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Kazakhstan: Opportunities to Accelerate Coal to Clean Power Transition in Kazakhstan

Terms of Reference of Pre-feasibility Study on the Potential for Energy Transition Mechanism Opportunities in the Republic of Kazakhstan

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Asian Development Bank

TERMS OF REFERENCE PRE-FEASIBILITY STUDY ON THE POTENTIAL FOR ENERGY TRANSITION MECHANISM OPPORTUNITIES IN THE REPUBLIC OF KAZAKHSTAN

A. Background

1. The TA will conduct a pre-feasibility study (Pre-FS) aiming to identify opportunities and possible transition mechanisms in Kazakhstan to accelerate the retirement of coal-fired power plants (CFPPs) and combined heat-power plants (CHPPs) and replace them with cleaner energy sources in line with Strategy 2030¹.

2. The Ministry of Energy of Kazakhstan (MOE) requested ADB on country's interest in participation in Energy Transition Mechanism (ETM), and receiving ADB's TA to conduct Pre-FS, sector assessments and gap analysis. The ETM can support the country's goals to: (i) significantly decrease greenhouse gas (GHG) emissions from CFPPs, (ii) achieve its nationally determined contributions under the Paris Agreement, (iii) develop a "just transition" component to ensure a fair transition to a low-carbon society, and (iv) increase the country's share in renewable energy sources (RES) for heat and power production.

3. Around 39% of the world's existing CFPPs currently costs more to continue operating than installing and operating new onshore wind or solar photovoltaic with storage (with 4-hour storage rated at half the renewable generation capacity). This share is expected to increase to as high as 73% by 2025².

4. Kazakhstan is a significant producer and consumer of coal. The country's proven coal reserves are estimated at 25.6 billion tons (eighth in the world). More than 50% of Kazakhstan's primary energy is generated from coal, two-thirds of which is used in the power sector. As of 2021 coal-based generation accounts for 69% of electricity production, followed by natural gas - 20%, hydropower - 8%, and RES – 3%. The energy sector of the country contributes 82.4% of the country's total greenhouse gas (GHG) emissions which are associated with coal-fired power and heat generation produced by the northern energy zone. The northern zone consumes two-thirds of all electricity in Kazakhstan, with only 41% of the country's population concentrated there. Such imbalance in consumption is due to many production facilities in Pavlodar and Karaganda regions which provide 54.3% of the total consumption level.

5. While the early retirement of coal and other high-carbon (captive) power plants might be technically or financially viable, decarbonization efforts need to consider the significant impact on communities dependent on coal and other high-carbon fuel sectors (so-called stranded regions) who will lose jobs and revenues. The government of Kazakhstan will need to ensure that these communities are not left behind in the transition to a low-carbon society³

B. Objective and Scope of Work

1. The TA's objective aims to assist the Government of Kazakhstan (GOK) and other relevant stakeholders with analyzing and assessing the current and future costs of maintaining the existing and planned CFPP and CHPP capacity, in order to initiate the possible phase-out of

¹ ADB. 2018. Strategy 2030: Achieving a Prosperous, Inclusive, Resilient, and Sustainable Asia and the Pacific. Manila.

² Rocky Mountain Institute, Carbon Tracker Initiative and The Sierra Club. 2020. How to Retire Early: *Making Accelerated Coal Phaseout Feasible and Just*.

³ T. Spencer, et al. 2018. The 1.5°C Target and Coal Sector Transition: At the Limits of Societal Feasibility. *Climate Policy*. 18(3), 335–331.

the Kazakhstan's CFPPs and CHPPs generation and substitute it with alternative cleaner energy sources, in a fair, inclusive, and balanced manner.

2. The ETM Pre-FS will assess Kazakhstan's policy and regulatory environment under which CFPPs and CHPPs are operating in order to understand the feasibility of acquiring, retiring, and replacing CFPPs and CHPPs suitable for GOK's consideration under one of the potential ETM modalities. Excepted to be completed **by June 2023**, this assessment will also include a review of: (i) Kazakhstan's prevailing energy policy and planned policy reforms; (ii) existing incentives and subsidies for different power generation technologies; (iii) a high-level view of Kazakhstan's overall generation mix (i.e., operational, in construction, planned); and (iv) an energy demand forecast to determine what role coal, other high- and less-carbon fuels, and renewables would need to play to ensure sustainable energy access and security and within the country's energy mix for mid and long-term perspectives.

3. This ETM Pre-FS will include the development of a "multi-criteria analysis" (MCA) framework that will be used to carry out a high-level screening of Kazakhstan's entire fleet of CFPPs and CHPPs based on financial, contractual, institutional, regulatory, geographical location and market-related aspects for the purpose of identifying and ranking them from high-prospect to low-prospect assets in terms of their potential for accelerated retirement under a suitable ETM modality. This methodology will be delivered for Kazakhstan by **June 2023** based on available secondary information and appropriate assumptions.

4. Based on the results of the high-level screening exercise, a detailed financial analysis of the top-five (5) representative CFPPs and CHPPs will be undertaken under this assessment. Each individual plant analysis will be used to estimate the financial and economic value of a significant share (up to 50%) of Kazakhstan's total CFPP and CHPP fleet suitable for accelerated retirement under some form of ETM modality. This valuation exercise is expected to be completed by **August 2023** and will also include a sensitivity analysis of the key input assumptions that considered to significantly affect that value.

5. The TA will additionally help define the terms of reference (TORs) for a full feasibility study with a larger scope and timeframe, which would later design the structure of a pilot ETM aiming to replace coal and/or other high-carbon power generation with cleaner technologies. While the TORs are expected to be delivered by **September 2023**.

6. The TA will help in capacity building and conduct an extensive capacity building workshop on international practices for accelerated retirement of the CFPP and CHPP fleets for the government agencies, academic institutions, and other stakeholders by **October 2023**.

7. The final report under this ETM Pre-FS should also include: (i) potential ETM opportunities to accelerate the transition from coal-fired and other high-carbon power generation to clean power generation in Kazakhstan; (ii) conduct an analysis on the suitable ETM models within the prevailing legal and regulatory framework of Kazakhstan's energy sector; (iii) conduct a gap analysis and develop a roadmap on targeted GHG emissions reduction for Kazakhstan in the medium- to long-term (including through the early retirement of CFPPs in conjunction with new RE investments to replace the early retired CFPP capacity); and (iv) sound of public and private sector co-financing appetite to seek firm participation commitments to fund ETM structures for Kazakhstan. The final report is expected to be delivered by **October 2023**.

C. Consultant Recruitment and Contract Modality

1. To attain the objective, ADB needs consulting services to be recruited on an intermittent basis through the individual consultant selection method. The envisaged consulting services contracts will be partial lumpsum/output-based and the submission of each deliverable will be

subject to acceptance by ADB (taking in account the expected timeliness and required standard of quality), at ADB's sole discretion.

2. The consultants shall ensure (and cause any associated or subcontracted consultant) to ensure, full compliance with the laws and regulations of Kazakhstan and with ADB's policies. Although required to engage directly with the Ministry of Energy, Ministry of Ecology, and Natural Resources of the Republic of Kazakhstan as well as with other relevant stakeholders, the consultants' duty of care will be directly and solely to ADB.

D. Composition Consultant Team, Terms of Reference and Deliverables

1. The envisaged ETM Pre-FS for Kazakhstan will require the consulting service of a Senior Expert on Energy Policy and Markets (Team Leader) (international, 4.3 person-months); Senior Financial Specialist (international, 4.0 person-months); and National Consultant (3.5 person-months). The consultants are expected to carry out their respective tasks intermittently over 9 months in accordance with the detailed terms of reference (TORs) attached as **Appendices 1, 2 and 3**, respectively. These TORs may be adjusted in consultation with the parties concerned, as deemed necessary.

2. Led by the Team Leader, the consultants are expected to support the design and implementation of the TA, and submit deliverables in a timely manner and at the required standard of quality as follows:

- (i) **Report I:** Inception Report,
- (ii) **Report II:** Report on policy and regulatory assessment of the ETM-financed acquisition, retirement and replacement of CFPPs and CHPPs in Kazakhstan;
- (iii) **Report III:** Report on high-level screening using the MCA framework for Kazakhstan;
- (iv) **Report IV:** Report on (a) detailed financial analyses of the selected top-5 CFPPs and/or CHPPs in Kazakhstan; and (b) estimated financial and economic value of up to 50% of Kazakhstan's CFPP and CHPP fleet suitable for accelerated retirement under some form of ETM modality.
- (v) **Report V:** TORs for a full feasibility study with a larger scope and timeframe to design the structure of a pilot ETM aiming to replace coal and/or other high-carbon power generation with cleaner technologies. The TOR should cover a next key section: Technical Feasibility, Just Transition, Political Economy, Legal and Policy Analysis, Asset Identification and Owner Engagement, Fund Structuring and Capital Raising, Communication;
- (vi) Extensive capacity building **workshop** on international practices for accelerated retirement of the CFPP and CHPP fleets for the government agencies and academic institutions; and
- (vii) **Report VI:** The Final Pre-FS report summarizing the key findings and recommendations of the preceding reports.

3. The Team Leader shall also produce Quarterly Progress Reports within 30 days following each preceding quarter summarizing TA implementation progress and status against scheduled milestones agreed on, as well as on key issues and recommended corrective actions, including any suggested changes to TA implementation, TORs and/or resource requirements. In addition, the consultants shall undertake adequate TA implementation administration, and maintain

updated records relevant to the TA assignment.

E. Location and Budget

4. The international experts' inputs are expected to be rendered from their respective home offices and/or from Kazakhstan during up to two cross-country field trips. The National Consultant will be based on Kazakhstan and may be required to join the international experts during the field trips. The allocated budget for the ETM Pre-FS assignment is \$225,000 for the duration of nine (9) months.

F. Implementation Schedule and Reporting Requirements

5. It is anticipated that the consultants will be mobilized by 31 January 2023, and that the TA assignment will be completed by 31 October 2023. The consultants shall develop an implementation schedule for the TA assignment comprising the level of detail that would be adequate for planning and monitoring purposes. The proposed TA implementation schedule is specified in Table 1 below.

Table 1: TA Implementation Schedule and Reporting Requirements

Milestone	Deliverable(s)	Expected Completion Date	Lumpsum Payment
1. Consultant Team mobilized – Kick-off Meeting / Workshop conducted – Inception Report produced and accepted	a. Consultant Team mobilized	Feb 2023	0% (TL, FS, NC)
	b. Report I: Inception Report <ul style="list-style-type: none"> ○ Draft Report I submitted ○ Kick-off Meeting / Workshop conducted * ○ Final Report I accepted by ADB 	Feb 2023 Mar 2023 Mar 2023	10% (TL, FS, NC)
2. Policy and regulatory assessment of the acquisition, retirement and replacement of CFPPs and CHPPs in Kazakhstan completed / accepted	Report II: Report on policy and regulatory assessment of the acquisition, retirement and replacement of CFPPs and CHPPs in Kazakhstan <ul style="list-style-type: none"> ○ Draft Report II submitted ○ Final Report II accepted by ADB 	May 2023 Jun 2023	10% (TL, FS) 30% (NC)
3. High-level screening using the MCA framework completed	Report III: Report on high-level screening using the MCA framework for Kazakhstan <ul style="list-style-type: none"> ○ Draft Report III submitted ○ Meeting / Workshop on Reports II and III conducted * ○ Final Report III accepted by ADB 	May 2023 Jun 2023 Jul 2023	20% (TL, FS, NC)
4. Financial analyses of the selected top-5 CFPPs and/or CHPPs completed /accepted and financial and economic value of 50% of Kazakhstan's CFPP and CHPP fleet	Report IV: Report on: (a) the detailed financial analyses of the selected top-5 CFPPs and/or CHPPs in Kazakhstan; and (b) the estimated value of Kazakhstan's total CFPP and CHPP fleet retiring up to 50% of the country's fleet, including a sensitivity analysis of the key input		15% (TL) 30% (FS) 10% (NC)

Milestone	Deliverable(s)	Expected Completion Date	Lumpsum Payment
suitable for accelerated retirement estimated / accepted	assumptions that considered to significantly affect that value. <ul style="list-style-type: none"> ○ Draft Report IV submitted ○ Meeting / Workshop on Report IV conducted * ○ Final Report IV accepted by ADB 	Jul 2023 Aug 2023 Aug 2023	
5. TORs for a full feasibility study prepared / accepted	Report V: TORs for a full feasibility study with a larger scope and timeframe to design the structure of a pilot ETM aiming to replace coal and/or other high-carbon power generation with cleaner technologies <ul style="list-style-type: none"> ○ Draft Report V submitted ○ Final Report V accepted by ADB 	Sep 2023 Sep 2023	15% (TL, FS, NC)
6. Extensive capacity building workshop on international practices for accelerated retirement of the CFPP and CHPP fleets for the government agencies and academic institutions	TA's consultants' report, and workshop evaluation report	Oct 2023	
7. Final Pre-FS Report prepared / accepted	Report VI: Final Pre-FS Report summarizing the key findings and recommendations of the preceding reports. <ul style="list-style-type: none"> ○ Draft Report VI submitted ○ Meeting / Workshop on Reports V and VI conducted * ○ Final Report VI accepted by ADB 	Sep 2023 Oct 2023 Oct 2023	30% (TL) 15% (FS, NC)
* Meetings / Workshops are either conducted face-to-face in Astana or virtually (as agreed) ** TL= Senior Expert on Energy Policy and Markets [Team Leader] FS= Financial Specialist NC= National Consultant			100%

APPENDIX 1: TERMS OF REFERENCE

Senior Expert on Energy Policy and Markets (Team Leader)

A. Consultant Profile

1. The profile of the Senior Expert on Energy Policy and Markets (Team Leader) is as follows:
 - (i) Selection: Individual Consultant Selection
 - (ii) Selection Title: Opportunities to Accelerate the Transition from Coal-Fired and/or other High-Carbon Power Generation to Clean Power Generation in Kazakhstan
 - (iii) Source: International
 - (iv) Consultant Name: Senior Expert on Energy Policy and Markets (Team Leader)
 - (v) Expertise: Energy Policy and Markets
 - (vi) Engagement: 4.3 person-months intermittently over nine (9) months
 - (vii) Expertise Group: Engineering

B. Tasks and Deliverables

2. The Senior Expert on Energy Policy and Markets (Team Leader) will lead the ETM Pre-FS consulting team and oversee the structure and preparation of all deliverables making part of the ETM Pre-FS, and guide and oversee the Senior Financial Specialist and National Consultant in carrying out the designated activities and tasks in their respective areas of expertise. A Team Leader will be also responsible for the quality of the reports submitted and ensure proper coordination between two other consultants. He may also require input data from the National Consultant and Financial Expert which will be used in the final assessments and pre-FS report.
3. **Detailed tasks.** The tasks of the Senior Expert on Energy Policy and Markets (Team Leader) will include, but not be limited to:
 - (i) lead the Consultants, including during in-country face-to-face or virtual meetings / workshops (as required) with relevant government officials and other stakeholder counterparts;
 - (ii) coordinate with ADB and relevant government officials and other stakeholder counterparts;
 - (iii) establish the MCA framework;
 - (iv) define the scope of the National Consultant on the policy and regulatory assessments, and then oversee the work to ensure they are within the scope;
 - (v) guide the Senior Financial Specialist in carrying out the financial analyses, data gathering and evaluation process during financial analyses;
 - (vi) oversee the structuring and writing of all deliverables / reports, including the Final Pre-FS Report, and submitting all (draft) deliverables to ADB, including those produced by other consultants;
 - (vii) define and structure the TORs and scope for a full pilot ETM Feasibility Study;
 - (viii) present the Consultants' findings and recommendations to relevant government officials and other stakeholder counterparts as part of the dissemination of the

agreed TA outputs during in-country face-to-face or virtual meetings / workshops (as required); and

- (ix) carry out any other tasks that may reasonably be requested in relation to the TA assignment.

C. Minimum Qualification Requirements

4. The Senior Expert on Energy Policy and Markets (Team Leader) will have relevant international work experience in the energy sector, with a focus on thermal generation, power systems planning, operations of coal-power plants, and utility management as follows:

- (i) minimum general experience: 20 Years
- (ii) minimum specific experience (relevant to assignment): 20 Years
- (iii) Relevant experience in Central & West or South Asia (Kazakhstan): preferable

APPENDIX 2: TERMS OF REFERENCE

Senior Financial Specialist

A. Consultant Profile

1. The profile of the Senior Financial Specialist is as follows:
 - (i) Selection: Individual Consultant Selection
 - (ii) Selection Title: Opportunities to Accelerate the Transition from Coal-Fired and/or other High-Carbon Power Generation to Clean Power Generation in Kazakhstan
 - (iii) Source: International
 - (iv) Consultant Name: Senior Finance Specialist
 - (v) Expertise: Finance
 - (vi) Engagement: 4.0 person-months intermittently over nine (9) months
 - (vii) Expertise Group: Finance and Investment

B. Tasks and Deliverables

2. The Senior Financial Specialist will contribute financial and other relevant information to the high-level screening of Kazakhstan's full CFPP and CHPP fleet and undertake detailed cost analyses of the selected top five (5) CFPPs and/or CHPPs in Kazakhstan.
3. **Detailed Tasks.** The tasks of the Senior Finance Specialist will include, but not be limited to:
 - (i) advise on defining the MCA methodology for the high-level screening to identify and rank the CFPPs and CHPPs in Kazakhstan;
 - (ii) provide (primarily financial) inputs for carrying out the high-level screening to identify and rank the CFPPs and CHPPs in Kazakhstan;
 - (iii) develop a financial model to carry out the detailed financial analysis of the selected top 5 CFPPs and/or CHPPs;
 - (iv) gather data for the modelling, such as heat rates, subsidies, operations and maintenance costs, fuel pricing strategies and power purchase agreement terms; or develop appropriate assumptions/use secondary data where primary data are not available;
 - (v) carry out financial analysis of two of the selected top five CFPPs and/or CHPPs , and estimate, based on various scenarios and assumptions, the "retirement value" of each of the analyzed assets;
 - (vi) estimate the economic and financial value of up to 50% of Kazakhstan's entire fleet of CFPPs and/or CHPPs suitable for accelerated retirement under some form of ETM modality;
 - (vii) lead the structuring and writing of all reports that summarize the financial analyses performed;
 - (viii) review and providing inputs into the TORs for the full ETM Feasibility Study and the other deliverables under this assignment, including the Final ETM Pre-FS Report;
 - (ix) participate in-country face-to-face or virtual meetings / workshops (as required), present the Consultants' findings and recommendations to relevant government and

other stakeholder counterparts as part of the dissemination of the agreed TA outputs; and

- (x) carry out any other tasks that may reasonably be requested in relation to the TA assignment.

C. Minimum Qualification Requirements

10. The Senior Financial Specialist will have relevant international work experience in the energy sector, with a focus on thermal generation, power systems planning, operations of coal-power plants, and utility management as follows:

- (i) minimum general experience: 10 Years
- (ii) minimum specific experience (relevant to assignment): 10 Years
- (iii) relevant experience in Central & West or South Asia (Kazakhstan): preferable

APPENDIX 3: TERMS OF REFERENCE

National Consultant

A. Consultant Profile

1. The profile of the National Consultant is as follows:
 - (i) Selection: Individual Consultant Selection
 - (ii) Selection Title: Opportunities to Accelerate the Transition from Coal-Fired and/or other High-Carbon Power Generation to Clean Power Generation in Kazakhstan
 - (iii) Source: National
 - (iv) Consultant Name: National Consultant, C5
 - (v) Expertise: Engineering involved in Policy, legal and regulatory development

 - (vi) Engagement: 3.5 person-months intermittently over nine (9) months
 - (vii) Expertise Group: Engineering

B. Tasks and Deliverables

2. The National Consultant will lead the policy and regulatory assessment in Kazakhstan and ensure that all the other analyses are based on the best available data and/or appropriate local assumptions. The National Consultant can use local services for survey and data collection when additional data and surveys are not available in the necessary format for analysis and recommendation.

3. **Detailed tasks.** The tasks of the National Consultant will include, but not be limited to:
 - (i) advise on defining the MCA methodology for the high-level screening to identify and rank power plants in Kazakhstan.
 - (ii) provide inputs (primarily market-related) for carrying out the high-level screening to identify and rank the power plants by collecting and preparing the input market data for the financial and technical analysis;
 - (iii) statistical data analysis to eliminate unreliable data using special software
 - (iv) carry out policy and regulatory assessments related to the feasibility of acquiring, retiring, and replacing CHPs and/or other CHPPs; and review Kazakhstan's energy policy, overall generation mix and forecast for energy demand;
 - (v) support the collection of relevant data for the detailed financial analyses, and test the assumptions made by the other consultants;
 - (vi) review and providing inputs to the TOR for the full ETM feasibility study;
 - (vii) arrange and participate in in-country face-to-face or virtual meetings / workshops (as required), present the Consultants' findings and recommendations to relevant government and other stakeholder counterparts as part of the dissemination of the agreed TA outputs; and
 - (viii) carry out any other tasks that may reasonably be requested in relation the TA assignment.

C. Minimum Qualification Requirements

5. The National Consultant will have at least 10 years of relevant work experience in conducting policy, legal and regulatory assessments in Kazakhstan:

- (i) minimum general experience: 10 Years
- (ii) minimum specific experience (relevant to assignment): 5 Years
- (iii) relevant experience in Kazakhstan's energy sector: Preferable