepared in early October 2023.

6. Emissions associated with the construction of the transmission system connecting the solar plants to the bulk grid are negligible in comparison with emissions in the baseline scenario, due to the short length of the connection circuits (0.3 km and 3.2 km) and considering that a connection with a double circuit at 220 kV would typically require a right-of-way with approximately 300 ft in width. Emissions due to technical losses in connection circuits with these features are also negligible, at less than 0.1 percent of the transported energy even under a very conservative calculation.

7. The country-specific economic discount rate used was 8 percent per year. This means that the Project is categorized as economically feasible when the ERR exceeds the hurdle rate of 8 percent. As per the Guidance Note on Shadow Price of Carbon in Economic Analysis, results are reported for *low* and *high* shadow price of carbon, as well as without valuing avoided emissions at all (ERR without GHG impact).

Details of the counterfactuals, assumptions, results, and sensitivity analysis of the Project are described below.

A. Project Economic Analysis

8. A comprehensive economic analysis was carried out for the USRES Project, which consists of 250 MW of solar photovoltaic (PV) plant and 63 MW/126 MWh BESS component in Bukhara. The input data and assumptions used correspond to the best information available at the time of project appraisal.

9. The economic viability of the Bukhara Solar IPP project is assessed using a standard cost-benefit analysis which are evaluated in terms of the NPV and ERR from total economic costs and benefits attributable to the Project. The economic costs and benefits are expressed in real price terms in constant US$2021. The economic analysis is exclusive of any taxes and duties that might be applicable to the Project inputs and outputs.

10. As this is an economic analysis, fuel prices are valued at opportunity costs for Uzbekistan. Opportunity costs of natural gas are assumed to be defined by imports. The values are estimated based on a conservative estimate of gas prices at the neighboring border with Turkmenistan, from which Uzbekistan imports, and estimates of transport costs within Uzbekistan. Estimates of prices at Turkmenistan's border are defined by net-backing projections of gas prices in China, and in turn assuming that the percent changes in price (in constant US$ of 2021) at which Turkmenistan will be able to sell gas to China roughly follow movements of the real spot price in the Japanese market. The projections for the spot price in the Japanese market are based on the October 2022 World Bank Commodity Markets Outlook.

11. The project technical assumptions and inputs (installed capacity, capacity factors, grid connection cost) are based on the technical parameters received from the Sponsor, for the *reference scenario of assumptions*. Sensitivity analyses were carried out for key parameters such as CAPEX, OPEX, to attest that the economic performance remains satisfactory even if the actual costs depart from sponsor projections that may be optimistic. The most significant departure from the sponsor's assumptions in the *reference scenario* is to assume that the project starts early operations in 2025, allowing at least 12 months for implementation of the plants. The sponsor's original assumption for Bukhara site is that operations would start in November 2024.

A summary of the assumptions and the results for the economic analysis is presented in table 3.1.

Table 10. Summary of Economic Analysis for USRES Project

ASSUMPTIONS		
#	**Assumptions**	**Bukhara Solar IPP**
1	Social Discount rate	8%
2	PV nominal capacity	250 MW
3	BESS capacity	63 MW/126 MWh
4	Implementation period	Dec/2023
5	Commercial operation year	Nov/2024
6	PV lifetime	25 years
7	BESS lifetime	10 years
8	PV capacity factor	25.2%
9	Capex cost per watt	US$0.254
10	Average annual degradation of PV output[28]	0.43%
RESULTS		
11	EIRR (including GHG impact, low carbon price)	11.8%
12	EIRR (including GHG impact, high carbon price)	15.5%
13	EIRR (excluding GHG impact)	8.2%
NET PRESENT VALUE		
14	NPV (including GHG impact, low carbon price, in thousand US$)	75,422
14	NPV (including GHG impact, high carbon price, in thousand US$)	130,109
15	NPV (excluding GHG impact, in thousand US$)	20,477
AVOIDED EMISSIONS ACROSS PROJECT LIFETIME (SIMPLE SUM)		
16	Avoided GHG emissions during project lifetime, undiscounted (in thousand tons)	1,709

12. The capacity factors reported above are average values across the project lifetime, resulting in an average yearly generation of 606.1 GWh/year, or 0.6 TWh/year as reported for the corresponding PDO indicator.

13. Net economic benefits of the project are calculated using the total system costs (excluding tax and financial costs) and the total benefits from the avoided costs. Avoided operation costs are estimated assuming a simplified counterfactual scenario where the absence of the project and BESS result in increased dispatch of a CCGT running on natural gas with 61.7 percent efficiency and OCGT for peak demand (two) hours that would deliver the same amount of yearly energy as the BESS. Avoided costs of emissions are estimated using the methodology and inputs described in the "Methodology" section of this Annex.

14. The analysis takes a conservative approach to developing the counterfactual scenario: the capacity credit for the solar power plant is assumed to be zero (0) percent (as the winter peak in the country is at or around 7 pm per the hourly dispatch in Uzbekistan), and hence it is assumed that the energy produced by the solar power plant will replace only the fuel cost from the thermal (gas and coal) power plants. It is assumed that the transmission and distribution losses for the solar power plant and those of the alternative sources are the same. The average

[28] Degradation is affected by local weather and environmental conditions. The parameters indicated in this table were received from the sponsor and are assumed to take local conditions into account.

electricity generation of the Project is estimated at around 606.1 GWh per year over the Project life of 25 years (P50).

15. The analysis indicates that the Project is economically viable with and without factoring in the GHG impact. The analysis indicates that the Project is economically viable when avoided emissions are valued at the *low* and the *high* scenarios of SPCs of the abovementioned guidance note, and also when avoided emissions are not valued at all. The economic rate of return (ERR) (with GHG benefits) of the Project is 11.6 percent per year if emissions are value at the *low* SPCs, 15.2 percent per year for the *high* scenario. The economic rate is above the hurdle rate and demonstrates the positive economic returns of the Project. Table 5 displays other evidence of the satisfactory economic performance of the project.

16. Avoided GHG emission. The amount of avoided GHG emissions were estimated based on the methodology described at the beginning of this Annex. The Project in total is expected to contribute to a reduction of about 1.7 million tons of CO2 over its lifetime and an average of about 68 thousand tons per year.

C. Sensitivity Analysis (of Project Economic Analysis)

17. A sensitivity analysis was conducted for the following key cost-and-benefit drivers in the economic analysis: (a) discount rate; (b) O&M costs of the plants; (c) capital cost of the plants, and (d) generation output of the plants. The economic performance of the Project is generally robust in all scenarios, as indicated by the following results:
(i) *When avoided GHG emissions are valued at* low *SPCs:* ENPV turns negative when the social discount rate is 15 percent.
(ii) *When avoided GHG emissions are valued at* high *SPCs:* ENPV turns negative when the social discount rate exceeds 20 percent.
(iii) *When avoided GHG emissions are not valued at all:* ENPV turns negative when the social discount rate exceeds 10 percent.

B. Project Financial Analysis

18. Results of financial analysis. The analysis arrived at satisfactory positive IRRs commensurate with similar IPPs, indicating that the project is expected to generate sufficient cash flows to recover capital expenditure, and meet operational and maintenance expenditures. Furthermore, after meeting debt-service costs, the cash flows for the project allow for regular dividend payments, providing the shareholder with a reasonable return for a project of this nature. The lenders' base case further confirmed an Average Debt Service Coverage Ratio (ADSCR) of 1.15x for the Project, indicating adequate comfort for the lenders comprising the debt syndicate.

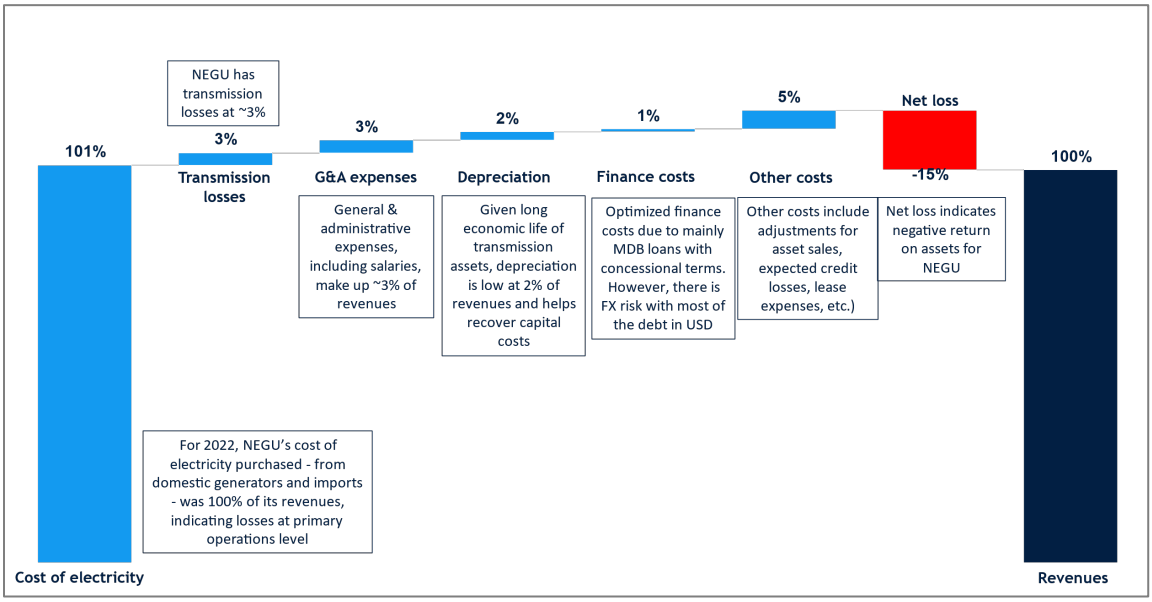
19. The USRES IPP will contribute to power-sector financial sustainability by reducing the average power purchase cost for NEGU as off taker. The proposed Project's tariffs are lower than the weighted-average electricity-purchase cost of NEGU from state-owned power plants. USRES is thus expected to deliver a positive NPV for NEGU and the sector at about US$ 12 million from 2025-30 (when applying a discount rate of 06 percent).

D. Sector Financial Analysis

20. Financial performance of NEGU. NEGU has faced a challenging financial situation over the last three years, failing to breakeven on an operating cost basis in 2022. In the absence of a regulated cost-plus transmission tariff regime, NEGU's revenues did not rise enough to offset increases in operating costs in 2022, which grew by 17 percent, primarily driven by cost of electricity purchased as a result of an increase in generation tariffs for domestic power plants. On the other hand, NEGU's revenues witnessed an increase of 13 percent driven by recovery in demand from COVID-19 pandemic, tariff increases (e.g. amongst some categories of non-residential consumers – who pay higher tariffs than residential consumers – in May 2022), balanced by decrease in export revenues by 31

percent. Notably, operating costs represented 107 percent of total revenues in 2022, resulting in Earnings Before Interest Taxes Depreciation and Amortization (EBITDA) of UZS -1,424.5 billion (~USD -127 million equivalent) at an EBITDA (operating) margin of negative seven per cent. The figure below illustrates NEGU's costs as percentage of revenues, averaged for 2021 and 2022.

Figure 7: Snapshot of NEGU's costs as percentage of revenues (numbers are average for 2021 and 2022)



21. Negative profits have adversely impacted NEGU's ability to ensure recovery of capital expenditure and service debt obligations from operations. NEGU has been unprofitable for the last two years, reporting net losses of UZS 2,344 billion (USD 220 million equivalent) and UZS 3,768 billion (USD 335 million equivalent) in 2021 and 2022 , respectively. In 2021, NEGU registered negative EBITDA margin of 8 percent, not generating enough revenues to cover electricity cost and (debt) interest costs, and for re-investments into building transmission grid. The challenging situation continued in 2022, as NEGU's EBITDA margins were negative, and it experienced a shortfall of UZS 800 billion (USD 71 million equivalent) to ensure full recovery of capital and debt service costs. NEGU plugged this shortfall through on-lent loans from MDBs and accumulation of payables to state-owned generation companies.

22. NEGU is yet to access commercial debt markets, and its existing debt is primarily from development banks, including the World Bank, in the form of on-lent loans through GoU's MoEF and guaranteed by the sovereign. As of end Dec 2022, NEGU's outstanding debt stood at UZS 3,477 billion (USD 309 million equivalent), of which World Bank (IDA & IBRD) accounted for the largest share at 63 percent, followed by ADB at 22 percent. A major proportion of NEGU's existing loans are in foreign currencies, which could entail substantial foreign exchange and interest rate risks, especially in the context of increasing volatility expected across global financial and currency markets in the short/medium term.

23. A major weakness of NEGU's balance sheet relates to rising accounts payables, indicating challenges in meeting timely payments to power producers, which are currently primarily state-owned electricity generating companies. NEGU's accounts payables increased by 42 percent during 2022 as against 2021 to UZS 10,617 billion (USD 943 million equivalent), equivalent to 183 days of power purchase costs. Notably, payables accounted for 35 percent of NEGU's aggregate liabilities. Accumulation of payables to power producers is seen as a temporary

measure to help NEGU manage its short-term liquidity situation, during the time when tariffs move towards cost-reflective levels.

24. Due to sustained losses since its formation in June 2019, NEGU's equity reached minus UZS 4,349 million (USD 386 million) at the end of Dec 2022. Negative equity stock is usually a cause for concern, though given NEGU's full state ownership, strategic position in the country's energy sector, and implicit support from the sovereign, NEGU is expected to be able to sustain operations while the MoEF implements cost recovery tariffs.

25. The GoU is fully aware of NEGU's current challenging financial situation, and has guaranteed all ongoing liabilities, including payments to IPPs, and debt obligations of NEGU. Recent developments in the country's energy sector are also expected to improve NEGU's financial standing. These include rebound of economic activity post COVID-19 leading to rise in electricity demand, recovery of tariff increases, and initiatives such as smart metering that will help maintain high bill collection efficiency rates, which are expected to further improve through advanced metering. As end-consumer tariffs become more cost reflective, NEGU's payables to state-owned generation entities are expected to come down in line with enhanced revenue collections. Lastly, the implementation of IPPs, which have a lower cost than Uzbekistan's current inefficient generation fleet, is also expected to improve NEGU profitability.

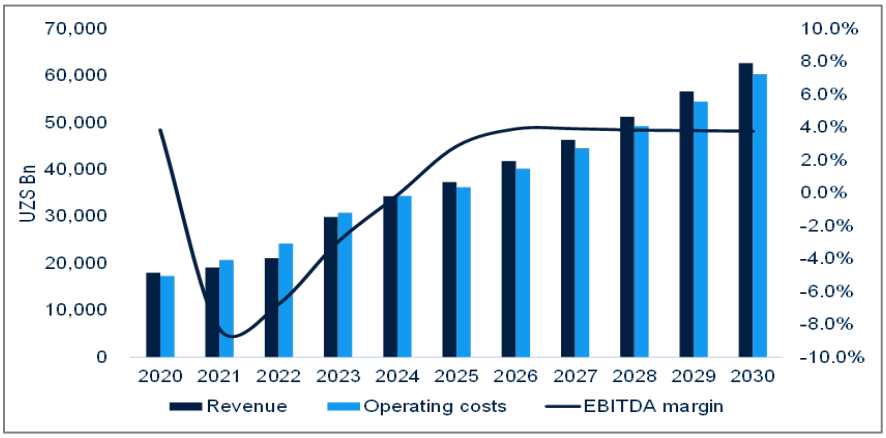
26. NEGU's financial projections are prepared based on feedback received from key GoU stakeholders, including MoEF, Ministry of Energy (MoE) and NEGU, that highlighted improvement in NEGU's financial performance in the medium/long term as sector reforms are implemented. The following key assumptions around electricity demand, tariffs, investment plan, and other key parameters, form the basis of NEGU's financial forecast:

- As per Least Cost (LC) Generation Expansion Plan and dispatch efficiency analysis for Uzbekistan, baseline electricity demand for the country is expected to rise at a compound annual growth rate (CAGR) of 6.4 percent to reach c. 132 TWh by 2030, from c. 85 TWh in 2023;
- NEGU's financial performance is expected to gradually improve from 2023 onwards, and it is expected to reach full cost recovery by 2026 on the back of upward revisions of end-consumer tariffs by GoU/MoEF in accordance with cost-plus tariff methodology. During the transition period from 2022-25, it is assumed that NEGU's tariff will gradually increase to enable it to improve cost recovery to 100 percent in 2025;
- Implementation of over 10 GWs of IPP projects that are planned to be operational over the next 5 years. By 2030, these IPP projects are expected to meet c.50 percent of Uzbekistan's electricity demand. Notably, majority of these IPPs have lower electricity generation costs compared to Uzbekistan's current fleet of old inefficient gas plants. Therefore, increasing the share of IPPs in its electricity mix will help NEGU reduce operating costs, and in turn, improve financial performance over the medium/long-term; and
- NEGU is able to stabilize its working capital situation by 2026.

27. The financial forecasts indicate improved EBITDA margin for NEGU over the next few years (2023-25) as sector reforms, particularly on tariffs, are implemented. During these years, NEGU is not expected to generate adequate cash flows to meet interest costs or for reinvestments, and would need additional financial support (of up to USD 368 million, based on forecasts). That said, from 2026 onwards, NEGU's operational performance is expected to improve due to cost reflective tariffs, enabling it to generate adequate resources to not only service debt, but also channel to re-investments. During the forecast period from 2023-2030, the weighted-average cost of power purchase by NEGU from state-owned generation companies and IPPs increases by 1.2 times from UZS 370 per kWh in 2023 to UZS 445 per kWh in 2030. On the other hand, NEGU's average sale tariff is expected to increase from UZS 362 per kWh in 2023 to UZS 486 per kWh in 2030, increasing above purchase price in 2026, following the same trend in later years, thus enabling NEGU to cover operational expenses and capital costs from 2026. The

chart below provides a snapshot of NEGU's revenues, operating costs and EBITDA margin for the historical (2020, 2021 and 2022) and forecast years (2023 onwards).

Figure 8. NEGU's revenues, operating costs and EBITDA margin (2020-30)



28. NEGU's overall leverage is expected to rise in the coming years since it is not expected to generate resources from operations for its development program, and would need to rely on loans for financing 80 percent of its capital expenditure to modernize and expand its transmission network. Due to this, NEGU's debt is expected to reach a peak of 24 percent of total assets by 2026, from 13 percent in 2022. In the absence of a cost-plus tariff regime during the forecast years of 2022-26, and amid rising debt levels, NEGU will need additional liquidity support to maintain comfortable cover ratios viz. Interest Service Coverage Ratio (ISCR) and Debt Service Coverage Ratio (DSCR). Such additional liquidity requirement is expected to be about UZS 4,661 billion (USD 368 million equivalent) from 2023-26, averaging UZS 1,165 billion per year. The table below provides a snapshot of NEGU's financial performance during 2020/21/22, and for the forecast years from 2023-2030.

Table 6: Snapshot of NEGU's financial performance (2020-2030)

Particulars	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
in UZS Bn	***Historical***	***Historical***	***Historical***	***Forecast***	***Forecast***	***Forecast***	***Forecast***	***Forecast***	***Forecast***	***Forecast***	***Forecast***
Revenue	18,073	19,164	21,120	29,939	34,373	37,361	41,853	46,376	51,269	56,709	62,723
Operating costs (adjusted for lease)	17,377	20,748	24,236	30,824	34,413	36,291	40,213	44,554	49,298	54,547	60,355
EBITDA (adjusted for lease)	**697**	**(1,584)**	**(1,425)**	**(885)**	**(40)**	**1,070**	**1,640**	**1,822**	**1,971**	**2,162**	**2,368**
EBITDA margin	*3.9%*	*-8.3%*	*-6.7%*	*-3.0%*	*-0.1%*	*2.9%*	*3.9%*	*3.9%*	*3.8%*	*3.8%*	*3.8%*
Net profit/loss	**(113)**	**(2,344)**	**(3,768)**	**(1,254)**	**(496)**	**526**	**969**	**1,060**	**1,157**	**1,264**	**1,381**
Net profit/loss margin (%)	*-1%*	*-12%*	*-18%*	*-4%*	*-1%*	*1.4%*	*2.3%*	*2.3%*	*2.3%*	*2.2%*	*2.2%*
Annual debt service	427	407	323	370	397	474	657	747	745	859	983
Cash Balance	299	91	80	101	114	120	134	150	167	187	208
Equity	1,763	(581)	(4,349)	(3,968)	(2,706)	(657)	1,413	2,519	3,719	5,039	6,486
Debt	2,539	2,867	3,477	4,272	5,320	6,546	7,869	8,251	8,702	9,203	9,744
Capex	640	857	1,222	1,328	1,586	1,819	2,045	2,283	2,528	2,786	3,056
Additional liquidity support needed	0	0	0	1,369	1,440	1,159	692	0	0	0	0
Key Ratios											
Net Debt/EBITDA	3.2	(1.8)	(2.4)	(4.7)	(130.8)	6.0	4.7	4.4	4.3	4.2	4.0
Debt to Assets ratio	30%	28%	13%	15%	18%	21%	24%	23%	23%	23%	23%
ISCR	15.1x	3.8x	4.8x	3.8x	2.3x	2.0x	1.9x	1.9x	1.8x	1.9x	2.0x
DSCR	1.6x	1.2x	1.2x	1.1x	1.0x	1.0x	1.0x	1.0x	1.0x	1.0x	1.0x

29. Notwithstanding the strong support from the sovereign and recent positive developments, NEGU operates in a risky environment that could adversely impact its operational and financial performance. Key risks faced by NEGU are described below.

(i) Delay in implementing tariff reforms: Cost-recovery tariffs are critical for NEGU to reach operational and financial sustainability. The current (interim) tariff structure arrives at NEGU's tariff by deducting

generation and distribution tariffs from end-consumer tariffs, entailing a heightened risk of adverse impact on NEGU's revenues to accommodate rising generation and distribution costs.

(ii) Foreign-exchange risk: NEGU has sizeable liabilities in foreign currencies. These primarily include debt service obligations on outstanding IFI debt, and dollar-indexed payments to IPPs under Power Purchase Agreements. Such foreign-currency liabilities of NEGU are expected to increase due to reliance on IFI debt to finance its transmission-network development program, coupled with the rising share of IPPs in the country's energy mix. In the event such increased foreign-exchange losses are not passed onto consumers through higher tariffs, NEGU's financial situation could be negatively impacted.

(iii) Increase in purchase price of electricity: Since NEGU is expected to continue to rely on gas-based electricity generation to meet the majority of the country's demand in the short-medium term, there is risk of a rise in power-generation costs due to higher gas prices not fully subsidized by the GoU. Furthermore, NEGU's balance sheet may be directly exposed to gas-price risks under its tolling arrangements with IPPs if such risks are not fully transferred to entities best placed to manage it (gas suppliers). Additionally, NEGU's electricity purchase price may also increase if it makes deemed-energy payments to IPPs under 'take-or-pay' contracts. In the event such incremental generation costs are not passed onto end-consumers, NEGU's financial situation could be negatively impacted.

ANNEX 6: Environmental and Social Risks and Mitigation

UZBEKISTAN
Uzbekistan Solar and Renewable Energy Storage (USRES) Project
(Bukhara Solar IPP)

1. Masdar is an existing IFC client with five projects currently under supervision. Masdar's E&S performance is presently considered satisfactory (ESRR2) for all projects in portfolio. Main E&S risks for the project requiring mitigation include:

a. Lack of a Project Environmental and Social Management System (ESMS): Masdar has a corporate ESMS but is yet to establish a project level ESMS. Also, the EPC contractor does not yet have a project specific ESMS developed for the project. Prior to the commencement of construction activities, Masdar and the EPC need to develop and implement an ESMS appropriate for the scale & complexity of the project, per the general requirements of PS1.

b. Project Organizational Capacity: Masdar's and the EPC contractor's E&S staff have not yet been appointed for the project. Masdar has committed to employ a site based Environmental Health and Safety (EHS) Manager as well as a Community Liaison Officer (CLO). Also, the EPC Contractor has committed to employ a competent Health, Safety, Social, and Environment (HSSE) manager, HSSE deputy manager, a CLO, as well as an E&S advisor with experience of working with international lenders.

c. Contractor Management: For project construction, the EPC contractor will hire multiple sub-contractors including local ones with limited E&S capacity and understanding of local and international E&S standards such as the PSs. The company and the EPC will develop, as part of their ESMS, a Subcontractors and Suppliers Management Plan (SSMP) defining their approach to managing the EHS performance of their contractors, subcontractors, and other third parties during the various phases of the project. The company will also include legally binding obligations in the EPC contract (and subcontractor contracts) to ensure compliance with the requirements of all relevant E&S plans contained within the project ESIA and ESMP, project ESMS, the PSs, and national regulations. The EPC will do the same on legal contracts for its sub-contractors.

d. Labor Conditions: Contextual risk screening performed during appraisal identified labor and working conditions as significant. Masdar will closely monitor compliance against the requirements defined within their human resources procedures and will implement corrective measures when needed. Additionally, Masdar will hire a suitably qualified and experienced independent consultant, to undertake a labor audit during the construction phase of the project to assess contractor and sub-contractor adherence to local labor laws and PS2 requirements.

e. Supply Chain: Masdar has shortlisted Astronergy (Chint Group) and Longi as the Solar PV Suppliers for the projects. For both these suppliers, some manufacturing facilities are located in China. The BESS component will be sourced directly by the EPC contractor. The Company will maintain and implement Masdar's supply chain management system to identify, manage and remediate supply chain risks associated with forced labor, as well as any other significant environmental and human rights risks and impacts. IFC's E&S due diligence of Masdar's supply chain concluded that the company is complying with PS2 requirements. Masdar requires its tier 1 and tier 2 suppliers to comply with its Business Partner Code of Conduct which prohibits the use of child labor and forced labor and requires them to comply with all applicable occupational health and safety laws and regulations. For equipment and supplies which will be procured by the EPC, Masdar requires implementation of the SSMP, which will be prepared as part of the Construction ESMS. The SSMP requires the screening of suppliers, maintaining

supporting documentation and compliance with the Code of Conduct. Masdar internal audit team will review documentation related to EPC's due diligence regarding their suppliers.

f.Livelihood Restoration: The project Bukhara project site area has no permanent users, and it is only used as an alternative grazing site during the spring months. No physical displacement impacts will result from the project activities, but a portion of land was formally leased for short-term (ten months) by a herder and his partner, who will be impacted by project development. The other land users expected to be affected by project development are seven households from the Kirilishon community who informally use this land to graze their livestock during the spring months. Masdar has developed a comprehensive livelihood restoration plan (LRP) to address adverse impacts and losses related to the decrease in available farmland areas. The LRP has been disclosed to the project impacted people, and a thorough engagement process was undertaken. To ensure the successful implementation of the LRP, Masdar will monitor its implementation, providing bi-annual monitoring reports to the lenders during the construction phase and annual reports during operations. Additionally, Masdar will engage a third-party consultant within one year after the completion of LRP activities to undertake an independent completion audit to assess if all the LRP provisions have been met and LRP mitigation measures implemented.

ANNEX 7: Implementation Arrangements and Support Plan

UZBEKISTAN
Uzbekistan Solar and Renewable Energy Storage (USRES) Project

(Bukhara Solar IPP)

1.The MoEF, MoE, and MIIT, on behalf of the GoU, have conducted a competitive bidding process for the selection of an investor to design, finance, construct, and operate a solar IPP plant at Bukhara. IFC Transaction Advisory Services advised the Government on structuring and tendering the Project. The Project was structured and tendered using the Scaling Solar Initiative approach — a WB product consisting of a set of standardized documents which include an RFQ, Request for Proposal, Project Agreements, IFC financing term sheet, and World Bank Guarantees term sheet.

2.The Project is anticipated to follow customary arrangements for such private-sector projects and will be implemented through a special-purpose company (registered in Uzbekistan) that will have overall responsibility for the design, finance, supply, construction, testing, commissioning, and O&M of the power-plant asset for the duration of the PPP contractual agreements (PPAs and GSAs). The Project Company will set up appropriate management structures to undertake its respective project. The Project participants are experienced and familiar with Uzbekistan's and the Project's requirements, and, according to the Lenders' technical advisor, are expected to reduce the associated risks through the good observance of applicable norms, standards, and other relevant requirements pertaining to the Project.

3.The liquidity mechanisms under the Project will help the public off-taker, NEGU, meet its obligations under the PPA to procure and provide payment security to the IPP company. It will provide the private IPP company with facilities to manage any temporary interruptions in monthly PPA payments from the public off-taker. In the event the public off-taker is unable to make a monthly PPA invoice payment owed to the private IPP company, the latter may draw a corresponding amount under the relevant L/C issued by the LC bank (Step 1). The public off-taker first, and the Government second, are required to repay the amount drawn and reinstate the L/C at its original value (Step 2). In cases in which the public off-taker and the Government fail to reinstate the L/C at its original value within 12 months of the draw on the L/C, the L/C bank will have recourse to the World Bank under the World Bank guarantee for the outstanding L/C draw amounts and any interest accrued (Step 3). Finally, the Indemnity Agreement to be concluded between the GoU and the World Bank will oblige the GoU to reimburse the World Bank the amount paid out by the World Bank to the L/C-issuing bank under the guarantee (Step 4).

4.It is expected that the current implementation arrangements for the Project will be replicated for other IPP projects under IFC Advisory support in the near term. As power-sector reform in Uzbekistan continues, the institutional and implementation arrangements for future projects may differ from those of the Project. Any such changes will be assessed and included in subsequent guarantee projects.

5.The IPP company will have primary responsibility for the financial management of the IPP project. It will install and maintain adequate FM systems, including systems for accounting, reporting, auditing, and internal controls, and will employ relevantly qualified staff. The annual financial statements will be prepared in accordance with IFRS/IAS. In addition, it will be audited in accordance with ISA. The copy of authorized audit reports will be provided to the World Bank within six months after the end of the relevant reporting period. The financial management-related requirements of the World Bank Policy on Investment Project Financing do not apply to private-sector parties involved in a project supported by a Bank guarantee, such as this one.

6.The World Bank Procurement Regulations for IPF Borrowers do not apply to a project supported by a Bank guarantee, such as this one.

7.The current Uzbek legal framework for public procurement has been adopted in 2018 and has been revised in 2021 and is set out mainly in the following legislation: (a) Public Procurement Law (PPL), (b) Public Procurement Resolution No. 3550, (c) Regulation No. 3016, and (d) Decree of the President No. PP-4544. Before adoption of the PPL, there was no comprehensive regulation providing for thorough governance of public procurement procedures, which resulted in many problems, uncertainties, and abuses. Presently, with an established public procurement policy, the Government aims to eliminate unfair competition and increase the efficiency and transparency of the expenditures of public purchasers through the use of Electronic Government Procurement(e-GP) tools which is very positive development. The PPL and Regulations regulate the procurement of goods, works, and services carried out by any government agency, parastatal body, or any other body or unit established and mandated by the Government to carry out procurement (such entities referred to under the PPL as 'procuring entities') using public funds.

8.The PPL introduces two general categories of public purchasers, as follows: (a) state-budget-financed purchasers and (b) corporate purchasers, which include (i) SOEs; (ii) entities in which more than 50 percent of the shares are held by the state; and (iii) entities in which more than 50 percent of the shares are held by entities with more than 50 percent of the shares held by the state.

9.Among the above categories, the PPL determines a special category of public purchasers, the so-called 'strategic public purchasers', the list of which is approved under Strategic Purchasers Resolution No. 3487 and revised in Decree No. PP-4544. In accordance with the PPL (Article 1), the PPL does not govern procurement carried out by strategic public purchasers. Currently, the list of 'strategic public purchasers' includes NEGU, the "Thermal Power Plants" JSCs, and "Regional Electric Networks" JSC.

10.The Implementation Support Plan described in Table 6 below explains how the World Bank team will supervise and monitor the proposed Project, the Project risks, and the Project indicators. It is also linked to the results identified in the Results Framework. Supervision arrangements will ensure adequate monitoring, evaluation of risks, and escalation to manage the risk of any call on the guarantees.

11.The level of technical support needed includes staff with energy-sector knowledge and expertise, specialized project-based guarantee project expertise (including legal counsel and financial experts), environment and social specialists, and power engineering as well as monitoring and evaluation expertise. The responsibility for this support lies with the energy-sector co-task team leaders and the guarantee-specialist co-task team leader with support from other experts. The main focus in terms of support during implementation is summarized below in Table 6.

Table 11. Implementation Support and Corporate Monitoring Plan

Time	Focus	Skills	Resource Estimate	Partner Role
Months 0–12	Effectiveness, financial closure, selection of L/C bank, environment and social, construction progress, and political developments.	☐ Sector ☐ Guarantee/commercial ☐ Financial ☐ Legal ☐ Environment and Social ☐ Engineering ☐ Country team	US$100,000	n.a.

Time	Focus	Skills	Resource Estimate	Partner Role
Months 12–24	☐ Review of progress in construction and generation by the IPPs ☐ Review of sector technical and financial performance ☐ Review of environment and social compliance ☐ Review of progress of the sector and the IPPs ☐ Review of status of completion against indicators and PDO	☐ Sector ☐ Guarantee/commercial ☐ Financial ☐ Legal ☐ Environment ☐ Social ☐ Monitoring and evaluation	US$50,000	n.a.
Through end of guarantee effectiveness period	Corporate monitoring of legal covenants and risks that could lead to a possible call on any of the signed IBRD guarantees	☐ Sector ☐ Guarantee/commercial ☐ Financial ☐ Legal	US$30,000 per year, including US$20,000 of staff cost and US$10,000 of travel (one trip of two staff per year).	

Table 12. Skills Mix Required

Skills Needed	Number of Staff Weeks (weeks per year)	Number of Trips	Comments
Team leader	3–5	2–3 per year	To be adjusted annually depending on available supervision budget
Energy specialist, co-task team leader	3–5	2–3 per year	
Guarantee specialist, co- task team leader	3–5	2–3 per year	
Energy specialist	3-5	Located in Uzbekistan	
Legal specialist	2–3	Depending on needs	
Financial analyst	1–2	2 per year	
Power engineer	1–2	1 per year	
Social	1–2	2 per year	
Environmental	1–2	Local staff	
Monitoring	1–2	1 per year	

Procurement	1–2	Local staff	
FM	1–2	Local staff	