



REPUBLIC OF TURKEY

MINISTRY OF ENVIRONMENT, URBANIZATION AND CLIMATE CHANGE (MOEUC)

GENERAL DIRECTORATE OF CONSTRUCTION AFFAIRS (GDCA)

“Energy Efficiency in Public Buildings Project”

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CONSULTANCY SERVICES FOR

**ENERGY AUDIT, DESIGN AND CONSTRUCTION SUPERVISION
SERVICES FOR ENERGY EFFICIENCY RENOVATIONS IN PUBLIC
BUILDINGS**

Reference No:

EEPB/WB/MoEU/QCBS-DES&SUP-12

TERMS OF REFERENCE

“For Energy Audit and Design”

Issued on: June 20, 2022

**TERMS OF REFERENCE
(TOR)
FOR LUMP SUM CONTRACT**

**CONSULTING SERVICES FOR ENERGY AUDIT REPORTS, DETAILED DESIGNS AND
TECHNICAL SPECIFICATIONS FOR ENERGY EFFICIENCY BUILDING RENOVATIONS**

(Ref : EEPB/WB/MoEU/QCBS-DES&SUP-12)

I. Introduction

The Ministry of Environment Urbanization and Climate Change (MoEUCC) has received financing from the World Bank toward the cost of the Energy Efficiency in Public Buildings Project (EEPBP) and intends to apply part of the proceeds for consulting services.

The project investments will focus primarily on the renovation of central public buildings with high energy consumption and shorter pay-back periods. The proposed project would be implemented through two components: (i) energy efficiency (EE) investments in central government buildings; and (ii) technical assistance (TA) and project implementation support. The General Directorate of Construction Affairs (GDCA) under the MoEUCC has been delegated to assume overall responsibility for the project. This will include completion of the necessary activities to support project preparation as well as implementation for the six-year project period. In parallel, grant funding has been mobilized from the Clean Technology Fund (CTF) to help analyze the investment needs and potential of the central government buildings.

The GDCA established a project implementation unit (hereinafter called the “Client”) to administer all aspects of the project, including selection of the buildings, procurement of the various contractors (e.g. energy audits, technical designs, renovation works, construction supervision, savings verifications, technical assistance or consultancies, etc.), and monitoring.

Through the EEPBP, approximately 500-700 public buildings will be renovated for EE. Investments would include building envelope measures (roofs/wall insulation, windows, doors), heating/cooling systems, water heating, pumps/fans and lighting and some renewable energy (RE) applications (e.g., rooftop solar PV, biomass heating, solar water heating, geothermal heat pumps) to offset the building’s electricity/fuel use. A limited amount of funds may be allocated for non-EE/RE measures (e.g., rewiring, minor structural repairs, painting, seismic safety, etc.).

Within the framework of the EEPBP, a consulting firm will be employed to conduct investment grade energy audits, prepare detailed designs and technical specifications of selected public buildings.

II. Scope of Services

The Consultant will be required to conduct investment grade energy audits for all buildings, prepare the energy performance certificate before the renovations, prepare detailed designs (including architectural, mechanical and electrical designs), and technical specifications, cost estimates and bills of quantities (BoQs) measurement and verification plan and commissioning plan for energy efficiency renovations in public buildings based on energy audit reports. The Consultant shall also identify environmental and social risks associated with the planned renovation works and prepare Environmental and Social Management Plans (ESMPs) and Occupational Health and Safety (OHS) Plan.

This Terms of Reference covers designs and technical assistance for energy efficiency renovations of selected public buildings twenty-nine (29) campuses having **552.497,50m²** total area as listed below in Table 1 and given in the Annex-1.

Table 1: List of the Campuses to be renovated in the scope

No	Name of Campus	Beneficiary Institution	City	Number of Blocks	Construction Area (m ²)
1	Kırıkkale University Faculty of Medicine and Hospital	Kırıkkale University	Kırıkkale	1	45.471,00
2	Kırıkkale University Faculty of Health Sciences and Physical Therapy Rehabilitation Hospital	Kırıkkale University	Kırıkkale	1	45.500,00
3	Building of Council of State	Council of State	Ankara	9	81.403,00
4	Çubuk Halil Şıvgın State Hospital	Ministry of Health	Ankara	1	19.735,00
5	Beypazari State Hospital	Ministry of Health	Ankara	1	18.025,00
6	International National Girls Anatolian Imam Hatip High School	Ministry of Education	Ankara	3	13.612,50
7	Beytepe Murat Erdi Eker State Hospital Main Building	Ministry of Health	Ankara	4	21.573,00
8	Gendarmerie and Coast Guard Academy	Ministry of Interior	Ankara	31	171.068,00
9	Yakacak Anatolian High School	Ministry of Education	Ankara	1	6.410,00
10	Etlik Anatolian Imam Hatip High School	Ministry of Education	Ankara	1	7.310,00
11	Ankara Etimesgut Hayriye-Ethem Turhanlı Vocational and Technical Anatolian High School	Ministry of Education	Ankara	1	4.000,00
12	Pınarbaşı Vocational and Technical Anatolian High School	Ministry of Education	Ankara	1	6.700,00
13	Kocalar Anatolian Imam Hatip High School	Ministry of Education	Ankara	1	6.830,00
14	Töreent Vocational and Technical Anatolian High School	Ministry of Education	Ankara	1	6.550,00
15	Dede Korkut Anatolian High School	Ministry of Education	Ankara	1	8.800,00
16	Yunus Emre Anatolian High School	Ministry of Education	Ankara	1	6.000,00
17	Güzelkent Anatolian High School	Ministry of Education	Ankara	1	6.592,00
18	Şehit Büyükelçi Daniş Tunalıgil Vocational and Technical Anatolian High School	Ministry of Education	Ankara	1	5.705,00
19	Mustafa Azmi Doğan Anatolian High School	Ministry of Education	Ankara	1	6.235,00
20	Keçiören İMKB Vocational and Technical Anatolian High School	Ministry of Education	Ankara	1	5.691,00
21	Şehit Rıdvan Süer Anatolian High School	Ministry of Education	Ankara	1	6.150,00
22	Mustafa Kemal Vocational and Technical Anatolian High School	Ministry of Education	Ankara	1	7.657,00
23	Gölbaşı Vocational and Technical Anatolian High School	Ministry of Education	Ankara	1	5.665,00
24	Rasim Özdenören Anatolian High School	Ministry of Education	Ankara	1	7.150,00
25	Polatlı Science High School	Ministry of Education	Ankara	1	6.550,00
26	Mahir İz Anatolian Imam Hatip High School	Ministry of Education	Ankara	1	5.200,00
27	Kırkkonaklar Anatolian High School	Ministry of Education	Ankara	1	5.200,00

28	Gölbaşı Anatolian High School	Ministry of Education	Ankara	1	6.715,00
29	Mamak Anatolian Imam Hatip High School	Ministry of Education	Ankara	1	9.000,00
	TOTAL			72	552.497,50

Regarding the preparation of the detailed designs and technical specifications, it should be noted that according to the findings in the investment grade audit reports, slight changes may occur in the building list, the number of buildings or locations may be changed with nearby alternatives.

Some of the buildings may be renovated by an energy service company (ESCO) in the form of Energy Performance Contract (EPC) and similarly, one of the building may be selected to be renovated as nearly zero energy building (nZEB).

The possible buildings to be renovated within an Energy Performance Contract and as an nZEB pilot implementation will be determined after according to the energy audit reports prepared by the Consultant.

The total construction area of the buildings to be renovated under EPCs and as nZEB would be limited to less than 10% of the total square meters.

The Consultant will not be required to prepare the detailed designs and technical specifications of the buildings that are removed from the list for Energy Performance Contract (EPC) and nZEB implementations after the energy audit stage. For the buildings implemented under EPCs or as nZEBs, the detailed designs and technical specifications will be developed by an ESCO or another consultant hired by the Client.

III. Description of the Consultant’s Tasks

Task 1: Conduct investment grade energy audit report

The consultant shall conduct investment grade energy audits of public buildings to identify and recommend energy efficiency measures (EEMs) for implementation of energy efficiency (EE) investments according to the Audit Template. The activities required to conduct investment grade energy audits include, but may not be limited to, the tasks described in the following sections. The work conducted should comply with the principles and processes described in ISO 50002.

MOEU will review all of the completed energy audits after Task 1. It may be determined that some of buildings, limited to less than 10% of the total square meters, may be reclassified as an ESCO or nZEB contract, in which case these buildings will be removed from the technical designs for Task 2. In this case, the contract will be modified. However, for bidding purposes, the bidders are requested to assume that energy audits and technical designs will be required for all buildings on the list.

Further definition and details of intended audit template is provided in the project’s website in the form of “**Audit Template**”. Please refer to this template document for detailed process overview and intended outcome of the process.

Web-link: <https://www.kabev.org/kutuphane/kontrol-listeleri/>

1.1) Conduct preliminary reviews: Perform an initial energy use evaluation by reviewing all utility data and building or system diagrams, which can include architectural plans, electrical plans and cuts, electrical board schemes, thermal systems (production and distribution) plans, equipment lists and catalogues, operation and maintenance logs, and other available facility information.

The initial activities under this task include determining the required scope of work, identifying key personnel (including personnel responsible for Operation and Maintenance (O&M) and energy-related issues); and requesting specific information and data. The data to be requested and collected from the building managers should include, but may not be limited to:

- Meteorological data of the site: Monthly ambient temperature and humidity, heating degree days (HDD) and cooling degree days (CDD) for a 3 consecutive year period

- Energy bills for the past three calendar years; all forms of energy should be included in this analysis
- Online billing data
- Building Management System (BMS) history and data
- Building layout drawings and site plans
- Equipment lists for main energy-using equipment
- Process flow diagrams
- Process and instrumentation drawings (P&IDs) for large energy users
- Operational, weather and other data relevant for energy use (occupancy, weather, production data)
- Copies of any previous energy audits, studies or details of known opportunities for energy efficiency
- Details of upcoming organizational changes or other investment plans that are expected to affect energy efficiency or energy use

Review all available facility documentation with site representatives where possible. Review at least three years of energy data and discuss year-to-year variations and seasonal variations in energy use patterns. Calculate the baseline consumption, i.e., the expected energy consumption under current operating conditions, based on the monthly ambient temperature and the historical consumption data for a selected reference period. If national norms for lighting/heating/cooling are not met in the existing status of the building and current baseline does not represent a fair benchmark for energy use of previous years, an adjusted baseline shall be generated so that energy consumption of the building before and after energy efficiency measures are implemented can be accounted in a fair and correct way. The baseline consumption shall be normalized as defined in ISO 50006 and later be revised using data from site assessments. In the case that energy data is not available, energy modelling shall be performed to calculate the baseline consumption.

1.2) Conduct site assessments: Further investigate the major energy-consuming processes in the facility. At the end of this task, the buildings and systems descriptions and collection of consumption and other relevant data to propose and describe EEMs should be completed. All relevant findings related to the visual inspections, field measurements, and interviews must be included in the energy audit report. The site assessment shall focus on all passive and active systems available on site and will include, but may not be limited to, the following subtasks:

- Conduct visual inspections
- Develop time plan for field visits and measurements
- Conduct field measurements, i.e., electricity measurements of the main consumption points per floor or per main use (e.g., X-rays in hospitals), develop monthly and daily load profiles for electricity consumption, cooling and heating, internal and ambient temperature and humidity per hour during the period of audits
- Conduct field interviews

1.2.1) Conduct visual inspections: Conduct visual inspections in a walk through to verify the completeness and accuracy of available documentation. This will include, but may not be limited to:

- Construction details of the building envelope (e.g., walls, roof, windows, doors) and related insulation values
- Heating and cooling production systems capacities (e.g., chillers, boilers), rated efficiency, and maintenance status

- Heating, Ventilation and Air Conditioning (HVAC) distribution system (e.g., pumps, heat exchangers) capacities, rated efficiency, and maintenance status
- Air handling units capacities, rated efficiency, and maintenance status
- Electrical motors, their end-use, efficiency data, and maintenance status
- Type of control methods and operation schedules
- Interior and exterior lighting systems and related controls
- Service/domestic hot water systems, their storage capacity, efficiency, and maintenance status
- Renewable Energy (RE) generation and integration with building systems
- Other relevant energy consumption drivers

The report should include images to present the current state of the facility, possible shortcomings in the construction or in systems maintenance.

1.2.2) Develop a time plan for field visits and measurements: Define and agree on a time plan for field visits and measurements with the building supervisor, the O&M team and inform the Client at least 10 business days before the visit. The time plan may be revised based on the operational conditions and availability of the building depending on the Covid-19 restrictions.

1.2.3) Conduct field measurements: Perform all necessary on-site measurements to detail the energy baseline and collect data required for identifying EEMs. Install and operate the necessary energy monitoring equipment on-site suitable for the relevant data collection (e.g., data loggers, flue gas meters, temperature and hygrometer sensors, electric/gas meters, air and water flow meters, thermal cameras). If it is not possible to measure the actual performance of systems and equipment (e.g., due to temporary malfunction, or out of season audit), performance of the systems and equipment shall be either simulated based on theoretical and inspection data or measured later before the final date of audit report submission depending on the time plan of the audit process. In case there are equipment/systems which cannot be measured despite all efforts, a clarification that explains the reasons why they cannot be measured shall be provided to MoEUCC along with supporting documentation such as site pictures, field interviews with Beneficiary’s technical staff, etc. This clarification shall also be included in a relevant section of the final audit report.

Field measurements should include, but may not be limited to:

- a) Building envelope: Windows, doors and insulation
 - Outside and inside surface temperatures
 - Thermal image for energy loss/gain and surface temperature
 - Layer by layer definition of building components
 - Insulation layer thickness
 - Glazing details/thickness (U-value, visual light transmittance percentage, SHGC, thickness of glass, U-value and construction details of frames, equivalent U-value of fenestration (frame + glass))
- b) Heating/cooling production and distribution system
 - Input values like electrical instantaneous and continuous power consumption for electrical based systems (e.g., chillers, fan, pumps)
 - Enthalpy measurements for chillers and boilers
 - Output values like airflow, water flow, air and water temperatures (fans, pumps, chillers, cooling towers)
- c) Efficiency of boilers and other heat-generating equipment
 - Flue gas temperature and chemical composition (O₂, CO₂)
 - Fuel/gas instantaneous consumption
 - Relevant measurements in order to calculate COP, SCOP, EER, SEER values
- d) Ventilation system and air terminal units: Air handling units, heat recovery units, exhaust fans, etc.

- Input values like electrical instantaneous and continuous power consumption for electrical based systems (e.g., fan, pumps)
 - Enthalpy measurements for heating and cooling coils
 - Output values like airflow, water flow, air and water temperatures (fans, heating/cooling coils)
- e) Electrical consumption of lighting systems
- Electrical instantaneous and continuous power consumption for sample circuits
 - Lighting level (lux) in sample representative locations
- f) Motors (including fans, pumps) and other plugged systems
- Electrical instantaneous and continuous power consumption for sample circuits.
- g) Electrical loads and consumption of the buildings
- Electrical instantaneous and continuous power consumption for at least 5 full days which shall include weekday and weekend operation profile for main distribution panels, transformers
- h) Other energy consumption systems and equipment.

During the field measurement phase, building supervisor should provide the corresponding relevant variables, e.g., operating parameters, production data, occupation data. Additional measuring points, appropriate measuring equipment, associated processes and feasibility of installation may be identified during field measurements.

1.2.4) Conduct field interviews: Interview key stakeholders (e.g., building manager, O&M staff, and users) to assess O&M routines, potential changes in user patterns (e.g., number of users or changes in user behaviour), and comfort levels (e.g. indoor temperature, air quality, lighting levels) and to collect/confirm other relevant information. Interviews shall consider data collected during the previous tasks and aim at obtaining relevant information to explain seasonal and year-to-year changes in historical energy consumption, identifying current energy management practices and improvement potential, and identifying the feasibility of potential EEMs.

1.3) Data analysis: Revise the baseline energy consumption using data collected in previous tasks. If national norms for lighting/heating/cooling are not met in the existing status of the building and current baseline does not represent a fair benchmark for energy use of previous years, an adjusted baseline shall be generated so that energy consumption of the building before and after energy efficiency measures are implemented can be accounted in a fair and correct way. Identify EEMs and their investment costs, energy savings, and cost benefit. Develop scenarios for different combinations of EEMs with consideration of cross-effects between different EEMs. The audit report should document methodology, assumptions, and supporting calculations. This task will include, but may not be limited to, the following subtasks:

- 1) Describe audit scope
- 2) Review energy baseline and conduct EEM calculations
- 3) Determine investment costs
- 4) Establish different investment scenarios (base scenario, deep renovation, recommended scenario or mix scenario)
- 5) Conduct financial analysis
- 6) Determine energy performance class,

1.3.1) Describe audit scope: Describe buildings and systems analysed in the energy audit (e.g., areas/buildings covered, building envelope, heating/cooling, lighting and RE, alternatives to fossil fuel-based heating).

1.3.2) Review energy baseline and conduct EEM calculations: Review the preliminary assessment of the energy consumption baseline using data collected in the previous tasks, including:

- a) Use measurement data to explain the consumption behaviour of the main users and refine the energy consumption baseline.

- b) Compare energy consumption with specific energy use values of similar buildings if available (local and international experience)
- c) Identify Best Available Techniques (BAT) at international level
- d) Study the historical pattern of energy performance and establish relationships between energy performance and the relevant variables (e.g., heating/cooling degree days, occupation)
- e) Assess existing energy performance indicators, e.g., kWh/m², kWh/occupant, kWh/bed, and additional energy performance indicators, e.g., kWh/HDD or CDD

If there is insufficient quality data for setting up the baseline, dependencies and correlations between historical data, field data and other variables (e.g. weather-related variables, occupancy, events, documented equipment malfunctions, etc) should be used to establish a suitable baseline. If national norms for lighting/heating/cooling are not met in the existing status of the building and current baseline does not represent a fair benchmark for energy use of previous years, an adjusted baseline shall be generated so that energy consumption of the building before and after energy efficiency measures are implemented can be accounted in a fair and correct way. This process has to be documented in the report.

The field measurements and the catalogue/historical data must be used for the calculation to simulate the future energy performance with the proposed EEMs. If deemed necessary by the Consultant, several software tools may be used for baseline and EEM simulation calculation (not exhaustive): *Trace* for life cycle analysis; *Energy Plus*, *IESV* or *Carrier HAP* for energy modelling. Software tools to be used to simulate the level of service and envelope requirements may include: *Dialux* for lighting levels; *TS 825 Heat Insulation Standard* for insulation requirements.

EEMs shall be developed based on the specific building analysis, but typical measures that should be considered include:

- New or improved building envelope insulation
- Renewal of window and doors
- Heating boiler renewal
- Boiler burner adjustment
- Boiler waste heat recovery integration
- Heating fuel shift by replacement of boilers with heat pumps
- Renovation of cooling/chiller systems
- Replacement of chiller systems with 4-pipe heat pump chillers or reversible heat pumps
- Replacement of old chiller systems with ground or water or air sourced reversible heat pumps
- Hybrid solutions which integrate existing or renovated chillers and reversible heat pumps especially utilized for transitional season operations
- Variable speed circulation pumps and fans
- Piping and duct insulation
- Thermostatic valve usage in heating/cooling circuit
- Lighting ballast type renewal
- LED lighting systems
- Daylight harvesting, solar tubes
- Movement sensor integration to lighting systems
- Building automation systems
- Energy monitoring system
- Upgrade of electric motors with high-efficiency models
- Cogeneration/Trigeneration
- Photovoltaic (PV) systems both rooftop and over canopy in open parking lots
- Solar water heating (SWH)
- Biomass or other alternatives to fossil fuel-based energy
- Heat pumps

In all cases, the main energy-consuming vectors have to be addressed in the EEM proposal. The RE

generation should be carefully detailed, with simulation production, grid connection point and relevant construction requirements, if any. No-cost measures, e.g., energy management and O&M, shall be stated but not included in the financial analysis.

The indirect effects of the EEM implementation have to be considered:

- Repairs or operational changes required for the EEM to be effective
- Impact on O&M procedures and cost
- Impacts on occupant health, comfort or safety, as well as non-energy benefits, especially improvements to health, safety and environment, changes in equipment run time, and maintenance labour hours
- Challenges of dismantling of old equipment and installation of new equipment or of scaffolding and civil construction works due to physical constraints on site
- Possible operational changes in human and vehicle mobility within the building site or campus due to location of proposed new system/equipment
- Commissioning requirement

1.3.3) Determine investment costs: Accurate investment cost need to be determined for the financial analysis by gathering equipment, installation and construction costs from a sample of vendors and contractors. Costs should include any specific considerations for the particular facility and all indirect costs needed for implementation (e.g., dismantling, transport, scrapping, recycling, scaffolding, pipe accessories, civil construction works, electrical connections, changes in electrical boards). O&M costs, commissioning, and reinvestment cost have to be included in the financial analysis.

1.3.4) Establish different investment scenarios: Three different scenarios of combination of EEMs shall be presented in the audit report:

- a) Base scenario with EEMs that save a minimum of 20%* of the baseline consumption and a payback period shorter than 12 years for the combination of EEMs
- b) Deep renovation scenario with EEMs that save a minimum of 30%* of the baseline consumption and a payback period shorter than 20 years for the combination of EEMs
- c) Recommended package of EEMs, which could be a selection of EEMs from the base and deep renovation scenario

All EEMs that were considered but not included in any of the scenarios should also be presented in the report.

The scenario construction will depend on the specific circumstances, but some general guidance can be provided in the next paragraphs and in the table below:

- a) The base scenario should include retrofitting the insulation and fenestration according to the TS 825 Heat Insulation Standard, basic building-level energy metering, and other EEMs with shorter payback periods.
- b) The deep renovation scenario should always include additional insulation and window/door upgrade, include upgrades of EEMs from the base scenario, and include additional EEMs not included in the base scenario. The payback period for the building envelope measure can be longer than 20 years, but the individual payback periods for all other EEMs should be shorter than 20 years.
- c) The recommended package can comprise a combination of EEMs from the base or deep renovation scenario but should not include (i) EEMs with payback periods longer than 20 years except for the building envelope measure and (ii) EEMs with payback periods longer than the lifetime of the equipment.

* Primary energy efficiency improvement percentage may be used for calculating overall energy efficiency calculation of the deep renovation scenario in case on-site electricity production measures are proposed such as cogeneration/trigeneration, etc.)

Table 2: General guidance on scenario construction

Existing situation	Base Scenario	Deep Scenario
Insulation/fenestration not standard	Insulation/fenestration as in TS 825 Heat Insulation Standard	Insulation/fenestration better than TS 825 Heat Insulation Standard
Insulation/fenestration as in TS 825 Heat Insulation Standard	-	Insulation/fenestration better than TS 825 Heat Insulation Standard
EFF1 or EFF2 motors	IE3 motors	IE4 motors
EFF1 or EFF2 motors	IE3 motors	Variable Frequency Drive (VFD) with IE3 motors
Conventional Boiler	Condensation Boiler	Heat pump or biomass boiler or hybrid system of heat pumps with condensing boilers
Air-Cooled Chillers	New Air-Cooled Chillers with VFD	4-pipe Heat Pumps or reversible Heat Pumps
Water-Cooled Chillers	New Water-Cooled Chillers with heat recovery	4-pipe Heat Pumps or reversible heat pumps or New Water-Cooled Chillers with VFD compressors
Stand Alone Split System	New Inverter stand-alone Split System	New Volume Refrigerant Variable package system or reversible heat pump
Old Air Handling Units (AHU)	VFD implementation to AHU Fans and CO2 based demand control ventilation	New AHU with heat recovery and VFD
-	PV Generation with shorter payback (e.g. on the roof)	PV Generation with longer payback (e.g. on a carpark)
-	Basic energy monitoring	Full BMS and energy monitoring system
-	Cogen with Shorter Payback (e.g. small packaged without chilled water production)	Cogen/Trigeneration with Longer Payback (e.g. full cogen with Absorption chiller)
-	Solar Water Heating (e.g. small system with natural convection)	Solar Water Heating (e.g. pump system with storage) in combination with waste energy of cooling system condensers
-	Insulation of Fittings, Valves, Piping	same with baseline
-	Application of Outdoor Air Compensation to Controlling of Boiler	-
-	Replacement of Circulation Pumps	Circulation Pumps with integrated VFD and enhanced controlled
-	Application of Motorized Two-Way Valve	Application of combined control and balancing valves
-	Replacement of conventional Luminaires for LED	Replacement of conventional Luminaires for LED and motion automated system, daylight harvesting, solar tubes
-	Efficient belts for fan motors	Plug fans

Some EEMs presented in base, deep, and recommended scenario need to be recalculated for each

scenario due to the cross effects that may arise (e.g., piping insulation savings will decrease with better envelope insulation).

Simultaneous implementation of energy efficiency measures addressing the same energy saving category leads to a cross-effect. (i.e., building envelope insulation retrofit and boiler replacement simultaneously) In such a case, total savings of a set of measures have to be calculated together and overall savings will be lower than the addition of individual savings, thus increasing the overall payback.

When considering multiple EEMs with interactive effects between measures, the order of analysis must start with load reduction measures and proceed with distribution systems and associated equipment efficiencies, and then plant and heat rejection systems.

For EEMs that involve system interactions within a single EEM (e.g., lighting retrofits that affect HVAC loads), those system interactions should be considered within that particular EEM analysis.

When analysing measures with interactive effects, include in the analysis:

1. Explanation of how EEMs interact with one another.
2. If and why savings from this EEM may be more or less effective depending on other EEMs.
3. Note if EEM is independent of all other EEMs in terms of savings or its practical application.
4. Interactions within lighting EEMs should be shown on the same row in the table (i.e., electrical savings entered as a positive value (net of cooling savings if any) and any non-electric heating should be entered as a negative value in appropriate heating fuel column. Assumptions on heating/lighting interactions (e.g., percentage of heat loss to conditioned space) should be explained in the EEM Section of the report.
5. If including mutually exclusive EEMs, list each as an individual row on the tables. Only one of the mutually exclusive EEMs should be included in the TOTAL EEM Energy Savings calculation (e.g., include only the recommended EEMs as to not “double count” measures in the total).

A basic energy monitoring system should be included in all scenarios, i.e., building-level energy meters, or submeters that can be aggregated to provide building-level energy use data (electricity, natural gas, fuel oil, propane, etc.). Utility-owned meters capable of aggregating base building-level resource use are acceptable. The basic system can be standalone, i.e., without automated report capabilities or software aggregation.

1.3.5) Conduct financial analysis: Each measure and scenario must include a Cost-Benefit Analysis with the calculation of energy cost savings, simple payback period, NPV and IRR over a 20-year period. The financial analysis must be presented in TRY. (The foreign exchange rates will be fixed for each audit for converting the cost of imported equipment/goods into TRY currency.) If the net life of the measure is lower than the NPV timeframe, re-investment costs need to be included in the analysis. If the economic lifetime of an equipment which is proposed to be installed in an energy efficiency measure is less than 20-year NPV timeframe (i.e. 8 years), reinvestments (i.e., at the 9th year and 17th year) of that equipment shall be included in the 20-year cash flows, net present value and internal rate of return calculations. Reinvestment costs are not included in the first investment cost and simple payback period of the energy efficiency measure which is shown in the EEMs list (alternative scenario). O&M costs and other indirect related costs should be included in the analysis. Investments are made in year 0 (or when re-investments take place) and the savings will start in year 1. Details of the financial analysis are laid out in the Audit Template.

1.3.6) Determine the energy performance class: Determine the energy performance class of the building in the current state by issuing an Energy Performance Certificate (EPC-EKB) so that it can be compared to the performance class after renovation (issuance of an actual energy performance certificate is not required for the building in the current state if the building already has an EPC (EKB) issued by the most recent version of national EPC software, BEP-TR2). The performance class to be achieved has to be calculated using the recommended measures list. Preliminary Calculation Result Report (Ön Hesap Sonuç Raporu) has to be obtained for the building to be achieved with proposed energy efficiency measures by using most recent version of national EPC software, BEP-TR2. In any

case, the proposed scenario must achieve at least an Energy Performance Class (EKB) B. After energy efficiency measures are implemented on site and construction works are finalized, a new EPC (EKB) shall be issued for the upgraded form of the building.

1.4) Applications based on green and innovative technologies to enable the behavioural change that support the implementation of energy efficiency measures:

Meeting the energy efficiency goals will require significant efforts to change consumer and user behaviours. Strategies and targets need to be in line with the motivations of individual building users and owners, and actions need to be easily integrated into daily behaviours to be effective. Changing these daily behaviours is a major challenge, requiring training and awareness activities, as well as feedback measures and incentives to trigger long-term change.

The Consultant shall develop innovative and green solutions derived from the energy efficiency measures applied in the buildings such as; PV powered mobile device and electric vehicle charging station, occupant information screens that shows the current energy consumption data of the building, etc. that can help awareness raising towards energy consumption and have high impact on user behaviours. The proposed innovative visibility technologies shall be building specific and have an impact assessment for each proposal. Additionally, the estimated cost for the proposed innovative technologic solutions shall be calculated and provided in a separate table other than the table prepared for energy efficiency measures.

1.5) Monthly Audit Progress Report: Includes findings during site assessments, measurements and data analysis and shall be submitted monthly to the Client for tracking the progress of audits. Detailed work schedule of the Task.1 shall be submitted within the report of the first month. Preliminary energy efficiency measures (EEMs), based on different renovation scenarios, considered to be proposed, and their calculations if exits, shall also be added to the report of the second month.

1.6) Investment Grade Energy Audit Report: The report should follow the Audit Template. Changes to the report structure have to be authorized by the Client. The audit report should be prepared both in English and Turkish concise and clearly written; capture all calculations, analyses and assumptions; and discuss difficulties encountered in data collection and field work.

Revisions shall be made by the Consultant, in calculations or other documents in case of any discrepancy or mistake recognized during the Construction Phase. Any problems related to the eligibility of audit reports are binding for the Consultant regardless of when the problem occurs.

Further definition and details of intended audit report is provided in the project’s website in the form of “*Audit Report Checklist*”. Please refer to this checklist document for detailed overview of how audit reports are going to be checked by MoEUCC and eventually approved as a result of this process.

Web-link: <https://www.kabev.org/kutuphane/kontrol-listeleri/>

1.7) Survey Plans and Drawings: Survey plans and drawings of up-to-date status of zones/rooms in the building interrelating with the proposed EEMs shall be produced. These survey plans and drawings shall include architectural dimensioning including sections of zones/rooms and exact positioning, specifications and scaling of any equipment and mechanical/electrical infrastructure that are in. The Consultant shall also illustrate its comments and/or possible enhancements of these interventions and their interactions with other systems to the drawings. A scaled site-layout shall also be submitted with these plans and drawings.

The Consultant cannot proceed to Task, 2 until the detailed audits had been reviewed by the MoEU, the scenarios and package of EE measures agreed and building candidates for EPCs/NZEBs agreed.

Deliverables

1.1 Monthly Audit Progress Report

1.2 Investment Grade Energy Audit Reports

1.3 Survey Plans and Drawings

Task 2: Detailed Renovation Designs, Technical Specifications & Bill of Quantities

2.1) Measurement and Verification (M&V) Plans

M&V Plan explains how to verify savings for each Energy Efficiency Measure, how to adjust the Reference Energy Consumption (or baseline) by using the data of the building, with methods and calculation details.

Consultant shall prepare M&V plans which will include the verification method of savings, important measures to be taken, the timing of these activities, the duties and responsibilities of the parties and how to ensure quality assurance for this process.

Further definition and details of intended M&V process is provided in the project’s website in the form of “*M&V Guidelines*”. Please refer to this guideline document for detailed process overview and intended outcome of the process.

Web-link: <https://www.kabev.org/kutuphane/kilavuzlar/>

2.2) Commissioning Plans

Commissioning is a quality-based process that focuses on verifying and documenting that the equipment and systems used during the implementation of energy efficiency measures are designed, installed, tested, and properly operated to meet the described requirements. Commissioning helps to deliver a safe and healthy project, optimizes energy use, reduces operating costs, provides adequate maintenance personnel orientation and training, and provides documentation. Commissioning is often perceived as focusing solely on testing at the end of the construction phase but, commissioning is a collaborative process to plan, deliver and operate all processes so that they work as intended by the designer. Commissioning starts with project planning and includes design, construction, commissioning, acceptance and training, and warranty phase services. Commissioning process has four overarching principles that begin at project inception and continue throughout use and operation:

- Creating measurable project performance descriptors
- Planning and executing the commissioning process
- Verifying and documenting compliance with requirements
- Effectively transfer all acquired knowledge to the business team

Commissioning process requires good planning. In this context, the determination of the systems and equipment to be handled in the process and how the test and training activities to be developed will be carried out should be discussed at the planning stage. Planning is the coordination and integration of systems and equipment in the commissioning process with other construction phase activities. The detailed integration of the commissioning works with the construction program is critical to maintaining the milestones in the project program.

Consultant shall prepare responsible commissioning plans and form commissioning teams of each project for the healthy execution of the whole process. A commissioning team is formed to oversee, implement, and perform commissioning process activities. The leadership responsibility of the commissioning team shall be determined at the beginning of the project and a task assignment shall be made. The term for the person generally responsible for the commissioning process is “Commissioning Officer” or “Commissioning Agent” or “Commissioning Agent/Authority”.

The responsibilities of the commissioning team include:

- a) Identify experts responsible for performing commissioning activities for specific systems and assemblies
- b) Organizing a pre-construction commissioning process meeting
- c) Planning the commissioning process activities and integrating them into the project construction program
- d) Handling program changes
- e) Documenting and developing test procedures and data sheets
- f) Conducting and documenting commissioning team meetings
- g) Monitoring compliance with project requirements by making periodic site visits
- h) Verifying completion of items specified in construction checklists

- i) Observing the tests
- j) To verify the tests and their results
- k) Verifying test data reports
- l) Verifying the training of operation and maintenance personnel and users according to project requirements
- m) Monitoring, diagnosing and documenting problems and deviations related to project requirements and documenting their solutions as well
- n) Writing and examining the progress reports of the commissioning process
- o) Examining the construction progress reports
- p) Verify that new equipment and systems are incorporated into the maintenance management program
- q) Notifying all commissioning team members of decisions that cause changes in project needs.

Buildings consist of static systems (e.g., building envelope, building structure etc.) and dynamic systems (e.g., HVAC, lighting etc.). During the commissioning process, all systems and equipment that could have a significant impact on the building's ability to meet energy performance targets shall be included in the study.

The commissioning work will not just be the functional tests and training. It will also be used for the first or early performance evaluation of the project implementation. The objective is to have a first indication of the system behaviour regarding energy performance and compliance with the energy audit objectives in the form of an operational verification. Hence, operational verification of energy efficiency measures shall be clearly stated in the commissioning plan in order to have the preliminary energy performance assessment of the project.

Further definition and details of intended commissioning process is provided in the project's website in the form of “*Commissioning Handbook*”. Please refer to this handbook for detailed process overview and intended outcome of the process.

Web-link: <https://www.kabev.org/kutuphane/kilavuzlar/>

2.3) Detailed Renovation Designs, Technical Specifications & Bill of Quantities

The technical designs and all tender documents for the construction tender shall be prepared based on the approved energy audit reports and a cost-benefit analysis, using clear energy savings indicators, which then should be monitored and verified upon project completion.

Following the approval of the Preliminary Design Stage Report and the agreement between the Client and the beneficiaries on the EE/RE measures to be included, the Consultant shall prepare the detailed renovation designs and technical specifications for works to be tendered and implemented in the selected public buildings of the buildings. After agreement between the Client and the beneficiaries on the EE/RE measures to be included, the Consultant will prepare detailed renovation designs and technical specifications for works to be tendered and implemented in the selected public buildings. Detailed renovations should include architectural (including comparative drawings clearly showing the revisions/differences/interventions before and after renovation) and engineering services (all mechanical and electrical services, including but not limited to: heating, cooling, ventilation, hot and cold water supply systems, fire protection, electrical supply system, lighting system, gas distribution, power and service sockets, telephone/television/radio, lifts, building management/automation system (if any) etc.) related with renovation and collateral works.

Renovation designs and general and specific technical specifications for all the renovation works shall be prepared in accordance with MoEUCC's “Construction Works, Civil, Mechanical Works and Electrical Works General Specifications”. However, if no proposed interventions are being considered for a particular area (e.g., no lighting or other electrical measures), detailed (e.g., electrical) drawings may not be required.

In case a solar PV installation measure exists in the finally approved EEM list, Consultant shall organize and coordinate the whole Call Letter process (GES Çağrı Mektubu) with the beneficiary and/or building owner institution, electricity distribution grid operator company and/or Turkish Electricity Distribution Grid Operator (TEDAŞ). Consultant shall receive Call Letter at the end of the

formal application process. All formal application tax, duties and costs shall be born by the Consultant.

In case a cogeneration /trigeneration measure exists in the finally approved EEM list, Consultant shall carry out the mechanical/electrical design process by keeping in mind that these systems will need an approval from relevant central and regional energy authorities (Ministry of Energy and Natural Resources, Turkish Electricity Distribution Grid Operator (TEDAŞ) or Turkish Electro-mechanic Industries Co. (TEMSAN)) and regional environment authorities (Environmental Impact Assessment Exemption, etc.). Hence, all provisional design and calculations shall be made based on not only the building’s electrical/thermal loads but also the capacity and availability of the connected transformer of local electrical grid, the regional grid operator’s feedbacks/opinions.

Design drawings should be presented in such a way that:

- The drawings can easily be understood
- They visually communicate the concept to the beneficiary and the construction contractor
- They clearly show the renovation interventions before and after renovation so the beneficiary and construction contractor can easily understand what sections/areas/systems/components are to be renovated
- Clear and understandable “General Notes” and “Project Specific/Key Notes” should be embedded in the design plans/drawings so that the beneficiary and construction contractor can easily understand what to be done at which areas/sections/systems/components
- Scope of demolition work and new work shall be clearly identified on the drawings
- They are legible
- All information from previous revisions and updates are included.
- No details will be provided in the areas not subject to any intervention.

The design drawings should include the following aspects:

- Site layout for each building (within the campus, considering the scope of buildings and any other works (if applicable) required outside the buildings.
- Plan views (focusing on the areas related with the renovation works) and system cross-sections and details as necessary from the points of renovation
- Elevations showing scope of demolition and new works. Demolition drawings, plans, section and details as necessary
- Occupational Health and Safety (OHS) related tentative placements on drawings including but not limited to:
 - vehicle and pedestrian roads and possible measures to be taken,
 - social facilities of workers (i.e. dining hall, dormitory, health unit, if any, resting places, showers and toilets, etc., if they are inside the building, their floors and locations will also be shown.),
 - warehouses and waste areas,
 - emergency assembly areas escape routes,
 - areas where lifting vehicles (tower cranes, etc.) will be used and scaffolding will be erected, etc., horizontal and vertical lifelines are necessary,
 - Holes and openings threatening safety of workers

The technical drawings and details will be in 1/50 scale, and details including system details (for interventions 1/20, 1/5 scales, 1/1 scale if needed), which have to be compliant with the applicable in force regulations:

- (i) **Architectural drawings:** Site layout, floor plans/construction plans with all partition types

and details provided for the areas subject to intervention, lighting plan for ceilings, System cross-sections from the points of renovation.

- (ii) **Mechanical drawings** (in conformity with the heating zone where the building is located): The mechanical installation drawings should include the components recommended to be replaced by the energy audit. Heating, cooling, ventilation and sanitary plumbing projects and system drawings specific to each project should be prepared according to the obtained energy audit reports in conformity with electrical and architectural designs. Heat insulation calculations and reports should be prepared according to TS 825 Standard.
- (iii) **Electrical drawings:** The electrical installation drawings should include the components recommended to be replaced by the energy audit. MV distribution, transformer, generator, UPS, lighting, socket (mains and UPS), mechanical and force distribution, cable transportation, earthing and lightning protection, elevator, table loading tables, strong current column diagram and calculations (lighting, heating, short circuit, voltage drop). Energy efficiency comparisons (comparison of current and new status) should be shown in the corresponding plans. Necessary infrastructure plans should be prepared for the remote monitoring of energy consumption.
- (iv) **Structural drawings:** Structural plans, sections and details along with structural calculations based on relevant in force codes/regulations for the works to be done independent of the existing structure (i.e. open parking lot canopies, canopy rooftop PV systems, etc.) Superposition plan of new components and existing structures (i.e. frame systems supporting rooftop PV system, solar hot water collectors, etc.) Structural design and calculation reports of newly added systems/components in compliance with in force codes/regulations (i.e. structural calculations and reports of the frames supporting the PV panels, solar hot-water collectors, etc.) Structural calculation reports and checks which will verify that the existing structure will be able to safely support the newly added systems (i.e. verification report of the roof being able to safely bear rooftop PV systems, solar hot water collectors, etc.) Seismic calculation and design of the restraints of cogeneration/trigeneration systems and suspended piping network if applicable.

The compliance of renovation designs with standards and regulations in force in Turkey shall be certified by the Consultant. The specifications shall be prepared in accordance with the Building Code, current By-law Concerning Construction in Planned Areas, By-Law on Building Energy Performance and related Turkish legislation and standards.

Company should also propose measures to be taken in order to meet the national norms, standards and legislations about additional aspects (e.g., indoor air quality, humidity, comfort levels, fire protection measures).

Regarding hospitals, if the Ministry of Health or hospital administrations request COVID-19 measures for any of its buildings in list, mechanical drawings should include measures to be taken such as modifications in filters or mechanical installations for COVID-19 patient rooms.

The draft renovation design must be submitted to the beneficiary for formal consent, and to any required third parties for review and certification. Any comments provided by the beneficiary, third party auditor or the Client must be taken into account before the designs are finalized.

Within the scope of preparation of technical specifications, Consultant shall;

- Submit final Bill of Quantities (BoQ), all related design calculations, and relevant final cost comparison analysis. Prepare BoQ's in compliance with unit price guidelines of MoEUCC or other relevant state authorities or market prices. BoQ's prepared by the Consultant should be in compliance with pricing preambles, technical specifications and other relevant parts of the documents to be prepared for tender process. The BoQs and related cost estimation tables shall be prepared by using an accurate and easy-to-use cost estimating software that is approved by the Client.
- As specified above, for the Preliminary Design and Detailed Renovation Design Stage specified above, the Technical Specifications, Bills of Quantities, final designs,

system/detailed drawings shall be prepared and submitted to the Client for approval, following the decision of the Client on which parts of these works shall be integrated to the relevant parts of the tender documents.

- The Consultants shall prepare all the deliverables in close cooperation with the Client and with due care and diligence. Any of the items in these documents shall not contradict with each other and all material specifications shall be in accordance with the specifications of the first quality materials satisfying the Turkish Standards, or otherwise international standards.

The Consultant, before finalizing and submitting the technical designs and tender documents to the Client, shall present the detailed renovation designs of the buildings to the beneficiary (and their user/occupant committees) for their approval considering their needs and the function of the building. The Consultants shall submit a letter countersigned by the principal and/or directorates of the relevant public buildings and the Consultant’s representative indicating that the principal and/or directorate is informed about and agreed on the Final Architectural, Structural, Mechanical and Electrical works subject to tendering following the decision of the Client on the works approved to be integrated to the relevant parts of the tender documents.

Revisions shall be made by the Consultant, in drawings or other documents in case of any discrepancy or mistake recognized during the Construction Phase.

Further definition and details of intended detailed renovation designs is provided in the project’s website in the form of “**Detailed Renovation Designs Checklists**”. Please refer to this checklist document for detailed overview of how detailed renovation design documentations are going to be checked by MoEUCC and eventually approved as a result of this process.

Web-link: <https://www.kabev.org/kutuphane/kontrol-listeleri/>

2.4) Visual Presentation Materials

The Consultant shall prepare graphic representation (rendering) of the buildings, zones, rooms and design steps, which are interrelated with the EEMs. The graphic representations shall include creation of three-dimensional images and animations showing the attributes of proposed renovation designs. These efforts shall be supported by high resolution and quality photos of existing status for comparison and it shall include photos of:

- At least four different façades
- Roof (from above showing All the roofing, preferably with the help of a drone camera)
- Fenestration systems
- Heating system (Boilers, pumps, piping, valves, insulation, etc.)
- Cooling system (chillers, Cooling towers, pumps, valves, piping, insulation, outdoor a/c units, rooftop units, etc.)
- DHW (accumulation tanks, heat exchangers, pumps, insulation, piping, etc.)
- Solar water heater system
- Ventilation system (air handling units, piping, ducts, etc.)
- Lighting system (fixtures, bulbs, panels, etc.)
- Room thermostats, radiators, fan-coil units, etc.
- Automation system
- Renewable Energy systems, if exists
- Co-generation/tri-generation units, if exists

Up to 500-1000 presentation visuals including posters, brochures, catalogues and leaflets will be prepared, printed and distributed by the Consultant for each building complex to give information and to raise awareness about the energy efficiency measures implemented in the building, and the benefits of these applications.

The graphic designs of the presentation visuals will be subject to the Client approval before printing. All visual materials shall include the logo and the names of the Client and the project, the template of which will be provided by the Client. The posters will be presented especially in the areas/sections where innovative and green applications are implemented.

2.5) Final Synthesis Report

The Consultant shall submit a synthesis report after completion of all final designs and relevant tender documents. The report shall at least cover;

- An executive summary indicating overall information regarding the scope of the services, amendments, final decisions, energy efficiency measurements and methodologies indicating comparison of energy consumption before and after renovation works,
- An overall Report that brings together in one place all the information used to produce the Consultant’s recommendations for renovation works of the buildings assessed in the project. The report shall only cover the methodologies, summary of processes, brief of the recommendations and summary of findings.
- Building executive summary reports for each public building under the scope of the Consultant.
- Consultant should revise and finalize investment Grade Energy Audit Reports and M&V and Commissioning plans if needed.

The Consultant shall provide a full risk assessment, performance indicators and an implementation strategy for the Construction process, to be used by the Client.

The Consultant shall provide Final Investment Grade Energy Audit Reports, M&V and Commissioning plans if changed.

Deliverables

- 2.1 M&V Plan
- 2.2 Commissioning Plan
- 2.3 Detailed Renovation Designs, Technical Specifications & Bill of Quantities
- 2.4 Visual Presentation Materials
- 2.5 Final Synthesis Report

Task 3: Identify Environmental and Social Risks

3a) Identify environmental and social risks and impacts associated with the building renovations: Identify environmental and social risks associated with the building renovation, including identifying presence and quantity of any hazardous materials (specifically asbestos and mercury containing light-bulbs) that would have to be removed as part of the renovation works.

3b) Prepare site specific Environmental and Social Management Plans (ESMPs): Prepare site-specific Environmental and Social Management Plans (ESMPs) in line with the Environmental and Social Management Framework (ESMF) developed for the Project and submit them to the Client to be finalized and integrated into construction contractor bidding documents. The ESMF of the project entails an ESMP format, which shall be deployed in development of ESMPs for renovation activities. In addition, the consultant shall update ESMPs during implementation/construction in consultation with the construction contractors, during construction, if required. The ESMPs shall include specifications and bill of quantities for removal, packaging, transport and disposal/interim storage of hazardous materials, personal safety equipment, monitoring requirements (the Environmental Mitigation and Monitoring Measures based on the Environmental and Social Management Framework) and estimate of costs for the measures. This will also include the location where the asbestos can be disposed and the interim storage location for the mercury containing lightbulbs as per ESMF and Turkey legislation. The Consultants shall also liaise with MoEUCC in order to finalize the ESMPs and help MoEUCC organize disclosure and consultation for the ESMPs with the public, stakeholders who might be affected from the renovations.

Each of the ESMPs will be made publicly available on MoEUCC’s website and the physical copies will be accessible by the public at the offices in the construction yard during the construction activities. In this manner, all stakeholders will have full access to the ESMPs, which provides information regarding the potential environmental and social impacts and the details of the mitigation measures to be taken. The Consultant will make sure that both site specific ESMPs will be publicly

available at the construction sites, and easily accessible places within the local area.

3c) Prepare site specific Occupational Health and Safety (OHS) Plans

- Prepare site specific Health and Safety plan in line with Turkish Occupational health and Safety regulation in Construction, the World Bank Group (WBG) General Environment, Health and Safety (EHS) Guidelines and Good International Industrial Practices (GIIPs).
- The OHS Plan shall outline the health and safety hazards mitigation, monitoring and mitigation measures to be taken during project implementation to avoid or eliminate health and safety risks to the workers and community
- The Consultant shall prepare the OHS Plan in both English and Turkish languages for World Bank review, until otherwise advised by the World Bank at later stage of the project implementation.
- The Consultants shall liaise with the MoEUCC in order to finalize the OHS Plan with the World Bank’s approval and help MoEUCC to organize disclosure and consultation for the OHS Plan with the public (especially including the stakeholders who might be affected from the renovations).
- The OHS Plan shall include specifications an, bill of quantities for scaffolding, packaging, transport and disposal/interim storage of hazardous materials, personal protective equipment, monitoring requirements and estimate of costs for the measures.
- All occupational health and safety hazards, which related with work shall be defined and OHS plan shall be prepared including those information such as risk mitigation measures, responsibilities, log out tag out procedure, work permit system, community safety and traffic management plan etc.

Deliverables

3.1 Environmental and Social Management Plans (ESMPs)

3.2 Occupational Health and Safety (OHS) Plans

VI. Timeline & Submission Requirements for Deliverables

This assignment will be held in the 1th quarter of 2023 and finalized in 10 months’ period. The deliverables for each task will be submitted to and approved by the Client. The Consultant must obtain approval for each deliverable before moving to subsequent tasks. The Client shall give a decision within 15 days of receipt of a review or approval request. The deadlines for the submission of the deliverables (including Client’s review and approval durations) are given below.

Table 3: Tentative Timeline*

N°	Tender Package	Months														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1 st Group of Campuses (Campus 1, 2)	■	■	■	■	■	■	■								
2	2 nd Group of Campuses (Campus 3-5)		■	■	■	■	■	■								
3	3 rd Group of Campuses (Campus 6,7)			■	■	■	■	■	■							
4	4 th Group of Campuses (Campus 8-29)				■	■	■	■	■	■						

*The Group of buildings are given in the Annex 1

■ Investment Grade Energy Audit Reports

■ Detailed Renovation Designs, Specifications, BoQ, M&V Plans, Cx Plans

Table 4: Deliverables

Tasks	Deliverables	Submission Deadline (after effectiveness of the contract)
1	1.1 Monthly Audit Progress Report	Each month until submission of Investment Grade Energy Audit Reports
	1.2 Investment Grade Energy Audit Reports	4 Months
	1.3 Survey Plans and Drawings	
2	2.1 M&V Plan	7 Months
	2.2 Commissioning Plan	
	2.3 Detailed Renovation Designs, Technical Specifications & Bill of Quantities	
	2.4 Visual Presentation Materials	
	2.5 Final Synthesis Report	
3	3.1 Environmental and Social Management Plans (ESMPs)	
	3.2 Occupational Health and Safety (OHS) Plans	

All deliverables need to be prepared in Turkish. The Investment Grade Energy Audit Report, M&V plan, and commissioning plan of one of the buildings will be translated into English.

All deliverables will be submitted as (i) one hard copy (signed and stamped), (ii) soft copy (on a SSD (Solid State Drive)), and (iii) uploaded to an online platform, which the Client addresses.

The metric system of weights and measures shall be used. The drawings shall be submitted in the format, labelling, grouping and details as required by the Client. The plot size, parcel, map sheet for all buildings shall be listed and integrated into the drawings and other required documents.

Digital formats shall be as follows:

- Format of Reports/Documents : MS Office Word/Excel/PowerPoint & PDF
- Format of Drawings : AutoCAD 2006 (or newer) & PDF

Printing formats shall be as follows;

- Format of Reports/Documents : A4 or A3 including where appropriate drawings could be reduced to A3 size
- Format of Drawings : A1 size (unless otherwise required or agreed)
- Scale of Drawings : To be agreed with the Client.
- Format of Visual Presentation Materials
 - Format of Posters : A0, A1 and A2 size /min. 300dpi
 - Format of Others : A4 size/min. 300dpi

As indicated in the General Conditions of Contract all the drawings, reports, plans, specifications, and any other documents produced under this Contract are the property of the Client.

VII. Facilities provided by the consultant

The Consultant must ensure that its professional staff has adequate support and equipment. All costs for equipment and administrative and logistic support must be covered by the Consultant and included in the bid price, including:

- All costs arising from the activities of its staff during the contract period, including accommodation, allowances, transportation, insurance, etc.

- Automotive, equipment, equipment for field and lab tests, office supplies, hardware and software (software for modeling and static/dynamic analysis of critical structures) etc.
- All communication costs, including fax, email, telephone, etc.
- All the equipment, instruments, services and logistical support required for the implementation of the contract, and any costs incurred during its preparation of documents and drafts, copying, printing, qualified translation, interpretation etc.
- Technical equipment at the monitoring site.

VIII. Support to be provided by the client to the consultants

- The Client provides inputs, project data, reports etc. about the buildings with the RFP if exist. The consultants shall verify the provided inputs during the field studies and in all cases; the assignment shall be undertaken according to the consultant’s own inputs.
- If any delay or no response received from the beneficiary or other third parties during the execution of aforementioned tasks, the Consultant shall inform the Client in a timely manner with indicating the possible grounds. The Client will accelerate the process or give consent to proceed the task.

IX. Team Composition and Qualification Requirements for the Key Staff

- The working language of the project is English. All the team members assigned by the Consultant must possess proficiency in English language. Day-to-day communication language will be Turkish or English at the field level to ensure smooth communication among all participants, direct and indirect, of the Project.
- All key staff and support staff shall be mobilised immediately after the contract signature.

Table 5: Key staff’s qualifications shall include but not limited to the following:

Task	[N°] - Position	Required Experience
All Tasks	[K-1] - Team Leader (1):	Architect, Civil, Electrical or Mechanical Engineer with minimum fifteen (15) years of professional experience, includes at least ten (10) years’ energy efficient similar building design experience and five (5) years working experience in manager position.
Task.1	[K-2] - Mechanical Engineer (1):	Mechanical Engineer having ten (10) years of professional experience including five (5) years’ similar building energy audit experience and also energy manager or audit-project certification given by Ministry of Energy and Natural Resources is mandatory.
	[K-3] - Electrical Engineer (1):	Electrical Engineer having ten (10) years of professional experience including five (5) years’ similar building energy audit experience and also energy manager or audit-project certification given by Ministry of Energy and Natural Resources is mandatory.
	[K-4] - Architect (1):	Architect with minimum five (5) years of professional experience, includes at least three (3) years’ energy efficient similar building design experience.
	[K-5] - Structural Engineer (1):	Civil Engineer with minimum ten (10) years of professional experience includes at least five (5) years’ experience in structural engineering of superstructures.
Task.2	[K-6] - Design Architect (1):	Architect with minimum five (5) years of professional experience, includes at least three (3) years’ energy efficient similar building design experience.
	[K-7] - Mechanical Engineer (1):	Mechanical Engineer having ten (10) years of professional experience including five (5) years’ energy efficient similar building design experience.

Task	[N°] - Position	Required Experience
	[K-8] - Electrical Engineer (1):	Electrical Engineer having ten (10) years of professional experience including five (5) years' energy efficient similar buildings design experience
	[K-9] - Structural Engineer (1):	Civil Engineer with minimum ten (10) years of professional experience includes at least five (5) years' experience in structural engineering of superstructures.
	[K-10] - Cost and Planning Engineer (1):	University degree in engineering with minimum five (5) years of professional experience includes at least two (2) years' experience in tender documentation. These experiences should be mainly on development of project specifications, time schedules and budgets of prepared designs of similar buildings.
	[K-11] - Measurement & Verification Expert (1)	Certified Measurement and Verification Expert having five (5) years of professional experience
	[K-12] – Commissioning Specialist (1)	Engineer having ten (10) years of professional experience including three (3) years of test & commissioning works experience.
Task.3	[K-13] - Environmental Specialist (1):	Environmental Engineer with minimum five (5) years of professional experience including at least three (3) years' experience in the national environmental legal framework, environmental impact/risk assessment, preparation of environmental assessment tools (ESMP, Environmental and Social Impact Assessment (ESIA), etc.) and knowledge in environmental safeguard policies and ESSs of the World Bank's Environmental and Social Framework (ESF) or other international development institutions, GIIPs.
	[K-14] - Social Specialist (1):	University degree in sociology with minimum five (5) years of professional experience including at least three (3) years' experience in gender studies, using SPSS Statistics Programme actively, to have conducted at least 1 study/research on quantitative data analysis and reporting University degree in sociology with minimum five (5) years of professional experience including at least three (3) years' experience in gender studies, using SPSS Statistics Programme actively, to have conducted at least 1 study/research on quantitative data analysis and reporting.
	[K-15] – Occupational Health and Safety Specialist (1):	Occupational Health and Safety Specialist with minimum five (5) years of professional experience, including at least three (3) years' experience in OHS assessment and management in construction projects financed by international finance institutions or other international donors, preferably the World Bank and with a knowledge in environmental and social safeguard policies and ESSs of the World Bank's ESF or other international development institutions, having A or B Class Occupational Safety Expert certificate received from the Directorate General of Occupational Health and Safety or equivalent international certificate.
All Tasks	[N-...] - Technical Support Staff	Support staff for the technical services with minimum three (3) years of professional experience shall be proposed additionally as required (architects, surveyors, mechanical and electrical technicians/junior engineers, OHS personnel, etc.)
	[N-...] -Administrative Support Staff	Support staff for the administrative services shall be proposed additionally as required (clerks, drivers, secretary, etc.)

Annex-1: List of Buildings covered under the Assignment

Annex-1:

List of Buildings covered under the Assignment

Group No	No	Name of Campus	Beneficiary Institution	City	Number of Blocks	Construction Area (m ²)	Group m2
1	1	Kırıkkale University Faculty of Medicine and Hospital	Kırıkkale University	Kırıkkale	1	45.471,00	90.971,00
	2	Kırıkkale University Faculty of Health Sciences and Physical Therapy Rehabilitation Hospital	Kırıkkale University	Kırıkkale	1	45.500,00	
2	3	Building of Council of State	Council of State	Ankara	9	81.403,00	119.163,00
	4	Çubuk Halil Şıvgın State Hospital	Ministry of Health	Ankara	1	19.735,00	
	5	Beypazari State Hospital	Ministry of Health	Ankara	1	18.025,00	
3	6	Beytepe Murat Erdi Eker State Hospital Main Building	Ministry of Health	Ankara	4	21.573,00	199.641,00
	7	Gendarmerie and Coast Guard Academy	Ministry of Interior	Ankara	31	171.068,00	
4	8	International National Girls Anatolian Imam Hatip High School	Ministry of Education	Ankara	3	13.612,50	149.723,00
	9	Yakacık Anatolian High School	Ministry of Education	Ankara	1	6.410,00	
	10	Etilik Anatolian Imam Hatip High School	Ministry of Education	Ankara	1	7.310,00	
	11	Ankara Etimesgut Hayriye-Ethem Turhanlı Vocational and Technical Anatolian High School	Ministry of Education	Ankara	1	4.000,00	
	12	Pınarbaşı Vocational and Technical Anatolian High School	Ministry of Education	Ankara	1	6.700,00	
	13	Kocalar Anatolian Imam Hatip High School	Ministry of Education	Ankara	1	6.830,00	
	14	Törekent Vocational and Technical Anatolian High School	Ministry of Education	Ankara	1	6.550,00	
	15	Dede Korkut Anatolian High School	Ministry of Education	Ankara	1	8.800,00	
	16	Yunus Emre Anatolian High School	Ministry of Education	Ankara	1	6.000,00	
	17	Güzelkent Anatolian High School	Ministry of Education	Ankara	1	6.592,00	
	18	Şehit Büyükelçi Daniş Tunalıgil Vocational and Technical Anatolian High School	Ministry of Education	Ankara	1	5.705,00	
	19	Mustafa Azmi Doğan Anatolian High School	Ministry of Education	Ankara	1	6.235,00	
	20	Keçiören İMKB Vocational and Technical Anatolian High School	Ministry of Education	Ankara	1	5.691,00	
	21	Şehit Rıdvan Süer Anatolian High School	Ministry of Education	Ankara	1	6.150,00	
	22	Mustafa Kemal Vocational and Technical Anatolian High School	Ministry of Education	Ankara	1	7.657,00	
	23	Gölbaşı Vocational and Technical Anatolian High School	Ministry of Education	Ankara	1	5.665,00	
24	Rasim Özdenören Anatolian High	Ministry of	Ankara	1	7.150,00		

	School	Education			
25	Polatlı Science High School	Ministry of Education	Ankara	1	6.550,00
26	Mahir İz Anatolian Imam Hatip High School	Ministry of Education	Ankara	1	5.200,00
27	Kırkkonaklar Anatolian High School	Ministry of Education	Ankara	1	5.200,00
28	Gölbaşı Anatolian High School	Ministry of Education	Ankara	1	6.715,00
29	Mamak Anatolian Imam Hatip High School	Ministry of Education	Ankara	1	9.000,00
	TOTAL			73	552.497,50



REPUBLIC OF TURKEY

MINISTRY OF ENVIRONMENT, URBANIZATION AND CLIMATE CHANGE (MOEUCC)

GENERAL DIRECTORATE OF CONSTRUCTION AFFAIRS (GDCA)

“Energy Efficiency in Public Buildings Project”

Loan No: 9015-TR | Project ID: 162762

CONSULTANCY SERVICES FOR

**ENERGY AUDIT, DESIGN AND CONSTRUCTION SUPERVISION
SERVICES FOR ENERGY EFFICIENCY RENOVATIONS IN PUBLIC
BUILDINGS**

Reference No:

EEPB/WB/MoEU/QCBS-DES&SUP-12

TERMS OF REFERENCE

“For Construction Supervision”

Issued on: June 10, 2022

**TERMS OF REFERENCE
(TOR)
FOR TIME BASED CONTRACT**

**CONSULTING SERVICES ON THE CONSTRUCTION SUPERVISION AND
COMMISSIONING FOR ENERGY EFFICIENCY BUILDING RENOVATIONS**

(REF: EEPB/WB/MoEUCC/QCBS-DES&SUP-12)

I. Introduction

The Ministry of Environment Urbanization and Climate Change (MoEUCC) has received financing from the World Bank toward the cost of the Energy Efficiency in Public Buildings Project (EEPBP) and intends to apply part of the proceeds for consulting services.

The project investments will focus primarily on the renovation of central public buildings with high energy consumption and shorter pay-back periods. The proposed project would be implemented through two components: (i) energy efficiency (EE) investments in central government buildings; and (ii) technical assistance (TA) and project implementation support. The General Directorate of Construction Affairs (GDCA) under the MoEUCC has been delegated to assume overall responsibility for the project. This will include completion of the necessary activities to support project preparation as well as implementation for the six-year project period. In parallel, grant funding has been mobilized from the Clean Technology Fund (CTF) to help analyze the investment needs and potential of the central government buildings.

The GDCA has established a project implementation unit (hereinafter called the “Client”) to administer all aspects of the project, including selection of the buildings, procurement of the various contractors (e.g. energy audits, technical designs, renovation works, construction supervision, savings verifications, technical assistance or consultancies, etc.), and monitoring.

Through the EEPBP, approximately 500-700 public buildings will be renovated for EE. Investments would include building envelope measures (roofs/wall insulation, windows, doors), heating/cooling systems, water heating, pumps/fans and lighting and some renewable energy (RE) applications (e.g., rooftop solar PV, biomass heating, solar water heating, geothermal heat pumps) to offset the building’s electricity/fuel use. A limited amount of funds may be allocated for non-EE/RE measures (e.g., rewiring, minor structural repairs, painting, seismic safety, etc.).

Within the framework of the EEPBP, a consulting firm will be employed to carry out construction supervision and building commissioning.

II. Scope of Services

The Consultant will be required to carry out construction supervision and building commissioning services, issuance of an energy performance certificate after the renovation, supervise remedial works to rectify defects that arise during the Defects Notification Period (DNP), and prepare Measurement and Verification (M&V) reports for the renovated buildings.

Estimated total area of buildings for renovation in twenty-nine (29) campuses having **552.497,50m²**.

Table 1: List of the Campuses to be renovated in the scope

No	Name of Campus	Beneficiary Institution	City	Number of Blocks	Construction Area (m ²)
1	Kırıkkale University Faculty of Medicine and Hospital	Kırıkkale University	Kırıkkale	1	45.471,00
2	Kırıkkale University Faculty of Health Sciences and Physical Therapy Rehabilitation Hospital	Kırıkkale University	Kırıkkale	1	45.500,00

3	Building of Council of State	Council of State	Ankara	9	81.403,00
4	Çubuk Halil Şıvgın State Hospital	Ministry of Health	Ankara	1	19.735,00
5	Beypazari State Hospital	Ministry of Health	Ankara	1	18.025,00
6	International National Girls Anatolian Imam Hatip High School	Ministry of Education	Ankara	3	13.612,50
7	Beytepe Murat Erdi Eker State Hospital Main Building	Ministry of Health	Ankara	4	21.573,00
8	Gendarmerie and Coast Guard Academy	Ministry of Interior	Ankara	31	171.068,00
9	Yakacak Anatolian High School	Ministry of Education	Ankara	1	6.410,00
10	Etlık Anatolian Imam Hatip High School	Ministry of Education	Ankara	1	7.310,00
11	Ankara Etimesgut Hayriye-Ethem Turhanlı Vocational and Technical Anatolian High School	Ministry of Education	Ankara	1	4.000,00
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17	Güzelkent Anatolian High School	Ministry of Education	Ankara	1	6.592,00
18	Şehit Büyükelçi Daniş Tunalıgil Vocational and Technical Anatolian High School	Ministry of Education	Ankara	1	5.705,00
19	Mustafa Azmi Doğan Anatolian High School	Ministry of Education	Ankara	1	6.235,00
20	Keçiören İMKB Vocational and Technical Anatolian High School	Ministry of Education	Ankara	1	5.691,00
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24	Rasim Özdenören Anatolian High School	Ministry of Education	Ankara	1	7.150,00
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27	Kırkkonaklar Anatolian High School	Ministry of Education	Ankara	1	5.200,00
28	Gölbaşı Anatolian High School	Ministry of Education	Ankara	1	6.715,00
29	Mamak Anatolian Imam Hatip High School	Ministry of Education	Ankara	1	9.000,00
	TOTAL			73	552.497,50

III. Description of the Consultants’ Tasks

The Consultant as “the Engineer” or “the Project Manager” shall be responsible to carry out all the duties envisaged in World Bank’s Standard Procurement Documents (SPD). The Consultant shall also be responsible as the “Engineer” or “the Project Manager” to provide details and instruct the contractors whenever it necessitates, during the course of works and execute the services in accordance with recent laws and regulations (including the sub-project specific ESMPs). Significant issues shall be subject to approval of the Client as indicated in the General Conditions (GCC) or Special Conditions (SCC) of the Construction Contracts.

The Consultant’s Key Experts (e.g. Structural, Mechanical, Electrical, Environmental Engineers and Architects, Social and OHS) shall check and review the existing designs for their applicability to field. If any revision is needed in the existing designs, a report will be provided to the Client. If the revision needs to be approved by a “Design Supervisor”, the approval will be obtained by the consultant. All costs of “Design Supervisor” approval belong to the consultant.

The Consultants shall provide sufficient, qualified and experienced staff to ensure proper construction supervision of the works and engineering services both during the Construction period and during the Defects Notification/Maintenance period.

Task 1: Carry out construction supervision and building commissioning services

Consultant’s responsibilities (included but not limited to) for this task are summarized as follows:

Initiation of the Works:

- The Consultant shall follow up evacuation of buildings (if needed) respect to Contractors’ work programs closely on site and shall communicate with related authorized persons for public buildings (in compliance with the mitigation measures identified within the sub-project specific ESMPs). The Client shall be informed simultaneously of the actual evacuation progress. In case the evacuation is not place on time, the Consultant will take the necessary measures, in close cooperation with the Client and the Contractors, to ensure the timely completion of the works.
- The Consultant shall collect necessary documents required for obtaining the modification construction permit (if needed) from the municipality and assist the Contractors for obtaining the modification construction permit. The Consultant shall also sign the documents be submitted for construction permit.
- The Consultant shall prepare Initial Inspection Reports of the buildings showing the initial status. The report shall include existing status pictures of areas to be intervened. Additionally, the Consultant shall review the designs, plans, technical specifications, BOQs, etc. that were originally prepared during the Lump-Sum (first phase design services) Contract and any alteration request of Contractor(s). In case of existence of any findings that may adversely affect the quality of the work, increase the Contract Price, or delay the execution of the Works, the Consultant may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the contract price and completion date of the Works. In case, it is considered that any alterations in any of the Contract Documents necessary by the Consultant, the Consultant shall prepare and submit such alterations to the Client with the Initial Inspection Report. The report should be supported by the necessary photos, calculations, details and, time and cost implications. The Consultant shall state whether the alterations will cause any delay in the work program, and therefore the contractor(s) to be entitled any time extension or not, supported by necessary documentation. On receiving written approval from the Client, the Consultant shall promptly amend the existing designs or supply any additional designs, plans, drawings and specifications where required or found necessary for the satisfactory completion of the works. The Client shall not be responsible from the consequences of the fact of which the Client is not informed in advance.
- The Consultant shall ensure that the Contractor deliver the hoarding panels and install them around the construction site appropriately before construction work starts.

Supervision of Works

- The Consultant shall supervise and oversee all aspects of the construction and installation of the various components of the works and engineering services to ensure strict compliance with the drawings and contract documents.
- The Consultant shall ensure the construction progress complies with the work-plan, building access plan, and restrictions (for access to users during the construction phase).
- The Consultant shall take Weekly Site Pictures from at least 5 points for each building, showing the progress on the site with dates, record them, and submit to the Client in an acceptable format by the Monday of each week via electronic mail.
- The Consultant shall carry out the Services with all due diligence, care and in timely manner so as not to cause any delay. It is deemed that the Consultant familiarized himself with the nature of Project and is expected to take all sorts of precautions during the performance of Services to get the works completed by the Contractors on time.
- It is the duty of the Consultants to interpret the drawings and specifications and to consult with the Contractors as required to ensure compliance with the Contract Documents and the construction/installation work-plan.
- In case, the Contractor may execute some of the works (i.e. concrete) in night hours rather than daily hours because of the sustainability of services in buildings or any other reasons. In that case, Consultant will arrange his staff employment according to this condition without any extra cost to the Client and the Contractor.
- The Consultant shall arrange weekly and monthly meetings with contractors, inform the Client about progress of the work, activities, health and safety issues, and attend any meetings reasonably convened by the Client and provide any information or evidence reasonably required by the Client at any public meetings or inquiries, which might be held in connection with the Project.
- Since the similar construction works may also be supervised by other Consultants in other sites, the Consultant shall co-operate with the other Consultants and join the meetings whenever required by the Client.

Supervision of ESMPs and OHS Procedures

- Ensure that all health & safety measures are respected by the construction company in compliance with the monitoring and reporting requirements of relevant official authorities and the World Bank
- The Consultant shall take necessary measures for environmental, social and occupational health and safety aspects. The Consultant shall ensure that the Contractor’s activities are following the ESMP and OHS Plan. The Consultant shall supervise the Contractor’s implementation of environmental and social mitigation measures as identified in the ESMP and OHS Plan. The Consultant shall provide feedback and give notice to the Client regarding environmental and social issues at sites.
- If the Contractor is found to be non-compliant with the ESMP requirements, the Consultant shall file a non-conformity report and any relevant payment orders should be put on hold, until non-compliance issues are remedied satisfactorily or issue a fine in consultation with Client.
- The Consultant shall supervise the Contractor on behalf of the Client for performing and implementation of all Occupational Health and Safety activities (including mitigation/prevention measures to address Covid-19 or any other communicable disease/pandemic risk) in accordance with the enforcement of the related Turkish Laws and legislations, and measures specified in the ESMP and OHS plan. The consultant duties and responsibilities shall include:

- Conduct regular visits which are daily controls, weekly inspection monthly audits to all construction sites to check the contractor’s OHS documents and compliance, provide on-the-job trainings, ensure compliance of the works with OHS practices and regulations, and issue non-compliance notices to the contractor and report the same to the Client.
- Ensure that the workers are provided OHS training and have complete health records and personal files in accordance with pertinent legal requirements, and avoid access of the workers to work site if there any non-compliance
- Make available an OHS expert in high-risk worksites (e.g.: high elevations scaffolds, confined space, crane works, digging works, etc.).
- Check and approve conformity of equipment/ machines on worksites with national standard, and avoid their use in case of non-compliances
- Promptly notify the Client within 48 hours of any incident or accident related to the Project which has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers including health and safety serious injuries and road accidents. Provide sufficient detail regarding the incident or accident, indicating immediate measures taken or that are planned to be taken to address it, and any information provided by any contractor
- Participate in the contractor's regular OHS meetings which will be hold monthly and provide input for needed improvements.
- The Consultant shall check periodic checks of lifting vehicles, boiler and tanks and control scaffolding, welding tubes, small hand tools, etc. are met with the standards (e.g. CE, TSE, BS)
- The Consultant shall control and approve method of statement, which will be prepared by contractor before each work start. If needed consultant help contractor to prepare the document
- Consultant shall conduct safety visit t to site periodically with project manager, construction manager and OHS manager
- In case of urgent, imminent and life-threatening non-conformities, the Consultant suspends the construction of the relevant work until the nonconformity related to that work is rectified. In this case, the Consultant promptly informs the Client about the status.
- The Consultant shall ensure that the Contractor’s activities are following the ESMP and OHS Plan. The Consultant shall supervise the Contractor’s implementation of environmental and social mitigation measures as identified in the ESMP and OHS Plan. The Consultant should ensure Contractor that the Project’s Grievance Mechanism set forth by Client is utilized and made available, accessible and visible in Project site.
- The Consultant shall provide feedback and give notice to the Client regarding environmental and social issues at sites.
- The details of the Environmental and Social Management and the responsibilities of the “Engineer/Project Manager” shall also be detailed in the Contractor’s contract. Consultant shall have the responsibility for relevant supervision and instruction of the applications to the Contractor.
- The consultant will assist the Client in the Stakeholder Consultation Meetings / Public Participation Meetings for the Project that will be led by the Client. The meetings might be carried out virtually. Both virtual and physical consultation meetings will be held with participation of the Client’s representative/s. Presentation material(s) including relevant content of per sub-project to be shared during the consultation meetings shall be prepared by the consultant and the presentation shall be delivered by the relevant personnel of the consultant. Content of each presentation for per sub-project is subject to review and approval of the Client.

Grievance Redress Mechanism

- The Consultant shall ensure that the Contractor records any grievance received by local community or worker and report it in monthly ESMP monitoring reports to the Client.
- The Consultant should ensure Contractor that the Project’s Grievance Mechanism set forth by Client is utilized and made available, accessible and visible in Project site. .
- The Consultant shall be in contact with the Client in responding to inquiries and grievances received at construction sites in timely manner, provide including but not limited to logistical and data collection support to communication activities to be carried out at such as informative meetings and trainings in the project site before construction work starts and contribute to community awareness raising operations.

Progress Payments to Contractors, Variations

- The Consultant shall check the Contractor’s valuations for payment on account and issue certificates according to the Conditions of Contract used and shall also be responsible for agreeing with the Client on each payment certificates in payable amount. The actual procedure and presentation of the certificates, supporting documents, etc. shall be discussed and agreed with the Client.
- If payment certificate is not prepared by contractor, consultant will prepare payment certificate for contractor,

Tests

- The Consultant shall approve an appropriate Material Testing Laboratory for all tests required that will be mentioned in Contractors’ Technical Specification and shall discuss the various testing requirements stipulated in its documents with personnel of the laboratory. The Consultant shall give at least 24 hours’ prior notice to the laboratory for all tests, which are required to be undertaken. All samples shall be properly labeled in accordance with the requirements of the laboratory and the Consultant shall be responsible for the delivery of all samples for testing and for the collection of all test reports.
- The involvement of the approved accredited Materials Testing Laboratory is limited to the actual performance of the tests in accordance with the Consultant’s laid down procedures and/or the specified standards stated in the Contract. The Consultant shall be responsible for interpreting the results received, instructing the repetition or the carrying out of additional tests and taking whatever action necessary to ensure compliance with the contract requirements. The Laboratory staff may from time to time offer advice to the Consultant on any matter within the scope of their competence but it is up to the Consultant whether to accept or reject such advice or suggestion. If any advice or suggestion is accepted by the Consultants, they shall become completely responsible for it as if the advice or suggestion has been of its own initiative.
- The Consultant shall stipulate the criteria, the planning and the procedure for all tests and inspections necessary for the materials (such as pull-out tests for anchorages (embedded new reinforcements)), equipment, plant and workmanship and the commissioning of the Works and shall provide supervision and inspection for these tests. The Consultant shall compile a record of all such tests and compare the results with the specifications, standards or with the performance criteria that has been guaranteed by the suppliers or contractors.

Accounts, Claims

- In any case, all the correspondences received from the contractor shall be reviewed, evaluated and responded within one week. Any claim from the contractor(s) under the construction contracts shall be evaluated by the Consultant and necessary recommendation shall be made the latest within two weeks, as well.
- The Consultant shall review and report on any financial claims submitted by the Contractors within 2 weeks of receipt of such claim submission. Report on any claim shall include (not limited

t) determinations, the justification letter, cost-benefit analysis, all probable effects on approved work plan and the final decision on any variation.

Disputes

- The Consultant shall assist in the setting of all disputes or differences, which may arise between the Client and the Contractors, in a timely manner. In the case of litigation and arbitration the Consultant shall assist the Client in the preparation of the documents needed by the Client.

Completion of Works and Commissioning

- Confirm the projects' compliance with the investment plan. In case of deviation from those plans, justification of the differences and evaluation of consequences in terms of compliance of the project with the eligibility criteria of the facility.
- Before issuing the Certificate of Completion of the Works, the Consultant will enforce any obligation placed on the construction contractor to remove all obstructions, surplus materials, plant, wreckage, rubbish and temporary works.
- Upon completion of the works, the Consultant will require the construction contractor to remove all plant, equipment and materials except those required to complete any outstanding or remedial works and facilities required by the Consultant during the Defects Notification Period.
- The Consultant shall witness the performance tests carried out after completion and will analyze, evaluate and approve the final performance tests with the concurrence of the Client. The analyses, results and conclusions with recommendations shall be compiled in the Commissioning Report to be submitted to the Client.
- The Consultant shall oversee training of O&M staff on new equipment.
- The Certificate of Completion shall be prepared and issued by the Consultant in consultation with the Client, following the successful completion of the works. The issuance of the Certificate of Completion shall be subjected to:
 - The Contractor having provided the operating and maintenance manuals, training of O&M staff on new equipment, as well as all the drawings and documents handed over to the Client requested in the contract.
 - Preparation of problem registration list (Issues Log) for the minor defects.

Reporting Requirements for this Task:

- **Initial Inspection Reports:** The report should indicate the early findings on tendered documents for the Works and if any alterations needed, include the necessary calculations, details, the opportunities that the effects may be avoided or reduced, and time and cost implications.
- **Weekly Site Pictures:** The Consultant have to record views from at least 5 points for each building, on weekly base, showing the progress on the site with dates and record them with acceptable format and submit to the Client
- **Monthly Progress Reports** for works contract. These will describe the physical and financial progress of the works and will address contractual and technical matters. They shall provide information on (tentative list below that can be amended):
 - (i) a description of physical progress, with reference to the program (including progress charts and dated photographs in color giving all information regarding the progress of the Works);
 - (ii) explanations for differences between actual and forecast progress;
 - (iii) a summary financial report containing cash-flow forecasts and budget expenditure;
 - (iv) status of payments and requests for payment:

- (v) explanations for differences between actual and forecast cash-flow o summary of claims and disputes;
- (vi) major milestones, obstacles, achievements, constraints on progress and problems encountered and appropriate identified solutions;
- (vii) remarks on procedural issues;
- (viii) variations and proposals for future variations to the timing and budgets of individual activities;
- (ix) a projection of activities for the forthcoming month;
- (x) recommendation for further actions and improvements, both short- and long-term;
- (xi) records of human resources, mechanical equipment and materials, testing and quality control, with copies of the test results and, statistical evaluation of the test results in table or graphical form. Action taken with regard to poor results shall be stated;
- (xii) local issues/stakeholder issues (including any grievances received by nearby communities and/or workers);
- (xiii) a summary of site-specific environmental and social issues (update on the status of implementation of the respective ESMP, OHS compliance, and also outline any environmental, social and OHS problems being encountered);
- (xiv) The report shall include the percentages of the Work items completed and planned, and also the actual and planned cash-flows for each work item as of the reporting period prepared in the project planning tools (such as Primavera, Asta, etc) accepted by the client.

The report shall be submitted to the Client by the fifth day of following month. Any comment by the Client on the report shall be reviewed and re-submitted to the Client within a week.

- **Other reports upon request.** The Client may request the Consultant to submit specific reports on the issues related to the execution of the works. The Consultant will make the requested report in such manner within a reasonable time. The Consultant is obliged to provide all assistance to the Client, upon request, in drawing up reports to the bodies that comprise the institutional framework for project implementation described in the introduction to this project task, relating to project implementation reports, financial reports and etc.

Task 2: Supervise remedial works to rectify defects that arise during the Defects Notification Period (DNP)

The Defects Notification Period (DNP) is 12 months, starting on the date of building commissioning.

- Commissioning of the renovated buildings shall be performed by the Consultant to verify and document that the equipment and systems were designed, installed, tested, and properly operated to meet the described requirements of the construction contract.
- Energy Performance Certificate (EKB) of the buildings after the completion of the works with the BEP-TR program shall be prepared.
- Preparation and submission of as-built drawings, shop drawings, operating and maintenance manuals for all items of equipment and plants incorporated in or associated with the works, shall be controlled and followed by the Consultant in timely manner. As-built drawings, operating and maintenance manuals should be obtained from the Contractor during the issuing of taking-over certificate. Otherwise, the Client might ask the Consultant for the conversion of the approved shop drawings into as-built drawings if Client considers that the Consultant is not strictly following up the work. The Consultant shall also prepare and submit to the Client's approval a report giving all information about the “as-built-conditions” including (but not limited to) calculations, drawings, specifications, test reports and final cost analysis.

- Visual presentation materials shall be prepared by using high resolution and quality photos of before and after status of the buildings, zones, rooms and renovation steps, which are interrelated with the EEMs.
- The Consultant shall continue to be responsible for the supervision and inspection of the construction and completion of the Works during the DNP as defined in the works contracts. The level of supervision shall be appropriate to the scale of the works being carried out. The Consultant will provide adequate number of technical staff acceptable to the Client on each construction site during the DNP. These inspections and supervision are to ensure that works, agreed to be carried out during the DNP, are properly carried out and have been completed and that any failure of any part of the Works has been rectified. If any defect is discovered, during this period, the Consultant shall promptly investigate the reason for it, report to the Client and take required actions to rectify the defect. A report of these inspections shall be submitted to the Client, which shall include all details of any defects, faults, accidents or breakdowns, which have occurred together with the estimated costs of repair and the time scales within which they will be completed.
- The Consultant will provide minimum number of technical staff acceptable to the Client on each construction site during the Defects Notification Period. Defects are expected to be minimum for a competent Consultant Firm during defects notification period. Therefore, consultant should consider minimum number of staff assigned in DNP consisting of technicians.

Reporting Requirements for this Task:

The Reports should cover, but not necessarily be limited to, the information as follows:

- **Commissioning Reports:** After all the items in the problem registration list (issues log) are closed and the trainings are completed, a final commissioning (Cx) report is prepared, which includes the documentation and results of the work done.

All kinds of machinery, equipment and systems used in the project, user manuals, operation and maintenance manuals, handbooks that contain system diagrams and should be hung in technical places, manufacturer catalogues, authorized service contact information, as-built projects, calculations, test reports, commissioning forms and minutes and other related documents will be submitted with the final commissioning report.

The report should consist of the following headings:

- a) Equipment and systems included for works
- b) Executive summary
- c) Issues Log List
- d) Floor plans and/or system flowcharts
- e) Basic tests checklists
- f) Pre-functional checklists
- g) Initial start-up forms

Functional performance test forms

- h) Energy performance assessments*
- i) Training documents
- j) System guides
- k) Other documents and images
- l) Annex

* Early or first performance evaluation of the project implementation. The objective is to have

a first indication of the system behaviour regarding energy performance and compliance with the audit objectives. The methodology for each individual analysis will require that the energy input will be measure against the functional output. This is not a deep dive on the efficiency, but a first view that will be taken to the next level in the following M&V process. Further definition and details of intended commissioning process is provided in the project’s website in the form of “**Commissioning Handbook**”. Please refer to this guideline document for detailed process overview and intended outcome of the process.

Web-link: <https://www.kabev.org/kutuphane/kilavuzlar/>

- **Final Completion Report**, to be delivered in 2 months after issuance of Certificate of Completion of each Works Contract. The reports shall contain at least:
 - Draft Final Accounts
 - Approved As-Built drawings (signed by the Contractor & Consultant)
 - Energy Performance Certificates (EKB)
 - Data on the technical difficulties encountered and how they were solved;
 - Evaluations on Contractor’s ESHS performance
- **Visual Presentation Materials:** Up to 500-1000 presentation visuals including posters, brochures, catalogues and leaflets will be prepared, printed and distributed by the Consultant for each building complex to give information and to raise awareness about the energy efficiency measures implemented in the building, and the benefits of these applications.

The grounds of the Visual Presentation Materials will be before/after renovation comparison and it shall include high resolution and quality photos of:

- At least four different façades
- Roof (from above showing All the roofing, preferably with the help of a drone camera)
- Fenestration systems
- Heating system (Boilers, pumps, piping, valves, insulation, etc.)
- Cooling system (chillers, Cooling towers, pumps, valves, piping, insulation, outdoor a/c units, rooftop units, etc.)
- DHW (accumulation tanks, heat exchangers, pumps, insulation, piping, etc.)
- Solar Water heater system
- Ventilation system (air handling units, piping, ducts, etc.)
- Lighting system (fixtures, bulbs, panels, etc.)
- Room thermostats, radiators, fan-coil units, etc.
- Automation system
- Renewable Energy systems
- Co-generation/tri-generation units

The graphic designs of the presentation visuals will be subject to the Client approval before printing. All visual materials shall include the logo and the names of the Client and the project, the template of which will be provided by the Client. The posters will be presented especially in the areas/sections where innovative and green applications are implemented.

- **DNP quarterly reports.** A report of the DNP inspections shall be submitted to the Client, which shall include all details of any defects, faults, accidents or breakdowns, which have occurred together with the estimated costs of repair and the time scales within which they will be completed. The reports shall be prepared on a quarterly basis.
- **DNP final report** shall be submitted by the time of the expiration of the DNP giving full details of all works carried out during the period. This report shall be submitted by the Consultant to the Client at least 30 days prior to issuing the Defects Notification Certificate for the completed Works.

Task 3: Preparation of Measurement and Verification (M&V) report

The M&V period covers 12 months, starting on the date of building commissioning.

	2.3	Visual Presentation Materials	
	2.4	DNP Quarterly Reports	Quarterly during DNP
	2.5	DNP Final Report	by the time of the expiration of the DNP
3	3.1	M&V Report	one year after the renovation works are completed

All deliverables need to be prepared in Turkish. Only one selected M&V Report and executive summary sections of every deliverable will be translated into English

All deliverables will be submitted as (i) one hard copy (signed and stamped), (ii) soft copy (on a SSD (Solid State Drive)), and (iii) uploaded to an online platform, which the Client addresses.

The metric system of weights and measures shall be used. The drawings shall be submitted in the format, labelling, grouping and details as required by the Client. The plot size, parcel, map sheet for all buildings shall be listed and integrated into the drawings and other required documents.

Digital formats shall be as follows:

- Format of Reports/Documents : MS Office Word/Excel/PowerPoint & PDF
- Format of Drawings : AutoCAD 2006 (or newer) & PDF

Printing formats shall be as follows;

- Format of Reports/Documents : A4 or A3 including where appropriate drawings could be reduced to A3 size
- Format of Drawings : A1 size (unless otherwise required or agreed)
- Scale of Drawings : To be agreed with the Client.
- Format of Visual Presentation Materials
 - Format of Posters : A0, A1 and A2 size /min. 300dpi
 - Format of Others : A4 size/min. 300dpi

As indicated in the General Conditions of Contract all the drawings, reports, plans, specifications, and any other documents produced under this Contract are the property of the Client.

VI. Facilities provided by the consultant

Supervision of the works and engineering services both during the construction and defects notification period including M&V works and ensure that the works are executed in accordance with recent regulations and rules. All costs for equipment and administrative and logistic support must be covered by the Consultant and included in the bid price, including:

- All costs arising from the activities of its staff during the contract period, including accommodation, allowances, transportation, insurance, etc.
- Automotive, equipment, equipment for field and lab tests, office supplies, hardware and software (software for modeling and static/dynamic analysis of critical structures), etc.
- All communication costs, including fax, email, telephone, etc.
- All the equipment, instruments, services and logistical support required for the implementation of the contract, and any costs incurred during its preparation of documents and drafts, copying, printing, qualified translation, interpretation etc etc.
- Technical equipment at the monitoring site;

VII. Support to be provided by the client to the consultants

- The client will sign letters with the beneficiary buildings that describe the responsibilities of the beneficiary, including appointing a contact/facility coordinator for all project phases,

facilitating access to buildings or facilities, providing existing documentation, etc. Client shall, where possible, assist the Consultants in obtaining approvals, permissions from the Municipalities and other State Authorities in respect of the Services to be performed.

- The inputs (contract drawings, Bill of Quantities, tender documents, etc.) shall be provided free of charge by the Client to the Consultants. Consultant shall return all such drawings and documents received to the Client upon the completion of services.
- The Works Contractors’ bidding documents are already arranged to incorporate clauses to provide temporary office facilities to the Consultants depending on the size and location of the construction sites, the size and number of rooms (generally the site office has approximately 80 m2 area and includes 1 meeting room, 3 room, 1 WC and 1 Kitchen) shall be jointly determined by the Client and the Consultant considering the needs of the Client as well. However, these will be constructed by the Contractors and will take some time.
- The Consultants will be fully responsible for providing their central site office until the contractors are in place to make site offices available. The central office shall be furnished and equipped by the Consultants, whereas the site offices shall be furnished by the Contractor. All sort of running expenses for the site offices except water and electricity (to be provided by the Contractor) shall be under the Consultant’s responsibility.
- The Consultant shall not be required to deliver any equipment and materials provided by the reimbursable expenses and which have been used for the Services to the Client.

VIII. Team Composition and Qualification Requirements for the Key Staff

- The working language of the project is English. All the team members assigned by the Consultant must possess proficiency in English language. Day-to-day communication language will be Turkish or English at the field level to ensure smooth communication among all participants, direct and indirect, of the Project.
- All key staff and support staff shall be mobilised immediately after the first Construction Contract signature in way to evaluate the design and make the necessary adjustment before the works commence.

Table 4: Key staff’s qualifications shall include but not limited to the following:

Task	[N°] - Position	Required Experience
All Tasks	[K-1] - Team Leader	Architect, Civil, Electrical or Mechanical Engineer with minimum fifteen (15) years of professional experience, includes at least ten (10) years’ energy efficient similar building supervision experience and five (5) years working experience in manager position.
	[K-2] - Civil Engineer	Civil Engineer with minimum ten (10) years of professional experience includes at least five (5) years’ energy efficient similar building supervision experience.
	[K-3] - Architect	Architect with minimum ten (10) years of professional experience, includes at least five (5) years’ energy efficient similar building supervision experience
	[K-4] - Mechanical Engineer	Mechanical Engineer having ten (10) years of professional experience including five (5) years’ energy efficient similar building supervision experience
	[K-5] - Electrical Engineer	Electrical Engineer having ten (10) years of professional experience including five (5) years’ energy efficient similar building supervision experience
	[K-6] - Cost and Planning Engineer	University degree in engineering with minimum five (5) years of professional experience includes at least two (2) years’ experience in preparation of progress payments, claim management, time schedules and reporting of construction projects that include similar buildings.

Task	[N°] - Position	Required Experience
	[K-7] - QA/QC Engineer	University degree in engineering with minimum five (5) years of professional experience includes at least two (2) years' quality assurance and control experience in construction projects that include similar buildings.
	[K-8] - Measurement & Verification Expert	Mechanical Engineer having ten (10) years of professional experience including two (2) years' measurement & verification experience in measuring, collecting and analysing data for the purpose of verifying and reporting energy savings in EE renovations. Energy manager or audit-project certification given by Ministry of Energy and Natural Resources is also mandatory.
	[K-9] – Commissioning Expert	Engineer having ten (10) years of professional experience including three (3) years of test & commissioning works experience.
	[K-10] - Environmental Specialist	Environmental Engineer with minimum five (5) years of professional experience including at least three (3) years' experience in the national environmental legal framework, environmental impact/risk assessment, preparation of environmental assessment tools (ESMP, Environmental and Social Impact Assessment (ESIA), etc.) and knowledge in environmental safeguard policies and ESSs of the World Bank's Environmental and Social Framework (ESF) or other international development institutions, GIIPs.
	[K-11] - Social Specialist	University degree in sociology with minimum five (5) years of professional experience including at least three (3) years' experience in gender studies, using SPSS Statistics Programme actively, to have conducted at least 1 study/research on quantitative data analysis and reporting University degree in sociology with minimum five (5) years of professional experience including at least three (3) years' experience in gender studies, using SPSS Statistics Programme actively, to have conducted at least 1 study/research on quantitative data analysis and reporting.
	[K-12] – Occupational Health and Safety Specialist	Occupational Health and Safety Specialist with minimum five (5) years of professional experience, including at least three (3) years' experience in OHS assessment and management in construction projects financed by international finance institutions or other international donors, preferably the World Bank and with a knowledge in environmental and social safeguard policies and ESSs of the World Bank's ESF or other international development institutions, having A or B Class Occupational Safety Expert certificate received from the Directorate General of Occupational Health and Safety or equivalent international certificate.
	[N-...] - Technical Support Staff	Support staff for the technical services with minimum three (3) years of professional experience shall be proposed additionally as required (architects, surveyors, mechanical and electrical technicians/junior engineers, OHS personnel, etc.)
	[N-...] -Administrative Support Staff	Support staff for the administrative services shall be proposed additionally as required (clerks, drivers, secretary, etc.)