



REPUBLIC OF TÜRKİYE

MINISTRY OF ENVIRONMENT, URBANIZATION AND CLIMATE CHANGE (MoEUCC)

GENERAL DIRECTORATE OF CONSTRUCTION AFFAIRS (GDCA)

“Türkiye Earthquake Recovery and Reconstruction Project (TERRP)”

Project ID: P180849

TERMS OF REFERENCE (TOR)

for

**TECHNICAL ASSISTANCE FOR DETERMINING THE NATIONAL
BUILDING LIFE CYCLE ASSESSMENT (LCA)**

Reference No:

TERRP-AF/CS-TA-02

TABLE OF CONTENT

1. INTRODUCTION.....	3
2. OBJECTIVES OF CONSULTANCY/TECHNICAL ASSISTANCE	4
3. SCOPE OF SERVICES	5
4. DESCRIPTION OF CONSULTANT’S TASKS.....	6
Task 1: Kick-off Meeting.....	6
Task 2: Analysis of Current State of Life Cycle Assessment (LCA) in Buildings and International Best Practices and Regulations.....	7
Task 3: Organization of Technical Study Visit.....	8
Task 4: Development of the National LCA Method.....	9
Task 5: Conducting Case Studies and Finalizing the National LCA Method	14
5. PROJECT TIMELINE	15
6. PROJECT TEAM.....	17

1. INTRODUCTION

The long-term goal of the Paris Agreement, signed in 2015 and regarded as the most significant international accord in the fight against climate change, is to keep the global temperature increase well below 2°C compared to pre-industrial levels (preferably at 1.5°C). Türkiye took an important step in climate action by ratifying the Paris Agreement in 2021 and subsequently announcing its target for net zero emissions by 2053.

In line with net zero target, Türkiye announced its Updated First NDC, establishes an ambitious, economy-wide mitigation target covering all key sectors, including energy, industry, transport, buildings, agriculture, waste, and land use, land-use change, and forestry (LULUCF). Under its Updated First NDC, Türkiye commits to reducing its greenhouse gas emissions by 41 percent by 2030 compared to the business-as-usual (BAU) scenario, representing a significant milestone on the country's pathway toward its 2053 net-zero target.

According to the 2023 Türkiye Energy Consumption Statistics released by the Ministry of Energy and Natural Resources, approximately 35% of the nation's total energy consumption occurs in the building sector—the highest share among all sectors. With a building stock of nearly 9.5 million structures and the annual construction of around 100,000 new buildings, both energy use and the resulting greenhouse gas emissions from the building sector are projected to continue increasing in the coming years.

Given this trajectory, reducing emissions across the entire life cycle of buildings—from material production and construction to operation, renovation, and end-of-life stages—is essential. This approach is critical for Türkiye to effectively address climate change and to meet its 2053 net-zero emissions target.

“Türkiye Earthquake Recovery and Reconstruction Project (TERRP)”, which aims to restore access to basic municipal and health services in some provinces affected by the February 2023 earthquakes and to construct resilient housing, is jointly financed by the World Bank and the French Development Agency. The third component of TERRP, which concerns the reconstruction of rural housing, is being implemented by the General Directorate of Construction Affairs (GDCA) within the Ministry of Environment, Urbanization, and Climate Change (MoEUCC). The 3.2 sub-component aims to develop approaches for the design and construction of disaster-resistant and sustainable structures. Reducing greenhouse gas emissions, strengthening adaptation to the adverse effects of climate change, protecting ecosystems, and increasing the community's resilience to the climate crisis are priority issues for TERRP. In this regard, it is crucial to adopt environmentally conscious production processes in the construction sector, conserve natural resources, and optimize material use in line with circular economy principles. In order to improve environmental quality and enable individuals to live in a healthy environment, it is important to assess the environmental impact of construction products throughout their entire life cycle. Life Cycle Assessment (LCA) is a method that systematically evaluates all environmental impacts of a building, from raw material extraction to production, use, and demolition at the end of its life. This approach directly

contributes to a more accurate measurement of greenhouse gas emissions in buildings life-cycle and is of great importance for sustainability. Through LCA, the types, quantities, and behavior of all materials used in a building over their lifetime are identified, enabling the prior determination of which materials are recyclable, which can be reused, and which generate waste. Circular economy principles such as recycling, reuse, and waste reduction have become easier to implement with LCA. Building materials and systems can now be evaluated not only in terms of cost or durability, but also in terms of environmental performance. Life Cycle Assessment (LCA) of buildings is not merely a tool for analyzing environmental impacts; it also serves as a crucial scientific foundation for developing resilient, energy-efficient, and disaster-resistant reconstruction strategies. It also plays a very powerful role in improving post-disaster housing programs. LCA is a powerful tool that enables the design of durable, energy-efficient, and safer buildings for future disasters. In post-disaster housing programs, it ensures longer-lasting housing, less waste, lower costs, and greater social resilience through the right material selection. Aiming for “fast and high-quality” post-disaster reconstruction, LCA provides decision-makers with a scientific and data-driven roadmap, enabling both rapid and sustainable planning. Developing a technical methodology for integrating building life cycle assessment principles into current and future building regulations is a necessity for Türkiye.

The General Directorate of Vocational Services is responsible for the legislation and regulation of energy efficiency in buildings within its mandate. Since building life cycle assessment also falls within this domain, a protocol has been established between General Directorate of Construction Affairs and the General Directorate of Vocational Services. In this protocol, it is stated that both General Directorates will work together to develop a national methodology for the life cycle assessment of buildings, in line with the objectives of TERRP. The consultant will be responsible to the General Directorate of Vocational Services throughout the duration of the project for completion of each task.

2. OBJECTIVES OF CONSULTANCY/TECHNICAL ASSISTANCE

Recent developments at both international and national levels have made the systematic implementation of Life Cycle Assessment (LCA) in buildings a regulatory and technical necessity for Türkiye.

At the international level, the revised Energy Performance of Buildings Directive (EPBD), published on 8 May 2024, introduces mandatory life cycle-based assessment of buildings across the European Union. Under the revised EPBD, the Global Warming Potential (GWP) of new buildings must be calculated and disclosed using LCA methodologies for buildings with a useful floor area exceeding 1,000 m² from 2028, and for all new buildings from 2030, regardless of size. As the EPBD constitutes the legislative basis of Türkiye’s Building Energy Performance Regulation, these requirements are directly relevant for the national regulatory framework.

At the national level, the Twelfth Development Plan of Türkiye (2024–2028) explicitly identifies the strengthening of national capacity for sustainable building design methodologies based on LCA as a strategic priority. Furthermore, an amendment to the Planned Areas Zoning Regulation, published in the Official Gazette No. 32838 on 11 March 2025 and entering into force on 1 January 2027, introduces a legal provision mandating building-level life cycle

assessments for project categories to be designated by the Ministry of Environment, Urbanization and Climate Change.

In parallel, Türkiye has committed to an ambitious climate policy framework, including a 41% reduction in greenhouse gas emissions by 2030 compared to the business-as-usual scenario under its Updated First Nationally Determined Contribution (NDC), and a net-zero emissions target by 2053. Given that the building sector accounts for approximately 35% of total national energy consumption, addressing both embodied carbon and operational carbon emissions across the full life cycle of buildings is essential to achieving these targets.

Within this context, the primary objective of this assignment is to develop a robust, nationally applicable building Life Cycle Assessment (LCA) methodology for Türkiye that:

- is fully aligned with international standards, particularly EN 15978, EN 15804, and ISO 14040/44,
- is compatible with the revised EPBD requirements,
- is tailored to national construction practices, data availability, and climatic conditions, and,
- can be integrated with the existing BEP-TR software infrastructure used for building energy performance assessments.

The developed methodology will enable consistent and transparent calculation of life cycle Global Warming Potential (GWP) for buildings in Türkiye, covering all relevant life cycle stages (Modules A–D). It will provide a standardized technical basis for regulatory implementation, policy development, and decision-making processes related to sustainable construction.

In addition, the project aims to support resilient and energy-efficient post-disaster reconstruction, particularly within the framework of the Türkiye Earthquake Recovery and Reconstruction Project (TERRP). By embedding life cycle thinking into building design, material selection, and system choices, the methodology will contribute to:

- reducing long-term environmental impacts of reconstruction activities,
- improving resource efficiency and circular economy practices, and
- enhancing the durability, adaptability, and sustainability of the reconstructed building stock.

Ultimately, the outputs of this project will establish a technical and methodological foundation for mainstreaming building LCA into Türkiye's regulatory system, supporting the transition toward low-carbon, climate-resilient, and sustainable buildings in line with national and international climate commitments.

3. SCOPE OF SERVICES

The entire life cycle emissions of a building, often referred to as its carbon footprint, include carbon emissions occurring at various stages throughout the building's lifespan, as illustrated in Figure 1.

The emissions generated during the production of building materials from raw materials, and their subsequent transportation and on-site assembly maintenance and repair activities throughout the lifespan of buildings, and finally the demolition and disposal stages at the end of their lifespan are referred to as “Embodied Carbon.”

However, emissions generated during the use of the building, such as heating, cooling, lighting, hot water preparation, and the energy consumption of devices, are referred to as “Operational Carbon.” These emissions are the carbon emissions that occur during the daily operation of the building and are directly released during its use. Thus, a building’s “Life Cycle Emissions” include both “Embodied Carbon” and “Operational Carbon,” and these two components are the main factors contributing to the overall carbon footprint of the building.

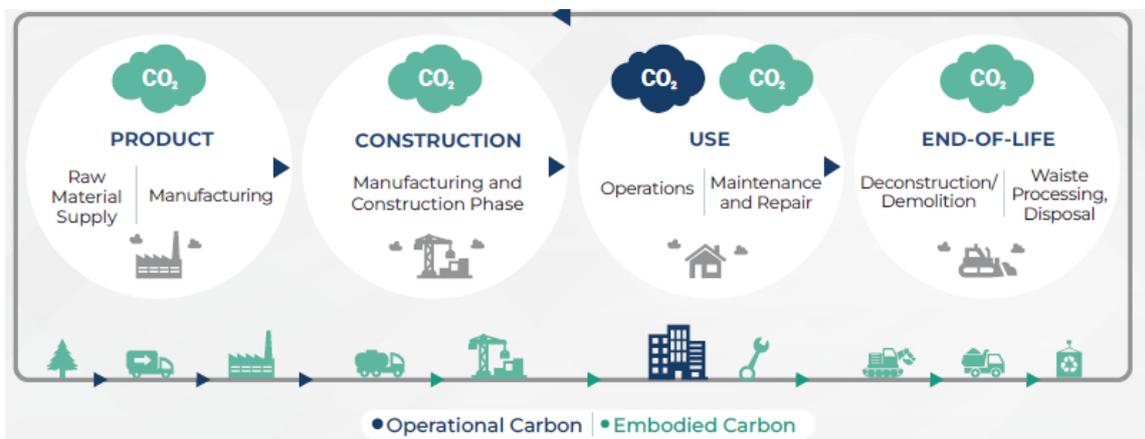


Figure 1: Carbon Emissions in the Building Life Cycle

Through this work, all emissions arising from the life cycle (50 years) of a new building to be constructed in Türkiye will be analyzed, and a national-level calculation method will be developed. The project shall consist of the following phases:

- Kick-off meeting and Preparation of the Inception Report,
- Analysis of Current State of Life Cycle Assessment (LCA) in buildings and International Best Practices and Regulations
- Organization of Technical Study Visit,
- Development of the Draft National LCA Method,
- Conducting Case Studies and Finalizing the National LCA Method

A progress meeting will be held following the completion of each task.

4. DESCRIPTION OF CONSULTANT’S TASKS

Task 1: Kick-off Meeting

The Consultant will outline the general methodology, timeline, and approach to achieving the project outputs in the Technical Proposal. The consultant will adopt a phased and holistic structure, taking into account the interrelated nature of the tasks, and will define the reporting

standard from the outset to ensure transparency and traceability of the process. The following elements will be presented in the Technical Proposal:

- Determination of the approach and methods to be applied in the provision of services within the scope of project activities,
- Preparation of a detailed work schedule based on the timeline in the contract,
- Presentation of the general content of the reports to be prepared by the consultant as deliverables of the tasks,
- Identification of the main technical tools and concepts to be used,
- Definition of the purpose, scope, system boundaries, and stages of the life cycle assessment,
- Identification of potential problems that may be encountered during implementation and preventive strategies to address them.

Fifteen (15) days after the Contract signature, a Kick-off Meeting will be organized to reiterate the roles and responsibilities, the methodology, the detailed timeline, and other key aspects of the assignment. The Kick-off Meeting will take place at the Ministry's premises, and the Project Leader as well as all Key Experts will be required to attend in person. During the meeting, translation support shall be provided by the Consultant. All transportation and any other associated costs related to the meeting shall be borne by the Consultant. Following the Kick-off Meeting, the Consultant will submit the Minutes of the Meeting, detailing the decisions taken and any actions to be undertaken.

Task 1: Deliverables

- D 1. Kick-off Meeting Minutes

Task 2: Analysis of Current State of Life Cycle Assessment (LCA) in Buildings and International Best Practices and Regulations

Under this task, the current situation in the field of building LCA in Türkiye will be analyzed, and a fundamental methodological structure will be established by benchmarking against international standards. The analysis will address technical standards and develop a life cycle modeling framework suitable for the data infrastructure specific to Türkiye. Including but not limited to the technical stages described below within the scope of this task, the following technical steps will be undertaken:

- ***Review of Legislation and Standards:*** A detailed technical analysis of standards such as TS EN ISO 14040 (Life Cycle Assessment - LCA), TS EN ISO 14044 (Life Cycle Assessment - LCA), TS EN 15978 (EU Standard for Building LCA), and other relevant standards will be conducted (ISO 16745-1:2017, LCBI Certification Scheme, GREET Building LCA Module, etc.). This analysis will evaluate the impact categories, system boundaries, data quality criteria, and definitions of functional units described in the standards, and identify the necessary technical adaptations for applicability at the building scale in Türkiye. Additionally, the EU Level(s) framework, the European

Commission's Product Environmental Footprint (PEF) and Organisation Environmental Footprint (OEF) guidelines, and LCA technical documents will be referenced to propose a framework suited to the Turkish context. The research data for this phase will be included in the "*Current Situation Analysis Report*".

- ***Functional Units and System Boundaries:*** Based on typical building service life and performance outcomes within the Turkish context, potential functional units and system boundaries will be examined. A modular approach will be applied as necessary to ensure systemic comparability. The research data for this phase will be included in the "*Current Situation Analysis Report*".
- ***International Comparative Analysis:*** The national LCA approaches, standards, best practices and guidelines of five countries to be determined by the Ministry will be comparatively reviewed. The data from this phase will be included in the "*International LCA Best Practices Report*".
- ***Data Structure and Quality Assessment:*** Both foreground and background data sources will be analyzed to assess data representativeness and reliability levels. Proxy data and assumption documentation will be prepared for data gaps. Lifecycle data gaps specific to Türkiye and their implications will be examined. Major data gaps and limitations related to the availability, quality and reliability of these data will be identified. Relevant institutions and organizations will be identified for data acquisition, and necessary efforts will be made to obtain such data. Strategies will be proposed to improve the data availability, reliability and traceability. The data from this phase will be included in the "*Data Structure and Quality Assessment Report*".
- ***Compatibility Analysis with BEP-TR:*** This section is designed to ensure that the building's architectural characteristics, mechanical systems, and other building systems are sourced from BEP-TR within the methodology. In this regard, A detailed needs analysis will be carried out for LCA calculations to be performed through the BEP-TR software, assessing data flow, component compatibility, and output relationships. The data from this phase will be included in the "*BEP-TR Compatibility Analysis Report*".

Task 2: Deliverables

- D2.1. Current State Analysis Report
- D2.2. International LCA Best Practices Report
- D2.3. Data Structure and Quality Assessment Report
- D2.4. BEP-TR Compatibility Analysis Report

Task 3: Organization of Technical Study Visit

Under this task, technical study visits will be conducted to countries with advanced building LCA applications at the international level: the United Kingdom, Denmark, and the Netherlands. Each visit will involve a 6-person Ministry team and will last 5 days. During these visits, environmental performance calculation methods at the building scale, data management systems, software infrastructure, and institutional application examples will be examined. This scope will include:

- **Review of policy and regulatory framework:** On-site analysis of the legal and institutional infrastructure of building-scale LCA in the visited countries,
- **Evaluation of best practice examples:** Site visits and institutional meetings on the integration of LCA practices into building design, material selection, and labeling systems,
- **Digital tools and software infrastructure:** Technical assessment of how LCA calculations are calculated via national softwares,
- **Establishment of comparative analysis infrastructure:** Systematic documentation of tangible outputs and potential differences that can be transferred to the LCA method to be developed for Türkiye.

All expenses related to technical visit travel arrangements (transportation, transfers, accommodation, meetings, site visits, translation services, etc.) will be covered by the Consultant.

Note: The outcomes of these study visits are expected to contribute to the parametric structure of the calculation method to be developed under Task 5.

Task 3: Deliverables

- D3. Technical Study Visit Report

Task 4: Development of the National LCA Method

In this task, a building LCA calculation method will be developed that is tailored to Türkiye, aligned with international standards, and fully interoperable with the BEP-TR system in both directions. The general life cycle modeling framework will be established and be reported (LCA Modelling Framework Report) in this Task. This framework will form the basis of this method. The method will be detailed taking into account the national data structure, building sector practices, and the existing Bep-TR software infrastructure.

Based on the analyses in Task 2, a life cycle modeling framework tailored to Türkiye will be developed, categorized and modular, and compatible with data sources. This framework will include the following technical aspects:

- Ensuring compatibility with international inventories
- Determination of quality levels and functional equivalence criteria for secondary materials,
- Comparative analysis of scenario-based alternatives for end-of-life modeling,
- Definition of data source hierarchy and data quality metrics,
- Suggestions for identifying and addressing potential uncertainties,
- Logical structure of data flows between Modules A–D.
- Definition of the physical characteristics of the building (the shape and size of the building shall include number of storeys; the storey height, and overall dimensions (gross floor area); the structural frame and foundations; frame (beams, columns, slabs); external walls; windows; roof; internal walls; doors; floor; heating, cooling and hot water systems; mechanical ventilation lighting systems;

The data related to the building components described above shall be obtained from the BEP-TR database. In cases where such data are not available, additional data sources or assumptions shall be determined in consultation with the Ministry.

The method will be detailed taking into account the national data structure, building sector practices, and the existing software infrastructure. The details of the method will be presented in Technical Analysis Report 1. The LCA calculation method based on excel sheet to be developed will include the components shown in Figure 2.

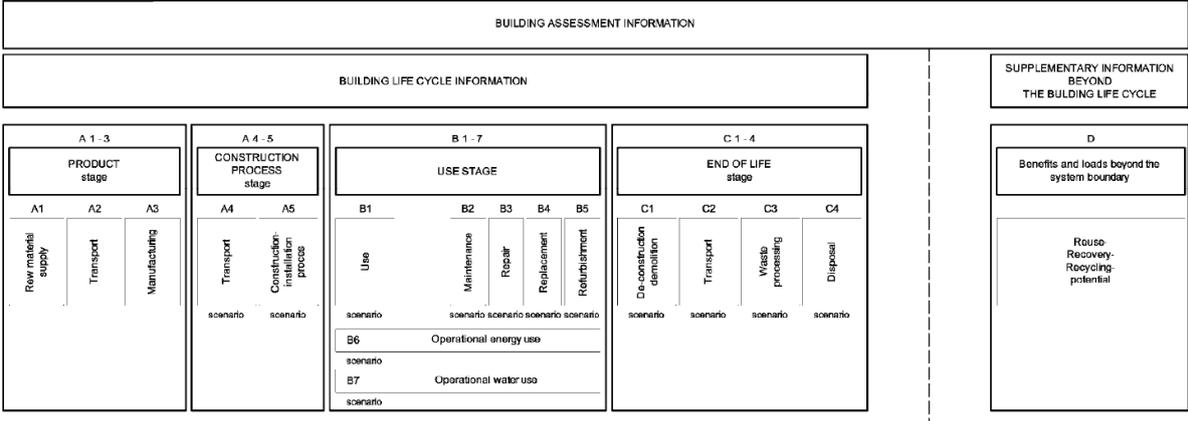


Figure 2: Modules Defined for the Building LCA Method

The system boundary determines the processes that are taken into account for the object of assessment.

Each stage shall cover, at minimum, the elements and procedures outlined in the following subsections.

Building Material Production Stage A(1-3):

This stage will consist standard datasets for building materials, such as verified Environmental Product Declarations (EPDs) provided by national or international suppliers, and will include the building material library defined in the TS 825 standard. A reference value will be established for each construction material included in this library. These EPDs has to been prepared in accordance with EN 15804. When no EPD is available for certain building materials, the Consultant will define clear product scenarios—covering cradle-to-gate modules in accordance with EN 15804 and tailored to Türkiye.

- Extraction of raw materials – A1
- Transportation of raw materials – A2
- Manufacturing of raw materials into construction products – A3

Building Construction Stage A(4–5):

Scenarios for the construction process stage cover the period from the factory gate of the different construction products to the practical completion of the construction work. The scenarios shall define for any elementary operation described within the boundaries of the construction stage. The transport of products (ready for construction), materials, services and equipment to and from the building site - module A4 - the construction process (in-site construction, off-site construction assembly of pre-fabricated products or any combination of these) - module A5 - including if significant and relevant:

- ground works and landscaping;
- transport of materials, products, waste and equipment within the site;
- construction process;
- product installation, including ancillary products and not counted in the EPD of the products;

Maintenance, Repair, Replacement Stage B(1–4):

- **Scenario for the use of building components – B1**

The scenario shall define the internal and external conditions for the object of assessment. These conditions influence the impacts related to the characteristics of the products in their application (e.g. release of substances into the environment depends on pattern of use, humidity, air velocity, and temperature).

- **Scenario for the maintenance, repair and replacement of building components – B(2-4)**

These scenarios shall take into account the following:

- ✓ client requirements as expressed in the brief (example: maintenance every five years or no maintenance);
- ✓ service life planning according to ISO 15686-1, -2, -7 and -8;
- ✓ requirements issued from EN 15804;
- ✓ manufacturers' information;
- ✓ pattern of use.

Other examples of processes connected to construction products within the system boundaries are maintenance or processes for replacement of protective surfaces e.g. flooring or wallpaper.

The scenarios should be based on statistical data or normative data or, in the case of an existing building, based on real-life data.

Different scenarios based upon predefined or default values or based on statistical comparison may be defined.

- **Refurbishment Stage -B5**

The scenarios for refurbishment of the building, building elements and/or technical equipment shall be developed where details of planned refurbishment are known or decided. If no requirements for refurbishment are stated in the building life cycle, the scenarios for refurbishment shall be typical for the type of building being assessed.

- **Operational Energy Use -B6**

The scenarios for energy use will include energy consumed by use of the following systems: heating, cooling, ventilation, domestic hot water, lighting. For this, overall operational energy use will be obtained from Bep-TR software.

- **Water Use-B7**

The water use scenario shall include (but not be limited to) the consumption of potable water for sanitary purposes, and should consider other water use directly related to the object of assessment (e.g. drinking water, swimming pool, watering of landscaped areas) where possible, or appropriate.

The scenarios should be based on statistical data, normative data, or on real-life data where available.

Building Demolition Stage C(1–4):

- **Scenario for demolishing building components – C1**

The scenarios for dismantling and deconstruction shall be restricted to the on-site process and activities. It shall describe all the relevant processes that are assumed to be necessary for the deconstruction of building including initial on-site sorting of the materials, according to the cut-off rules

- **Scenario for transporting building debris to excavation sites – C2**

Scenarios for transport shall specify for any category of materials or products, the type of transport used, distances travelled and fuel consumption required for their movement from the site for disposal or to the system boundary for materials leaving the system for reuse, recycling and energy recovery.

- **Scenario for processing components as waste – C3**

The scenarios shall describe all waste treatment processes: for example, sorting, preparatory processes for reuse, recycling and energy recovery, up to the moment where the output from dismantling, deconstruction or demolition of the building or construction works ceases to be waste.

- **Disposal of building components – C4**

The scenarios shall include any processes (neutralisation, incineration with or without utilisation of energy, land filling with or without utilisation of landfill gases, etc), or activities (packaging) necessary before final disposal where not covered in modules C1 to C3, as well as the final disposal itself.

Reuse and Recycling Potential of Building Materials Stage D

The scenarios for reuse, recovery and recycling potentials outside of the system boundary of the object of assessment describe the processes that lead to future substitution of resources. If relevant and available, module D addresses the net environmental benefits or loads resulting from reuse, recycling and energy recovery. Hence, module D shall be fully consistent with all the scenarios developed for the various life cycle stages and modules

Each main and sub-module listed above will include detailed explanations of the assumptions and calculations for data sets that will form the basis of the calculation method. The following technical elements will be addressed in the calculation approach developed through these modules:

- The data requirements and availability and calculation structure for life cycle modules will be defined specifically for Türkiye,
- Environmental impact categories will be selected in line with Türkiye's environmental priorities and policy goals,
- A functional unit and system boundary suitable for national building patterns and usage habits will be established,
- The representativeness, timeliness, and accuracy levels of the data to be used will be defined, and a prioritization for data selection will be conducted,
- Scenarios regarding the service life, maintenance/renewal cycles, and waste disposal processes of building components will be developed and analyzed for their impact,
- Calculation building blocks will be identified for each module, including inputs, outputs, and assumptions; typological scenario matrices for building components will be prepared,
- Methodological recommendations for data validation procedures and sensitivity testing will be provided,
- Methodological transparency will be ensured in the analysis outputs, and data uncertainties will be addressed systematically,
- The developed calculation method based on excel sheet will be structured to be integrable with the BEP-TR software; counterparts of each module within BEP-TR will

be identified, and structural recommendations will be proposed to support data flow within the software.

- The indicator(GWP-Global Warming Potential) used for LCA calculations will be expressed in units of kg CO₂ equivalent

Task 4: Deliverables

- D4.1. LCA Modeling Framework Report
- D4.2. Technical Analysis Report – 1
- D4.3. Draft LCA Calculation Method(Excel Sheet)

Task 5: Conducting Case Studies and Finalizing the National LCA Method

In Task 5, the previously developed draft LCA method will be tested using an Excel-based calculation tool on at least two sample buildings representing the 6 climate zones defined under TS 825 for residential and non-residential building typologies. The Consultant is expected to propose how these sample buildings could be selected already in the Technical Proposal. Buildings deemed suitable by the Ministry from those implemented under the Türkiye Earthquake Recovery and Reconstruction Project (TERRP) – Rural Earthquake Rehabilitation and Reconstruction (KADIYAP), led by General Directorate of Construction Affairs under the Ministry of Environment, Urbanization and Climate Change, will be used for these case studies. All data for the sample buildings used to test the LCA method will be provided by the Consultant and the case study will commence after Ministry approval.

A Technical Analysis Report–2 will cover the entire LCA process of the building and including the following elements:

- ***Building Information:*** Basic data such as typology, address, area, number of floors, and intended use will be collected.
- ***Module-Based Calculations:*** LCA analyses will be carried out covering modules A1–D; for each module, inputs, assumptions, and calculation results will be reported.
- ***Alternative Scenario Evaluations:*** Especially within Modules C and D, different waste management strategies, end-of-life criteria, and reuse scenarios will be designed in line with national/international regulations, and environmental impact differences will be tested.
- ***Challenges and Proposed Solutions:*** Technical problems encountered during the implementation process—such as data gaps, material definitions, scenario incompatibilities, data uncertainty, and parameter sensitivity—will be systematically addressed, and solutions will be proposed.
- ***Technical Analysis of Results:*** A comprehensive evaluation of the outputs obtained from the case studies will be conducted to identify the strengths and weaknesses of the method in field applications.

- **LCA logo:** To enhance the visibility and awareness of the LCA methodology, a Türkiye-specific LCA logo shall be designed by the Consultant. The final design of the logo shall be agreed upon in consultation with the Ministry.

All outputs will be compiled under Technical Analysis Report–2 and submitted to the Ministry. This report will clearly outline the calculation details, encountered difficulties, and recommendations for each building, thereby finalizing the National LCA Calculation Method.

The final LCA methodology to be developed under this assignment shall be delivered in Excel format.

Task 5: Deliverables

- D 5.1. Technical Analysis Report–2
- D 5.2. Final LCA Calculation Method(Excel Sheet)
- D 5.3. LCA logo

5. PROJECT TIMELINE

The project duration is planned as 12 months. The Consultant shall submit all the documents in a timely manner to complete the services on time without any delay. To achieve this, the Consultant shall carry out the necessary arrangements in field/home teams. A tentative time schedule for the completion of the consultants' services (including Client's review and approval durations) for the various parts of the consultancy services is given below;

Table 1. Deliverables List

Task	Deliverable No	Deliverables	Duration	Requirements
1	D1	Kick of Meeting Minutes	1 months	All documents must be prepared in both Turkish and English. The deliverables should include 2 printed copies The electronic copies must be delivered via two external storage devices.
2	D2.1	Current State Analysis Report	3 months	
	D2.2	International LCA Best Practices Report		
	D2.3	Data Structure and Quality Assessment Report		
	D2.4	BEP-TR Compatibility Analysis Report		
3	D3.	Technical Study Visit Report	2 months	
4	D4.1	LCA Modeling Framework Report	5 months	

Task	Description	Deliverables	Months													
			1	2	3	4	5	6	7	8	9	10	11	12		
3	Organization of Technical Study Visit	Technical Study Visit Report														
4	Development of the National LCA Method	4.1. LCA Modeling Framework Report 4.2. Technical Analysis Report – 1 4.3. Draft LCA Calculation Method(Excel Sheet)														
5	Conducting Case Studies and Finalizing the National LCA Method	5.1. Technical Analysis Report– 2 5.2. Final Version of the LCA Calculation Method (Excel Sheet) 5.3. LCA logo														

6. PROJECT TEAM

The working language of the project is English. All personnel assigned by the consultant must be preferably proficient in English. Project documents will be prepared in both Turkish and English.

Table 2: Project Team Qualification Requirements

Task	Key Expert	Position	Man/Month	Required Experience
All Task	KE.1	Project Manager	12	The Project Manager shall have a PhD degree in Civil Engineer or Architecture with minimum fifteen (15) years of professional experience includes at least five (5) years specific experience in building life cycle assessment (LCA), sustainable construction, circular economy or building energy performance and five (5) years working experience in manager position.

Task	Key Expert	Position	Man/Month	Required Experience
Task 1,2,4,5	KE.2	Building Physic and Construction Technology Expert	6	The expert shall have a PhD degree in Civil Engineering or Architecture with minimum ten (10) years of professional experience, includes at least five (5) years specific experience with a focus on building physics and construction technologies .
Task 1,2,4,5	KE.3	Life Cycle Assessment Expert	6	The expert shall have a PhD degree in Civil Engineering, Environmental Engineering, Industrial Engineering with minimum ten (10) years of professional experience, includes at least five (5) years experience in academic publication and professional experience in life cycle assessment related work ..
Task 1,2,4,5	KE.4	Construction Material Expert	6	The expert shall have a PhD degree in Civil Engineering with minimum ten (10) years of professional experience, includes at least five (5) years experience in Materials Science, Building Materials, Waste Management, Sustainable Construction or Recycling Technologies .
Task 2,5	KE.5	Energy Expert	3	Mechanical or electrical engineer with minimum ten (10) year professional experience, including preparing at least 25 Energy Performance Certificate (EPC/EKB) projects within the last 5 years , demonstrating practical knowledge of building energy performance assessment and data management in accordance with national regulations (e.g., BEP-TR).
Non-Key Experts	Support Staff	Technical Support Staff Requirement (1):	6	Support staff for the technical services with experience shall be proposed (architects, civil engineer, mechanical and electrical technicians/junior engineers, etc.)
		Administrative Support Staff Requirement (1):	12	Support staff for the administrative services shall be proposed additionally as required (surveyors, clerks, drivers, secretary etc.)