**[2021**

Terms of reference for hiring a Consultant to prepare feasibility study

Project: “***Feasibility Study on the Establishment of the ECO Regional Electricity Market” (ECO-REM)***

EME, ECO secretariat, 2021

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# Acronyms and abbreviations

|  |  |
| --- | --- |
| ECO REM- ECO Regional Electricity Market | ECO-Economic Cooperation Organization |
| RPC – Regional Planning Council of ECO | CPR – Council of Permanent Representatives of ECO |
| IsDB – Islamic Development Bank | ETDB – ECO Trade and Development Bank |
| EGM – Expert Group Meeting | FGPF - Feasibility and General Purpose Fund of ECO |
| kWh-kilowatt hours | CASA 1000- Central Asian and South Asian power project |
| NESPAK- National Engineering Services of Pakistan |  |

# Background and Rationale of the Project

## Background

To address the issues relating to the regional electricity market, ECO has undertaken some specific initiatives. In November 2013, the **First Experts Group Meeting (EGM) on the Establishment of the ECO Regional Electricity Market** was organized. The representatives from the Republic of Azerbaijan, Islamic Republic of Iran, Kyrgyz Republic, Islamic Republic of Pakistan, Republic of Tajikistan and Republic of Turkey, as well as the representative of Nord Pool Spot, ECO-CCI and international and regional financial organizations like the IsDB and ETDB took part in it. The Meeting has produced the following main outcomes and recommendations:

Proposal of the Islamic Republic of Iran to establish the ECO regional electricity market as a pilot project was initially to start with participation of Iran and Turkey. Further, other interested ECO Member States agreed to join the project to gain maximum of benefits;

Hiring of local Consultants from Iran and Turkey under the supervision of International Consultant for the purposes of preparing the feasibility study with the objective of harmonizing and merging electricity markets has been agreed on. Also, financial and technical support of interested international financial institutions/donors has been sought.

2. **Notable achievements** have been reached since the inception of the First EGM on "Establishment of the ECO Regional Electricity Market". These came in the following succession:

ECO Secretariat was engaged in bilateral consultations with Iran and Turkey;

**The First Iran-Turkey Bilateral Meeting on ECO Regional Electricity Market** was held on 25-26 September 2014 in Ankara (Turkey). The Meeting agreed to continue regular consultations at expert/manager levels within the existing framework, as well as, through new dialoguing platforms to be introduced by the ECO Secretariat;

**The Second Iran-Turkey Bilateral Meeting on ECO Regional Electricity Market** was held on 10-11 May 2016 in Shiraz (Iran). The main recommendations of the Meeting were:

* To define criteria and guidelines for hiring the three (3) consultants (2 local and one international) to prepare the Feasibility Study for establishment of ECO REM;
* To obtain the approval of the ECO Council of Permanent Representatives (CPR) for funding the project from the ECO Feasibility and General Purpose Fund (FGPF) with the possibility of Iran and Turkey providing additional seed funding for hiring local consultants.

**The Third EGM Meeting was held on May 31, 2021 virtually**. The main outcomes have been, as follows:

* The current situation in the electricity trade, transmission and interconnections between both countries (Turkey and Iran) was updated and reviewed, accordingly.
* Azerbaijan, as a special guest, elaborated on the cooperation with the two project countries in regard of the electricity production, transmission and electricity trade exchange.
* Update and further review of the Terms of reference (ToR) against the passage of time, notably, the 5 year-period have been undertaken agreeing that a Meeting for finalizing the ToR should push through.

## Rationale of the project:

**Resources**: ECO, given its rich natural resources’ endowment especially of energy resources reserves and, fast growing demand for energy spurred by the demand-supply gaps, currently faces a risk that such gaps will further widen. To mitigate such risk, Exports of energy-related commodities must be well-balanced by Imports. The enhancement of national energy security issues is another concern. The latter largely depends on a whole range of complex factors, including but not limited to the diversification of energy sources & forms as well as cost- efficiency of supplies.

**Advantages**: The advantageous geographic location of the ECO Region, which is at crossroads between emerging Eurasian and advanced European electricity markets, presents a yet untouched economic opportunity. Cross-border energy trade exchange and transmission of electric currents via networks at regional and interregional levels can be significantly augmented. From this perspective, forward-looking activities are being undertaken in ECO Member States. Yet again, more needs to be done for expanding intra-Trade in energies and improving selected physical infrastructures. For that, the subject project is a tool.

**Interconnectedness among the ECO countries’ electricity grids**: The increasing dynamism in the advancing the cross-border trading patterns in the ECO Region demonstrates that the Member States are bilaterally benefiting from the opportunities offered on Trade and Investment for electric power. The data listed below (Table 1) describes the existing interconnections among the power systems of Member States as follows:

**Table 1: Interconnectedness among ECO Member States' electricity networks**

|  |  |
| --- | --- |
| **No.** | **Interconnections among power systems of ECO Member States** |
| 1. | Afghanistan imports electricity from Iran (by 132&20kV), Tajikistan (by 220, 110&10kV), Turkmenistan (by 220, 110&10kV) and Uzbekistan (by 220&10kV) lines. |
| 2. | Azerbaijan is interconnected with Iran (by 330, 230&132kV) lines for exchange & transit, with Turkey (by 154&34,5kV) lines for exchange of electricity. |
| 3. | Iran is interconnected with Afghanistan (by 132&20kV) and Pakistan (by 132&20kV) lines for export, with Turkey (by 400&154kV) lines for export, with Turkmenistan (by 230kV) line for import of electricity. |
| 4. | Kazakhstan is interconnected with Kyrgyzstan (by 500&220kV) and Uzbekistan (by 500&220kV) lines for exchange & transit of electricity. |
| 5. | Kyrgyzstan is interconnected with Kazakhstan (by 500&220kV), Uzbekistan (by 500kV) and Tajikistan (by 110&35kV) lines for exchange & transit of electricity. |
| 6. | Pakistan imports electricity from Iran (by 132&20 kV) lines. |
| 7. | Tajikistan exports electricity to Afghanistan (by 220, 110&10kV) lines and also interconnected with Kyrgyzstan (by 110&35kV) lines for exchange & transit of electricity. |
| 8. | Turkey is interconnected with Azerbaijan (by 154&34,5kV) lines for exchange and with Iran (by 400&154kV) lines for import of electricity. |
| 9. | Turkmenistan exports electricity to Afghanistan (by 220, 110&10kV) and is interconnected with Iran (by 230kV) line for export and with Uzbekistan (by 500&220kV) lines for exchange & transit. |
| 10. | Uzbekistan exports electricity to Afghanistan (by 220&10kV) lines and interconnected with Kazakhstan (by 500&220kV), Kyrgyzstan (by 500kV) and Turkmenistan (by 500&220kV) lines for exchange & transit of electricity. |

In sum, the above-identified individual countries’ factors indicate at how tight, but, each in its own separate way interconnected the ECO member countries are at present. And that, forms one of the core rationales of the subject project. Thus, the project will focus on the exploring of the effective ways of creating the ECO regional electricity market based on the current interconnectedness among the ECO countries’ national electric systems. It will then work out concrete solutions of how the above-shown fragmented factors could be integrated through a complementary mechanism, which will be developed under the subject project.

**Bilateral trade of countries in electricity**: The presently practiced mode of the bilateral trade among the ECO countries represents the "island mode". In such a mode, only part of the national electricity system of one country (typically, a net importer) is synchronized with that of a net exporter, but disconnected from within the national electric grid. In this context, the operations of national electric grids of only some of the Central Asian states, notably, Kazakhstan, Kyrgyz Republic, and Uzbekistan are synchronized. The bilateral electricity trade exchange is typically undertaken through short-term arrangements, rarely involving more than two countries. If the ECO countries were to utilize the full regional electricity trade potential, the bilateral trading arrangements should be multilateral, longer-term thus sustainable but technically and institutionally more complex requiring that multilateral trade transactions be supported by a reliable platform. In that regard, the subject project will explore the technical, economic, financial environmental and social aspects of the electric power trade exchange among the countries in the ECO region.

**Prevailing trends in the ECO electric power sector**: Over the two decades, the two major trends, notably, the “Regionalization” and “Liberalization” have led to certain ‘transformations’ in world’s electric power sectors. In the ECO region, a number of the ongoing and accomplished regional initiatives now aim to re-allocate and re-direct the surpluses in electricity. Practical evidences of the process of the Regionalization of electricity markets have been observed, of late. One such practical transformation project is CASA-1000 (2016). It connects the Central Asia with South Asia through national electricity grids. Among the ECO countries, Afghanistan, Kyrgyz Republic, Pakistan, and Tajikistan have been involved in the development of electricity under the CASA-1000 project’s framework. While having the best of the examples of this project to follow, the ECO member countries may benefit from the “complementarity” effects of this project entailing from its collective generation of hydropower. The subject project may wish to explore the substance and variable forms of such complementarities.

**ECO Regional Electricity Platform**: The regional cooperation requires long-term commitments and considerable investments in connectivities among electricity network infrastructures of ECO member countries. It largely depends on: (i) the project's commercial attractiveness and (ii) the level playing field of electricity markets in the region. This type of cooperation will eventually enhance the economic efficiency from use of cross-border transmission capacities of national electricity grids (seasonal/daily) and, will help reap financial gains in the form of earnings from electricity trade exchange. That will enable the complementarity of domestic electric power generating capacities, which may well contribute to the balancing of seasonal inconsistencies on supply-demand side. In the meantime, the re-distribution of excessive electric power currents that are generated by national electric grids across ECO region may be complemented with more cost-effective investment arrangements, which should support new capacities in the involved countries. The attractiveness of the ECO Regional Electricity Platform will grow, if the latter can provide connectivity to the two major power markets: of the EU power markets and of the emerging Eurasian regional electricity markets.

**Regional electricity trade exchange**: such trade can be strengthened via increases in intra-regional electricity trade in Central Asia, where an interconnected grid already exists but still needs to be adjusted to ensure balanced supplies of electricity; also the security of supplies is an issue. By strengthening the Central Asian power links with those of Iran, Azerbaijan and Turkey, the benefits of a much larger integrated power system can be available from within the ECO region itself. For that, the subject feasibility study is a critical tool to lay down firm groundwork. Another important advantageous element in interconnecting the power systems of the ECO Member States is the available capacities for ECO regional power exchange. Such potentials are vested in the two-way exchange mode of electric power among the ECO Member States instead of the currently practiced one-way mode, which is for Export, only.

**Building better from past experiences**: the interconnection and parallel functioning of the ECO Power Systems remain the core objectives of the ECO regional energy sector. To realize these objectives, the “Feasibility study on the Interconnection of the ECO Power Systems” was started in 2005 under consultancy of National Engineering Services of Pakistan (NESPAK). That project was funded by the Islamic Development Bank (IsDB). However, due to the lack of satisfactory progress, the IsDB, upon notice of the ECO Secretariat, terminated the project in December 2008. Further, the ECO Member States have stated their willingness to re-start that same interconnection project. In that context, the Secretariat is currently seeking a funding source for a revival of the previous project. If reactivated, that will also contribute to the establishment of the “ECO Regional Electricity Market” (hereinafter referred as “ECO REM”).

**Market-driven roles of ECO countries**: the current state of electricity demand- and- supply in the ECO Region is characterized along the main three (3) groups in which each of ECO bear the features of their prevailing market orientations as either net exporter or net importer or a transit state. Table 2 below reflects market orientations of the ECO regional countries in their capacities of electricity market players:

**Table 2: Exporter/Importers of electricity in the ECO region**

|  |  |
| --- | --- |
| **No.** | **Market orientations of market involved ECO countries in energy trade exchange** |
| 1. | Afghanistan is an importing and transit country and has existing interconnections with Iran, Turkmenistan, Uzbekistan and Tajikistan; |
| 2. | Azerbaijan, Kazakhstan and Uzbekistan are exporting countries with fossil-fuel fed power generation; |
| 3. | Azerbaijan, Kazakhstan and Uzbekistan are exporting countries with fossil-fuel fed power generation; |
| 4. | Iran and Turkey are both importing and exporting countries; |
| 5. | Pakistan is an importing country with rapidly growing demand; |
| 6. | Tajikistan and Kyrgyzstan are exporting countries with hydropower based generation; |
| 7. | Turkmenistan is an exporting (mainly oriented to Iran) and transit country. |

*Previous research*: a certain research vacuum does exist in the regional comprehensive analytical studies that present well-quantified and fully-evaluated potentials of the ECO countries for the ECO regional electricity trade exchange. The detailed cost-estimates of transnational physical infrastructures and thorough investigations of non-physical barriers to the ECO regional cooperation are needed. From that stance, the subject feasibility study will effectively fill the vacuum and define future non-researched areas in the ECO electricity market development.

# Goals

The project will pursue the following goals:

(i) ECO REM established, (ii) regional interconnectedness among ECO countries electric grids improved; (iii) trade exchange in electricity and related products increased.

# Objectives

The key objectives of the subject feasibility study are to:

1. Explore the prerequisites and existing conditions in the ECO Region for establishing ECO REM through harmonizing and merging the electricity markets of Iran and Turkey with the view of further expanding it to other ECO Member States through, inter alia, rigorous assessments and analyses under the subject project;
2. Advise ECO Member States on the optimal solutions to increase electricity trading via forming relevant trading arrangements, capacity building, and enabling frameworks, institutional enhancements, improving policy and regulatory environment;
3. Determine the line routing, control scheme, project cost, implementation plan, functional specifications, operations and maintenance plan and related risks.

The information and recommendations of the feasibility study should be of practical value, providing the policy makers at the ECO regional level, as well as at the ECO Member States’ national levels, a firm basis for both, the decision-making in regard of ECO region-wide initiatives and negotiating the specific trading and investment arrangements.

# Technical, Economic, Financial, Commercial, Social and Environmental Feasibility Analysis

## Technical survey

The study will analyze the current state of affairs in ECO countries’ electricity grids and develop a clear roadmap for establishing the ECO REM. For that, the project will fulfill the technical, economic/financial and environmental/social multiple criteria analyses with the view of fulfilling the objectives as set forth for the project.

The Consultant, to be hired for the purposes of the project, will thoroughly analyze alternative ECO regional electricity markets and their pertinent characteristic features (technical, commercial, organizational, institutional, regulatory and other as deemed relevant). The study should contain an in-depth survey of the workable evolutions of the electricity markets. Such options may step from the simpler solutions (ex. bilateral cross-border trade between Iran and Turkey) toward more integrated multi-player markets. Based on such survey, the Consultant will suggest most appropriate arrangements for the regional electricity trade exchange within the ECO Region and present forecasts of the latter’s progressive evolution.

## Economic and financial

The economic component of the project will envisage the analyses of investments required for the establishment of ECO REM. The project will also identify the costs of reinforcements in the interconnection lines and domestic electricity systems in order to ensure reliable energy exchanges and transits in all involved power systems.

The study will further estimate the feasibility of power exchanges and transits through the ECO Member States' power systems.

The study shall embrace technical, and economical/financial evaluations of alternative electricity markets with different power trading capacities, voltage levels and Alternative Current/Direct Current (AC/DC). Alternatives shall be ranked on technical and economic merits. At least two short-listed highest ranking alternatives shall be investigated in full detail and the design parameters of their elements shall be quantified. The final selected alternatives shall be supported by more detailed studies, including project packaging, implementation schedule, investment programme and draft agreements/arrangements on electricity trade exchange.

## Analysis of Social and Environmental and Risk-related factors

Almost all factors that are of the environmental nature pose serious social threats as they directly affect lives and wellbeing of people. Among the social factors influencing the implementation of the project is the project’s future impact on the project social coverage area. For the reason that the subject project is happening at the time of covid19-caused pandemic, the impact of this natural and socio-epidemiological cause on the people of the ECO region is direct. To that effect, the spillover effects of the global pandemic will be taken into account by project by detailing the latter’s environmental and social impacts on the project.

In terms of the social benefits to the project’s beneficiaries, such social benefits will be analyzed under the assumption of non-materialized risks associated with the development of the ECO regional electricity market. Given that most risks do not materialize in the life span of most of projects, the expected benefits, under the scenario of the non-realization of social and environmental risks under this project, will be described at full length.

In specific terms, the increases of the per capita income (in the part of contributions to come from the integration of the ECO electricity market) will be analyzed and the resulting forecast scenarios will be provided in regard of each of ECO countries.

Under this project, there exists a set of risk factors that the feasibility study should explore. The main critical ones have been reflected in Table 3. The 16 risk factors which, if realized should be met by adequate measures determined in advance have been suggested for the purposes of this project’s risk analysis. The project will detail each such factor and develop the risk mitigation plans for: (i) environmental factors, (ii) social factors and (iii) risks specifically related to electric power systems.

In terms of the policy safeguard for project’s risks, although ECO has no specific safeguard policy in this regard, the subject feasibility study will conduct the overall risk assessment in line with commonly practiced project management risk assessment methodologies.

**Table 3: Assessment of environmental, social and risk factors of the project**

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **Potential risks** | **No.** | **Potential risks** |
| **1.** | Uncertainties in Environmental and Social impact; | **9.** | Developments affecting the project (e.g., construction of an upstream hydropower plant in case of hydropower); |
| **2.** | Fuel supply risks (or hydrology risk for hydropower plants); | **10.** | Other legal, regulatory, and policy risks (e.g. labor laws, electricity market structure and regulation, natural resource laws, commercial laws etc); |
| **3.** | Actual demand (demand/market risks); | **11.** | Risks same or of similar nature as for projects of an individual country; |
| **4.** | Security of transit; | **12.** | International projects may introduce new risks or give a different dimension to the shared ones. |
| **5.** | Price and payments; | **13.** | Availability of electricity (supply risk); |
| **6.** | Exchange rate; | **14.** | Disruptions in financing; |
| **7.** | Profit repatriation; | **15.** | Access to the facilities (production, transmission); |
| **8.** | Construction risks (costs overruns, completion schedule, technology risks); | **16.** | Political risk |

In applying the risk mitigation methodologies, the study will describe how risks are managed, identified, assessed, allocated, and mitigated in international electricity trade projects; how the associated contractual and institutional framework documents are designed as a function of the trading arrangements *between* and *within* the electricity markets; and how the projects are structured to mitigate the risks. The study will also bring insights to the main elements of project’s arrangements and associated contractual and framework documents. The study will address all important risks, with a particular focus on those that are specific to international electricity investment and trade projects, bilateral and multilateral. The study will recommend future options for structuring international electricity projects in the ECO Region.

Also, under this section of subject feasibility study, the outline typical set of legal documents for an international investment project in the electricity sector will be defined. That will include (concession agreements between the governments and developers; transit agreement; shareholder agreements between shareholders; power purchase agreements; operating agreements; guarantee agreements; construction contracts). The latter list is not exhaustive and depends on the overall framework for trade - bilateral or multilateral, or in a more integrated regional market, with or without an intergovernmental framework agreement.

# Resources (Inputs) required, procurement and scheduling

## Project financing/funding

This section presents the inputs to the implementation of the project. In specific terms, the study will examine the role of the public and private sectors. It will recommend on workable options for public- private partnerships (PPPs) in promoting regional electricity trade and ensuring investment. It will describe the entire process of investing in the ECO REM, starting from creating appropriate enabling environment to implementing the project, and how the PPPs could stimulate trade in electricity through sharing of benefits and risks. The elements of such partnerships could include intergovernmental framework agreements with appropriate institutional arrangements, which would enable private sectors to finance investment projects and enter into commercial contracts. The governments will play a significant role, particularly in such aspects as the mitigating of the project’s environmental and social impacts, guaranteeing performance of national utilities or national regulation, providing concession for development of a resource.

*Options of financing the establishment of the ECO regional electricity market*. The task of the establishment of ECO REM is challenging. Financial support from international financial institutions is essential to undertake this complex and ambitious multinational project. The study will describe most workable options of financing the establishment of the ECO regional electricity market project. In will identify project commitments of prospective partners of the project. It will assign roles and responsibilities among the various partners of the project. The mode of financing will be particularly described in detail. Examples of such financing will include the PPP project financing scheme, including creation of a special purpose vehicle (SPV).

International experience. Development of interconnections of large electric power systems is a global phenomenon with varying differences across regions. New and prospective interconnections developed elsewhere in world are the evidences of economic benefits for all trading partners. In the latter terms, the study will recommend on the best internationally proven practices of the regional electricity markets with direct pertinence to the ECO Region.

The project will be implemented based on the following major inputs:

**Project input data**

**A. Data collection based on questionnaires to be developed by Consultant**

Technical, economic, financial, social, environmental and risk-related parameters of the subject project will be captured through the input items of questionnaires The data will be collected in close coordination with Focal Points to be assigned by Member States for the project or upon counsel of Members of the EGM on the Establishment of the ECO REM. The project does not envisage fees for local national consultants as the Consultant will form his/her team and render the latters’ services for the subject project. The reason for not accounting for local national consultants’ fees is that in ECO practices those were mainly for the per diem and daily subsistence allowances paid for participation of local national consultants in the project related events.

**B. Processing, analyzing and display of project inputs from Member States**

All collected data from Member States will processed, analyzed and displayed in the body of the Feasibility study report as annexes.

**C. Project related events:** As input of the Secretariat, the project related events, including inception meeting of project team, EGM meetings, validation meeting will be arranged by effort of the project team at ECO Secretariat side, i.e. Directorate for Energy, Minerals and Environment.

**D.** **Printing, publishing, display** of the project’s final products will be done by inputted effort of the ECO Secretariat.

Based on the objectives set forth for the subject project, the efforts of Consultancy Service and of the ECO Secretarial project team have been reflected in the Input-Output table of the project as follows:

|  |  |  |
| --- | --- | --- |
|  | **Input-Output Table of Project Milestones** |  |
|  | **Input** | **Output** |
| 1 | Analyzing current status of interconnectedness among the ECO countries. | Analytical map of ECO countries' power systems' interconnectedness. |
| 2 | Preparing analysis of existing conditions in the ECO Region for establishing ECO REM and identify the prerequisites for establishing ECO REM. | Sensitivity analysis of the establishment of the ECO REM. |
| 3 | Analyzing regulatory frameworks of ECO countries enabling harmonization of regulations to establish ECO REM. | Modality on harmonization processes for purposes of establishing the ECO REM. |
| 4 | Developing optimal solution ensuring the increases of electricity trade flows via forming relevant trading arrangements using the ECO regional electricity platform. | Road Map of the ECO REM. |
| 5 | Developing optimal solution ensuring the increases of electricity trade flows via effective institutional capacity building in the ECO member countries. |
| 6 | Developing optimal solution ensuring the increases of electricity trade flows via creating the enabling environment frameworks: (i) institutional enhancements and (ii) improving policy and regulatory environment. |
| 7 | Determining the line routings of the ECO Regional Platform of the ECO REM. | Framework of the ECO Regional Platform of ECO-REM. |
| 8 | Preparing analyses of PPP project financing models suitable for the ECO REM and recommending on most optimal project financing model. | Project finance model of the ECO-REM. |
| 9 | Conducting the technical survey of systemic parameters of ECO countries' national electric grids and preparing the analytical report on the survey results for establishing ECO REM. | Technical survey of the establishment of the ECO-REM. |
| 10 | Consolidating project's analysis and modeling the optimal operations design of the ECO Regional Platform. | Modality/Statute of the ECO Regional Platform of ECO-REM. |
| 11 | Consolidating project's analysis and modeling the optimal regulatory and institutional design framework of the ECO Regional Platform. | Operations' Manual/Guidelines of ECO-REM. |

Figure 1: Project’s Input-Output Table

**Presenting the results.** The results of the project will be presented for validation. All data, analytical materials, visuals and analytical maps, configurations of the design works will be presented. These will be then available via ECO website.

The Directorate of Energy, Minerals and Environment (EME) will coordinate the Consultancy Service in close collaboration with Project Management Section (PMS). National Focal Points of ECO Member States assigned by their respective authorities on Energy, Minerals in particular, may interact with Consultant on matters relating to data and information pertinent to the electricity subsector. Consultant will create online interactive linkages as convenient for contacts in the framework of execution of the ToR and deactivate those within 3 months after the present ToR be fulfilled. The implementation arrangements are summarized in table below.

**Table 4. Consultancy Service Implementation Arrangements**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***No.*** | **Items** | **Arrangements** | **Period** | **Cost (US$)** |
| *1.* | Indicative implementation | Consultancy Service Work Plan |  |  |
| *2.* | Project Executing Agency | ECO Secretariat (Project Coordinator: EME Director) |  |  |
| *3.* | Project Implementing Agency |  |  |  |
| *4.* | Project Participating Countries | ECO Member States |  |  |
| *5.* | Consultant | Consultant will be hired as per Functional Methodology of ECO (1998).  Name of Expert Consultant:  Address: | 6 person-months |  |
| *6.* |  | Selection of Consultant will be though public hire. |  |  |
| *7.* | Consultancy Service Fees | Payments will be effected in installments by Chief Accountant’s Office. |  | 50,000 |

# Outputs to be produced and their financial and economic value

Consultancy Service will take the ECO-adopted approach toward the realization of the ECO’s goals in energy sector, notably, subsector of electricity. Such approaches are aimed at promoting and use of high-level technology methodologies, novel knowledge products and integrated solutions in fulfilling feasibility study on ECO-REM. Consultant will be shouldered by the enabling policies under *ECO Vision 2025* in support of Sustainable Development Goals under the project. In this regard, relevant provisions of *ECO Vision 2025* will guide in policy work. Consultancy Service will see to the opportunities for involving in the project (as its co-partners that will be involved in establishing ECO-REM) the public-private sector entities (as envisaged in the Dushanbe and in Antalya Communiqués). This measure will help maximize on SDGs in regard of energy.

The delivery of outputs on the project titled “Feasibility study on the establishment of the ECO Regional Electricity Market” (ECO-REM) has been reflected in their entirety in Table 5.

**Table 5. Time schedule of delivery of study outputs**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| No. | **Project Activity** | **Sep-21** | **Oct-21** | **Nov-21** | **Dec-21** | **Jan-22** | **Feb-22** |
| 1 | Analyzing current status of interconnectedness among the ECO countries. |  |  |  |  |  |  |
| 2 | Reviewing of lessons learnt from previous project "Feasibility study on interconnection of ECO power systems" (2006-2008). |  |  |  |  |  |  |
| 3 | Arranging in close coordination of the ECO Secretariat the Inception meeting on the project with participation of Focal Points for project. |  |  |  |  |  |  |
| 4 | Developing questionnaires and analyzing the inputs from ECO member countries. |  |  |  |  |  |  |
| 5 | Preparing marketing analyses of electricity trade exchanges among the ECO member countries. |  |  |  |  |  |  |
| 6 | Preparing analysis of existing conditions in the ECO Region for establishing ECO REM and identify the prerequisites for establishing ECO REM. |  |  |  |  |  |  |
| 7 | Analyzing regulatory frameworks of ECO countries enabling harmonization of regulations to establish ECO REM. |  |  |  |  |  |  |
| 8 | Modeling of electricity trade transactions via the ECO regional electricity platform under the two countries' scenario (Turkey and Iran). |  |  |  |  |  |  |
| 9 | Modeling the electricity trade transactions via ECO regional electricity platform under the ECO ten countries' scenario. |  |  |  |  |  |  |
| 10 | Developing optimal solution ensuring the increases of electricity trade flows via forming relevant trading arrangements using the ECO regional electricity platform. |  |  |  |  |  |  |
| 11 | Developing optimal solution ensuring the increases of electricity trade flows via effective institutional capacity building in the ECO member countries. |  |  |  |  |  |  |
| 12 | Developing optimal solution ensuring the increases of electricity trade flows via creating the enabling environment frameworks: (i) institutional enhancements and (ii) improving policy and regulatory environment. |  |  |  |  |  |  |
| 13 | Determining the line routings of the ECO Regional Platform of the ECO REM. |  |  |  |  |  |  |
| 14 | Determining the control scheme of processes of establishing the ECO REM. |  |  |  |  |  |  |
| 15 | Preparing comparative analysis of international practices of establishing regional electricity markets. |  |  |  |  |  |  |
| 16 | Preparing analyses of PPP project financing models suitable for the ECO REM and recommending on most optimal project financing model. |  |  |  |  |  |  |
| 17 | Determining the project commitments and funding plan of the establishment of the ECO REM. |  |  |  |  |  |  |
| 18 | Preparing the detailed project budget and project implementation plan of the establishment of the ECO REM. |  |  |  |  |  |  |
| 19 | Fulfilling risk analysis and drawing the risk mitigation plan of the establishment of the ECO REM. |  |  |  |  |  |  |
| 20 | Preparing the design of the ECO REM (institutional framework (Charter), functionalities (Modality), operations (Manuals). |  |  |  |  |  |  |
| 21 | Conducting the technical survey of systemic parameters of ECO countries' national electric grids and preparing the analytical report on the survey results for establishing ECO REM. |  |  |  |  |  |  |
| 22 | Preparing economic and financial analyses of establishing the ECO REM. |  |  |  |  |  |  |
| 23 | Preparing analyses of social, environmental and 16 risk-related factors of establishing the ECO REM. |  |  |  |  |  |  |
| 24 | Consolidating project's analysis and modeling the optimal design of the ECO Regional Platform. |  |  |  |  |  |  |
| 25 | Consolidating project's analysis and modeling the optimal design framework of the ECO Regional Platform. |  |  |  |  |  |  |
| 26 | Based on the ECO Regional Platform design framework, modeling the design of the ECO-REM. |  |  |  |  |  |  |
| 27 | Fulfilling sensitivity analysis of viability and complementarity of the ECO-REM. |  |  |  |  |  |  |
| 28 | Consolidating the project's analyses into a Midterm Report. |  |  |  |  |  |  |
| 29 | Participating in the planned virtual Meeting of the Expert Group Meeting (EGM) on the Establishment of the ECO REM to discuss the Midterm Report. |  |  |  |  |  |  |
| 30 | Adjusting the Midterm Report based on the reviews of the EGM. |  |  |  |  |  |  |
| 31 | Disseminating the Midterm Report to Member States and incorporating the comments obtained in the main body of the document. |  |  |  |  |  |  |
| 32 | Preparing the Final Report of Feasibility study on establishment of the ECO REM and according it for comments of Project Coordinator. |  |  |  |  |  |  |
| 33 | Disseminating the Final Report to Member States and adjusting final comments, if any, in the document and validation. |  |  |  |  |  |  |
| 34 | Presenting the Final Report of Feasibility study to ECO Secretariat and/or Member States at planned EGM. |  |  |  |  |  |  |
| 35 | Receiving the certification of acceptance of completed project by ECO Secretariat. |  |  |  |  |  |  |

# Cost benefit and sensitivity analysis

Consultancy Service will be aligned with the act of identifying the function of the complementarity of the ECO REM vis a vis national electricity systems through their interregional connectivities. The results of the sensitivity analysis will be presented as one of the core outputs of the feasibility study project.

Consultancy Service will have the following **Outcomes**: (i) ECO REM established, (ii) regional interconnectedness among ECO countries electric grids improved; (iii) trade exchange in electricity and related products increased.

Below is the required set of key **Outputs** to be validated upon execution of feasibility study:

Table 6: Project’s Expected Outputs

| **Outputs** | **Description** |
| --- | --- |
| Output 1. | Analytical map of ECO countries' power systems' interconnectedness. |
| Output 2. | Sensitivity analysis of viability and complementarity of establishment of the ECO REM. |
| Output 3. | Modality on harmonization processes for purposes of establishing the ECO REM. |
| Output 4. | Road Map of the ECO REM. |
| Output 5. | Framework design of the ECO Regional Platform of ECO-REM. |
| Output 6. | Project finance model of the ECO-REM. |
| Output 7. | Technical survey of the establishment of the ECO-REM. |
| Output 8. | Modality/Statute of the ECO Regional Platform of ECO-REM. |
| Output 9. | Operations' Manual/Guidelines of ECO-REM. |

# Estimated project budget

The project’s estimated budget is US$ 50,000. The total project cost will be funded by the ECO Secretariat from ECO Feasibility and General Purpose Fund (FGPF). For details pl. see table below.

**Table 7. Project Cost and Financing Details**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Project budget** | | | | |
|  | **Budget items** | **Cost (US$)** | **Co-funding** | |  |
|  |  |  | **ECO** | **Partner** | **ECO funding (%)** |
| 1 | Preparation of inception report | $ 10,000 | $ 10,000 |  | 20 |
| 2 | Per diem | $ - | $ - |  |  |
| 3 | Inception meeting | $ - | $ - |  |  |
| 4 | Preparation of technical survey | $ 10,000 | $ 10,000 |  | 20 |
| 5 | Preparation of Midterm report | $ 10,000 | $ 10,000 |  | 20 |
| 6 | EGM meeting | $ - | $ - |  |  |
| 7 | Preparation of Final report | $ 20,000 | $ 20,000 |  | 40 |
| 8 | Validation | $ - | $ - |  |  |
| 9 | Display, dissemination, publishing, printing | $ - | $ - |  |  |
| 10 | Contingency | $ - | $ - |  |  |
|  | Total | $ 50,000 | $ 50,000 |  | 100 |

Explanatory notes to Table:

1. Meetings/events are in online mode.
2. No per diem has been envisaged due to travel restrictions under covid19 pandemic.
3. Dissemination, publishing, printing is done by ECO Secretariat at its cost.

# Project implementation framework

This section of the ToR corresponds to the requirement stipulated in “*Functional Methodology of ECO*”, which envisages an “Implementation Plan comprising the organizational set-up and the legal requirements for undertaking the activities” (Clause 24, item (vii)).

The Directorate of Energy, Minerals and Environment (EME) will coordinate the Consultancy Service. Consultant will regularly interact with Director of the EME Directorate. There will be consultations/discussions organized by Project Coordinator among project teams (from Secretariat side and Consultancy side). National Focal Points of ECO Member States assigned by their respective authorities on Energy, Minerals, Environment, in particular, may interact with Expert Consultant on matters relating to data and information as pertinent to the electricity subsector. Consultant will create online interactive linkages using, among others, social media platforms (whatsup) as convenient for contacts in the framework of execution of the ToR and deactivate those online linkages within 3 months after the present ToR be fulfilled. The implementation arrangements are summarized in table below.

Payments are to be effected once successful completion is obtained and upon review & quality assurance of delivery of the feasibility study outputs as specified in the Terms of References. In preparing for the delivery of the feasibility study outputs, Consultant will be required to submit annexes to all reports, mapping designs, portraying progress & status of deliverables and consultations/teaming/teleconferencing sessions held/persons met.

Deliverables must be submitted by Expert Consultant to Director EME with a copy to PMS of ECO Secretariat. These will then be certified by Director EME as being of adequate quality and satisfying the specified terms under the ToR.

The overall number of **Activities** of Consultancy Service is 35, at completion of the feasibility study. For details see the table of overall activities below:

**Table 8: Project Activities (total)**

|  |  |
| --- | --- |
|  | **Project Activities** |
| 1 | Analyzing current status of interconnectedness among the ECO countries. |
| 2 | Reviewing of lessons learnt from previous project "Feasibility study on interconnection of ECO power systems" (2006-2008). |
| 3 | Arranging in close coordination of the ECO Secretariat the Inception meeting on the project with participation of Focal Points for project. |
| 4 | Developing questionnaires and analyzing the inputs from ECO member countries. |
| 5 | Preparing marketing analyses of electricity trade exchanges among the ECO member countries. |
| 6 | Preparing analysis of existing conditions in the ECO Region for establishing ECO REM and identify the prerequisites for establishing ECO REM. |
| 7 | Analyzing regulatory frameworks of ECO countries enabling harmonization of regulations to establish ECO REM. |
| 8 | Modeling of electricity trade transactions via the ECO regional electricity platform under the two countries' scenario (Turkey and Iran). |
| 9 | Modeling the electricity trade transactions via ECO regional electricity platform under the ECO ten countries' scenario. |
| 10 | Developing optimal solution ensuring the increases of electricity trade flows via forming relevant trading arrangements using the ECO regional electricity platform. |
| 11 | Developing optimal solution ensuring the increases of electricity trade flows via effective institutional capacity building in the ECO member countries. |
| 12 | Developing optimal solution ensuring the increases of electricity trade flows via creating the enabling environment frameworks: (i) institutional enhancements and (ii) improving policy and regulatory environment. |
| 13 | Determining the line routings of the ECO Regional Platform of the ECO REM. |
| 14 | Determining the control scheme of processes of establishing the ECO REM. |
| 15 | Preparing comparative analysis of international practices of establishing regional electricity markets. |
| 16 | Preparing analyses of PPP project financing models suitable for the ECO REM and recommending on most optimal project financing model. |
| 17 | Determining the project commitments and funding plan of the establishment of the ECO REM. |
| 18 | Preparing the detailed project budget and project implementation plan of the establishment of the ECO REM. |
| 19 | Fulfilling risk analysis and drawing the risk mitigation plan of the establishment of the ECO REM. |
| 20 | Preparing the design of the ECO REM (institutional framework (Charter), functionalities (Modality), operations (Manuals). |
| 21 | Conducting the technical survey of systemic parameters of ECO countries' national electric grids and preparing the analytical report on the survey results for establishing ECO REM. |
| 22 | Preparing economic and financial analyses of establishing the ECO REM. |
| 23 | Preparing analyses of social, environmental and 16 risk-related factors of establishing the ECO REM. |
| 24 | Consolidating project's analysis and modeling the optimal design of the ECO Regional Platform. |
| 25 | Consolidating project's analysis and modeling the optimal design framework of the ECO Regional Platform. |
| 26 | Based on the ECO Regional Platform design framework, modeling the design of the ECO-REM. |
| 27 | Fulfilling sensitivity analysis of viability of the ECO-REM. |
| 28 | Consolidating the project's analyses into a Midterm Report. |
| 29 | Participating in the planned virtual Meeting of the Expert Group Meeting (EGM) on the Establishment of the ECO REM to discuss the Midterm Report. |
| 30 | Adjusting the Midterm Report based on the reviews of the EGM. |
| 31 | Disseminating the Midterm Report to Member States and incorporating the comments obtained in the main body of the document. |
| 32 | Preparing the Final Report of Feasibility study on establishment of the ECO REM and according it for comments of Project Coordinator. |
| 33 | Disseminating the Final Report to Member States and adjusting final comments, if any, in the document and validation. |
| 34 | Presenting the Final Report of Feasibility study to ECO Secretariat and/or Member States at planned EGM. |
| 35 | Receiving the certification of acceptance of completed project by ECO Secretariat. |

The **Milestone Activities** (11) have been identified based on the project’s key objectives (p.7, ToR) as follows:

**Table 9: Project Milestones**

|  |  |
| --- | --- |
| 1 | Analyzing current status of interconnectedness among the ECO countries. |
| 2 | Preparing analysis of existing conditions in the ECO Region for establishing ECO REM and identify the prerequisites for establishing ECO REM. |
| 3 | Analyzing regulatory frameworks of ECO countries enabling harmonization of regulations to establish ECO REM. |
| 4 | Developing optimal solution ensuring the increases of electricity trade flows via forming relevant trading arrangements using the ECO regional electricity platform. |
| 5 | Developing optimal solution ensuring the increases of electricity trade flows via effective institutional capacity building in the ECO member countries. |
| 6 | Developing optimal solution ensuring the increases of electricity trade flows via creating the enabling environment frameworks: (i) institutional enhancements and (ii) improving policy and regulatory environment. |
| 7 | Determining the line routings of the ECO Regional Platform of the ECO REM. |
| 8 | Preparing analyses of PPP project financing models suitable for the ECO REM and recommending on most optimal project financing model. |
| 9 | Conducting the technical survey of systemic parameters of ECO countries' national electric grids and preparing the analytical report on the survey results for establishing ECO REM. |
| 10 | Consolidating project's analysis and modeling the optimal design of the ECO Regional Platform. |
| 11 | Consolidating project's analysis and modeling the optimal design framework of the ECO Regional Platform. |

**Sequencing of project activities**

The activities have been sequenced in line with priorities as defined by concerned Directorate for the subject project. Details have been reflected in the Gantt chart below.



Figure 2: Project’s Gantt chart

# Annex-I. QUALIFICATIONS REQUIREMENTS FOR CONSULTANT

The assignment should be carried out by Consultants (two local consultants/team from Iran and Turkey, respectively, under the supervision of one/team international consultant) with an appropriate local and international experiences and skills in the establishment of regional electricity markets. These experiences and skills, include, but not limited with, the policy, institutional, and regulatory areas, power/transmission system investment and planning, power market structure and regulatory issues, as well as in the areas of project structuring and finance, and fluency in English. The consultants are expected to possess the following skills and capacities (this is an indicative list and consultants may wish to propose their own set-up):

* Team Leader must be a graduate in Electrical Engineering and Energy Economics with at least M.S. degree and 15 years’ experience in energy policy and electricity markets. Team Leader should be strong in communication, coordination, managerial skills and have fluency in English;
* In-depth knowledge of electric utility, particularly transmission system, power and market operation;
* Experience of participation in a technical project(s) as a Project Manager (for the Project Manager only);
* Excellent knowledge of EU and ENTSO-E regulations on the transmission system and market operation, as well as of the best international practices of regional electricity markets;
* Expertise and experience in the Turkish and Iranian electricity markets and other ECO regional electricity market and market coupling;
* Legal knowledge and experience on carrying out project related to ToR/Feasibility Study, including economic and financial analysis and project agreements;
* Legal expert must be a graduate in Law or Economics of Energy, being familiar with regulatory issues of electricity market with at least 10 years’ experience in the relevant field;
* Financial Expert must be a graduate in Economics or Commerce with at least 10 years’ experience in financial analysis in the relevant field;
* Market Design/Operation Expert must be a graduate in Electrical Engineering or Power Economics with at least 5 years in relevant field, including projects or cross-border trade and power market;

System Operation Expert must be a graduate in Electrical Engineering with at least 5 years’ experience in the relevant field.