



REPUBLIC OF TÜRKİYE  
MINISTRY OF ENVIRONMENT,  
URBANIZATION AND CLIMATE CHANGE

# TÜRKİYE BUILDING SECTOR DECARBONIZATION ROADMAP

EXTENDED SUMMARY

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WRI TÜRKİYE  
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# FOREWORD

In today's rapidly urbanizing world, the demand for natural resources and energy is steadily increasing alongside technological advancements. Environmental pollution, climate change issues, and the destructive earthquakes we experience all emphasize the urgent need to consider the built environment as a whole and take all aspects into account when constructing. Planning and creating the building stock comprehensively, along with meeting the energy needs through renewable sources instead of fossil fuels, will become an inevitable outcome for the sector to achieve sustainability goals in the near future. In this context, buildings must be designed and constructed with a holistic approach that is in harmony with nature, considering their entire life cycle from site selection and material choices to demolition. They should also be climate and region-specific, utilizing natural resources like energy and water at a minimal level and meeting their energy needs through on-site and off-site renewable energy sources.

In Türkiye, the building sector, responsible for approximately 31% of the final energy consumption and 30% of greenhouse gas emissions, has seen a recent prominence of concepts like energy-efficient buildings, zero-energy buildings, green buildings, and smart buildings within the context of sustainability.

With the recent regulations implemented by the Ministry of Environment, Urbanization and Climate Change, an innovative approach has been aimed at providing comfort conditions in the building sector with less energy consumption while being environmentally and ecologically friendly.

It is clear that the building sector, with its significant potential for high energy efficiency and greenhouse gas emission reduction, is an important component to achieve the 2053 net zero emission and green development targets

announced by the President, Mr. Recep Tayyip Erdoğan. In light of these targets, the process, which started in 2011 with the obligation for newly constructed buildings to obtain at least a C-Class Energy Performance Certificate, continues with the NZEB (Nearly-Zero Energy Building) concept that came into force as of January 1, 2023. The Green Certificate for Buildings and Settlements, once again prepared by the Ministry to promote and disseminate sustainable buildings and settlements, has been introduced to the sector, and the application of this completely national green certificate has started for buildings and settlements.

To further support the Ministry's dedicated and innovative efforts within the building sector, the Ministry took part as the main beneficiary in the Zero Carbon Building Accelerator (ZCBA) project carried out by the World Resources Institute (WRI) and the United Nations Environment Program (UNEP) and supported by Global Environment Facility (GEF). Within the scope of the project, short, medium, and long-term strategies and actions were developed for the decarbonization of the building sector in our country, and the Türkiye Building Sector Decarbonization Roadmap was prepared.

The Türkiye Building Sector Decarbonization Roadmap, along with the opportunities presented by Türkiye's saving potential in the building sector, will be a significant guide for achieving the 2053 net-zero emissions goals.

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# ABBREVIATIONS

ABBREVIATION	DEFINITION
EPC	Energy Performance Certificate
BEPR	Building Energy Performance Regulation
ETS	Emission Trading Systems
GCIS	Green Certificate Information System
GEF	Global Environment Facility
LCA	Life Cycle Assessment
MoEUCC	Ministry of Environment, Urbanization and Climate Change
NZEB	Nearly Zero Energy Buildings
R&D	Research and Development
TurkStat	Turkish Statistical Institute
UNEP	United Nations Environment Program
WRI	World Resources Institute
YEKDEM	Renewable Energy Support Mechanism
YEKA	Renewable Energy Resource Area









CHAPTER 1

**INTRODUCTION**

## Background

Today, social life and all kinds of activities are shaped by historical and current climatic conditions. Therefore, climate conditions that deviate from current norms and exhibit increasing changes can have a profound impact on our lives. It is now widely accepted by scientists and policymakers that human activities significantly contribute to climate change. Climate change has negative effects on a broad spectrum of different social, cultural and natural resources, from human health to infrastructure, transportation systems, energy, food, and water resources. The main purpose of the Paris Agreement, signed in 2015, is to support countries in their efforts to reduce carbon emissions in order to keep the global average temperature increase below 2°C, or even 1.5°C pre-industrial levels and adapt to changing climate conditions [1].

To achieve the goals of keeping global warming below 2°C and limiting it to 1.5°C, there is an urgent need to radically reduce global carbon emissions over the next decade and reach net zero emissions by 2050. Buildings consume significant amounts of energy and natural resources throughout their life cycles, leading to adverse impacts on climate change and the environment. The global building sector accounts for approximately 30% of global energy consumption, primarily for building operational purposes such as heating, cooling, hot water preparation, cooking, lighting, and electrical appliances. Additionally, the building sector is responsible for approximately 27% of operational carbon emissions originating from the in-use phase of a building. The production of materials used in construction such as concrete, steel, and aluminium, is responsible for 4% of global energy use and 6% of global emissions in 2021 [2].

Buildings are also among the most vulnerable sectors, suffering the most from the negative effects of climate change. Extreme weather events such as heat waves and extreme temperatures, increased precipitation, thawing permafrost,

fires, severe storms and floods have a detrimental effect on the physical durability and structural properties of buildings. At the same time, the inability to control indoor conditions (e.g., temperature, air quality, etc.) can lead to negative effects on the health, well-being, and productivity of users.

Globally, buildings are considered one of the most compelling areas in climate change-related policies and programs due to their long lifespan, significant energy consumption, and the construction sector being a key driver in the economy.

Türkiye is actively involved in addressing climate change due to its status as one of the nations most susceptible to the impacts of climate change. Following President Recep Tayyip Erdoğan's announcement of the 2053 net-zero emissions and green development goals, Türkiye ratified the Law Approving the Paris Agreement in the Grand National Assembly of Türkiye (TBMM) on October 7, 2021 [3]. According to nationally determined contributions updated in 2023, Türkiye reveals its long-term goal of reducing greenhouse gas emissions by 41% by 2030 and reaching the net zero target by 2053, according to the business-as-usual scenario prepared based on 2012 [4].

The building stock in Türkiye is considerably heterogeneous. Various architectural designs and construction practices, ranging from commonly encountered reinforced concrete buildings to structural steel buildings or traditional architectural styles featuring wood, stone, or adobe buildings, continue to coexist today. Buildings represent one of the sectors that consume high amounts of energy in Türkiye. Türkiye is a large economy located in Western Asia and Southeastern Europe, with a population of over 85 million. As a result of population growth, Türkiye's urbanization rate increased from approximately 53% in 1990 to 93% in 2022 [5]. In particular, the number of residential and commercial buildings in large

cities is increasing rapidly. In Türkiye, the distribution of total final energy consumption in the year 2021 shows that the residential, commercial, and services sector holds the second-largest share with 31%, following the industrial sector [6]. Additionally, of the final energy consumption in the industrial sector in 2021, the Main Metal Industry, Cement Products Manufacturing, Glass Products Manufacturing, Ceramic Products Manufacturing, and other sub-sectors associated with construction activities exhibit a total share of 52%. Since the building sector stands as one of the highest energy-consuming sectors in Türkiye, it is considered a priority area for all policies and programs aimed at increasing energy efficiency and combating climate change.

## About the Roadmap

The Türkiye Building Sector Decarbonization Roadmap was meticulously developed through a transparent, participatory process within the framework of the Zero Carbon Building Accelerator (ZCBA) project, which was implemented in Colombia and Türkiye between 2021-2023. The roadmap aims to guide the building and construction industry by offering comprehensive, pioneering, and sustainable solutions to achieve the goal of combating climate change. The roadmap has been structured to reflect Türkiye's carbon emission reduction targets and has the goal of reducing emissions throughout the entire lifecycle of buildings. It aims to transform the building industry by increasing energy efficiency, transitioning to renewable energy sources, and promoting environmentally friendly building materials and construction methods. Additionally, it includes strategies to increase the climate resilience of the building sector.

The Zero Carbon Building Accelerator project is supported by the United Nations Environment Program (UNEP) and the Global Environment Facility (GEF). In the project, World Resources Institute (WRI) along with local technical leaders, including the Colombian Green Building Council

and WRI Türkiye, provided technical support in close collaboration with national and local stakeholders to develop long-term roadmaps that encourage systemic change towards zero carbon buildings [6].

In the project, the Ministry of Environment, Urbanization, and Climate Change (MoEUCC) from Türkiye participated as the main beneficiary. Gaziantep Metropolitan Municipality and Konya Metropolitan Municipality carried out studies as pilot cities. In Colombia, the cities of Bogota and Santiago de Cali were involved in the studies in collaboration with the Colombian Ministry of Environment and Sustainable Development.

Moreover, the methods, good practices, and financial solutions developed in the project provided guidance to the six cities within the project city network (Nagpur, India; Laikipia County, Kenya; Belen, Curridabat, Moravia and Santa Ana, Costa Rica) in developing their city action plans.

In this roadmap, Zero Carbon Buildings are defined as highly energy-efficient buildings, meeting the remaining energy needs from on-site or off-site renewable energy sources. These buildings minimize operational and embedded carbon emissions throughout their life cycle, and any unavoidable emissions are neutralized through carbon balancing. Additionally, it is crucial for Zero Carbon Buildings to be climate resilient.

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 [7].

The emissions generated during the production of building materials from raw materials, and their subsequent transportation and on-site assembly, all 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.

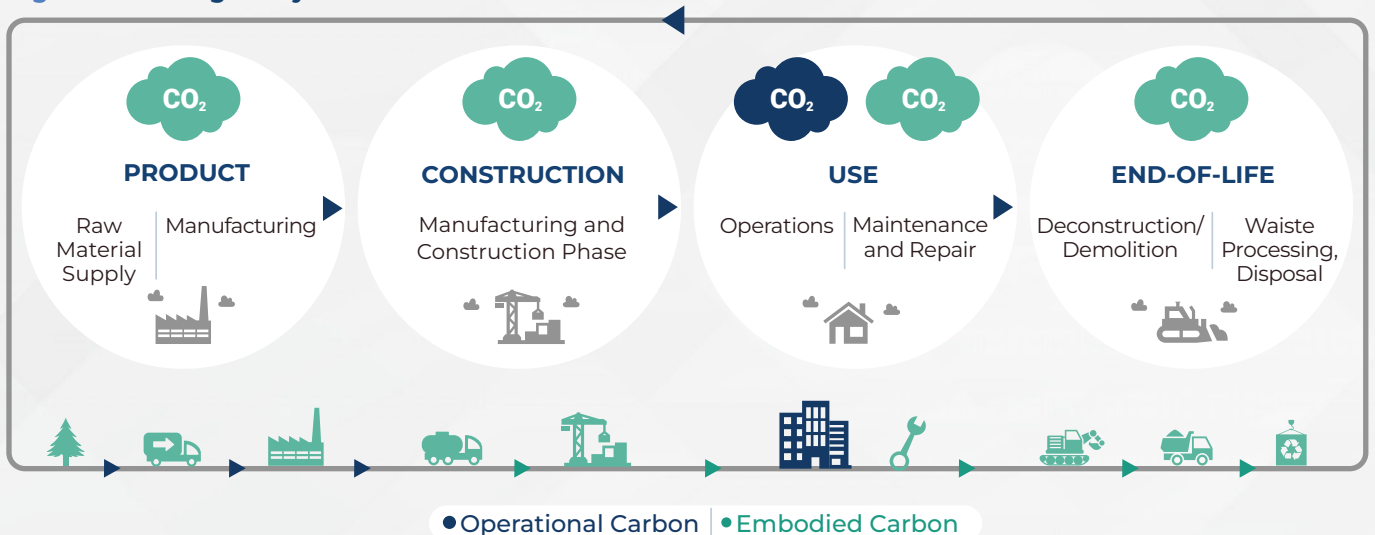
Today, there are architectural designs, construction practices, building materials, and sector-relevant technologies available to realize Zero Carbon Buildings. These buildings offer users additional benefits such as improved indoor air quality, more comfortable living and working spaces, and lower energy bills [8]. Worldwide, regulations on building energy performance are being implemented to limit operational energy consumption, and efforts are underway to accelerate the use of efficient devices and renewable energy technologies in buildings. However, the building sector requires faster changes to achieve a net-zero emissions scenario by 2050. National policies can support reaching goals by coordinating with all stakeholders for the cost-effective implementation of efficiency options at every stage of a building’s life cycle. This roadmap identifies potential actions to transition to zero-carbon buildings throughout the entire life cycle by specifying possible steps to reduce

emissions associated with embodied carbon and operational carbon.

Within the scope of this roadmap, national decarbonization strategies are evaluated in six main sections: Building Construction and Demolition, Building Materials, Existing and New Buildings, Renewable Energy, Climate Resilience and Adaptation to Climate Change, Financing and Gender Equality. This Extended Summary provides an overview of significant information in the Türkiye Building Sector Decarbonization Roadmap.

Each chapter has a detailed structure within itself, offers specific solutions to reduce the sector’s carbon footprint and supports a holistic approach aimed at coordinating the efforts of building sector stakeholders. The “Background” section includes current global-scale evaluations. The “Current State” section provides a brief analysis of the current state of the relevant topic in Türkiye, whereas the “Barriers and Gaps” section includes analysis to identify the challenges and shortcomings encountered on the path to decarbonization. In the most important part, the “Goals” and “Actions” sections provides detailed explanations of the targets to be achieved, the measures to be implemented, and the actions to be taken. These actions are planned in the realms of policy, technology, capacity building, awareness-raising, and finance. Stakeholders who will play a vital role in the achievement of these strategies, along with their possible roles, are also discussed.

**Figure 1. Building life cycle carbon emissions.**





CHAPTER 2

**AN OVERVIEW  
OF THE BUILDING  
SECTOR IN TÜRKİYE**

The population residing in Türkiye reached 85,279,533 people by the end of 2022, with approximately 93% of the population residing in urban areas and 7% in rural areas [5]. The building stock is naturally expanding in size, with the rate of new construction significantly higher than demolition rates. The increase in building size leads to a larger amount of space and volume that requires heating, cooling, ventilation, lighting, etc., resulting in higher energy consumption and increased carbon emissions.

The building stock in Türkiye is considerably heterogeneous. Various architectural designs and construction practices, ranging from commonly encountered reinforced concrete buildings to structural steel buildings or traditional architectural styles featuring wood, stone, or adobe buildings, continue to coexist in today's world.

In Türkiye, when we look at the distribution of total final energy consumption in the year 2021, it is observed that the residential, commercial, and services sector holds the second-largest share with 31%, following the industrial sector [9]. As per the breakdown of final energy consumption values in industry sector in 2021, the Main Metal Industry sector, Cement Products Manufacturing sector, Glass Products Manufacturing, Ceramic Products Manufacturing, and Construction sectors also have significant shares. Sectors related to the building sector are responsible for more than half of the total final energy consumption within the industry sector. Therefore, despite the absence of official statistics, it is thought that the amount of embodied energy generated through the production of building materials and the construction of buildings is substantial in Türkiye.

As of now, there is no comprehensive up-to-date building inventory in Türkiye and there are no official statistics available regarding the size and geographical distribution of the existing building stock. The analysis of the existing building stock conducted within the scope of this study is based on statistical data related to buildings that were collected during the building census conducted by the Turkish Statistical Institute (TurkStat) in the

year 2000. This data is supplemented with statistical information about buildings for which occupancy permits were issued by municipalities between the years 2000 and 2022 and is available in the TurkStat online database.

The current view of the building stock was derived from a combination of factors, including the total number of buildings and the total use area of the building stock, the distribution of the use area according to building typologies, the number of buildings issued with an Energy Performance Certificate (EPC) and their distribution by EPC class, and estimations based on demolition rates associated with urban transformation. Buildings that do not have a building occupancy permit or have acquired the certificate within the scope of the reconstruction forgiveness laws known as "Reconstruction Peace" are not included in the calculation.

As a result of the analysis, it is estimated that there are approximately 8.1 million buildings in the building stock in Türkiye as of 2021 [10]. Based on the assumptions and the analysis of the statistical data, the total usable area of the building stock at the end of 2021 was determined to be 3.874 million square meters. This figure includes 3.124 million square meters for residential buildings and 749 million square meters for non-residential buildings. To further break it down, 85% of the stock consists of residential buildings, while 15% consists of non-residential buildings.

76% of the overall building stock was built in the period before 2000, a period during which there were no national regulations on building energy performance in place. Approximately 9% of the building stock was built between 2000 and 2010, a period that coincided with the acceptance of the mandatory standards outlined in the TS825 Thermal Insulation Requirements for Buildings. Following the enactment of the Energy Performance Regulation in Buildings in 2011, approximately 14% of the building stock was built. Similar distributions are observed for residential and non-residential building breakdowns.



A growth projection of the building stock has been developed within the scope of the roadmap, and a reduction portfolio has been created, consisting of 9 separate mitigation measures to effectively reduce operational and embodied carbon emissions. The reduction portfolio includes the following measures:

- Building new residential and non-residential buildings as Nearly Zero Energy Buildings (NZEB\*) in the 2023-2032 period, building new residential and non-residential buildings as Class A buildings in the 2033-2042 period, building new residential and non-residential buildings as Constructing new residential and non-residential buildings between 2043-2053 to be Net Zero Operational Carbon Buildings\*\* and gradually renewing the stock by demolishing pre-2000 buildings and improving the energy efficiency of 2000-2010 buildings by 5% annually (up to 2043) through comprehensive renovations to achieve NZEB status (Mitigation Measures for Operational Carbon)
- Replacing low-efficiency refrigerators/washing machines/dishwashers used in homes with up-to-date technology and energy-efficient appliances at an approximate rate of 10% annually starting from 2023 (up to 2033) status (Mitigation Measures for Operational Carbon)
- Using low-carbon concrete/steel in new residential and non-residential reinforced concrete buildings starting from 2023. Achieving a 30% reduction by 2033 and 100% reduction by 2053 compared to 2023 status (Mitigation Measures for Embodied Carbon)

*\*Buildings classified as NZEB (Nearly Zero Energy Building) must have an energy performance class of B or better in their Energy Performance Certificate, and at the same time, they should use at least 10% of the building's primary energy demand from renewable energy sources. During the transition period between January 1, 2023, and January 1, 2025, the minimum renewable energy rate of "10%" will be reduced to "5%", and the total building construction area specified as "2000 m<sup>2</sup>" will be applied as "5000 m<sup>2</sup>".*

*\*\* Net Zero Operational Carbon Buildings are considered buildings balancing their annual operational carbon emissions with renewable energy sources.*

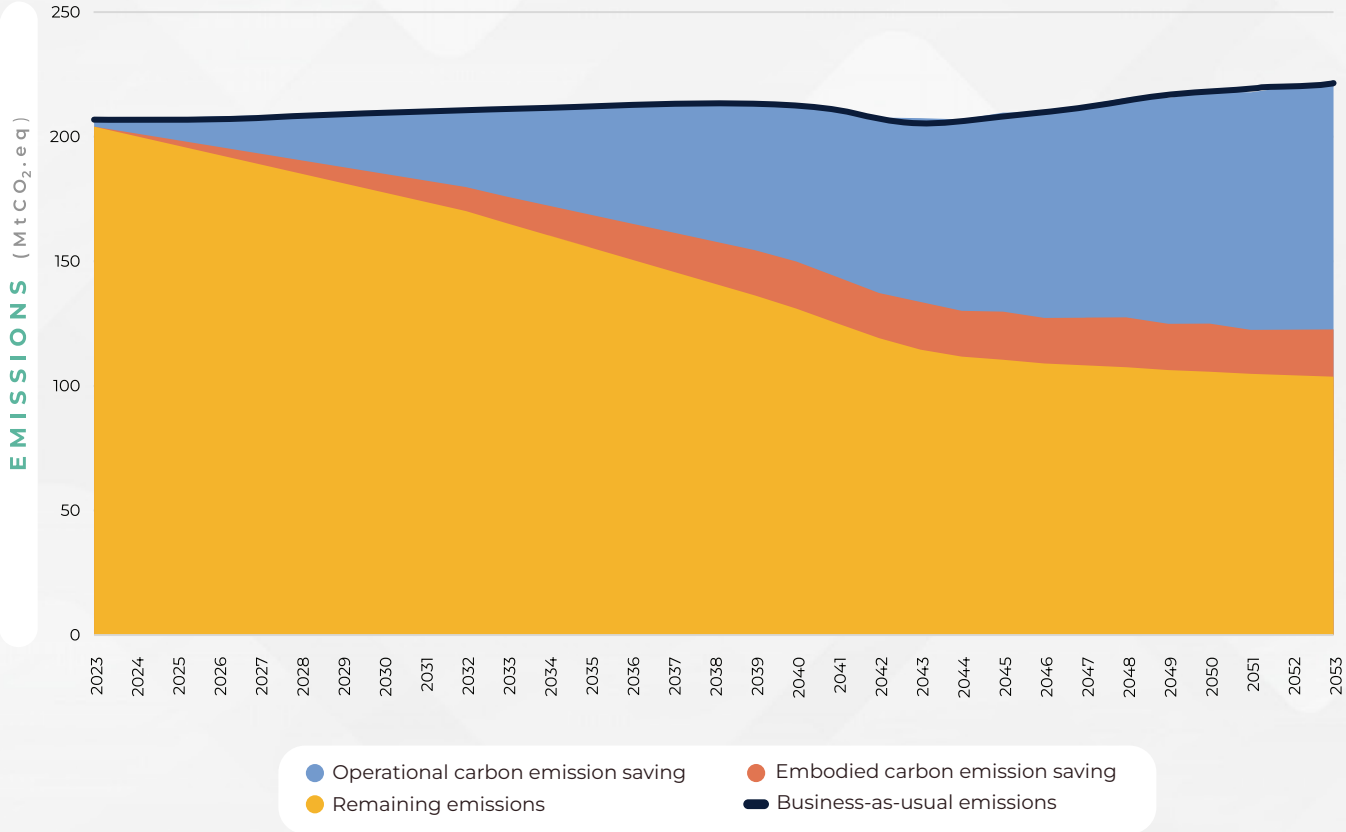




The implementation of the specified measures allows for a total reduction of 2,075 MtCO<sub>2</sub>.eq in greenhouse gas emissions from 2023 to 2053. This corresponds to a 32% reduction compared to business-as-usual emissions. Moreover, 50% of emission reduction is achieved in the year 2053 (Figure 2).

The analysis indicates that more ambitious reduction targets are necessary for the building sector to achieve national decarbonization goals. An effective strategy and defined actions are needed to address this.

**Figure 2. Operational and embodied carbon emission projection.**





CHAPTER 3

**CONSTRUCTION  
AND DEMOLITION  
OF BUILDINGS**

## Background

Construction processes such as the construction of new buildings, comprehensive renovations of existing buildings, and the demolition of end-of-life buildings can affect human health and the natural environment in various ways. Construction activities can result in soil exposure and erosion. This can reduce soil fertility and cause the disappearance of vegetation. Heavy machinery and vehicles used during construction can release harmful gases into the environment and cause air pollution. Transportation and the manufacturing of construction materials can also contribute to air pollution. Construction activities can lead to the introduction of waste and chemicals into water resources, resulting in a potential decrease in water quality and harm to natural ecosystems. During the construction process, pollutants such as dust, gases and particles can be released into the air. Heavy machinery and vehicles used during construction can cause noise pollution. Large amounts of water can be consumed during construction at the building site. Moreover, construction activities can generate waste. The utilization of energy sources, which mostly contain fossil fuels, in various activities during construction processes causes significant amounts of carbon emissions.

The energy used in the construction and demolition processes of the life cycle of buildings is classified as “Embodied Energy” and the carbon emissions generated are classified as “Embodied Carbon”. Reducing embodied energy and embodied carbon caused by construction and demolition activities play an important role in the decarbonization of the building sector. Therefore, the implementation of sustainability initiatives in the building sector is crucial, both to make the sector’s growth sustainable and to contribute to economic development.

## Current State

- The Turkish construction industry has a critical role for the country’s economy and provides high employment. Especially in recent years, the increase in housing demand, the increase in public investments and the developments in the tourism sector have supported the growth of the sector.
- The construction sector serves as a driving force for the Turkish economy with the added value and employment opportunities it creates and with more than 200 sub-sectors that it directly and indirectly affects. Activities such as production, transportation and assembly of materials used during construction projects also stimulate many sub-sectors.
- Foundational regulations overseeing construction and demolition processes include the Regulation on the Demolition of Buildings (Official Gazette Date: 13.10.2021, Official Gazette Number: 31627), the Regulation on Green Certificate for Buildings and Settlements (Official Gazette Date: 12.06.2022, Official Gazette Number: 31864), the Regulation on Waste Management (Official Gazette Date: 02.04.2015, Official Gazette Number: 29314), and the Regulation on Control of Excavation, Construction and Demolishing Wastes (Official Gazette Date: 18.03.2004, Official Gazette Number: 25406).

## Barriers and Gaps

- In Türkiye, there is no mandatory legislation regulating embodied energy and embodied carbon caused by construction and demolition. In recent years, there have been instances of good practice emerging with the voluntary adoption of national and international “green certification systems for buildings and settlements.”
- There are no established policies or mandatory legislation regulating energy efficiency in temporary spaces, fuel efficiency of the transportation fleet, the establishment of a sustainable supply chain, the efficiency of construction equipment, or the increase of renewable energy at the construction site during the construction process.
- Accessing the necessary data to calculate energy consumption and carbon emissions resulting from construction and demolition activities in life cycle assessments of construction projects is challenging.



## Goals

Within the scope of the roadmap, three main goals have been defined for the construction and demolition processes (Figure 3). The goals aim to increase the rates of recovery from construction and demolition waste, include construction and demolition processes in Life Cycle Assessment

(LCA) calculations, and to reduce and eventually eliminate embodied emissions resulting from construction and demolition processes in the long term. These goals are set for the Short term (2033), Medium term (2043) and Long term (2053).

**Figure 3. Goals for construction and demolition.**

Goals	Current State	Short Term (2033)	Medium Term (2043)	Long Term (2053)
<b>Increasing recovery rates of construction and demolition waste</b>	Currently, recycle rates of construction and demolition waste are low	Increase the recovery rate of construction and demolition waste to 20%	Increase the recovery rate of construction and demolition waste to 40%	Increase the recovery rate of construction and demolition waste to 70%
<b>Conducting Life Cycle Assessment (LCA) calculations of construction and demolition processes</b>	LCA calculations for construction and demolition processes are not typically carried out	Calculate LCA for 20% of the construction and demolition activities that occur each year	Calculate LCA for 50% of the construction and demolition activities that occur each year	Calculate LCA for all of the construction and demolition activities that occur each year
<b>Reducing carbon emissions caused by the construction and demolition process</b>	Currently, there is insufficient data on embodied carbon emissions from the construction and demolition process	Reduce embodied carbon emissions from the construction and demolition process by 20%	Reduce embodied carbon emissions from the construction and demolition process by 50%	Eliminate embodied carbon emissions from the construction and demolition process

## Actions

Currently, in Türkiye, there are significant opportunities to support the achievement of targets for reducing embodied carbon and environmental impacts in construction and demolition processes through policies, design, technology, implementation, and technical criteria.

Actions developed based on existing gaps and barriers are categorized into two groups, titled

“CDB.1 Reduction of embodied carbon caused by construction and demolition waste” and “CDB.2 Reduction of embodied carbon caused by construction and demolition processes.”

The timeframes for the implementation of actions are planned as Short-term (5 years) and Medium-term (10 years).



## CDB.1 Reducing embodied carbon caused by construction and demolition waste

Table 1. Actions for reducing embodied carbon caused by construction and demolition waste.

Action Code	Action	Action Type
<b>CDB.1.1</b>	Undertake efforts to enhance legal compliance for the preparation of Waste Management Plans, which address issues related to the collection, temporary storage, sorting, transportation, recycling, and disposal of excavation soil, construction, and demolition waste, for all types of construction projects, including buildings, before the commencement of construction.	<b>Policy Awareness raising</b>
<b>CDB.1.2</b>	Conduct efforts to enhance legal compliance for the classification of waste generated at construction sites as recyclable and non-recyclable, as well as for the provision of boxes/containers or predetermined collection areas for the collection of recyclable packaging waste (such as paper, cardboard, glass, metal, plastic).	<b>Policy Awareness raising</b>
<b>CDB.1.3</b>	Implement incentives and deterrent measures aimed at reducing the amount of construction waste and increasing recycling.	<b>Policy</b>
<b>CDB.1.4</b>	Conduct awareness-raising activities for construction developers to reduce the amount of construction waste and increase recycling.	<b>Awareness raising</b>
<b>CDB.1.5</b>	Strengthen control mechanisms for the effective inspection of regulations related to waste management.	<b>Policy</b>
<b>CDB.1.6</b>	Provide training to all construction personnel on the content of the construction waste management plan, proper waste classification, recycling, and implementation.	<b>Capacity building</b>
<b>CDB.1.7</b>	Develop collaboration platforms to expand partnerships with suitable facilities for the recovery of recyclable waste.	<b>Awareness raising Technology</b>
<b>CDB.1.8</b>	Develop incentives to promote the reuse of materials used during construction.	<b>Policy Awareness raising</b>
<b>CDB.1.9</b>	Carry out Research and Development (R&D) studies to ensure the safe reuse of materials used during construction.	<b>Technology</b>
<b>CDB.1.10</b>	Conduct awareness activities to ensure the preference for recyclable materials (e.g., steel, aluminum, glass, and plastic) in the selection of materials to be used during construction at the building design stage.	<b>Awareness raising</b>
<b>CDB.1.11</b>	Carry out R&D and awareness-raising efforts to promote the widespread use of prefabricated materials/products that are designed using Building Information Modeling (BIM) and produced in controlled environments outside the construction site to reduce production waste.	<b>Technology Awareness raising</b>
<b>CDB.1.12</b>	Prepare and disseminate a best practices guide for building demolition and disposal.	<b>Awareness raising Capacity building</b>

Period : ● Short ● Medium

## CDB. 2 Reducing embodied carbon caused by construction and demolition processes

Table 2. Actions for reducing embodied carbon caused by construction and demolition processes.

Action Code	Action	Action Type
CDB.2.1	Develop legal regulations to classify and certify the competencies of building contractors in constructing high-performance, green, energy-efficient, zero carbon buildings.	Policy
CDB.2.2	Conduct promotional and encouraging activities for building contractors to adopt Environmental Management Certificate standards.	Policy Awareness raising
CDB.2.3	Develop incentives/diversify green finance instruments for building contractors to adopt the national Green Certificate for Buildings and Settlements.	Policy Finance
CDB.2.4	Develop/disseminate innovative construction site monitoring systems/products to monitor the energy used and carbon emissions caused during construction and demolition processes (fuel type/amount used by construction site machines, number/type/driving distance of trucks coming to the construction site, energy used by temporary buildings, etc.).	Technology Awareness raising
CDB.2.5	Carry out awareness-raising activities to increase the number of employees with professional qualification certificates in construction processes.	Awareness raising
CDB.2.6	Update vocational and technical high school education curricula to incorporate energy-efficient and green building practices.	Capacity building
CDB.2.7	Develop and promote national training and professional competence certificate programs for practitioners (e.g., masons, workers, technicians, etc.) involved in construction and demolition processes to enhance their technical skills and train competent practitioners in implementing high-performance building applications (such as insulation, window installation, green roofs, integrated renewable energy systems, etc.).	Capacity building
CDB.2.8	Carry out activities to encourage/disseminate the use of mobile renewable energy systems at construction sites.	Policy Awareness raising
CDB.2.9	Develop legal regulations to gradually eliminate the use of diesel equipment on construction sites.	Policy Awareness raising
CDB.2.10	Encourage the use of equipment/transportation vehicles that are highly energy efficient and use clean energy sources (e.g., electricity, biodiesel) at construction sites.	Policy Awareness raising
CDB.2.11	Develop legal regulations and good practice guides to promote Life Cycle Assessment in construction and demolition processes.	Policy Capacity building
CDB.2.12	Conduct R&D and dissemination activities for building construction using 3D printers.	Technology
CDB.2.13	Carry out studies to establish a green supply chain in the construction industry.	Capacity building Awareness raising
CDB.2.14	Incorporate criteria for the energy performance of temporary buildings on construction sites into legal regulations.	Policy
CDB.2.15	Define legal obligations for the energy efficiency of lamps used in construction site lighting.	Policy

Period : ● Short ● Medium









CHAPTER 4

**BUILDING  
MATERIALS**

## Background

Construction activities around the world cause substantial consumption of raw materials and natural resources every year. In the process of preparing building materials, first the raw materials must be extracted, transported to the place where they will be processed, then processed, and the material must be produced and finally delivered to the place where it will be used. While these activities are crucial for the advancement of humanity, they also result in significant use of non-renewable energy sources, leading to the emission of greenhouse gases like carbon dioxide and pollutants, contributing to climate change. Furthermore, alongside the consumption of raw materials and energy during the preparation of building materials, there is also a significant use of water resources. Therefore, undesirable consequences stemming from building materials may arise at local, regional, national, or international scales that endanger the long-term health of the environment.

Efficiently optimizing the total carbon footprint of the building sector requires reducing both the carbon emissions generated during the building's operational phase and the embodied carbon emissions. Nowadays, there is a growing emphasis on sustainable building materials with minimized negative environmental impacts, and countries are implementing various strategies and actions to strengthen the necessary policies, technology, finance, and capacity in line with their needs.

## Current State

- The building materials sector is an important sector for Türkiye in terms of economic development, increased employment, and export potential.
- A considerable portion of Türkiye's building stock consists of reinforced concrete buildings. Concrete, steel, brick, plastic, and ceramics are among the building materials used extensively in Türkiye [11].
- In Türkiye, the industrial sector is the sector with the largest consumption with a share of 34% in the total final energy consumption distribution in 2021 [9].
- According to the energy consumption breakdowns of the industrial sector, the Main Metal Industry sector, which is the highest energy-consuming sector with a 25% share, is followed by the Cement Products Manufacturing sector with a 19% share. Additionally, other sectors linked to the building sector, such as Ceramic Products Manufacturing (4%), Glass Products Manufacturing (2%), Wood Products Manufacturing (2%), and Construction (2%), also have a significant share in the total final energy consumption in the industry [9].
- Foundational regulations and policy documents regulating construction materials include the Construction Products Regulation (305/2011/EU), (Official Gazette Date: 10.07.2013, Official Gazette Number: 28703), the Regulation on Environmental Labelling (Official Gazette Date: 19.10.2018, Official Gazette Number: 30570), the Regulation on Green Certificate for Buildings and Settlements (Official Gazette Date: 12.06.2022, Official Gazette Number: 31864), and the Green Deal Action Plan (July 2021).

## Barriers and Gaps

- In Türkiye, there is no mandatory legislation regulating the embodied energy performance of building materials. In recent years, exemplary practices regarding the use of international certification systems that can be applied on a voluntary basis have begun to be seen.
- The local Environmental Product Declaration certification system does not yet exist for building materials produced in Türkiye. Although international systems are not commonly used, they are used when necessary.
- The majority of local building materials lack an Environmental Product Declaration certificate.
- There is no comprehensive database that publishes the environmental performance of building materials produced or commonly used in Türkiye in accordance with international standards and norms.

## Goals

Within the scope of the roadmap, three main goals have been defined for building materials (Figure 4). These goals aim to reduce embodied carbon emissions from building materials in the short and medium term and ultimately eliminate

them in the long term by expanding the use of LCA and Environmental Product Declaration certifications for building materials in Türkiye. These goals are set for Short term (2033), Medium term (2043), and Long term (2053).

**Figure 4. Goals for building materials.**

Goals	Current State	Short Term (2033)	Medium Term (2043)	Long Term (2053)
<b>Adopting Life Cycle Assessment (LCA) for building materials</b>	Currently, the majority of building materials used in construction projects do not have LCA calculations	At least 40% of the key building materials have LCA calculations	At least 80% of the frequently used building materials have LCA calculations	At least 95% of all building have LCA calculations
<b>Disseminating Environmental Product Declaration (EDP) documents for building materials</b>	Currently, the majority of building materials used in construction projects do not have Environmental Product Declaration Certification	At least 40% of the key building materials have an Environmental Product Declaration	At least 80% of the frequently used building materials used in construction projects have an Environmental Product Declaration	At least 95% of all building materials have an Environmental Product Declaration
<b>Reducing building material embodied carbon emissions</b>	Currently, there is insufficient data on embodied carbon emissions from building materials used in construction projects	A 20% reduction in embodied carbon emissions resulting from building materials used in construction projects.	A 50% reduction in embodied carbon emissions resulting from building materials used in construction projects.	The elimination of embodied carbon emissions resulting from building materials used in construction projects.



## Actions

Today, there are significant opportunities to reduce embodied carbon and environmental impacts for building materials frequently used in Türkiye through policy, design, technology, material selection and technical criteria.

The actions developed in response to existing gaps and barriers are categorized into four groups, titled “BM.1 Reducing the adverse environmental impact of building materials and promoting life cycle assessment,” “BM.2 Reducing

energy consumption and carbon emissions resulting from the production of building materials,” “BM.3 Innovative approaches to ensure efficient and effective material use in construction projects,” and “BM.4 Promoting the widespread use of sustainable, healthy, and durable building materials in construction projects.”

The timeframes for the implementation of actions are planned as Short-term (5 years) and Medium-term (10 years).



## BM.1 Reducing the adverse environmental impact of building materials and promoting life cycle assessment

**Table 3. Actions for reducing the adverse environmental impacts of building materials and promoting life cycle assessment.**

Action Code	Action	Action Type
BM.1.1	Monitor the proposed regulation update by the European Union, which is intended to replace (EU) Regulation 305/2011 on construction products, and to conduct activities in areas such as “Life Cycle Assessment” and “Environmental Product Declaration Certification Systems.” for the adoption.	Policy
BM.1.2	Develop legal regulations to limit embodied energy, embodied carbon, and other environmental performance criteria for building materials and building products to be used in Türkiye.	Policy
BM.1.3	Develop incentive programs to increase the use of building materials and products with low environmental impact values and low embodied carbon in the Turkish construction industry.	Policy Finance
BM.1.4	Update the scope of green purchasing programs to encourage the procurement of materials with low environmental impact value and low embodied carbon in public procurements.	Policy
BM.1.5	Create an open-access national building material platform and database that will include embodied energy, embodied carbon and other environmental performance data for building materials.	Technology Capacity building
BM.1.6	Develop national analysis tools that are accessible to all stakeholders in order to carry out life cycle assessments of building materials and products.	Technology Awareness raising
BM.1.7	Conduct capacity building studies to raise awareness among construction industry professionals about the selection and use of sustainable building materials with low embodied carbon.	Capacity building
BM.1.8	Conduct awareness campaigns aimed at increasing the visibility of sustainable building materials with low embodied carbon among construction developers and property owners.	Awareness raising
BM.1.9	Conduct research to ensure that life cycle assessment, environmental performance, and sustainability of building materials are included in the education curricula of relevant departments such as architecture, civil engineering, metallurgical and materials engineering, chemical engineering, etc., in Türkiye.	Capacity building

Period : ● Short ● Medium

## BM.2 Reducing energy consumption and carbon emissions resulting from the production of building materials

**Table 4. Actions for reducing energy consumption and carbon emissions resulting from the production of building materials.**

Action Code	Action	Action Type
BM.2.1	Develop national incentive programs for building material manufacturers to increase the production of sustainable building materials with low embodied carbon.	Policy Awareness raising
BM.2.2	Provide incentives for the development of energy efficiency practices in building material production facilities.	Policy Awareness raising
BM.2.3	Encourage and facilitate R&D studies to develop low-carbon, sustainable and healthy innovative materials: For example, using clinker substitutes in cement production, encouraging concrete-steel composite structures, reducing the cement content in concrete, developing techniques for lowering the clinker-cement ratio, sustainable wood production, etc.	Technology
BM.2.4	Encourage and facilitate R&D studies to develop alternative materials with low embodied carbon that can be used as substitutes for building materials with high embodied carbon content.	Technology
BM.2.5	Promote and facilitate R&D studies in order to reduce production waste and develop materials and products that require fewer raw materials.	Technology
BM.2.6	Carry out R&D studies on process efficiency to increase energy efficiency in the production of building materials.	Technology
BM.2.7	Conduct encouraging studies to expand the utilization of renewable energy resources (solar, wind, hydroelectric, biomass, hydrogen, etc.) in the production of building materials.	Technology
BM.2.8	Organize technical trainings to educate material manufacturers on environmental performance criteria, embodied energy, and life cycle assessment in building materials.	Capacity building Awareness raising
BM.2.9	Encourage and facilitate R&D studies to increase the content of recycled materials in the production of building materials.	Technology Policy
BM.2.10	Carry out awareness-raising activities to increase the use of local resources in the production of building materials.	Awareness raising

Period : ● Short ● Medium



## BM.3 Innovative approaches to ensure effective and efficient material use in construction projects

**Table 5. Actions for innovative approaches to ensure effective and efficient material use in construction projects.**

Action Code	Action	Action Type
BM.3.1	Conduct R&D studies to develop building design approaches, new building components and construction production approaches that will reduce the need for building materials and minimize material usage (e.g., detachable-attachable finished prefabricated products, modular systems, prefabricated structures, composite components, etc.)	Technology
BM.3.2	Develop incentives to promote the reuse of buildings.	Policy
BM.3.3	Carry out awareness-raising activities to promote the reuse of buildings.	Awareness raising
BM.3.4	Develop incentives to promote the use of salvaged materials.	Policy Awareness raising
BM.3.5	Conduct activities to increase awareness on innovative approaches and materials that contribute to reducing material use in construction projects.	Awareness raising

Period : ● Short ● Medium



## BM.4 Promoting the widespread use of sustainable, healthy, and durable building materials in construction projects

**Table 6. Actions for promoting the widespread use of sustainable, healthy, and durable building materials in construction projects.**

Action Code	Action	Action Type
BM.4.1	Create a map of locally produced building materials and establish platforms that bring producers and consumers together to increase local material use.	Technology
BM.4.2	Conduct awareness-raising efforts to promote the locally produced materials nearby.	Awareness raising
BM.4.3	Develop legal regulations that limit the human health and environmental impact values of building materials used in interior finishes in buildings (such as volatile organic compounds, radiation, etc.).	Policy
BM.4.4	Update existing regulations that govern building performance to include embodied emissions and environmental performance criteria.	Policy
BM.4.5	Support and conduct R&D studies aimed at increasing the durability and lifespan of building materials.	Technology Policy
BM.4.6	Develop/diversify green financing instruments for sustainable, healthy, and durable building materials.	Finance
BM.4.7	Promote labelling systems to increase awareness of building materials produced with responsible resource use.	Awareness raising

Period : ● Short ● Medium







CHAPTER 5

**EXISTING AND  
NEW BUILDINGS**

## Background

Reducing carbon emissions generated by the building sector is crucial in the fight against climate change. To achieve this, measures for embodied emissions and operational emissions associated with a building must be planned holistically. Embodied carbon is the carbon dioxide emissions caused by the construction phase of a building outside its in-use phase. Operational carbon emissions, on the other hand, are related to the energy consumption caused during the in-use phase of a building after the construction is completed.

Operational carbon refers to a building's carbon footprint during in-use and includes all energy used to manage and maintain the building's functionality. It may include energy uses required to run systems such as heating, cooling, ventilation, lighting, cooking, hot water preparation, water pumps, elevators, electrical appliances, etc.

Operational carbon emissions can be managed and reduced through design, technology and innovation throughout a building's design process and lifecycle. The first and most important step is to reduce operational carbon emissions through improvements in energy use and energy efficiency. Energy efficiency and carbon emission reduction metrics are complementary, and both are necessary for achieving the decarbonization of the building stock.

## Current State

- As of December 31, 2022, the population in Türkiye is 85,279,553 people. Approximately 93% of the population lives in urban areas, and 7% in rural areas [5].
- In 2021, the industrial sector was the largest energy consumer, accounting for 34%, followed by buildings (housing, commerce, and services) with a share of 31% [9].
- According to the analysis carried out within the scope of the Building Sector Decarbonization

Roadmap, there are approximately 8.1 million buildings in total at the end of 2021, including 6.8 million residential and 1,3 million non-residential buildings in the existing building stock.

- Approximately 75% of the building stock was built before the year 2000.
- The number of buildings that have received an Energy Performance Certificate has reached approximately 1,5 million.
- Approximately 80% of the building stock consists of residential buildings.
- Foundational laws and regulations overseeing the energy performance of existing and new buildings in Türkiye include the Energy Efficiency Law (Official Gazette Date: 02.05. 2007, Official Gazette Number: 26510), the Energy Performance Regulation in Buildings (Official Gazette Date: 05.12.2008), Official Gazette Number: 27075), the Regulation on Green Certificate for Buildings and Settlements (Official Gazette Date: 12.06.2022, Official Gazette Number: 31864).

## Barriers and Gaps

- In Türkiye, national regulations and policies focus on improving the operational energy performance of buildings. There is a need for a holistic strategy plan that provides guidance on achieving Zero Carbon Buildings.
- The regulations governing energy performance in buildings do not currently encompass a whole life cycle approach.
- There is a lack of sufficient and comprehensive databases on the energy and emission performances and physical condition of the existing building stock. The absence of comprehensive monitoring systems to monitor the life-cycle performance of buildings makes it difficult to collect the necessary data for performance evaluations and continuous improvements.

## Goals

Within the scope of the roadmap, three main goals have been defined for existing and new buildings (Figure 5). The goals aim to reduce operational carbon emissions generated by

existing and new buildings and to reduce all life cycle emissions from buildings in the long term. These goals are set for the Short term (2033), Medium term (2043) and Long term (2053).

**Figure 5. Goals for existing and new buildings.**

Goals	Current State	Short Term (2033)	Medium Term (2043)	Long Term (2053)
<b>Reducing operational carbon emissions from new buildings</b>	Buildings with a total construction area of less than 2000 m <sup>2</sup> must have an EPC “C” rating, while those with an area exceeding 2000 m <sup>2</sup> must meet NZEB standards	<b>New buildings have 40% less energy consumption and carbon emissions, compared to NZEB</b>	<b>New buildings have 70% less energy consumption and carbon emissions, compared to NZEB</b>	New buildings have <b>net zero operational carbon emissions</b>
<b>Reducing operational carbon emissions from existing buildings</b>	It is mandatory to have EPC for existing buildings; there is no EPC rating requirement	<b>Renovate 40% of existing buildings to achieve the NZEB standard</b>	<b>Renovate 70% of existing buildings to achieve net zero operational carbon emissions</b>	Renovate all existing buildings <b>to achieve net zero operational carbon emissions</b>
<b>Reducing building whole life cycle carbon emissions</b>	There is no legal regulation regarding whole life cycle carbon emissions from buildings	Reduce whole life cycle carbon emissions <b>from buildings by 30%</b>	Reduce whole life cycle carbon emissions <b>from buildings by 60%</b>	Remove all lifecycle <b>carbon emissions from buildings</b>

## Actions

Today, there are significant opportunities in the areas of policy, technology, capacity development, awareness raising and finance to reduce operational carbon emissions and environmental impacts causing from the in-use phase of existing and new buildings.

The actions developed in response to existing gaps and barriers are categorized into two

groups, titled “ ENB.1 Reducing operational carbon emissions from existing and new buildings” and “ ENB.2 Increasing the environmental sustainability of existing and new buildings.”

The timeframes for the implementation of actions are planned as Short-term (5 years) and Medium-term (10 years).



## ENB.1 Reducing operational carbon emissions from existing and new buildings

Table 7. Actions for reducing operational carbon emissions from existing and new buildings.

Action Code	Action	Action Type
ENB.1.1	Develop national LCA system for buildings and promote its use in the design of new buildings or comprehensive improvements of existing buildings.	Policy
ENB.1.2	Create national analysis tools that all stakeholders can access and establishing to perform LCA of buildings and establish a national platform.	Policy Technology
ENB.1.3	Coordinate and synchronize various legislation regulating the building sector (EPRB, zoning, urban transformation, building materials, construction demolition, eco design, etc.) published by different ministries and units, towards limiting greenhouse gas emissions and energy efficiency.	Policy
ENB.1.4	Update the Regulation on Energy Performance in Buildings and the Communiqué on the Method of National Calculation of Energy Performance in Buildings in accordance with international standards to include the whole life cycle emissions approach and environmental performance criteria.	Policy
ENB.1.5	Update the Energy Performance Certificate system to also report on all life cycle carbon emissions.	Policy
ENB.1.6	Establish a building code improvement cycle that tightens the minimum building energy and carbon emission performance requirements defined in the Regulation on Energy Performance in Buildings every three to five years with the goal of achieving net zero carbon buildings by 2053.	Policy
ENB.1.7	Establish mandatory limit values for minimum operational, whole life cycle and embodied carbon emissions for different building typologies and climate zones.	Policy
ENB.1.8	Develop a "Building Passport National Certification System" for existing and new buildings, where all life cycle information of a building (administrative documents, data on parcels and location, technical and functional features, environmental, social, and financial performance) can be stored and monitored, and establish a monitoring system for all buildings through building passports.	Policy Technology
ENB.1.9	Develop policies that will ensure that new public buildings become NZEB in the short term and have net zero carbon emissions and high energy efficiency in the medium term.	Policy

Period : ● Short ● Medium



**Table 7. Actions for reducing operational carbon emissions from existing and new buildings.** (Continued)

Action Code	Action	Action Type
ENB.1.10	Update the Energy Performance Certificate calculation algorithm and user interface according to current needs.	Policy
ENB.1.11	Conduct efforts aimed at increasing coordination and collaboration among stakeholders such as the public sector, private sector, universities, etc. to develop decarbonization policies and projects in the building sector.	Awareness Raising Capacity Building
ENB.1.12	Carry out/support research and development studies on the development and application of innovative technologies to increase energy efficiency in buildings and achieve zero carbon buildings.	Technology Policy
ENB.1.13	Provide capacity development training for public personnel involved in the implementation of regulations related to the building sector.	Policy
ENB.1.14	Update legal regulations to ensure regular energy audits for all building types.	Policy
ENB.1.15	Develop policies that encourage the issue of EPC for existing buildings. Implement national programs that facilitate the implementation of comprehensive energy retrofits for the lowest-performing buildings.	Policy
ENB.1.16	Prepare national building renovation plans that consider full life cycle carbon emissions and aim to reduce operational and embodied carbon.	Policy
ENB.1.17	Develop monitoring, verification, and compliance mechanisms for the building sector at the national level.	Policy
ENB.1.18	Develop national policies to promote the electrification of buildings.	Policy

Period : ● Short ● Medium



## ENB.2 Increasing the environmental sustainability of existing and new buildings

Table 8. Actions for increasing the environmental sustainability of existing and new buildings.

Action Code	Action	Action Type
ENB.2.1	Develop a national framework program containing policies and regulations that aim to reduce the environmental, social, and economic impacts of buildings and contribute to sustainable production and consumption, green development, social integration, and environmental integrity.	Policy
ENB.2.2	Create a national existing building database by conducting a survey of the existing building stock.	Policy Technology
ENB.2.3	Develop policies and relevant legal regulations to ensure targets for zero carbon/green buildings in urban transformation projects.	Policy
ENB.2.4	Establish a monitoring framework and tools to improve the building industry's compliance with regulations.	Policy
ENB.2.5	Develop an incentive program to increase the utilization of the national system for the Green Certificate for Buildings and Settlements in existing and new buildings and settlements.	Policy
ENB.2.6	Tighten legal regulations to ensure the widespread use of highly energy-efficient heating, cooling, ventilation systems, domestic hot water, and lighting systems.	Policy
ENB.2.7	Develop legal regulations to classify and certify the competencies of building contractors in constructing high-performance, green, energy-efficient, zero carbon buildings.	Policy
ENB.2.8	Promote climate-sensitive building design, conduct initiatives to encourage the widespread adoption and use of BIM-based energy, lighting, indoor air quality, and other simulation tools in the design process.	Technology
ENB.2.9	Create comprehensive support programs containing financial instruments and incentives for new buildings and existing structures to promote sustainable construction, zero-carbon buildings, and the use of renewable energy in buildings.	Policy Finance
ENB.2.10	Develop/diversify certification, accreditation, and training programs to increase the technical capacity of professionals working in the construction sector regarding the sustainability.	Capacity Building
ENB.2.11	Conduct initiatives to enhance awareness and build the capacity of decision-makers regarding sustainable building and construction practices.	Awareness Raising Capacity Building

Period : ● Short ● Medium

**Table 8. Actions for increasing the environmental sustainability of existing and new buildings.** (Continued)

Action Code	Action	Action Type
ENB.2.12	Develop educational programs to increase knowledge about sustainable new buildings at the primary, secondary, vocational, university, and adult education levels.	<b>Awareness Raising</b>
ENB.2.13	Encourage companies in the construction value chain to design and implement their decarbonization plans through the widespread adoption of the UN Global Compact among construction sector firms or similar initiatives. <i>(The UN Global Compact is a corporate sustainability initiative that encourages organizations to collaborate in taking action to create a sustainable and inclusive global economy that benefits our world, all people, communities, and markets.)</i>	<b>Awareness Raising Capacity Building</b>
ENB.2.14	Develop mandatory regulations regarding indoor air quality in buildings and improve technical standards.	<b>Policy</b>
ENB.2.15	Develop technical guides and good practice guides and disseminate existing guides to promote LCA studies in building design, comprehensive renovation, and construction stages.	<b>Capacity Building</b>

Period : ● Short ● Medium









CHAPTER 6

**RENEWABLE  
ENERGY**

## Background

The use of fossil fuels as an energy source is at the heart of today's climate issue. Renewable energy, on the other hand, is a critical element in combating climate change and is a significant part of the solution. Türkiye's electricity generation capacity, fuelled by hydro, solar, wind, geothermal and other renewable resources has been increasing rapidly in recent years. The growth in renewable energy generation has been gaining momentum with new installations in the last decade.

Increasing the share of renewable energy in energy supply makes significant contributions to the reduction of greenhouse gas emissions, the fight against climate change, and environmental sustainability. Investments and policies for renewable energy are an important step in building a sustainable energy future.

## Current State

- In 2022, 34,6% of the national electricity generation share was obtained from coal, 22,2% from natural gas, 20,62% from hydraulic energy, 10,8% from wind, 4,7% from solar, %3,3 from geothermal energy and 3,7% from other sources [12].
- As of the end of April 2023, the installed power had reached 104.496 MW [12].
- The distribution of installed capacity according to resources is as follows: 30,2% hydraulic energy, 24,3% natural gas, 20,9% coal, 11% wind, 9,5% solar, 1,6% geothermal, and 2,5% other sources [12].
- Legal regulations regarding renewable energy in Türkiye are based on Law No. 5346 on the Utilization of Renewable Energy Sources for the Purpose of Generating Electrical Energy, enacted in 2005.
- The "Renewable Energy Support Mechanism (YEKDEM)" and "Renewable Energy Resource Area (YEKA)" processes are the current incentive elements for renewable energy support models.

- With the Regulation on Amending the Energy Performance Regulation in Buildings published in February 2022, a gradual transition to the "Nearly Zero Energy Buildings" concept, which is more energy efficient than normal buildings and provides a certain share of its energy from renewable energy sources, has been made mandatory. Accordingly, as of January 1, 2023, all buildings with a total construction area exceeding 2,000 square meters on a parcel are required to have a minimum energy performance rating of "B". Furthermore, it has become mandatory for these buildings to use renewable energy sources such as solar panels, wind energy and heat pumps for at least 10 percent of their energy consumption. During the transition period between 1st of January 2023 and 1st of January 2025, the minimum renewable energy rate specified as "10%" will be implemented as "5%", and the total building construction area specified as "2000 m<sup>2</sup>" will be applied as "5000 m<sup>2</sup>".

## Barriers and Gaps

- In Türkiye, gaps are observed in the regulations for the integration of renewable energy systems in buildings. Especially in residential type buildings, regulations are needed to define the roof area and adapt the renewable energy systems to the building design.
- In Türkiye, regulations need to detail the integration of renewable energy systems into buildings. Regulations are needed, especially for residential buildings, to define roof space and adapt building designs to accommodate renewable energy systems.
- Administrative and bureaucratic complexities encountered in the implementation of renewable energy projects into buildings and a lack of effective coordination between different authorities leading to long waiting times for obtaining the necessary permits.



- In Türkiye, individuals lack sufficient information on how to carry out distributed renewable energy investments at the point of consumption. Furthermore, there is insufficient information about the ecological and financial benefits of renewable energy and the level of awareness among individuals about renewable energy technologies is low. (Distributed generation refers to a system where electrical energy generation and energy storage are carried out

at low or medium voltage levels (0.4-36kV) and includes small-scale power plants, as well as renewable energy sources such as wind and solar, fuel cells and energy storage units [13].)

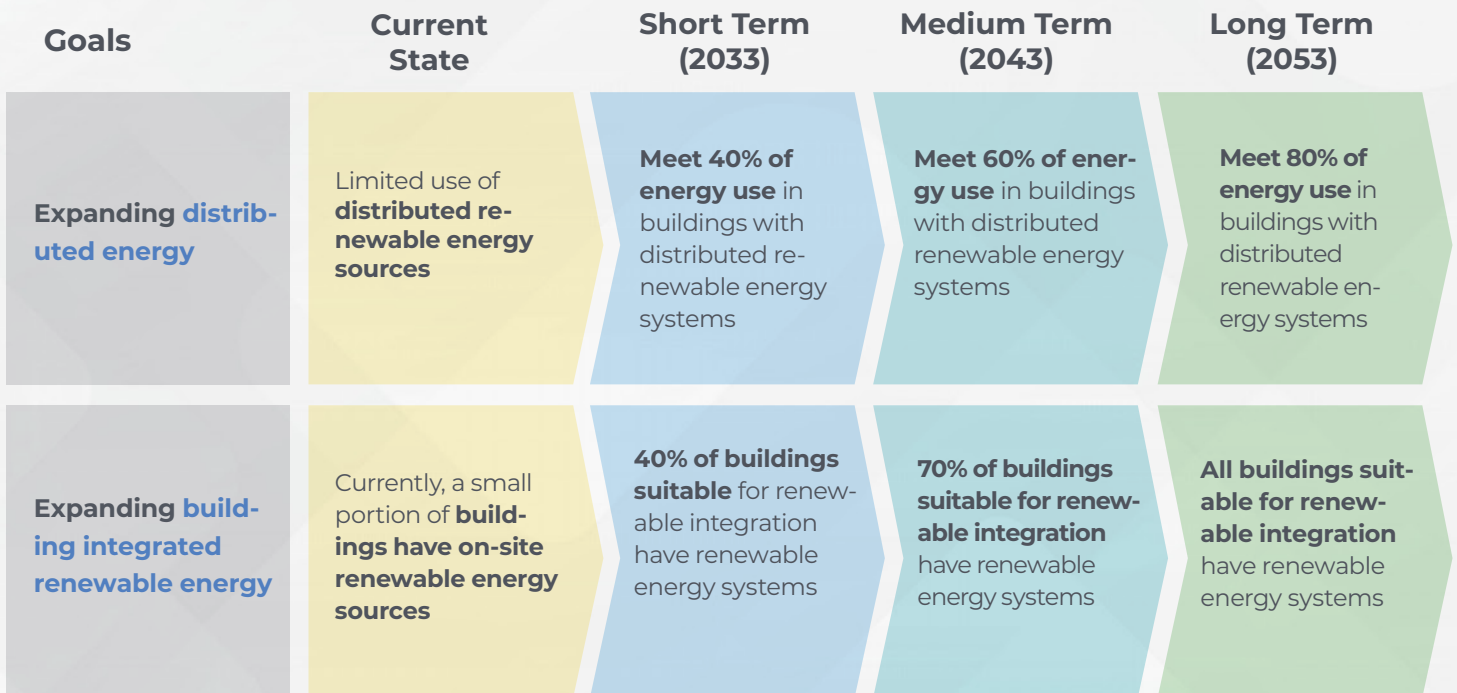
- In every region and province, there may not be a sufficient number of competent technical experts/practitioners to design, construct, operate, and maintain renewable energy systems.

## Goals

Within the scope of the roadmap, two main goals have been defined for renewable energy (Figure 6). These goals aim to reduce carbon emissions from buildings and settlements and facilitate their complete elimination in the long term

through the dissemination of distributed energy and building-integrated renewable energy systems. These goals are set for the Short term (2033), Medium term (2043) and Long terms (2053).

Figure 6. Goals for renewable energy.



## Actions

Today, there are significant opportunities for the dissemination of distributed renewable energy systems, and building-integrated renewable energy systems through policy, design, technology, application, and technical criteria.

Actions developed based on existing gaps and barriers are categorized into 2 groups: “REN.1

Dissemination of renewable energy” and “REN.2 Dissemination of distributed renewable energy systems at the building and neighbourhood scale.”

The timeframes for the implementation of actions are planned as Short-term (5 years) and Medium-term (10 years).

### REN.1 Disseminating renewable energy

**Table 9. Actions for disseminating renewable energy.**

Action Code	Action	Action Type
REN.1.1	Establish special financing mechanisms that offer low-cost loans, grant programs, risk-sharing opportunities, and technical support to facilitate the financing of sustainable energy projects.	Policy Finance
REN.1.2	Expand tax incentives for renewable energy investments and develop various measures such as tax reductions, tax exemptions and investment incentives make them more attractive.	Policy Finance
REN.1.3	Organize awareness campaigns, training programs, seminars, and events to raise awareness and promote energy efficiency and the use of renewable energy.	Capacity Building Awareness Raising
REN.1.4	Support R&D activities, creating innovation funds and encourage cooperation between universities, research centers and the private sector to increase the use of renewable energy resources and support the development of clean energy technologies.	Policy Technology
REN.1.5	Promote research, development, and implementation of carbon capture and storage technologies, provide financial support to priority projects, encourage the establishment of pilot facilities, and update regulations for carbon capture and storage projects.	Policy Technology
REN.1.6	Support R&D efforts for green hydrogen production and utilization, develop efficient electrolysis technologies, work on innovative storage methods, and strengthen the infrastructure to promote the industrial applications of green hydrogen.	Policy Technology

Period : ● Short ● Medium

**Table 9. Actions for disseminating renewable energy. (Continued)**

Action Code	Action	Action Type
REN.1.7	Support R&D efforts related to solar energy systems (photovoltaic and thermal) technologies, working on high-efficiency solar panels, storage solutions, and solar energy integration techniques, and promote innovation in the solar energy sector.	Policy Technology
REN.1.8	Develop incentive systems to disseminate the use of cogeneration systems in industry and large-scale urban transformation projects, implement pilot projects to increase the cost-effectiveness of cogeneration and promote energy efficiency.	Policy Technology
REN.1.9	Support biogas production and energy recovery technologies to encourage the proliferation of innovative waste-to-energy facilities focused on energy production within waste management processes.	Finance Policy
REN.1.10	Promote technological transformation to support decarbonization in sectors related to the construction industry, such as building materials, heating, cooling, and ventilation system equipment. Provide financial options, credit programs, grant programs, and capital support to encourage the transition to alternative fuels.	Finance Policy
REN.1.11	Develop policies and new business models to strengthen the market for renewable energy trading, promote the establishment of energy exchanges and trading platforms, and support international energy trade.	Policy Technology
REN.1.12	Accelerate the digital transformation in the energy sector, promote the use of energy storage systems, and develop regulations to implement demand-side management practices. Support the establishment of smart grids.	Capacity Building
REN.1.13	Promote vocational training programs to increase green employment in the renewable energy sector, encourage the development of a qualified workforce in the renewable energy sector, and create innovative employment models.	Finance Policies
REN.1.14	Increase (distributed) renewable energy incentives by reducing and gradually phasing out subsidies to fossil fuels, diversify incentives provided for renewable energy sources, and support the competitiveness of the sustainable energy sector.	Policy
REN.1.15	Update legislation to promote the widespread use of practices such as Net Energy Metering, feed-in tariffs, net-billing on electricity bills, and energy storage.	Finance Policy
REN.1.16	Enact legal regulations to promote the widespread supply of green energy, strengthen mechanisms such as purchase guarantees, long-term power purchase agreements, and renewable energy certificates to incentivize renewable energy use.	Capacity Building
REN.1.17	Provide training to financial institutions regarding the evaluation and financing of large-scale energy projects and distributed energy systems.	Capacity Building

Period : ● Short ● Medium



**Table 9. Actions for disseminating renewable energy.** (Continued)

Action Code	Action	Action Type
REN.1.18	Arrange training sessions and enhance the capacity of public institutions involved in renewable energy application processes regarding implementation principles.	Policy Technology
REN.1.19	Prepare regulations for certifying and auditing manufacturers of renewable energy systems to ensure their products meet international standards, support certification and quality control processes, and carry out studies to ensure the reliability and performance of renewable energy facilities.	Policy Technology

Period : ● Short ● Medium



## REN.2 Disseminating distributed renewable energy systems at the building and neighbourhood scale

**Table 10. Actions for disseminating distributed renewable energy systems at the building and neighbourhood scale.**

Action Code	Action	Action Type
REN.2.1	Prepare a comprehensive roadmap to promote electrification in buildings, accelerate the transformation process, and facilitate the implementation. (using electricity instead of fossil fuels for basic functions such as heating, cooling, hot water preparation and cooking).	Policy
REN.2.2	Prepare a comprehensive national roadmap to accelerate the adoption of distributed renewable energy systems (e.g., photovoltaic, solar thermal, micro wind, energy storage, etc.) and projects in the planning and design processes of buildings and settlements.	Policy
REN.2.3	Update regulations to ensure consistency and coordination among different existing legislations and regulations related to renewable energy and building performance.	Policy
REN.2.4	Review the legislative regulations necessary for the installation of building-integrated renewable energy systems and make legislative improvements related to the use rights of roof areas, external facades, and other common areas.	Policy
REN.2.5	Develop legal regulations and update relevant standards to encourage the design of new buildings to be suitable for the integration of renewable energy systems.	Policy
REN.2.6	Implement legal regulations to gradually increase the percentage of renewable energy in the definition of Nearly Zero-Energy Buildings (NZEB) over the years.	Policy
REN.2.7	Develop standards and guidelines to ensure the measurement, monitoring, and reporting of renewable energy use.	Policy
REN.2.8	Develop incentives for dynamic tariff models and net-billing applications to promote the widespread adoption of integrated renewable energy systems in buildings. Create economic mechanisms that reduce energy costs for consumers and incentivize energy production.	Policy Finance
REN.2.9	Promote the use of technologies such as heat pumps, district heating, and solar energy to facilitate the widespread adoption of renewable heating and cooling practices in buildings.	Policy Technology

Period : ● Short ● Medium

**Table 10. Actions for disseminating distributed renewable energy systems at the building and neighbourhood scale. (Continued)**

Action Code	Action	Action Type
REN.2.10	Implement support mechanisms that provide credit lines, leasing structures, incentive mechanisms, subsidies, and both financial and non-financial incentives for building-integrated distributed renewable energy projects, along with technical support and consulting services.	Finance
REN.2.11	Support energy sharing and community projects for electricity generation through distributed systems at the neighbourhood and settlement scale and develop mechanisms that encourage local energy transformation.	Policy Finance
REN.2.12	Create collaboration networks between policymakers, technology developers, renewable energy practitioners, construction developers, and financiers to generate more project opportunities and strengthen existing networks.	Capacity Building
REN.2.13	Develop/promote power purchase agreements (PPAs) and similar business models for renewable energy projects in buildings.	Policy Finance
REN.2.14	Provide capacity building training to financial institutions and developers on the evaluation and financing of building-integrated and/or distributed energy projects.	Capacity Building
REN.2.15	Provide guidance to local authorities to create regulations that promote the use of renewable energy in buildings and ensure their participation in the policy-making processes.	Policy Capacity Building
REN.2.16	Organize technical training programs for the planning, design, and implementation of renewable energy projects and update the knowledge and skills of professionals working in the building sector.	Capacity Building
REN.2.17	Implement training and information programs for all public institutions involved in renewable energy applications.	Capacity Building
REN.2.18	Develop methods to facilitate the use of renewable energy in different building typologies.	Technology
REN.2.19	Provide support programs to prevent energy poverty and facilitate energy access. Offering energy efficiency measures and renewable energy solutions to ensure social justice for low-income families.	Policy

Period : ● Short ● Medium





CHAPTER 7

**CLIMATE  
RESILIENCE AND  
ADAPTATION**

## Background

Comprehensive steps are being taken worldwide across all sectors, including the building industry, to reduce greenhouse gas emissions resulting from fossil fuel use, the primary cause of global warming. However, recent scientific publications indicate that the effects of climate change will increasingly make themselves felt. Recently, meteorological disasters occurring worldwide have led to a greater awareness of the adverse effects of climate change. The cost of these adverse effects on the economy, society, and the environment is increasing exponentially. Therefore, in addition to mitigation efforts such as reducing fossil fuel use, increasing the use of renewable energy sources, and improving energy efficiency, implementing strategies for adapting to changing climate conditions is of paramount importance. Taking timely and effective steps towards a solution is crucial in the fight against climate change.

Urban spaces and buildings, the fundamental components of cities, are responsible for approximately one-third of global carbon emissions, while they are also most affected by climate change-induced disasters.

“Climate Change Adaptation” means taking appropriate measures to anticipate the current and future adverse effects of climate change, prevent or minimize the potential harm they may cause, or seize the opportunities that may arise. “Climate resilience” is the ability to withstand, absorb, adapt to, effectively recover from, and improve upon the impacts of a climate change-induced hazard, while maintaining the fundamental structures and functions of natural, social, and economic systems when exposed to such a hazard.

The coordinated implementation of adaptation strategies at the national and local levels can make cities and buildings more resilient to climate change-induced disasters.

## Current State

- The Mediterranean Basin, in which Türkiye is located, is one of the most vulnerable regions in the world to global climate change. The impacts of climate change in Türkiye are becoming increasingly evident due to factors such as rising annual average temperatures, changes in precipitation patterns throughout the country, changing soil structures, and altering ecosystems, along with a growing number of disasters.
- In April 2023, Türkiye submitted its updated National Determined Contribution (NDC) document to the United Nations Secretariat. The NDC includes the background on Türkiye’s adaptation policies along with key policy preparation actions that support Türkiye’s adaptation activities through 2030. Among the planned actions is the publication of the Regulation on Local Climate Change Action Plans.
- The National Climate Change Strategy Document (2010-2020), Climate Change Action Plan (2011-2023), National Climate Change Adaptation Strategy and Action Plan (2011-2023) are among Türkiye’s official policy documents to combat climate change.
- Additionally, Preparations for the Climate Law, which comprehensively regulates the issue of climate change in Türkiye, are ongoing.

## Barriers and Gaps

- In Türkiye, prominent sectors such as transportation, industry, agriculture, tourism, energy, finance, buildings, and infrastructure are significantly affected by climate change. Climate change mitigation efforts carried out at the sectoral level, particularly emphasize emission reduction activities.
- In Türkiye, there is no direct legal framework regulating the building sector’s adaptation to climate change. Existing legislation in various sectors contains numerous provisions that support climate change adaptation. Issues related to building adaptation are indirectly addressed in various legal regulations.

- There is no specific action plan in place to enhance the adaptation of buildings to climate change. In Türkiye, policy documents that regulate climate adaptation do not contain dedicated sections for building sector adaptation. Actions related to building adaptation are

limited and scattered among existing policy documents.

- There is a need to develop monitoring-evaluation mechanisms for adaptation of building sector to climate change.

## Goals

Within the scope of the roadmap, three main goals have been defined for climate resilience and climate adaptation in buildings and cities (Figure 7). These goals aim to achieve long-term climate adaptation and resilience in the building sector through climate-resilient construction

of new buildings, climate-resilient renovations of existing buildings, and the climate-resilient transformation of cities. These goals are set for the Short term (2033), Medium term (2043), and Long term (2053).

**Figure 7. Goals for resilience and climate adaptation.**

Goals	Current State	Short Term (2033)	Medium Term (2043)	Long Term (2053)
<b>Constructing new buildings climate-resilient</b>	There is no direct policy or regulation in place that <b>regulates the climate-resilient construction of new buildings</b>	Strengthen relevant policies and legislation to <b>ensure climate resilience in new buildings</b>	Integrate climate change adaptation criteria into all <b>investment and decision-making processes regarding buildings</b>	Construct all new buildings to be compatible with <b>climatic conditions that may change again in the future</b>
<b>Renovating existing buildings climate-resilient</b>	There is no direct policy or regulation <b>in place that ensure the climate resilience of existing buildings</b>	Maintenance & renovations of <b>40% of existing buildings to ensure climate resilience</b>	Maintenance & renovations of <b>70% of existing buildings to ensure climate resilience</b>	All existing buildings are <b>adapted to climate change and resilient</b>
<b>Ensuring urban resilience against climate change</b>	Some major cities have planning strategies for <b>climate risks, but it is not widespread</b>	Implementing resilience planning and <b>adaptation efforts in 50% of urban areas</b>	Implementing resilience planning and <b>adaptation efforts in 70% of urban areas</b>	Implementing resilience planning and <b>adaptation efforts in all urban areas</b>



## Actions

Currently, in Türkiye, there are significant opportunities to support climate adaptation and resilience goals for climate-resilient buildings and cities through policies, technology, financing, technical capacity development, and awareness.

Actions aimed at enhancing resilience due to existing gaps and barriers are categorized into

two groups: “CRA.1 Enhancing the climate resilience of buildings” and “CRA.2 Enhancing the climate resilience of cities.”

The timeframes for the implementation of actions are planned as Short-term (5 years) and Medium-term (10 years).

### CRA.1 Enhancing the climate resilience of buildings

**Table 11. Actions for enhancing the climate resilience of buildings.**

Action Code	Action	Action Type
<b>CRA1.1</b>	Develop and enact legal regulations governing climate resilience and adaptation in buildings and define obligations.	<b>Policy</b>
<b>CRA1.2</b>	Ensure inter-legislative coordination by updating existing regulations and standards governing the building sector consistently across the entire lifecycle, location, and usage type in response to climate change hazards.	<b>Policy</b>
<b>CRA1.3</b>	Conduct a resilience assessment and climate risk classification for existing buildings, considering climate risk factors such as floods, heat stress, wind events, sea-level rise, water stress, and forest fires.	<b>Policy</b>
<b>CRA1.4</b>	Implement national campaigns to increase the climate adaptation and resilience of the existing building stock.	<b>Policy</b>
<b>CRA1.5</b>	Establish information, monitoring, and early warning systems to increase the resilience of buildings to disasters.	<b>Policy Technology</b>
<b>CRA1.6</b>	Develop financial and investment strategies for activities ensuring climate resilience throughout the entire building lifecycle, both for existing and new buildings, along with financial measures that promote equal access to insurance pricing and financial services.	<b>Finance Capacity Building</b>

Period : ● Short ● Medium

**Table 11. Actions for enhancing the climate resilience of buildings.** (Continued)

Action Code	Action	Action Type
<b>CRA.1.7</b>	Prepare roadmaps and guidance documents on enhancing climate adaptation and resilience in buildings.	<b>Capacity Building</b>
<b>CRA.1.8</b>	Conduct R&D efforts for innovative products and systems aimed at enhancing the climate resilience of buildings. (e.g., green roof applications, highly water-permeable floor coverings, coating materials with reflective surfaces, durable materials, cool roof coverings, cool roof paints, etc.).	<b>Technology</b>
<b>CRA.1.9</b>	Develop and implement procurement standards for climate-resilient buildings.	<b>Policy</b>
<b>CRA.1.10</b>	Develop maintenance guidelines and requirements for buildings and building systems.	<b>Policy</b>
<b>CRA.1.11</b>	Develop inspection mechanisms to monitor the climate adaptation of buildings.	<b>Policy</b>

Period : ● Short ● Medium



## CRA.2 Enhancing the climate resilience of cities

Table 12. Actions for enhancing the climate resilience of cities.

Action Code	Action	Action Type
<b>CRA.2.1</b>	Conduct a nationwide Energy Distribution Network Resilience Assessment and implement necessary measures.	<b>Policy</b>
<b>CRA.2.2</b>	Undertake efforts to promote microgrids, community energy storage facilities, and community-owned renewable energy projects to enhance resilience in local energy production.	<b>Policy Technology</b>
<b>CRA.2.3</b>	Provide financing, incentives, and develop economic tools to support climate change adaptation.	<b>Policy Finance</b>
<b>CRA.2.4</b>	Work towards popularizing widespread use of Green Certification programs at the settlement level.	<b>Policy Awareness Raising</b>
<b>CRA.2.5</b>	Prepare climate change projections for all cities.	<b>Policy Capacity Building</b>
<b>CRA.2.6</b>	Take steps to promote district heating and cooling and work on transitioning from individual heating systems to central and district heating systems.	<b>Policy Technology</b>
<b>CRA.2.7</b>	Work on promoting nature-based solutions in cities ( <i>e.g., urban forests, biological retention areas, artificial inland water areas, natural inland water areas, river floodplains, mangrove forests, salt marshes, sandy beaches, terraces and slopes, river and stream rehabilitation, structural solutions, open green areas, green corridors, etc.</i> ).	<b>Policy Capacity Building</b>
<b>CRA.2.8</b>	Promote decarbonization processes in cities through electrification, clean fuels, clean energy use, carbon capture, and storage.	<b>Policy</b>

Period : ● Short ● Medium





CHAPTER 8

**CROSS-CUTTING  
AREAS: FINANCE**

## Background

To decarbonize the building sector, comprehensive measures are needed in various building elements, from construction materials to building envelope, passive heating and cooling designs, active heating and cooling (HVAC) systems, electrical appliances, lighting, and renewable energy generation.

Each of these elements offers unique opportunities and challenges for decarbonizing buildings. However, the success of these policies also depends on financial solutions that can support the realization of zero carbon buildings alongside an advanced construction sector.

Worldwide, governments, financial institutions, and real estate market players have been developing and implementing various financial and non-financial tools and policies to promote investment in zero carbon buildings.

The financial tools used for net-zero carbon buildings include not only traditional building financing mechanisms, but also more complex tools specifically developed for the implementation of low-carbon buildings, devices, and structures.

## Current State

- In Türkiye, concepts such as sustainable finance, green finance, clean energy transition finance, and climate finance are emerging and gaining importance. It is observed that the use of resources for climate finance is increasing. Financial institutions in Türkiye have taken steps to manage environmental and social risks and support sustainable projects.
- The Principles for Responsible Banking initiated by the United Nations Environment Programme Finance Initiative (UNEP-FI) have been joined by Akbank, Garanti Bank, Şekerbank, Türkiye İş Bankası, Türkiye Kalkınma ve Yatırım Bankası, Türkiye Sınai Kalkınma Bankası, and Yapı Kredi Bank as founding signatories, and they are working towards a sustainable global financial sector [14].
- The “Sustainability Guide for the Banking Sector,” prepared in 2014 by the Turkish Banks Association (TBB) with the aim of considering the economic, environmental, and social dimensions of development in the activities of the banking and financial sector, was updated in 2021 [15].
- The Energy Performance Certificate system developed within the scope of the Energy Performance Regulation in Buildings, and the voluntary National Green Certificate System for Buildings and Settlements developed within the scope of the Regulation on Green Certificate for Buildings and Settlements (Official Gazette Date: 12.06.2022, Official Gazette Number: 31864) offer tools that can be used in the financial suitability assessment of projects related to buildings and settlements.

## Barriers and Gaps

- Awareness and understanding of the long-term energy cost savings, environmental sustainability, energy efficiency, indoor air quality, and positive health effects of zero-carbon buildings have not yet developed sufficiently. Therefore, many building owners and investors choose to focus on traditional buildings.
- There are limited financing options that are specifically tailored to zero-carbon building projects, and their recognition is low.
- Higher perceived risks associated with zero carbon buildings create doubt and unwillingness among stakeholders to invest in or finance green building projects.

## Goals

Within the scope of the roadmap, two main goals have been defined for financing (Figure 8). These goals aim to increase financing opportunities for zero-carbon buildings, alongside the decarbonization of lending and investment

portfolios, to support the realization of zero-carbon buildings.

These goals are set for the Short term (2033), Medium term (2043), and Long term (2053).

**Figure 8. Goals for finance.**

Goals	Current State	Short Term (2033)	Medium Term (2043)	Long Term (2053)
<b>Greening lending and investment portfolios</b>	There is no national target for zeroing out carbon emissions from the lending and investment portfolio. There are a few national financial institutions committed to international targets	Eliminate all operational and attributable carbon greenhouse gas emissions from the lending and investment portfolio <b>to reach net zero by 2050 at the latest</b>		
<b>Increasing financing for zero carbon buildings</b>	There are limited financing tools available for zero carbon buildings	The gradual transformation of zero-carbon building financing mechanisms <b>to make green finance accessible by 2050</b>		

## Actions

In Türkiye, there are significant opportunities for the expansion of sustainable finance and the development of innovative financing models for zero carbon buildings. These opportunities aim to support climate mitigation and adaptation goals across various areas, including, policy, technology, financing, technical capacity building and awareness raising. Recommendations

to strengthen sustainable finance due to existing gaps and barriers are categorized into two groups under “FIN.1 Enhancing sustainable finance” and “FIN.2 Financing zero-carbon buildings.”

The timeframes for the implementation of actions are planned as Short-term (5 years) and Medium-term (10 years).



## FIN.1 Enhancing sustainable finance

Table 13. Actions for enhancing sustainable finance.

Action Code	Action	Action Type
FIN.1.1	Establish a national regulatory finance framework that takes into account changes caused by climate change and supporting sustainable finance.	Policy
FIN.1.2	Create a national taxonomy that is in line with the European Union Taxonomy to define green and sustainable investments.	Policy
FIN.1.3	Develop national mechanisms that take into account emission costs such as Emission Trading Systems (ETS) and carbon tax systems.	Policy
FIN.1.4	Strengthen communication and coordination between financial institutions and regulatory authorities to support the development of sustainable and green finance.	Awareness Raising Capacity Building
FIN.1.5	Prepare and implement roadmaps to guide the transformation of national financial institutions in line with international sustainability principles.	Awareness Raising
FIN.1.6	Promote integrated reporting practices between financial institutions and private sector organizations and ensure the credit assessment and monitoring of financially supported projects are conducted through integrated reporting.	Capacity Building
FIN.1.7	Work towards the widespread implementation of environmental impact assessments for projects.	Awareness Raising
FIN.1.8	Develop data collection and monitoring methods for financial institutions to track the sustainability of projects.	Capacity Building
FIN.1.9	Develop systems to monitor the environmental, social, governance, and economic impacts of the projects for which loans are provided.	Technology
FIN.1.10	Work to label and monitor green financial products in line with global practices.	Capacity Building
FIN.1.11	Raise awareness of innovative financial instruments and sustainable/green/climate finance concepts through communication activities.	Awareness Raising
FIN.1.12	Work towards increasing the supply of green finance in the financial sector and create resources for projects in the field of sustainability and climate change.	Capacity Building Finance
FIN.1.13	Conduct awareness-raising activities to encourage investments to be directed towards sustainable projects.	Awareness Raising
FIN.1.14	Expand the roles and responsibilities of financial institutions to encompass technical consultancy, monitoring, and audit tasks for climate projects, in addition to providing financing. Encourage the establishment of technical units that support climate projects.	Capacity Building

Period : ● Short ● Medium

## FIN.2 Financing zero carbon buildings

Table 14. Actions for financing zero carbon buildings.

Action Code	Action	Action Type
FIN.2.1	Develop a comprehensive financial incentive program that includes tools such as tax incentives, subsidies, and grant programs for the decarbonization of new and existing buildings.	Policy Finance
FIN.2.2	Establish specialized financial resources such as green funds or green banks that can provide financing for zero-carbon building projects.	Finance
FIN.2.3	Develop competitive financial products and services designed specifically for zero-carbon/green building projects, such as green bonds or green home loans.	Finance
FIN.2.4	Develop specialized financial tools for deep renovations of existing buildings.	Finance
FIN.2.5	Develop financial tools and incentives to promote the use of low-embodied carbon sustainable materials in construction projects.	Policy Finance
FIN.2.6	Develop risk-sharing mechanisms that include tools such as insurance and guarantees to manage risks associated with zero-carbon building investments.	Finance
FIN.2.7	Develop innovative business models to support the growth of the Energy Service Company (ESCO) market.	Policy Finance
FIN.2.8	Conduct efforts to establish a common understanding among stakeholders in the financial sector regarding the definition and criteria for zero-carbon/green buildings.	Awareness Raising
FIN.2.9	Develop tools and certification programs that the finance sector can use to evaluate zero carbon, resilient, green building projects and strengthen existing national and international tools by adapting them to the finance sector.	Capacity Building Technology
FIN.2.10	Develop innovative valuation methods that better demonstrate the environmental and financial value of zero-carbon buildings.	Capacity Building Technology
FIN.2.11	Develop a quality assurance framework program that ensures transparency, consistency, and reliability of the project through independent verification to provide support and guidance to investors interested in zero carbon/green building projects.	Policy Capacity Building
FIN.2.12	Develop banking software for zero carbon building projects and creating databases by facilitating data collection on projects.	Technology

Period : ● Short ● Medium



**Table 14. Actions for financing zero carbon buildings.** (Continued)

Action Code	Action	Action Type
<b>FIN.2.13</b>	Increase awareness of green finance practices and technologies through information sharing platforms, educational programs, and workshops for financial institutions, developers, and construction industry professionals.	<b>Awareness Raising</b>
<b>FIN.2.14</b>	Conduct awareness activities to increase the demand for green finance by informing the public, investors, and financial institutions about the benefits of zero-carbon buildings.	<b>Awareness Raising</b>
<b>FIN.2.15</b>	Conduct efforts to enhance the awareness and technical capabilities of financial institution employees and customers towards energy efficiency, renewable energy, and climate change projects.	<b>Awareness Raising Capacity Building</b>
<b>FIN.2.16</b>	Carry out initiatives to encourage financial institutions to invest in innovative solutions that contribute to reducing carbon emissions from buildings.	<b>Policy Awareness Raising</b>

Period : ● Short ● Medium







CHAPTER 9

**CROSS-CUTTING  
AREAS: GENDER  
EQUALITY**

## Background

Gender equality is the principle of considering and addressing the interests, needs, and priorities of individuals of all ages, both women and men, in all aspects of life and work, ensuring their equal rights and opportunities.

Achieving gender equality in areas such as economic empowerment, education, healthcare, decision-making, and governance, as well as social inclusion, is considered a crucial element of sustainable development [16].

This process aims to reduce social and economic disparities between women and men, eliminate gender-based discrimination, and enable everyone to fully realize their potential.

Women's participation in the workforce is crucial for sustainable development. According to TURKSTAT data for 2021, the labor force participation rate in Türkiye is 70.3% for men and 32.8% for women. In the Eleventh Development Plan, the goal is to increase the female labor force participation rate to 38.5% and the female employment rate to 34% to enhance the economic position of women [17].

The policies that incorporate strategies developed to strengthen gender equality in Türkiye are listed below:

- In the National Action Plan on Gender Equality (2008–2013), published in 2008, goals, targets, and implementation strategies were determined under the coordination of the Directorate General on the Status of Women for the creation and implementation of public policies within the scope of the topics “Women's Education and Training,” “Women and Economy,” “Women and Poverty,” “Women and Health,” “Participation in Authority and Decision-Making Processes,” “Women and the Environment,” “Women and the Media,” “Women's Human Rights,” “Girls,” and “Institutional Mechanisms for the Advancement of Women” [18].
- In the Strategy Paper and Action Plan on Women's Empowerment (2018-2023), published in 2018, the current state, main objectives, goals, strategies, and activities were organized within the framework of five basic policies for the empowerment of women: education, health, economy, participation in decision-making mechanisms, and media, under the coordination of the Ministry of Family and Social Services [19].
- In the Women in Türkiye report published in 2022 by the Directorate General of the Status of Women of the Ministry of Family and Social Services, demographic data, education, health, participation in working life, participation in politics and decision-making mechanisms, combating violence against women, the current state of international and other studies, and implemented initiatives are presented.
- In the Eleventh Development Plan (2019-2023), the following article is included: “Arrangements to improve flexibility in the labor market, expanded child-care services and education opportunities and employment-oriented policies will support the labor market competencies of women and will support their more intensive participation into working life. Participation of women in the labor market at higher rates and with better jobs will boost household incomes and directly will contribute to savings, thereby enable more financing resources for investments.” [17].
- As of January 16, 2023, 57 provincial and district municipalities in Türkiye are signatories to the European Charter for Equality of Women and Men in Local Life. This charter is a commitment by Europe's local and regional governments to use their powers and develop partnerships to achieve greater equality for their citizens [20].
- The United Nations Sustainable Development Goals are included in the nationally determined contributions and action plans developed in the fight against climate change by many countries, including Türkiye. The Sustainable Development Goals include: “5. Gender Equality: “Achieve gender equality and empower all

women and girls”; “10. Reducing Inequalities: Reduce inequality within and among countries”; “7. Affordable and Clean Energy: Ensure access to affordable, reliable, sustainable, and modern energy for all” [21].

## Gender Equality Strategies in the Building Sector

The Türkiye Building Sector Carbonization Roadmap adopts a firm approach towards gender equality. Women’s full and equal participation in social life is supported. This will enable the building sector to move towards a fairer, more inclusive, and sustainable future.

The contribution and support of different stakeholder groups are crucial to strengthening gender equality. In recent years, stakeholders and institutions in the building, energy and construction sectors have taken important steps towards achieving gender equality.

This roadmap designs the planned actions for the decarbonization of the building sector with a gender equality perspective and supports stakeholders’ efforts in this direction.

Responsible stakeholder groups should encourage the participation of women leaders, managers, and technical experts in the implementation of actions. This will help the sector to have a more diverse workforce. Stakeholders should also encourage women’s participation in vocational training and certification programs and capacity-building activities. They can implement mentorship programs to support women in rising to leadership positions in the construction sector. This will help women gain more prominence in the sector.

It is recommended to establish platforms for women in the building sector to network and learn from each other. Furthermore, education and awareness campaigns aimed at achieving

gender equality will encourage increased participation of women in the sector.

All of these steps will contribute to achieving gender equality in the sector and help the sector move towards a more sustainable and inclusive future.

Additionally, topics supported in this roadmap such as transitioning to cleaner energy sources, promoting low-carbon building materials, widespread adoption of high-efficiency climate control systems, and the development of sustainable financing have the potential to create more employment opportunities for women compared to traditional fossil fuel-based job areas.







CHAPTER 10

**STAKEHOLDERS**



Numerous stakeholders play important roles in decarbonizing the building sector and enhancing climate resilience in Türkiye.

These stakeholders include:

- National and local governments,
- Construction developers and construction companies, construction workers,
- Building inspection companies,
- Non-governmental organizations representing construction developers and investors,
- Building material manufacturers,
- Building material suppliers and sellers,
- Non-governmental organizations representing the building material sector,
- Architects and engineers,
- Professional chambers representing architects and engineers,
- Technicians,
- Institutions regulating higher education,
- Universities and research organizations,
- Renewable energy systems manufacturers,
- Renewable energy systems practitioners, energy provider organizations,
- Financial institutions and customers,
- Standard developing institutions,
- National certification bodies,
- Private sector companies providing life cycle assessment and sustainability consultancy services,
- Consumers,
- Building owners and building users,
- Telecommunication companies,
- Insurance companies,
- Disaster management institutions,
- Financial sector regulatory institutions,
- Non-governmental organizations.

Effective collaboration and coordination among stakeholders will play a crucial role in achieving buildings characterized by high energy efficiency, fulfilling the remaining energy requirements through renewable sources, and demonstrating resilience to climate change and other natural disasters.







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REPUBLIC OF TÜRKİYE  
MINISTRY OF ENVIRONMENT,  
URBANIZATION AND CLIMATE CHANGE



# TÜRKİYE BUILDING SECTOR DECARBONIZATION ROADMAP

EXTENDED SUMMARY

December 2023



global  
environment  
facility  
INVESTING IN OUR PLANET



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