T.C. ÇEVRE, ŞEHİRCİLİK VE İKLİM DEĞİŞİKLİĞİ BAKANLIĞI

İKLİM DEĞİŞİKLİĞİ BAŞKANLIĞI

CLIMATE CHANGE MITIGATION STRATEGY AND ACTION PLAN 2024-2030

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Abbreviations

TR-Açık Hali	TR-ks.	EN-abbr.	EN-Open Form
Avrupa Birliği	AB	EU	European Union
Avrupa Birliği ve Dış İlişkiler Genel Müdürlüğü	ABDGM	GDEUFR	General Directorate of European Union and Foreign Relations
Afet ve Acil Durum Yönetimi Başkanlığı	AFAD	AFAD	Disaster and Emergency Management Presidency
Arazi Kullanımı, Arazi Kullanım Değişikliği ve Ormancılık	AKAKDO	LULUCF	Land Use, Land Use Change and Forestry
Araştırma Geliştirme	Ar-Ge	R&D	Research and Development
Aile ve Sosyal Hizmetler Bakanlığı	ASHB	MoFSS	Ministry of Family and Social Services
Atıktan Türetilmiş Yakıt	ATY	RDF	Refuse Derived Fuel
Akıllı Ulaşım Sistemi	AUS	ITS	Intelligent Transport System
Altyapı Yatırımları Genel Müdürlüğü	AYGM	GDII	General Directorate of Infrastructure Investments
Bankacılık Düzenleme ve Denetleme Kurumu	BDDK	BRSA	Banking Regulation and Supervision Agency
Binalarda Enerji Performansı	BEP	EPB	Energy Performance of Buildings
Yapı Bilgi Modellemesi	BIM	BIM	Building Information Modelling
Birleşmiş Milletler	BM	UN	United Nations
Birleşmiş Milletler İklim Değişikliği Çerçeve Sözleşmesi	BMİDÇS	UNFCCC	United Nations Framework Convention on Climate Change
Boru Hatları ile Petrol Taşıma A.Ş.	BOTAŞ	BOTAS	Petroleum Pipeline Corporation
Balıkçılık ve Su Ürünleri Genel Müdürlüğü	BSGM	DGFA	General Directorate of Fisheries and Aquaculture
Bilgi Teknolojileri Genel Müdürlüğü	BTGM	GDIT	General Directorate of Information Technologies
Bitkisel Üretim Genel Müdürlüğü	BÜGEM	DGPP	General Directorate of Plant Production
Milyar-Araç Km	BVKm	BVKm	Billion Vehicle-Kilometres
Sınırda Karbon Düzenleme Mekanizması	SKDM	CBAM	Carbon Border Adjustment Mechanism
Coğrafi Bilgi Sistemleri Genel Müdürlüğü	CBSGM	DGGIS	General Directorate of Geographic Information Systems
Metan	CH_4	CH_4	Methane
Karbondioksit	CO_2	CO_2	Carbon dioxide
Uluslararası Havacılığa Yönelik Karbon Denkleştirme ve Azaltma Şeması	CORSIA	CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
Çölleşme ve Erozyonla Mücadele Genel Müdürlüğü	ÇEMGM	GDCDE	General Directorate of Combating Desertification and Erosion
Çalışma ve Sosyal Güvenlik Bakanlığı	ÇSGB	MoLSS	Ministry of Labour and Social Security
Çevre, Şehircilik ve İklim Değişikliği Bakanlığı	ÇŞİDB	MoEUCC	Ministry of Environment, Urbanization and Climate Change
Çevre Yönetimi Genel Müdürlüğü	ÇYGM	GDEM	General Directorate of Environmental Management

TR-Açık Hali	TR-ks.	EN-abbr.	EN-Open Form
Türkiye Damızlık Koyun Keçi Yetiştiricileri Merkez Birliği	TÜDKİYEB	TUDKIYEB	Central Union of Sheep and Goat Breeders of Türkiye
Doğa Koruma ve Milli Parklar Genel Müdürlüğü	DKMPGM	GDNCNP	General Directorate for Nature Conservation and National Parks
Devlet Su İşleri Genel Müdürlüğü	DSİ	SWH	General Directorate of State Hydraulic Works
Türkiye Damızlık Sığır Yetiştiricileri Merkez Birliği	TDSYMB	CBAT	Central Cattle Breeder's Association of Türkiye
Doğa Temelli Çözümler	DTÇ	NBS	Nature-based Solutions
Elektrikli Araç	EA	EV	Electric Vehicle
Enerji Kimlik Belgesi	EKB	EPC	Energy Performance Certificate
Enerji Piyasası Düzenleme Kurumu	EPDK	EMRA	Energy Market Regulatory Authority
Enerji Piyasaları İşletme A.Ş.	EPİAŞ	EXIST	Energy Exchange Istanbul
Enerji Performans Sözleşmesi	EPS	EPC	Energy Performance Contract
Enerji ve Tabii Kaynaklar Bakanlığı	ETKB	MoENR	Ministry of Energy and Natural Resources
Emisyon Ticaret Sistemi	ETS	ETS	Emissions Trading System
Elektrik Üretim A.Ş.	EÜAŞ	EUAS	Electricity Generation Corp.
Eğitim ve Yayın Dairesi Başkanlığı	EYDB	DTP	Department of Training and Publication
Güneş Enerjisi Santrali	GES	SPP	Solar Power Plant
Gıda ve Kontrol Genel Müdürlüğü	GKGM	GDFC	General Directorate of Food and Control
Gayri Safi Yurt İçi Hasıla	GSYİH	GDP	Gross Domestic Product
Gigawatt	GW	GW	Gigawatt
Hektar	ha	ha	Hectare
Milyon Hektar	Mha	Mha	Million hectares
Hayvancılık Genel Müdürlüğü	HAYGEM	GDL	General Directorate of Livestock
Hidroflorokarbon	HFC	HFC	Hydrofluorocarbon
Hazine ve Maliye Bakanlığı	HMB	MoTF	Ministry of Treasury and Finance
Hızlı Tren	HT	FT	Fast Train
Hava Kirliliğinin Ormanlar Üzerindeki Etkilerinin Değerlendirilmesi ve İzlenmesine İlişkin Uluslararası İşbirliği Programı	ICP	ICP	International Co-operative Programme on Assessment And Monitoring of Air Pollution Effects on Forests
Hükümetlerarası İklim Değişikliği Paneli	IPCC	IPCC	Intergovernmental Panel on Climate Change
Uluslararası Transfer Edilebilir Azaltım Çıktıları	ITMO	ITMO	Internationally Transferred Mitigation Outcomes
İçişleri Bakanlığı	İB	MoI	Ministry of Interior
İklim Değişikliği Azaltım Stratejisi ve Eylem Planı	İDASEP	CCMSAP	Climate Change Mitigation Strategy and Action Plan
İklim Değişikliği Başkanlığı	İDB	DCC	Directorate of Climate Change
İklim Değişikliği ve Uyum Koordinasyon Kurulu	İDUKK	CCACB	Climate Change and Adaptation Coordination Board

TR-Açık Hali	TR-ks.	EN-abbr.	EN-Open Form
İzleme, Raporlama ve Doğrulama	İRD	MRV	Monitoring, Reporting and Verification
Türkiye İş Kurumu	İŞKUR	ISKUR	Turkish Employment Agency
İyi Tarım Uygulamaları	İTU	GAP	Good Agricultural Practices
Kamu Gözetimi, Muhasebe ve Denetim Standartları Kurumu	KGK	POA	Public Oversight, Accounting and Auditing Standards Authority
Karayolları Genel Müdürlüğü	KGM	KGM	General Directorate of Highways
Kamu İhale Kurumu	KİK	PPA	Public Procurement Authority
Karbondioksit eşdeğeri	$CO_{2\text{-eş}}$	$CO_{2\text{-eq}}$	Carbon dioxide equivalent
Küçük ve Orta Ölçekli İşletme	KOBİ	SME	Small and Medium Enterprise
Küçük ve Orta Ölçekli İşletmeleri Geliştirme ve Destekleme İdaresi	KOSGEB	KOSGEB	Small and Medium Enterprises Development Organization
Kültür ve Turizm Bakanlığı	KTB	MoCT	Ministry of Culture and Tourism
Düşük Karbon Ekonomisi	LCE	LCE	Low-Carbon Economy
Milli Eğitim Bakanlığı	MEB	MoNE	Ministry of National Education
Meteoroloji Genel Müdürlüğü	MGM	GDM	General Directorate of Meteorology
Maden, Petrol İşleri Genel Müdürlüğü	MPİGM	GDMPA	General Directorate of Mining and Petroleum Affairs
Maden Tetkik ve Arama Kurumu	MTA	GDMRE	General Directorate of Mineral Research and Exploration
Milyon Ton	Mt	Mt	Million tonnes
Bin Ton	Kton	kt	Thousand tonnes
Müstakil Sanayi ve İşadamları Derneği	MÜSİAD	MUSIAD	Independent Industrialists' and Businessmen's Association
Megawatt	MW	MW	Megawatt
Megawatt Saat	MWs	MWh	Megawatt Hour
Mesleki Yeterlik Kurumu	MYK	VQA	Vocational Qualifications Authority of Türkiye
Azot Oksit	N_2O	N_2O	Nitrous oxide
Ulusal Katkı Beyanı	NDC	NDC	Nationally Determined Contribution
Nükleer Düzenleme Kurumu	NDK	NRA	Nuclear Regulatory Authority
Azot Triflorür	NF_3	NF_3	Nitrogen trifluoride
Nükleer Güç Santrali	NGS	NPP	Nuclear Power Plant
Ulusal Envanter Raporu	NIR	NIR	National Inventory Report
Net-Sıfır Emisyon	NSE	NZE	Net Zero Emissions
Neredeyse Sıfır Enerjili Binalar	NSEB	NZEB	Nearly Zero-Energy Buildings
Orman Genel Müdürlüğü	OGM	GDF	General Directorate of Forestry
Orta Vadeli Programme	OVP	MTP	Medium Term Programme
Özel Tüketim Vergisi	ÖTV	SCT	Special Consumption Tax
Paris Anlaşması	PA	PA	Paris Agreement
Personel Genel Müdürlüğü	PERGEM	PERGEM	General Directorate of Personnel
Perflorokarbon	PFC	PFC	Perfluorocarbon
Posta ve Telgraf Teşkilatı	PTT	PTT	Postal and Telegraph Corporation
Radyo ve Televizyon Üst Kurulu	RTÜK	RTUK	Radio and Television Supreme Council

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Cumhurbaşkanlığı Strateji ve Bütçe Başkanlığı	SBB	PSB	Presidency of Strategy and Budget
Kükürt Hegzaflorür	SF_6	SF_6	Sulphur hexafluoride
Strateji Geliştirme Başkanlığı	SGB	SDD	Strategy Development Department
Sosyal Güvenlik Kurumu	SGK	SGK	Social Security Institution
Sürdürülebilir Kentsel Hareketlilik Planı	SKHP	SUMP	Sustainable Urban Mobility Plan
Sürdürülebilir Kentsel Lojistik Planı	SKLP	SULP	Sustainable Urban Logistics Plan
Sermaye Piyasası Kurulu	SPK	CMB	Capital Markets Board
Sanayi ve Teknoloji Bakanlığı	STB	MoIT	Ministry of Industry and Technology
Su Yönetimi Genel Müdürlüğü	SYGM	GDWM	General Directorate of Water Management
Tarımsal Araştırmalar ve Politikalar Genel Müdürlüğü	TAGEM	TAGEM	General Directorate of Agricultural Research and Policies
Tarım İşletmeleri Genel Müdürlüğü	TİGEM	TIGEM	General Directorate of Agricultural Enterprises
Ticaret Bakanlığı	TB	MoT	Ministry of Trade
Türkiye Bankalar Birliği	TBB	BAT	Banks Association of Türkiye
Türkiye Cumhuriyeti Devlet Demiryolları İşletmesi Genel Müdürlüğü	TCDD	TCDD	State Railways of the Republic of Türkiye
Türkiye Çevre Ajansı	TÜÇA	TEA	Turkish Environment Agency
Türkiye Elektrik Dağıtım A.Ş.	TEDAŞ	TEDAS	Turkish Electricity Distribution Corp.
Türkiye Elektrik İletim A.Ş.	TEİAŞ	TEIAS	Turkish Electricity Transmission Corp.
Türkiye Elektromekanik Sanayi A.Ş.	TEMSAN	TEMSAN	Turkish Electromechanical Industry Inc.
Türkiye Enerji, Nükleer ve Maden Araştırma Kurumu	TENMAK	TENMAK	Turkish Energy, Nuclear and Mineral Research Agency
Ton Eşdeğer Petrol	TEP	TOE	Tonne of Oil Equivalent
Tarım ve Kırsal Kalkınmayı Destekleme Kurumu	TKDK	ARDSI	Agriculture and Rural Development Support Institution
Tapu ve Kadastro Genel Müdürlüğü	TKGM	GDLRC	General Directorate of Land Registry and Cadastre
Türkiye Kömür İşletmeleri	TKİ	TKI	Turkish Coal Enterprises
Türk Lirası	TL	TRY	Turkish Lira
Tarım ve Orman Bakanlığı	TOB	MoAF	Ministry of Agriculture and Forestry
Türkiye Odalar ve Borsalar Birliği	TOBB	TOBB	Union of Chambers and Commodity Exchanges of Türkiye
Türkiye Petrolleri Anonim Ortaklığı	TPAO	TPAO	Turkish Petroleum Corporation
Tarım Reformu Genel Müdürlüğü	TRGM	GDAR	General Directorate of Agricultural Reform
Türk Standardı	TS	TS	Turkish Standard
Türk Standartları Enstitüsü	TSE	TSE	Turkish Standards Institute

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Türkiye Sınai Kalkınma Bankası	TSKB	TSKB	Industrial Development Bank of Türkiye
Türkiye Bilimsel ve Teknolojik Araştırma Kurumu	TÜBİTAK	TUBITAK	Scientific and Technological Research Council of Türkiye
Türkiye İstatistik Kurumu	TÜİK	TURKSTAT	Turkish Statistical Institute
Türkiye Nükleer Enerji A.Ş.	TÜNAŞ	TUNAS	Turkish Nuclear Energy Corp.
Türkiye Raylı Sistem Araçları Sanayii Anonim Şirketi	TÜRASAŞ	TURASAS	Türkiye Rail System Vehicles Industry Inc.
Türk Patent ve Marka Kurumu	TÜRK PATENT	TURK PATENT	Turkish Patent and Trademark Office
Türkiye Yem Sanayicileri Birliği	TÜRKİYEM BİR	TURKIYEM BIR	Association of Turkish Feed Industrialists
Türk Sanayicileri ve İş İnsanları Derneği	TÜSİAD	TUSIAD	Turkish Industry and Business Association
Türkiye Yem Katkıları Üreticileri İthalatçıları ve Dağıtıcıları Derneği	TÜYEKAD	TUYEKAD	Turkish Feed Additives Manufacturers, Exporters and Distributors Association
Tabiat Varlıklarını Koruma Genel Müdürlüğü	TVKGM	GDPNA	General Directorate for Protection of Natural Assets
Terawatt Saat	TWh	TWh	Terawatt Hour
Türkiye Ziraat Odaları Birliği	TZOB	TZOB	Turkish Union of Chambers of Agriculture
Ulaştırma ve Altyapı Bakanlığı	UAB	MoTI	Ministry of Transport and Infrastructure
Ulusal Atık Yönetimi ve Eylem Planı	UAYP	NWMAP	National Waste Management and Action Plan
Ulaştırma, Denizcilik ve Haberleşme Araştırmaları Merkezi Başkanlığı	UDHAM	DoTMC	Directorate of Transport, Maritime Affairs and Communications Research Centre
Ulaştırma Hizmetleri Düzenleme Genel Müdürlüğü	UHDGM	DGRTS	General Directorate of Regulation of Transport Services
Kat Edilen Araç-Km	VKT	VKT	Vehicle-Kilometres Travelled
Yenilenebilir Enerji Kaynak Garanti Sistemi	YEK-G	YEK-G	Renewable Energy Source Guarantee System
Yenilenebilir Enerji Kaynak Alanları	YEKA	YEKA	Renewable Energy Source Areas
Yenilenebilir Enerji Kaynakları Destekleme Mekanizması	YEKDEM	YEKDEM	Renewable Energy Sources Support Mechanism
Ulusal Yeşil Sertifika Sistemi	YeS-TR	YeS-TR	National Green Certification Scheme
Yüksek Fen Kurulu	YFK	YFK	Higher Technical Board
Yüksek Hızlı Tren	YHT	HST	High-Speed Train
Yüksek Öğretim Kurumu	YÖK	CHE	Council of Higher Education
Yeşil Kamu Satın Alımları	YSA	GPP	Green Public Procurements
Kentsel Ulaşım Talep Analiz Bölgesi	KUTAB	UTDAZ	Urban Transport Demand Analysis Zone
Ulusal Havza Rehabilitasyon Stratejisi	UHRS	NBRS	National Basin Rehabilitation Strategy

TR-Açık Hali	TR-ks.	EN-abbr.	EN-Open Form
Ulusal Arazi Örtüsü Sınıflandırma ve İzleme Sistemi	UASİS	NLCC&MS	National Land Cover Classification and Monitoring System
Bölge Kalkınma İdaresi	BKİ	RDA	Regional Development Administrations
Sivil Toplum Kuruluşu	STK	NGO	Non-Governmental Organization

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Foreword

Mehmet ÖZHASEKİ
Minister of Environment, Urbanization and Climate Change

Climate change is one of the greatest environmental threats we face in our times. This universal problem adversely affects not only individuals and countries but also the Earth, which is our shared home, posing a serious risk to the sustainability of our planet. According to current research, the average global temperature has reached 1.1°C above pre industrial levels and has already exceeded 1.5°C as of early 2024. Meanwhile annual global greenhouse gas (GHG) emissions have reached 59 billion tonnes of CO_2 equivalent. At this critical point, we bear the responsibility of taking a determined stance to reduce GHG emissions that lead to climate change.

In order for an effective climate response, we need to increase efforts to limit the global temperature rise to 1.5°C as laid down in the Paris Agreement. In this regard, Türkiye signed the Paris Agreement in 2021 and declared its target to achieve "Net Zero Emission" by 2053. Following these developments, Türkiye updated its Intended Nationally Determined Contributions (INDCs) which was submitted to the United Nations Framework Convention on Climate Change (UNFCC) in 2015, and increased the mitigation target which was previously set as 21% to 41% compared to the Business as Usual (BAU) scenario. These developments have demonstrated the determination of our country in the fight against climate change.

It was decided to formulate a new climate change strategy and action plan in order to set Türkiye's climate response targets for the future and design the activities to be undertaken in

this context, taking into account the 2053 Net Zero Emission Target, Twelfth Development Plan, Medium-Term Programme, and our NDCs. In this framework, the "Climate Change Mitigation Strategy and Action Plan (CCMSAP) for 2024-2030" was formulated under the coordination of our Directorate of Climate Change and with contributions from all relevant stakeholders. This paper aims to present a roadmap on climate response covering the period until 2030 and includes the relevant strategies and action plans in this regard. Built on a scientific basis, it offers a comprehensive approach by bringing together institutional policies, expert views, and GHG reduction needs

The Strategy and Action Plan includes 49 strategies and 260 actions covering GHG reduction policies in energy, industry, buildings, transport, waste, agriculture, and land use, land use change and forestry (LULUCF) sectors as well as in areas of carbon pricing mechanisms and just transition. This Strategy and Action Plan must be seen as a milestone for our country's combat against climate change and implemented through strong cooperation among public and private sectors, NGOs, and individuals.

This paper aims to unite around a common vision in climate response and build a sustainable future together. In this context, it is my belief that our Strategy and Action Plan will contribute to achieving our vision to take national and global action for a more sustainable world.

Executive Summary

Today, the adverse impacts of climate change have started to be felt prominently, with increased regional and global occurrences of extreme climate and weather events such as extreme heatwaves, sudden and heavy precipitation, floods and drought. The main cause of this situation is regarded as the rapid increase in greenhouse gas (GHG) emissions released to the atmosphere as a result of increased fossil fuel use in the age of Industrial Revolution. Accordingly, the global average temperature increased by nearly 1.1°C from 1850 to 2020 and if this continues, global temperature rise is expected to reach 3°C by the end of this century.

In order to combat climate change on a global basis, the United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 1992, Kyoto Protocol in 1997, and Paris Agreement in 2015. With the Paris Agreement, a paradigm shift was achieved in climate response by setting quantified targets to limit global temperature rise. To achieve the target of limiting global temperature rise to 1.5°C as set by the Agreement, it is stated that emissions must be reduced by 45% by 2030 and net zero emissions must be reached by the end of the century. Türkiye continues its efforts towards GHG emission reduction and adaptation to the adverse impacts of climate change in the framework of the "common but differentiated responsibilities and respective capabilities" principle of UNFCCC to which Türkiye became a Party in 2004. Türkiye's ratification of the Paris Agreement was announced on 21 September 2021, and its 2053 Net Zero Emission Target on 27 September 2021 as a part of the green development revolution. Soon after these developments, Türkiye became a Party to the Paris Agreement on 11 November 2021, demonstrating its determinedness to combat climate change by setting a net-zero-emission target as well as becoming a Party to the Paris Agreement.

After becoming a Party to the Paris Agreement, Türkiye, in cooperation with the United Nations Development Programme (UNDP), launched its efforts to update its Nationally Determined Contributions (NDCs) and formulate a Climate Change Mitigation Strategy and Action Plan and 2053 Long-Term Climate Change Strategy. The national mitigation target which was declared in 2015 as a 21% reduction compared to the Business as Usual (BAU) scenario was updated to 41%, and the Updated First Nationally Determined Contributions were submitted to UNFCCC on 13 April 2023.

Following Türkiye's announcement of its 2053 Net Zero Emission Target, the first Climate Council was held on 21-25 February 2022 by the Ministry of Environment, Urbanization and Climate Change, with a view to setting the milestones for the country's long-term climate change roadmap with all stakeholders. The Council was attended by nearly 5,000 people from various stakeholder groups including public and private sectors, universities, NGOs and students. After the Council, a roadmap was drawn including a total of 217 recommendations, 76 of which were prioritized, guiding Türkiye's long-term climate change policies. The roadmap served as a basis for the preparations for the Climate Law, NDCs, Climate Change Mitigation Strategy and Action Plan, and Long-Term Climate Change Strategy.

The Twelfth Development Plan 2024-2028 includes, in the section "Environmental Protection", a measure relating to reducing GHG emissions and strengthening climate adaptation actions, by considering national circumstances in the framework of the Paris Agreement and Türkiye's Nationally Determined Contributions. The Medium-Term Programme (MTP) for 2024-2026 includes a "Green Transformation" section which states that "In line with the 2053 Net Zero Emission Target and national development priorities, the green transformation process will be accelerated with an approach that supports reduction of GHG emissions, strengthens capacity to adapt to climate change, prioritizes competitiveness, efficiency and just transition, and develops incentive mechanisms by making maximum use of global financial resources". With the Presidential Decree No. 85 of 29/10/2021 (Official Gazette of 29/10/2021 issue 31643), the duty of "determining national and international policies, strategies and actions under Türkiye's climate response and adaptation efforts, executing negotiation processes and ensuring coordination with institutions and organizations" were entrusted to the Directorate of Climate Change.

In this direction, the Climate Council Conclusions, Twelfth Development Plan and MTP 2024-2026 included decisions and measures to formulate a Climate Change Mitigation Strategy and Action Plan, and the Directorate of Climate Change was accordingly charged with the task.

In this context, after the NDC studies were completed, Türkiye's Climate Change Mitigation Strategy and Action Plan (CCMSAP) 2024-2030 was formulated in a transparent and participatory process. The scope of the Action Plan was determined as 7 main mitigation sectors namely energy; industry; buildings; transport; agriculture; waste; and land use, land use change and forestry, and 2 cross-cutting thematic areas as just transition and carbon pricing mechanisms. As part of the preparatory works, a needs assessment and policy mapping studies were conducted by considering existing national and international studies, followed by a process with all stakeholders to formulate policies and measures to be incorporated in the Climate Change Mitigation Strategy and Action Plan. Accordingly, numerous sectoral workshops and meetings were held, with more than 2,000 participants from a total of 175 institutions and organizations from public and private sectors and NGOs, in order to determine and consult on strategies and actions intended for the said sectors.

The key sectoral strategies in the Action Plan, which comprises 49 strategies and 260 actions for 7 main mitigation sectors and 2 cross-cutting thematic areas, include:

- Promoting energy efficiency across all sectors,
- Maximizing use of renewable energy,
- Reducing product-based carbon footprint and carbon intensity in industry,
- Promoting sustainability reporting,
- Promoting circular economy and resource efficiency across manufacturing industry,
- Promoting Nearly Zero Energy buildings,
- Promoting use of district heating and cooling systems,
- Developing electrification systems in transport sector,

- Developing integrated transport systems,
- Ensuring transition to zero- or low-emission transport systems,
- Protecting and increasing sink areas for effective climate response,
- Ensuring transition of forestry and agricultural enterprises to circular bioeconomy with high added value,
- Extending eco-friendly agricultural practices,
- Ensuring rational fertiliser use,
- Reducing methane emissions originating from livestock,
- Preventing and reducing waste generation,
- Increasing use of waste as raw material/resource in production,
- Establishing an emissions trading system in Türkiye,
- Conducting infrastructure studies on other carbon pricing mechanisms,
- Developing and promoting clean technologies,
- Achieving digitalization in all sectors,
- Developing incentive and support mechanisms for GHG reduction,
- Developing sustainable investment instruments,
- Planning for transition to a low-carbon economy with the principle of just transition,
- Building capacity for just transition and employment transformation,
- Integrating Türkiye's net zero emission target into the education system.

Establishing sectoral GHG reduction policies through a participatory and inclusive perspective, the Action Plan provides a roadmap for responsible and relevant institutions. It outlines key strategies and actions for direct GHG emissions reduction, aiming to achieve the targets under NDCs. The effective implementation and monitoring of the Action Plan requires cooperation and coordination among various sectors and levels of government. In this context, it is essential that the designated strategies and actions are implemented with utmost sensitivity by relevant institutions and organizations.

1. Introduction

According to the Sixth Assessment Report published by the Intergovernmental Panel on Climate Change (IPCC), human activities primarily through emissions of greenhouse gases (GHGs) have unequivocally caused the global warming. Thus, global temperatures have reached 1.1°C above pre-Industrial levels; and if we proceed as usual, global warming will exceed pre-Industrial levels by approximately 3°C by the year 2100. GHG emissions arising from unsustainable energy use, land use and land-use change as well as other activities continue to increase, causing widespread and rapid changes in all ecosystems. Other significant findings in the report include the fact that human-induced climate change has been affecting climate across the world, which is already leading to adverse impacts globally, and vulnerable communities who have historically contributed the least to climate change are disproportionately affected.

The IPCC "Special Report on Global Warming of 1.5°C" emphasizes that the global emission projections in the current Nationally Determined Contributions (NDCs) cannot limit global warming to 1.5°C after 2030. Furthermore, climate risks relating to health, livelihoods, food security, water supply, human security, and economic growth are projected to increase with global warming of 1.5°C and increase further with 2°C.

1.1. International Process and Paris Agreement in the Context of Climate Change

Founded jointly by the World Meteorological Organization and UN Environment Programme to present scientific assessments of the scale, timing, and potential environmental and socio-economic impacts of climate change and to develop potential response strategies, IPCC released its First Assessment Report in 1990 of IPCC revealing that human activity significantly increased the amount of GHGs in the atmosphere and led to global warming. The outputs of this report constituted a basis for the adoption of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992.

The international climate change regime is shaped by UNFCCC, Kyoto Protocol and Paris Agreement as well as the studies of the relevant bodies thereof. It is subjected to continuous review and updated to respond to new or changing circumstances and scientific knowledge.

According to Article 2 of UNFCCC, the objective of the Convention is described as "achieving stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". Such stabilization should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, ensure that food production is not threatened and enable economic development to proceed in a sustainable manner.

Within the meaning of achieving the ultimate objective of the Convention, the Kyoto Protocol, which included quantified emission limitation and reduction targets for the countries covered

in Annex-I, was signed in 1997. However, the exclusion of some countries and developing economies with high GHG emissions caused a gradual narrowing of the scope of the Protocol in terms of total global GHG emissions, and led to the realization that a broader-based approach was required to include all countries, particularly highly-emitting countries and economies, in the global efforts to combat climate change.

At this point, the Cancun and Durban Conferences constituted the basis of negotiations that led to the adoption of the Paris Agreement. The Cancun Agreements set a long-term goal to limit global mean temperature rise to below 2°C above pre-industrial levels. The Durban Conference, with a view to strengthening the multilateral, rules-based regime under the Convention, launched "a process to develop a protocol with legal force, another legal instrument or an agreed upon legal outcome under the Convention applicable to all Parties".

The Paris Agreement, formulated to accelerate efforts to combat climate change and to set further ambitious targets, was adopted by 196 Parties at the 21st UN Climate Change Conference (COP21) to the United Nations Framework Convention on Climate Change in Paris, France, on 12 December 2015. It entered into force on 4 November 2016. With an overarching goal to keep the increase in the global average temperature well below 2°C pre-industrial levels and, if possible, to limit the temperature increase to 1.5°C, the Paris Agreement is a legally-binding international treaty on climate change. According to the IPCC, limiting global warming to 1.5°C requires global GHG emissions to peak before 2025 at the latest, be reduced by 45% by 2030 compared to 2019, and reach net zero by mid-century.

The Paris Agreement is a milestone in the multilateral climate change process, as it is the first time that an Agreement brings all countries together to combat and adapt to the impacts of climate change. Implementation of the Paris Agreement requires economic and social transformation, based on the best available science. The Agreement works on a five-year cycle of increasingly ambitious climate action, referred to as Nationally Determined Contributions (NDCs), undertaken by countries. According to the Agreement, Parties are obliged to submit their NDCs to the UNFCCC Secretariat and each successive NDC is meant to reflect an increasingly higher degree of ambition compared to the previous version.

In their NDCs, countries communicate actions they will take to reduce their GHG emissions and adapt to climate change impacts in order to reach the goals of the Paris Agreement.

To better frame the efforts towards the long-term goal, Article 4 of the Paris Agreement invites Parties to submit long-term low GHG emission development strategies. Under Long-Term Climate Change Strategies which, to date[1], have been submitted by 70 countries, Parties declare their long-term strategies and actions in accordance with their own capabilities and circumstances.

[1] As of January 2024

Long-term strategies offer a long-term horizon to the NDCs. Nevertheless, they place the NDCs into the context of countries' long-term planning and development priorities, providing a vision and direction for future development.

1.2. Türkiye's Climate Response Process

Türkiye addresses economic, social and environmental issues in a balanced manner, by considering its development priorities and international developments, and aims to progress on the path of sustainable development. In this regard, it also contributes to global efforts to combat climate change with its special circumstances and national means. According to the IPCC, the Mediterranean Basin which also includes Türkiye is one of the regions that will be most affected by climate change. Especially since 2018, there has been a significant increase in the number of meteorological disaster occurrences in Türkiye. Between 2010 and 2021, 8,274 meteorological natural disasters were reported which affected different parts of the country at varying degrees. Natural disasters that are projected to increase due to climate change in Türkiye are forest fires, storms, floods, hails, heatwaves, landslides, and avalanches.

Türkiye became a Party to UNFCCC in 2004 and the Kyoto Protocol in 2009. The Paris Agreement, which was adopted on 12 December 2015 and went into effect on 4 November 2016 under the Convention, covering the period after the Kyoto Protocol, is a significant milestone. Türkiye adopted the Paris Agreement in 2015 and signed on 22 April 2016, with an emphasis that it was a developing country. The Law on Ratification of the Paris Agreement was published in the Official Gazette of 7 October 2021 issue 31621, and states that "The Republic of Turkey declares that Turkey will implement the Paris Agreement as a developing country and in the scope of her nationally determined contribution statements, provided that the Agreement and its mechanisms do not prejudice her right to economic and social development."

The 2053 Net Zero Emission Target was announced by the President of Türkiye Recep Tayyip Erdoğan on 27 September 2021, thus launching the country's move towards green development. The green transformation process, with the announcement of 2053 Net Zero Emission Target and Türkiye's will to become a Party to the Paris Agreement, brings along a comprehensive change and transformation in all sectors. In order to execute this process with all of our institutions, the Directorate of Climate Change (DoCC) was established on 29 October 2021 under MoEUCC. DoCC was charged with setting national and international policies, strategies and actions under Türkiye's climate response and adaptation efforts, executing negotiations, and ensuring coordination with institutions and organizations.

With a belief that the Paris Agreement offers a significant opportunity for a green and sustainable world, Türkiye supports the implementation of climate change mitigation and adaptation policies. Furthermore, as a country going through the European Union (EU) accession process, Türkiye closely follows EU policies and has been formulating legislation on climate change and environment in order to align with the relevant acquis. Türkiye's climate change policy is structured by various regional and national policy papers, strategies and action plans on mitigation and adaptation. Furthermore, relevant ministries and public institutions

have formulated, updated, or are currently formulating various plans and strategies to determine and realize Türkiye's mitigation potential.

1.3. Türkiye's Nationally Determined Contributions (NDCs)

NDCs are at the heart of the Paris Agreement and achievement of its long-term goals. By considering the principle of "common but differentiated responsibilities and respective capabilities", Parties to the UNFCCC are called to contribute, as much as possible and through their own efforts, to global climate actions. In this context, they are asked to update and submit to the UNFCCC Secretariat every five years their NDCs, which include their activities to implement their main objectives of mitigation, adaptation, finance, technology transfer and capacity building.

In accordance with decisions 1/CP.19 and 1/CP.20, the Republic of Türkiye submitted its Intended Nationally Determined Contributions (INDCs) towards achieving its ultimate objective laid down in Article 2 of the Convention to the UNFCCC Secretariat in September 2015, declaring its target of achieving up to 21% reduction in GHG emissions from the Business as Usual (BAU) level by 2030.

The countries that are Parties to the Paris Agreement are obliged to submit to UNFCCC their NDCs every five years with increasingly ambitious mitigation targets (and optionally, climate adaptation targets). In this context, Türkiye submitted its Updated First Nationally Determined Contributions to UNFCCC on 13 April 2023, with a commitment to reduce its GHG emissions by 41% compared to the BAU scenario by 2030 (695 MT $CO_{2\text{-eq}}$ by 2030). Türkiye's Updated First Nationally Determined Contributions cover the overall economy and include comprehensive mitigation and adaptation actions as well as means of implementation. Türkiye's mitigation target is a step towards its long-term target to reach net zero by 2053.

1.4. Türkiye's Greenhouse Gas Emissions

National GHG emission inventories are prepared using the 2006 IPCC Guidelines. GHG inventories include direct GHGs such as carbon dioxide (CO_2), methane (CH_4), nitrogen oxide (N_2O), fluorinated gases (F-gases), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3). They cover emissions originating from energy, industrial processes and product use, agriculture and waste, as well as emissions and removals from land use, land use change and forestry.

Total GHG emissions, excluding the Land Use, Land Use Change and Forestry (LULUCF) sector, were calculated as 564.4 Mt $CO_{2\text{-eq}}$ in 2021. This represents an increase of 40.4 Mt, or 7.7%, compared to 2020, and a 157.1% increase compared to 1990 [1] (Table 1, Figure 1).

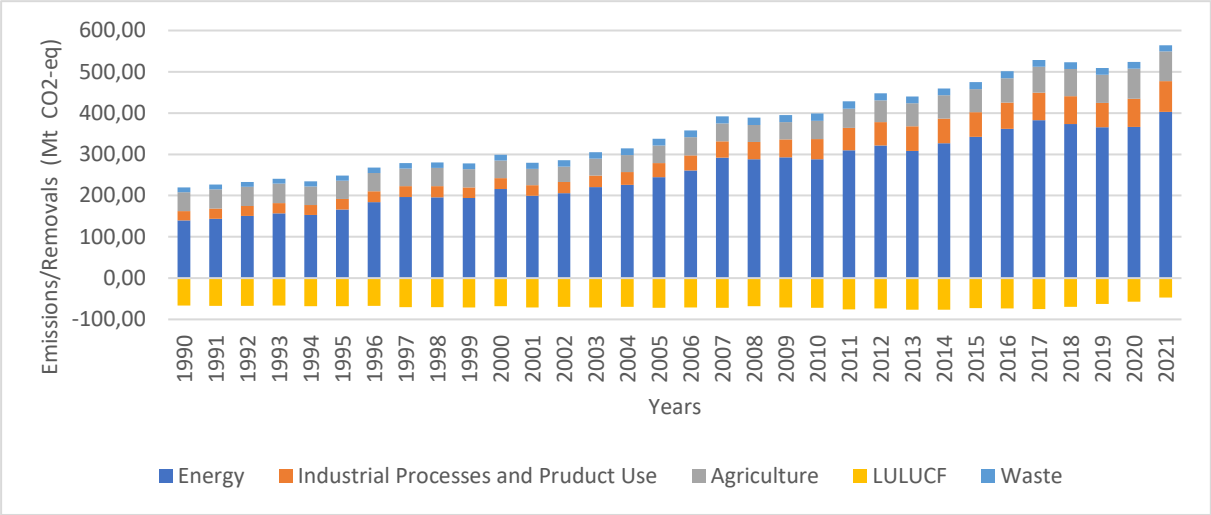


Figure 1. Greenhouse gas emissions and removals, 1990-2021 [1]

Emissions from energy increased by 9.8% to 402.5 Mt $CO_{2\text{-eq}}$ in 2021 compared to 2020. However, there is a 188.4% increase compared to 1990. Emissions from industrial processes and product use occurred at 75.1 Mt $CO_{2\text{-eq}}$ in 2021 which is 10.6% higher than those in 2020. Emissions in the agriculture and waste sectors were 72.1 Mt $CO_{2\text{-eq}}$ and 14.7 Mt $CO_{2\text{-eq}}$, respectively in 2021.

Table 1. Greenhouse gas emissions and removals, 1990-2021 [1]

	1990	1995	2000	2005	2010	2015	2020	2021
Energy	139.54	166.30	216.04	244.48	287.88	341.99	366.57	402.48
Industrial Processes and Product Use	22.86	25.52	26.20	34.25	49.06	59.72	67.96	75.14
Agriculture	46.05	44.08	42.33	42.44	44.41	56.13	73.15	72.08
LULUCF	-66.51	-67.77	-68.05	-71.78	-71.88	-72.81	-56.95	-47.15
Waste	11.08	12.35	14.34	16.40	17.45	17.12	16.31	14.70

Figure 2 presents a pie-chart breakdown of the national inventory in terms of the four main emission categories. In 2021, the energy sector accounted for the largest share of total emissions with 71.3%. Following this, industrial processes and product use represented with 13.3%, agriculture with 12.8%, and waste with 2.6% of total emissions. The pie-chart to the right shows the shares of energy sub-sectors in total emissions.

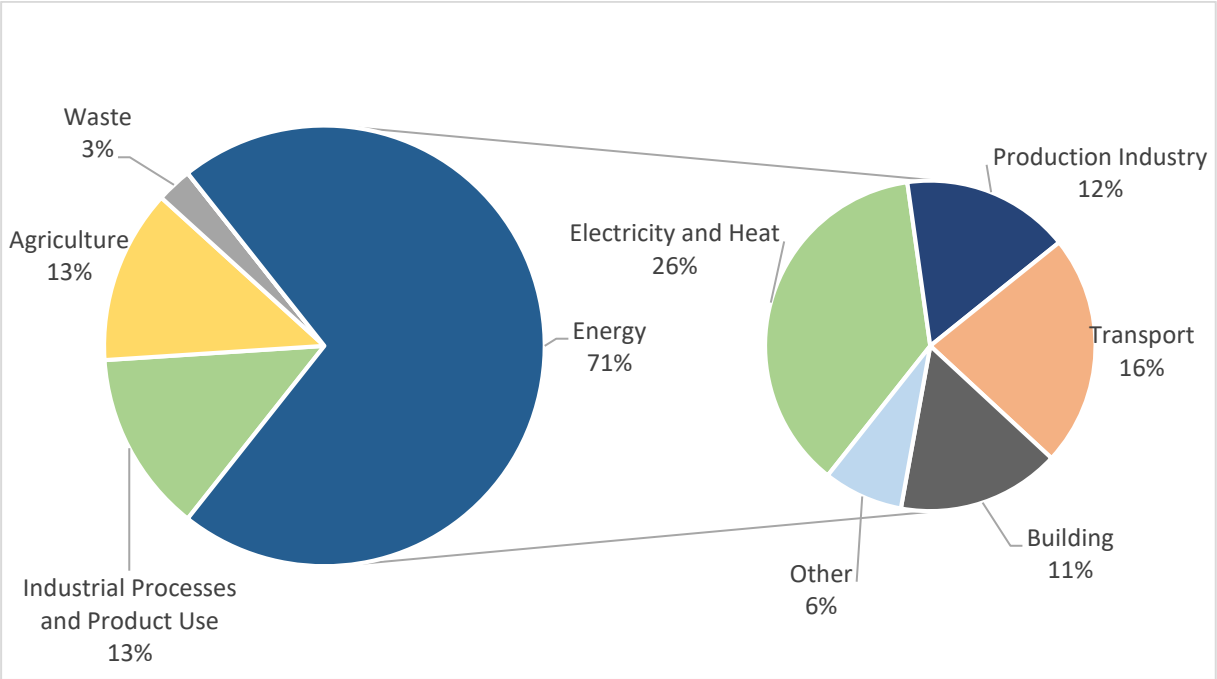


Figure 2. Sectoral distribution of greenhouse gas emissions in 2021 [1]

Quantitative data on fluorinated GHG emissions from industrial processes and product use is presented below (Figure 3, Table 2).

Table 2. Fluorinated greenhouse gas emissions, Mt $CO_{2\text{-}eq}$ [1]

	1990	1995	2000	2005	2010	2015	2020	2021
HFCs	0.0	0.0	0.1	1.1	3.1	4.8	6.5	7.2
PFCs	0.5	0.4	0.4	0.4	0.4	0.1	0.0	0.0
SF_6	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1

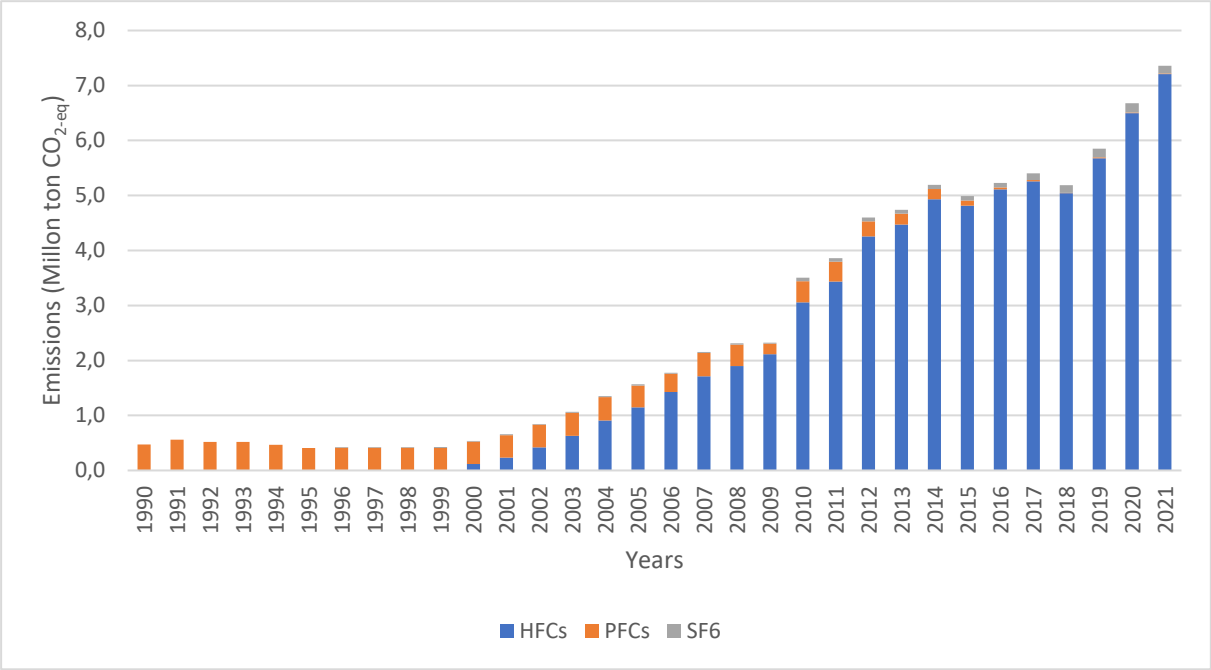


Figure 3. Fluorinated greenhouse gas emissions, 1990-2021 [1]

1.5. Climate Change Mitigation Strategy and Action Plan (CCMSAP) Preparation Process

Türkiye becoming a Party to the Paris Agreement accelerated the national efforts in the context of climate response. As a result of Türkiye's first Climate Council held on 21-25 February 2022, adopted 217 recommendations, 76 of which were priority, to create a vision for Türkiye's 2053 Net Zero Emission Target, and all recommendations were shared with the public. These recommendations served as a basis for the preparations for the Climate Law, Climate Change Mitigation and Adaptation Action Plans, and Long-Term Climate Change Strategy.

The Twelfth Development Plan 2024-2028 includes, in the section "Environmental Protection", roadmaps on reducing GHG emissions and strengthening climate adaptation actions, and measures regarding formulating relevant strategies and roadmaps, by considering national circumstances in the framework of the Paris Agreement and Türkiye's Nationally Determined Contributions. The Medium-Term Programme (MTP) for 2024-2026 includes a "Green Transformation" section which states that "In line with the 2053 Net Zero Emission Target and national development priorities, the green transformation process will be accelerated with an approach that supports GHG emission reduction, increases capacity to adapt to climate change, prioritizes competitiveness, efficiency and just transition, and develops incentive mechanisms by making maximum use of global financial resources".

In Türkiye, the duties of "determining national and international policies, strategies and actions under Türkiye's climate response and adaptation efforts, executing negotiation processes and ensuring coordination with institutions and organizations" were entrusted to the Directorate of

Climate Change pursuant to the "Presidential Decree No. 85 of 29/10/2021 on Organization of Presidential Office" (Official Gazette of 29/10/2021 issue 31643).

Preparatory works for the Climate Change Mitigation Strategy and Action Plan (CCMSAP) 2024-2030 were started in the framework of the Climate Council Decisions, Twelfth Development Plan, and MTP 2024-2026, and the process was executed in a transparent and participatory manner. The preparation process of CCMSAP was executed in parallel with NDC preparations; the core principles for the works were set and implemented throughout the process (Figure 4).

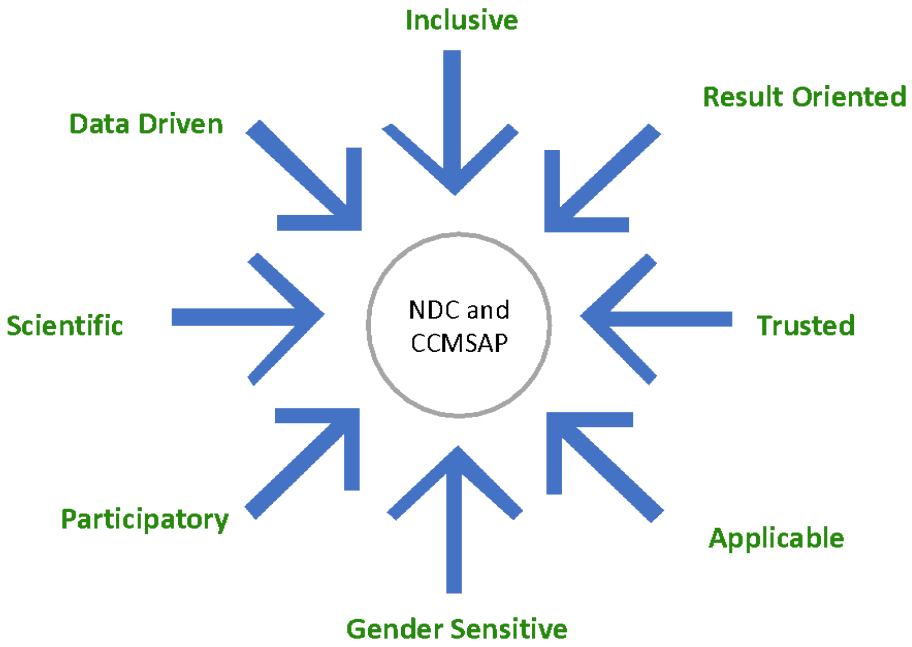


Figure 4. NDC and CCMSAP preparation process principles

CCMSAP was built on seven main mitigation sectors namely "Energy, Industry, Buildings, Transport, Waste, Agriculture and LULUCF", and two cross-cutting thematic areas which are "Just Transition and Carbon Pricing Mechanisms". The preparation works for the Action Plan were executed in coordination with NDC policy making works, aiming for the alignment and consistency of NDC with action plans for 2030. The works began with a needs assessment dealing with Türkiye's climate change policies, strategies, plans and measures. After the needs assessment and policy mapping study was completed, all ministries and private sector organizations were engaged in the process of data collection, identifying assumptions, and formulating NDC and CCMSAP policies and measures. The documenting process involved more than 100 meetings with stakeholders from all sectors. The meetings were attended by more than 2,000 individuals from public and private sectors and NGOs, and gender balance among participants was ensured. As part of the meetings, stakeholder views were sought through bilateral discussions and e-mail as well as two official letters, and reflected in the Action Plan. After these studies, CCMSAP 2024-2030 was submitted for the approval of the

Climate Change and Adaptation Coordination Board (CCACB). The preparation process of CCMSAP is shown in Figure 5.

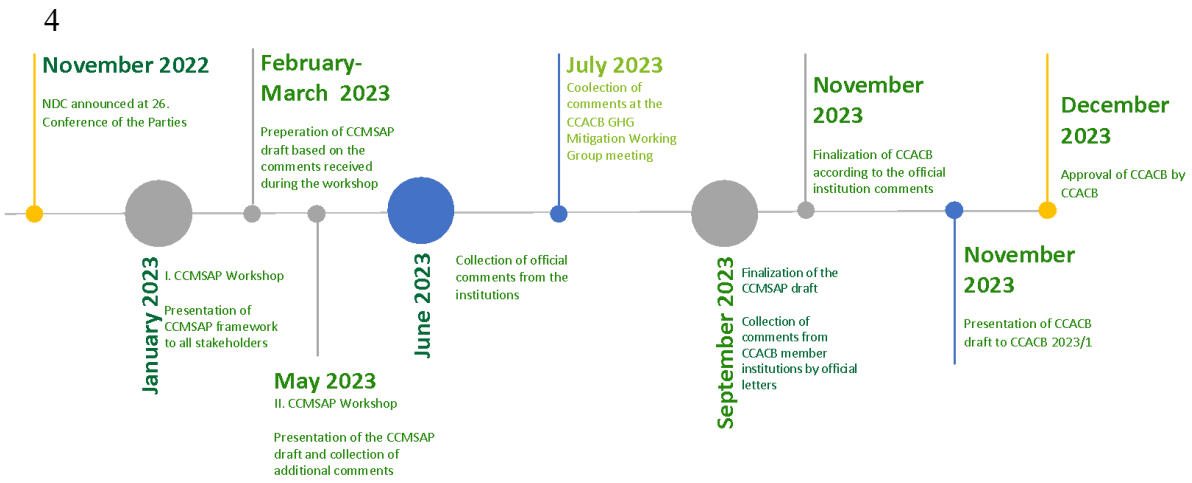


Figure 5. Climate Change Mitigation Strategy and Action Plan preparation process

1.6. Overview of Climate Change Mitigation Strategy and Action Plan (CCMSAP)

The Action Plan deals with seven main mitigation sectors namely energy, industry, buildings, transport, waste, agriculture and LULUCF. Electricity generation was covered under the energy sector while energy consumption in other sectors were addressed under the relevant sectors. When preparing the Action Plan, topics such as sectoral incentives, financing needs, technology, capacity-building and training activities were discussed under the strategies and actions of the relevant sectors for the sake of integrity. As a result of the meetings and studies conducted during the preparations for the Action Plan, it was decided to give separate headings for "just transition and carbon pricing mechanisms", under which the relevant strategies and actions would be detailed. Attention was paid to mainstream equal social opportunities in the strategies and actions for all sectors.

Table 3. Number of strategies and actions by sectors

Energy	5 strategies, 37 actions
Industry	8 strategies, 32 actions
Buildings	6 strategies, 18 actions
Transport	4 strategies, 36 actions
Waste	9 strategies, 34 actions
Agriculture	7 strategies, 27 actions

LULUCF	5 strategies, 49 actions
Just Transition	1 strategies, 7 actions
Carbon Pricing Mechanisms	4 strategies, 20 actions
Total	**49 strategies, 260 actions**

There are 49 strategies under the Action Plan comprised of 9 chapters in total, and 260 actions under these strategies (Table 3). The strategies lay down the actions required in different areas on a sectoral basis, including legislation, technical infrastructure, technology, finance, capacity building, training and public awareness (Table 4). Various monitoring indicators as well as responsible institutions and organizations were designated for each action under the strategies. There are a total of 47 responsible institutions and organizations under the Action Plan.

Table 4. Sectoral strategies

ENERGY
• Reducing carbon intensity of electricity generation • Coupling electricity sector with other sectors and supporting demand-side engagement • Strengthening electrical infrastructure, and reducing technical loss rate in transmission and distribution by increasing efficiency • Promoting use of low-carbon production technologies and strengthening alternatives in electricity generation • Developing a roadmap on carbon capture, utilization and storage to reduce unavoidable GHG emissions
INDUSTRY
• Optimizing energy efficiency potential for manufacturing industry • Increasing use of renewable energy in manufacturing industry • Reducing carbon footprints and $CO_{2\text{-eq}}$ intensity per GDP in manufacturing industry • Promoting sustainability reporting • Building capacity for manufacturing industry stakeholders • Promoting circular economy and resource efficiency across manufacturing industry • Developing new technology options through R&D and innovation with national resources • Developing sustainable investment instruments and creating suitable sources of finance for investors
BUILDINGS
• Improving energy efficiency of existing buildings • Improving energy efficiency of new buildings

- Improving energy efficiency in using electrical appliances, equipment and devices in buildings sector
- Promoting use of district heating and cooling systems
- Promoting use of eco-friendly design and construction materials through the National Green Certification Scheme (YeS-TR) application
- Ensuring and promoting use of Building Information Modelling (BIM) tools to ensure digital transformation of construction ecosystem

TRANSPORT

- Ensuring modal shift to maritime/railway transport
- Increasing efficiency in transport sector
- Use of sustainable/clean energy sources in transport systems
- Engaging in necessary infrastructure activities for sectoral decarbonisation

WASTE

- Preventing and reducing waste and wastewater before generation
- Improving waste recycling and recovery rates
- Reducing amount of untreated waste deposited to sanitary landfills
- Improving wastewater management and treatment infrastructure
- Developing human resources and social awareness as part of zero waste practices and reduction of GHG emissions
- Developing incentive and financing mechanisms to improve waste management, taking into account circular economy principles and GHG emission reduction
- Increasing R&D activities and developing technological infrastructure to improve waste management, taking into account circular economy principles and GHG emission reduction
- Increasing use of waste as raw material / resource in production processes
- Reducing GHG emissions from waste handling equipment & vehicles

AGRICULTURE

- Mitigating methane emissions from livestock breeding
- Increasing efficiency in using chemical fertilisers
- Reducing use of pesticides and antimicrobials
- Developing loss, waste and residue management in agricultural production
- Increasing efficiency of land and soil management
- Providing farmers with access to affordable financing
- Promoting training, awareness-raising and capacity-building activities for stakeholders operating in agriculture sector considering gender balance

LAND USE, LAND USE CHANGE AND FORESTRY (LULUCF)

- Increasing GHG sequestration annually by protecting and sustainably managing ecosystems and increasing sink areas, and reducing ecosystem-based emissions
- Ensuring transition of forestry and agricultural enterprises to a circular bioeconomy with high added value
- Doubling project supports to 2020 level by 2030 to strengthen the sector in terms of R&D and innovation
- Increasing number of technical personnel and professionals trained in carbon management in the sector
- Developing technology infrastructure for LULUCF sector

JUST TRANSITION

- Building capacity for just transition and employment transformation

CARBON PRICING MECHANISMS

- Establishing Emissions Trading System (ETS) in Türkiye
- Conducting infrastructure studies on other carbon pricing instruments
- Building infrastructure for voluntary carbon market and national offset system
- Conducting studies to evaluate participation in Article 6 of Paris Agreement

1.7. CCMSAP Monitoring System

Monitoring and evaluation are critical for the long-term success of the Action Plan. The monitoring process plays two key roles:

- Monitoring the performance of actions under the Plan
- Determining whether planned outputs and action results have been achieved

A successful monitoring and evaluation process plays a key role in enhancing the effectiveness of actions and ensuring accountability. A sound monitoring system can help achieve continuous support and additional financing that may be required for the actions.

In order to effectively monitor the Action Plan, an online monitoring system will be established under the climate portal created by the Directorate of Climate Change, ensuring that the activities of all responsible and relevant institutions are monitored and reported on a continuous and timely basis.

The institutions responsible for each action under CCMSAP will input the previous year's developments into the online monitoring system every year between 1 January-31 March. Annual monitoring and evaluation reports will be prepared by the Directorate of Climate Change by no later than 30 June of every year, with the contributions of the key responsible institutions and in accordance with the information put into the system.

The recommendations and required actions set out in the monitoring and evaluation report will be discussed in CCACB Working Groups. The annual evaluation reports prepared in coordination with the Directorate of Climate Change of MoEUCC will be submitted to the CCACB until 31 December.

Where needed, case-by-case revisions can be made to the action plan.

2. Current Situation and Relevant Strategies and Actions regarding CCMSAP Sectors

2.1. Energy Sector

2.1.1. Current situation

Population increase and economic growth in Türkiye have led to an increase in demand for energy. According to the Energy Balance Table for 2021, total energy supply stood at 159,432 million TOE (tonne of oil equivalent), and electricity and heat generation at 334,723 GWh [2].

By end of November 2023, the total installed power capacity of Türkiye was 106,071 MW. The share of renewable energy sources in the total installed capacity reached around 53%. There was a remarkable increase in distributed power capacity, especially based on solar power, with the entry into force of the repealed "Regulation on Unlicensed Power Generation in the Electricity Market" in 2013. Hydropower plants constitute the largest share of installed capacity with 31,496 MW. The second largest installed capacity of 25,352 MW is accounted for by natural gas-fired cycle plants. Wind installed power capacity ranks third with 11,643 MW, with domestic coal-fired power plants accounting for 11,440 MW and imported coal-fired power plants for 10,374 MW in installed power capacity. With a significant surge, solar power capacity rose to 11,268 MW. [3] In the last two decades, the share of electricity generation from renewable energy sources increased in terms of share as well as resource diversity, together with the strategies and policies followed and the support mechanisms implemented. As of the end of 2022, electricity generation based on imported coal and domestic coal had approximately 35% share in total electricity generation. The share of natural gas in electricity generation, on the other hand, stood around 50% since 2008 and declined to 23% at the end of 2022.

As of the end of 2022, renewables also became a significant energy source with an installed power capacity for 56,393 MW in Türkiye [4]. This rapid growth rate in the recent years can be briefly explained by the abundance of renewable energy sources in the country, policies and incentives implemented for renewable energy sources, and shifting of private sector investments from fossil fuels to renewable energy.

Electricity generation, which is a significant emission source in Türkiye, has been increasing over years. While electricity generation in Türkiye has increased, the change in GHG emissions may vary depending on primary energy sources used (Figure 7).

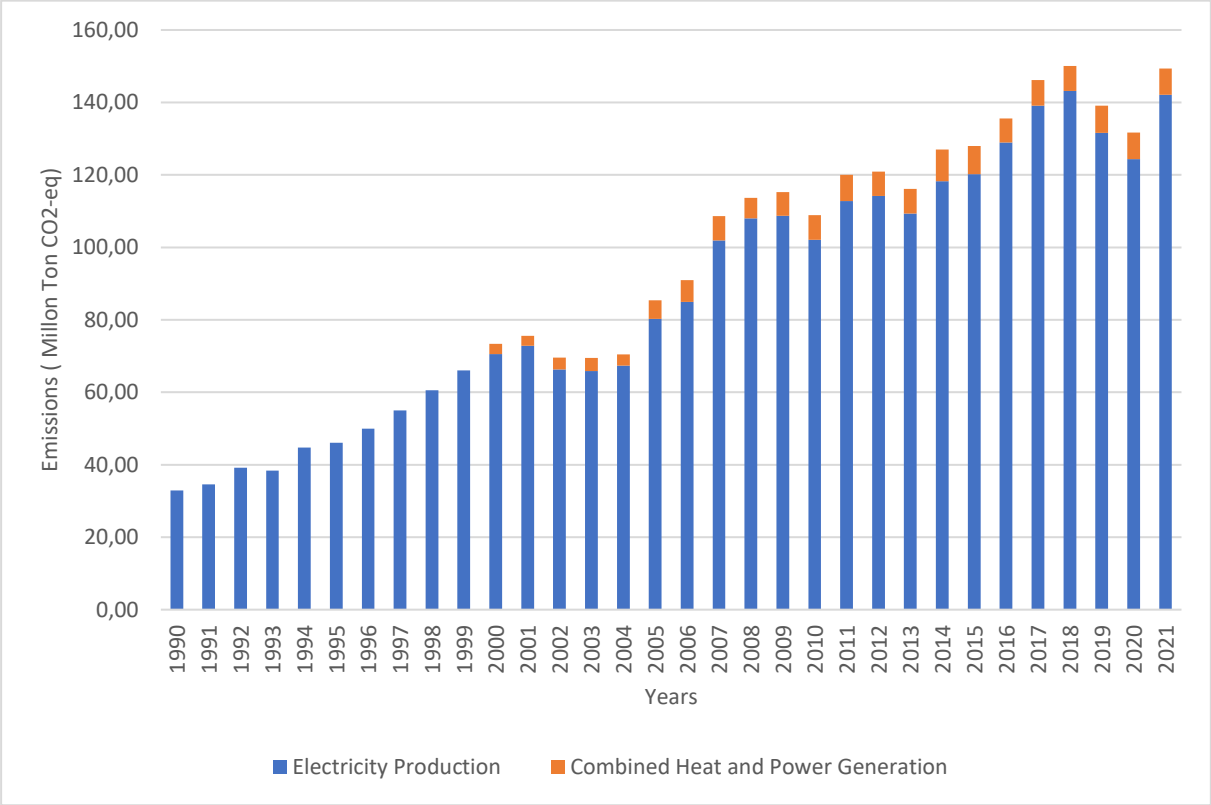


Figure 6. Emissions resulting from electricity generation over years [1]

In 2021, electricity and heat generation emissions were 149,395 Mt $CO_{2\text{-eq}}$, with that resulting only from the electricity sector being 140,720 Mt $CO_{2\text{-eq}}$ (Table 5). Emissions resulting from electricity generation has a share of 24.8% in total emissions [1].

Table 5. Total greenhouse gas emissions from electricity and heat generation, Mt $CO_{2\text{-eq}}$ [1]

	1990	1995	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Emissions	32.9	46.0	73.4	85.4	108.9	120.0	120.9	116.1	127.0	128.0	135.6	146.2	150.0	139.1	131.7	149.4

For example, the share of hydropower sources decreased in 2021 and was replaced by natural gas, and emissions from electricity generation increased compared to previous years.

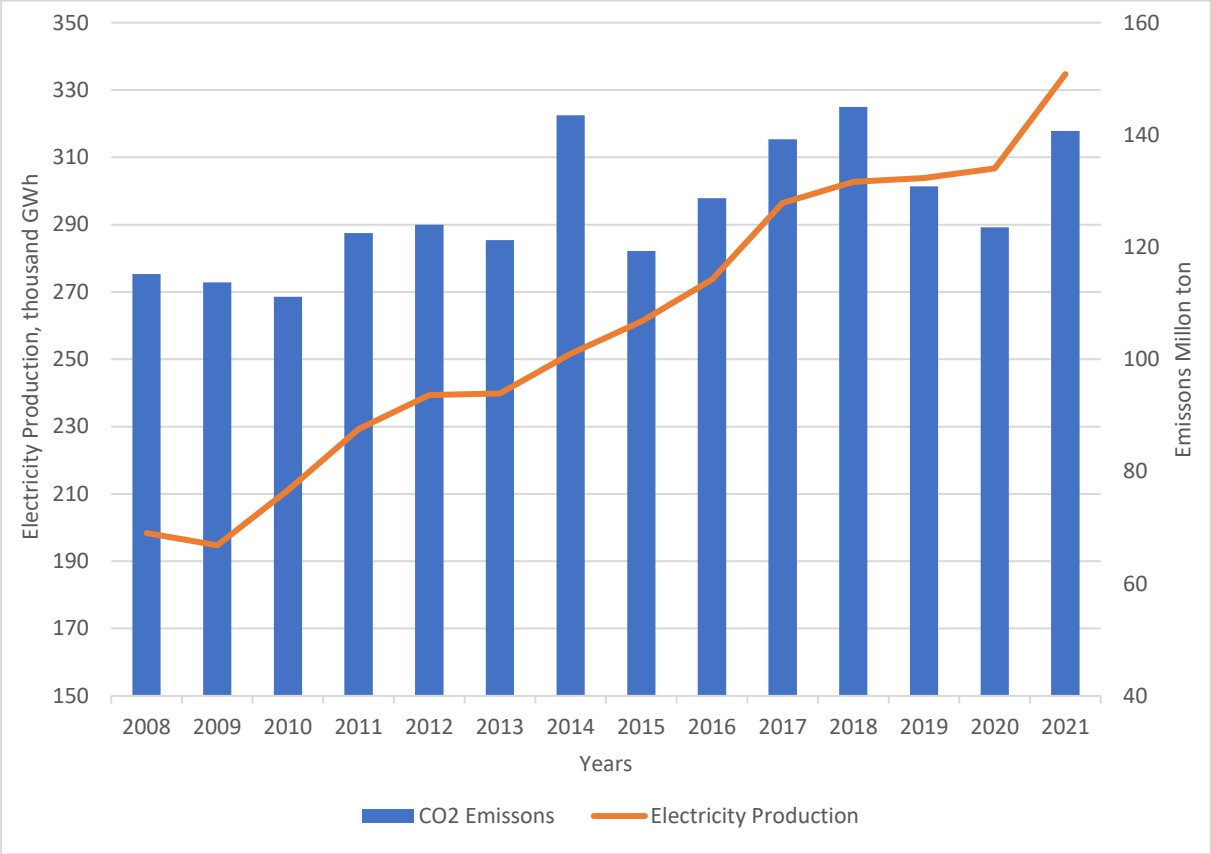


Figure 7. Evolution of electricity generation and emissions

Furthermore, there is a relative decoupling between electricity generation and associated emissions (Figure 8). Electricity generation shows a continuous increase while the resulting emissions follow an up-and-down path. This situation may allow room for absolute decoupling as Türkiye renders its electricity sector a low-carbon one.

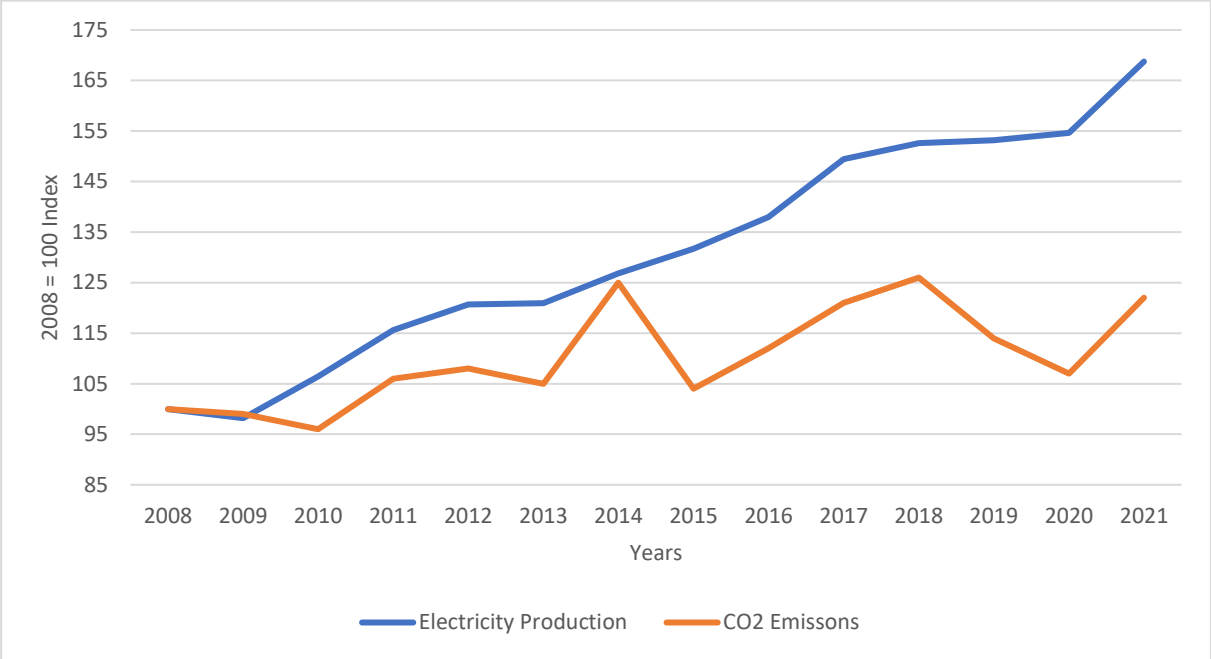


Figure 8. Relative decoupling in electricity sector [1] [2]

The key legislation as well as policy and strategy papers relating to the Turkish energy sector are shown in Table 6 and Table 7.

Table 6. Key legislation on energy

Key Legislation	**Purpose and Scope**
Law on Electricity Market (Law No. 6446)	The purpose of this Law is to ensure the establishment of a financially sound, stable and transparent electricity market operating in a competitive environment under, and subject to, private law provisions as well as to ensure the independent regulation and supervision of this market for purposes of delivering sufficient, good quality, uninterrupted, low cost and environment-friendly electricity to consumers.
Law on Utilization of Renewable Energy Sources for Electrical Energy Generation Purposes (Law No. 5346)	The purpose of this Law is to increase the use of renewable energy sources for generating power; benefit from these resources in a secure, economic and qualified manner; increase the diversification of resources; to reduce GHG emissions; use waste products; protect the environment, and develop the related manufacturing industries required to achieve these objectives.
Energy Efficiency Law (Law No. 5627)	The purpose of this Law is to increase efficiency in using energy sources and energy in order to use energy effectively, avoid waste, alleviate the burden of energy costs on the economy, and protect the environment.

Regulation on Certification and Support of Renewable Energy Sources	This regulation aims to encourage electricity generation from renewable energy sources and covers the issuance of Renewable Energy Source Certification to generation license holder legal entities for their generation plants based on renewable energy sources.
Regulation on Renewable Energy Source Areas	The purpose of this regulation is to create large-scale Renewable Energy Source Areas (YEKAs) in public, treasury or private real properties, and ensuring the domestic production of the advanced technology components used in electricity generation plants based on renewable energy sources.
Electricity Market Licensing Regulation	The objective of this regulation is to lay down principles and procedures regarding pre-licensing and licensing practices in the electricity market, and to designate the rights and obligations of pre-license and license holders.
Regulation on Unlicensed Power Generation in the Electricity Market	The purpose of this regulation is to lay down principles and procedures that apply to natural and legal persons who are entitled to generate electricity, with a view to enabling consumers to meet their electricity requirements from their generation facilities, incorporating the small-scale generation facilities to the national economy to ensure supply security, and ensuring efficient use of small-scale generation resources.
Regulation on Acceptance of Electricity Generation and Storage Facilities	The objective of this regulation is to lay down principles and procedures regarding the conduct of acceptance procedures of electricity generation and storage facilities in accordance with the relevant legislation and standards, connection of said facilities to compatible transmission or distribution grids, and acceptance process authorization.
Regulation on Renewable Energy Source Guarantees in the Electricity Market	The purpose of this regulation is to establish a renewable energy source guarantees system, which enables the certification and supply of electrical energy from renewable energy sources to consumers, through tracking, proving and disclosure that a certain amount or percentage of the electricity supplied to consumers was generated by license holder legal entities from renewable energy sources, with a view to increasing the use of renewable energy sources in electricity generation and consumption and protecting the environment, and to lay down principles and procedures regarding non-discriminatory, objective and transparent operation of such a system.
Regulation on Electricity Market Storage Activities	The purpose of this regulation is to lay down principles and procedures regarding the establishment of electricity storage units or facilities, connection of such units or facilities to transmission or distribution systems, and use of such units or facilities in market activities, under Law No. 6446 of 14/3/2013 on Electricity Market.

Table 7. Key policy papers relating to energy

Policy Papers	Goals and Objectives
Twelfth Development Plan 2024-2028	The main objective is to achieve a competitive structure, based on the uninterrupted, quality, sustainable, safe and affordable supply of energy, resource diversification in energy supply, and the 2053 Net Zero Emission Target; that utilizes domestic renewable energy sources to maximize energy self-reliance, increases energy efficiency, prioritizes localization in energy technologies, integrates new technologies, and strengthens our strategic position in the international energy trade. The development plan includes the following measures: Works will continue for the efficient use of energy in all areas. Akkuyu Nuclear Power Plant (NPP) will commence electricity generation with all of its units. Works to increase NPP installed power capacity will continue. Works will be undertaken towards new technologies such as small modular reactors, fusion technologies, and advanced generation reactors. Electricity generation from renewable energy sources will be boosted and integrated into the grid in order to achieve electrification through cleaner resources as part of the 2053 Net Zero Emission Target. Tenders will be made for new Renewable Energy Source Areas (YEKAs) with domestic component requirements, and works will be conducted to develop offshore YEKA projects. Planning and investment works will be conducted to enhance power grids, taking into consideration their potential renewable source areas and the development rate of renewable energy and electric vehicles. Flexibility of power grids will be increased to mitigate the negative impacts of noncontinuous generation from renewable energy sources on the grid. Energy storage systems will be installed, including pumped-storage HPPs. Works will be conducted for domestic electrolyser development to achieve green hydrogen generation. R&D works will continue for hydrogen transport and storage. Works will be conducted to increase the number of qualified personnel required in the energy sector.
NDC 2023	The policies relating to the energy sector in the NDC include; to utilize the energy efficiency and renewable potential at the highest level possible; reach approximately 33 GW of installed solar power capacity, 18 GW of installed wind power capacity, 35 GW of hydropower-installed power capacity, and 4.8 GW of installed nuclear power capacity; reach a battery and electrolyser capacities of 2.1 GW and 1.9 GW by 2030, respectively; increase renewable energy sources in primary energy consumption to 20.4% by 2030; achieve primary energy intensity of 0.113 TOE/thousand $2015 and final energy intensity of 0.08 TOE/thousand $2015 in 2030; establish an Emissions Trading System which will be one of the mitigation instruments in emission-intensive sectors.

National Energy Efficiency Action Plan 2017-2023	Plan had these strategies; to identify the potential cogeneration and district heating and cooling systems and prepare a roadmap; present consumers with comparable and further detailed billing data; create an energy data platform for smart management of measurement data; extensify smart meters; implement minimum performance standards for transformers; improve energy efficiency in public lighting; improve energy efficiency in electricity transmission and distribution; improve efficiency in existing power plants; build market infrastructure for demand-side response.
Energy Efficiency Strategy 2012-2023	To increase efficiency in generation, transmission and distribution of electricity; reduce energy losses and harmful environmental emissions; increase the total average cycle efficiency of coal-fired thermal power plants in the country to over 45% by 2023, including waste heat recovery; develop measures regarding the demand-side management in order to reduce electrical energy intensity by at least 20% were the main focus areas of strategy
Türkiye National Energy Plan 2022	In the Plan following goal were aimed; by 2035, to achieve a primary energy consumption of 205.3 Mtoe, electricity consumption of 510.4 TWh; achieve a share of 24.9% in electricity/final energy consumption; reduce energy intensity by 35.3%; increase installed power capacity to 189.7 GW (52.9 GW in Solar, 29.6 GW in Wind, 7.2 GW in Nuclear Power) and achieve an additional installed power capacity for 96.9 GW; increase the share of renewable energy to 54.7% in total electricity generation and 64.7% in installed power capacity; establish battery (7.5 GW), electrolyser (5 GW), and demand-side (1.7 GW) installed power capacity.
Türkiye Hydrogen Technologies Strategy and Roadmap	The objective is to create an effective value chain from the production of green hydrogen to its final use based on domestic and national technologies and contribute to the 2053 Net Zero Emission Target. The targets in this context include reducing the cost of green hydrogen production to less than \$2.4/kgH_2 by 2035 and less than \$1.2 /kgH_2 by 2053, and increasing electrolyser installed power capacity to 2 GW by 2030, 5 GW by 2035 and 70 GW by 2053.
National Climate Change Strategy 2010-2020	To use clean generation technologies and techniques at the highest level, in the framework of financing (internal and external) and by considering the topics of energy supply security of renewable energy sources and climate change; promote the use of zero emission technologies and R&D studies therefor; complete the improvement of existing thermal power plants; to develop economic instruments for alternative fuels.
Climate Change Action Plan 2011-2023	To reduce energy intensity; to increase the share of clean energy in energy production and use; to limit GHG emissions originating from use of coal in electricity generation, by using clean coal technologies and

	taking efficiency increasing measures; to reduce losses and illicit use in electricity distribution.
Climate Council 2022	To continue to support renewable energy and make the system infrastructure further flexible for production as well as self-consumption, and develop R&D and support mechanisms for all purposes; consider developing a roadmap and using alternative fuels to reduce emissions resulting from electricity generation, in line with the target to achieve net zero emission by 2053, and improve natural gas exploration and production activities and transmission infrastructures; promote the use of waste heat and heat pumping, district heating, and solar collector practices in heating and cooling; reduce emissions resulting from electricity generation by employing carbon capture, utilization and storage technologies in electricity generation from coal; increase training, green employment, digital transformation, storage, and demand-based applications to transform the energy sector.

2.1.2. Strategies and actions

Five strategies including the following topics were formulated: Decarbonization of electricity generation in the energy sector, which plays a decisive role in ensuring low-emission development across the economy; matching the sector with other sectors and supporting demand-side engagement; strengthening electrical infrastructure and boosting efficiency; and developing a roadmap on carbon capture, utilization and storage to reduce unavoidable GHG emissions.

Strategy E-S.1: Reducing carbon intensity of electricity generation

Energy policies have intertwined with climate policies and become one of the most significant components and instruments in the fight against climate change. The Paris Agreement as well as Türkiye's vision for 2053 call for greater importance to renewable energy. As of 2022, renewable energy sources comprise more than half of the total installed power capacity. Yet, despite this acceleration, higher renewable energy installed power capacity is required to reduce emissions at the national scale. While Türkiye has achieved an increase above the global average in terms of enhancing resource diversity and share of renewable energy, especially solar and wind installed power capacity, which the country has a high potential, should be further increased to reduce the current deficit and ensure the security of energy supply. In this context, Türkiye aims to increase solar (32,900 MW), wind (18,100 MW), hydropower (35,100 MW), geothermal and biomass (5,100 MW) and electrolyser (2,000 MW) installed power capacity and reduce CO_2 emissions per unit of electricity generation by 20%, in line with the targets laid down in the Türkiye National Energy Plan. It is also important to provide financial and technical support for distributed renewable energy applications for small-scale grid users, and residential units in particular, and continue renewable energy support mechanisms such as YEKA. Other actions include supporting R&D activities and developing roadmaps for advancing technologies such as wave, offshore wind and floating SPP energy.

Strategy	Actions
Strategy E-S.1: Reducing carbon intensity of electricity generation	**E-S.1.1** Increasing installed solar power capacity
	E-S.1.2 Increasing installed wind power capacity
	E-S.1.3 Increasing installed hydropower capacity
	E-S.1.4 Increasing both installed geothermal and biomass power capacity
	E-S.1.5 Boosting hydrogen use in electricity generation and increasing installed electrolyser power capacity during the plan period
	E-S.1.6 Developing a biomass roadmap
	E-S.1.7 Supporting R&D activities to mitigate carbon intensity in electricity generation
	E-S.1.8 Increasing use of Renewable Energy Source Guarantee System (YEK-G) and green tariff
	E-S.1.9 Increasing distributed renewable energy applications for small-scale grid users, and residential units in particular
	E-S.1.10 Boosting Renewable Energy Source Area (YEKA) applications and identifying potential YEKAs
	E-S.1.11 Designating a roadmap on wind, solar and wave power technologies
	E-S.1.12 Developing and supporting R&D activities on technologies to generate electricity from wave energy
	E-S.1.13 Reducing carbon intensity in electricity generation through increasing low-carbon energy investments
	E-S.1.14 Increasing installed nuclear energy capacity

Strategy E-S.2: Coupling electricity sector with other sectors and supporting demand-side engagement

It is essential to build a flexible structure in Türkiye that will not compromise system security in coupling high capacities and quantities of demand and supply when transitioning to a smart grid. Innovative business models need to be developed that enable the expansion of energy storage systems for grid and distributed energy, create structures that allow for demand-side energy management, and enable consumers and producers to choose flexibility structures in free market conditions. Coupling the electricity sector with other main sectors such as buildings, transport and industry will be possible through the efficient equilibration of supply and demand. It is also aimed to promote R&D studies for the use of solar power in the agriculture sector.

An Energy Efficiency Obligations System (EEOS) will be established, and targets will be set for distribution or supply companies in order to ensure the efficient use of energy from production to final consumption. Additionally, in order to the effective execution of EEOS, standards will be created for such market mechanisms as White Certification, and verification processes will be designated. Such processes will be monitored and evaluated in a transparent manner.

Certification is important for the continuity and sustainability of alternative renewable energy sources (e.g., sustainable biogas and green hydrogen). Türkiye aims to undertake sustainable biogas and green hydrogen certification works, formulate legislation and standards for biogas, and conduct studies relating to biogas injection to natural gas networks which will be completed by 2030. With regard to the introduction of system entry incentives for the sustainable biogas and green hydrogen which will be transported in the natural gas transmission and distribution system, it is planned to first establish a legal infrastructure and secondly undertake secondary legislation and infrastructure efforts.

Strategy	Actions
Strategy E-S.2: Coupling electricity sector with other sectors and supporting demand-side engagement	**E-S.2.1** Boosting battery capacity
	E-S.2.2 Enhancing integration of renewable energy systems into charging infrastructures
	E-S.2.3 Raising awareness of energy efficiency in electricity consumption
	E-S.2.4 Promoting R&D studies for use of solar energy in agriculture
	E-S.2.5 Delivering training aligned with green transition on distributed systems and low-carbon energy technologies
	E-S.2.6 Developing a white certification system and market in energy efficiency
	E-S.2.7 Certification of sustainable biogas and green hydrogen, establishing legislation and standards for biogas, conducting works for injection into natural gas networks

Strategy E-S.3: Strengthening electrical infrastructure, and reducing technical loss rate in transmission and distribution by increasing efficiency

Strengthening electrical infrastructure requires robust transmission and distribution infrastructures. The areas where energy efficiency can be implemented most perceptibly are electricity transmission and distribution improvements. It is aimed to reduce the technical loss rate which currently stands at 12%. In this context, it is important to enhance the safety and efficiency of network activities and increase support for distributed production and self-consumption from renewable energy sources. It is required to build a distributed electrical infrastructure where electricity is generated near its place of consumption, can meet the peak loads demanded by electric charging capacities, allows producing consumers to take part in the

market, enables bi-directional energy flow, and can transform and store electricity in different forms of energy.

An action plan that lacks a systematic roadmap for the digital transformation of energy will fall short in practice. The integration of digital systems with energy technologies should be enhanced. In this context, it is aimed to develop a digital transformation roadmap for energy, and rehabilitate distribution grids, including transformers. It is also aimed to integrate digital systems with energy technologies through extensifying smart meters and supporting R&D activities. Another target involves strengthening transmission and distribution lines and taking supportive measures for smart grid and micro grid applications, especially for the effective system integration of renewable energy sources.

It Is aimed to raise awareness to ensure that the energy sector can make further and better use of efficiency boosting projects, which requires regular training activities.

Strategy	Actions
Strategy E-S.3: Strengthening electrical infrastructure, and reducing technical loss rate in transmission and distribution by increasing efficiency	**E-S.3.1** Reducing nationwide technical loss rate
	E-S.3.2 Extensifying smart meters and supporting R&D activities
	E-S.3.3 Raising awareness to ensure the energy sector makes more and better use of efficiency boosting projects
	E-S.3.4 Strengthening transmission and distribution lines and taking supportive measures for smart grid and micro grid applications to ensure effective system integration of renewable energy sources
	E-S.3.5 Rehabilitating distribution grids, including transformers
	E-S.3.6 Developing a roadmap for digital transformation in energy

Strategy E-S.4: Promoting use of low-carbon production technologies and strengthening alternatives in electricity generation

Despite currently being regarded as an innovative technology with high potential for increased use in the area of nuclear energy, small modular reactors are not a new concept in the nuclear energy industry. What makes current small modular reactors so seminal is not their size but their superior security features of their designs, their production and installation processes, and cost effectiveness compared to large reactors. Small modular reactors contain numerous technical features that increase predictability, reduce construction costs and shorten deadlines in project management, which can help in reducing GHG emissions. In general terms, while small modular reactors may offer some potential benefits as a low-carbon energy source, it is essential to thoroughly assess all of their potential environmental and security impacts before employing them as a GHG reduction strategy. It is also aimed to implement education and training programmes at various levels regarding nuclear energy and security in order to rapidly

develop the competent human resource, and improve the vocational and technical training capacities in nuclear energy technologies. Furthermore, legislative arrangements should be made to create an incentive mechanism regarding hybrid systems in which small modular reactors and clean energy technologies (hydrogen, power-to-fuel, power-to-x, etc.) can be used concomitantly.

Supporting the applications for hydrogen production, storage, distribution and use, and dealing with hydrogen within the integrity of an energy system is essential for low-carbon energy supply. Again, in this context, it is aimed to map out storage areas for green and pink hydrogen, build an infrastructure for the transmission and distribution through existing natural gas pipelines, conduct feasibility studies for using them in existing natural gas-fired cycle plants, and ensure the distribution of hydrogen through the existing infrastructure for natural gas. In the context of the expansion and use of alternative energy sources, one of the objectives is to designate the potential supply and areas of use for resources including synthetic methane, synthesis gas, sodium borohydride, ammonia, methanol, and fuel cell.

Strategy	**Actions**
Strategy E-S.4: Promoting use of low-carbon production technologies and strengthening alternatives in electricity generation	**E-S.4.1** Conducting technical and commercial feasibility studies and exploring potential sites for use of small modular reactors
	E-S.4.2 Implementing education and training programmes at different levels to rapidly develop the competent human resource relating to nuclear energy and security
	E-S.4.3 Supporting R&D projects for the production, storage, distribution and use of hydrogen
	E-S.4.4 Mapping out green and pink hydrogen storage areas, conducting the feasibility studies required for transmission and distribution through existing natural gas pipelines, implementing training programmes at different levels for the rapid development of competent human resources, and undertaking legislative works to determine the appropriate ratio of the hydrogen mixture to be added to distribution lines
	E-S.4.5 Identifying the potential supply and areas of use for resources such as synthetic methane, synthesis gas, sodium borohydride, ammonia, methanol, and fuel cell
	E-S.4.6 Creating an incentive mechanism regarding hybrid systems in which small modular reactors and clean energy technologies (hydrogen, power-to-fuel, power-to-x, etc.) can be used concomitantly

Strategy E-S.5: Developing a roadmap on carbon capture, utilization and storage to reduce unavoidable GHG emissions

Carbon capture, utilization and storage (CCUS) is a significant mitigation strategy that captures the carbon dioxide (CO_2) emissions originating from power plants and other industrial sources, utilizes them in potential areas, and stores them in underground geological formations. CCUS is regarded as a potential technology to mitigate the GHG emissions often arising from fossil-fired power plants, and particularly, coal-fired power plants which are the main sources of CO_2 emissions.

It is aimed to complete, by 2025, the technical feasibility process to explore emission reduction technologies such as CCUS, and their economic potential, appropriate supply chain infrastructure and processes, and to set targets. In this context, it is aimed to develop a roadmap on CCUS, prepare a carbon storage atlas, and determine the relevant potential of Türkiye. It is essential to support R&D activities on CCUS, implement pilot facilities and create incentive mechanisms, as well as supporting the sectors in which such mechanisms can be implemented.

Strategy	Actions
Strategy E-S.5: Developing a roadmap on carbon capture, utilization and storage to reduce unavoidable GHG emissions	**E-S.5.1** Exploring emission reduction technologies such as carbon capture, utilization and storage, and their economic potential, appropriate supply chain infrastructure and processes for fossil-fired power plants, and setting targets
	E-S.5.2 Preparing a carbon storage atlas for Türkiye
	E-S.5.3 Developing a roadmap on carbon capture, utilization and storage
	E-S.5.4 Supporting R&D activities on carbon capture, utilization and storage, implementing pilot facilities, and creating incentive mechanisms

2.2. Industry Sector

2.2.1. Current situation

Industry is one of the most important sectors in the Turkish economy, and the manufacturing industry has the largest share of added value created in the industry sector. The Turkish industry sector is comprised of a variety of subsectors that collectively account for a significant portion of the country's GDP. Some significant subsectors of export include iron-steel, chemicals, pharmaceuticals, electrical and electronic equipment, construction materials, automotive industrial products, and apparel.

According to TURKSTAT data for 2022, GDP at current prices by production method increased by 106.9% compared to the previous year, reaching 15 trillion 11 billion and 776 million TRY. The share of the manufacturing industry in overall GDP, which stood at 22.1%, is shown in Figure 9. [5]

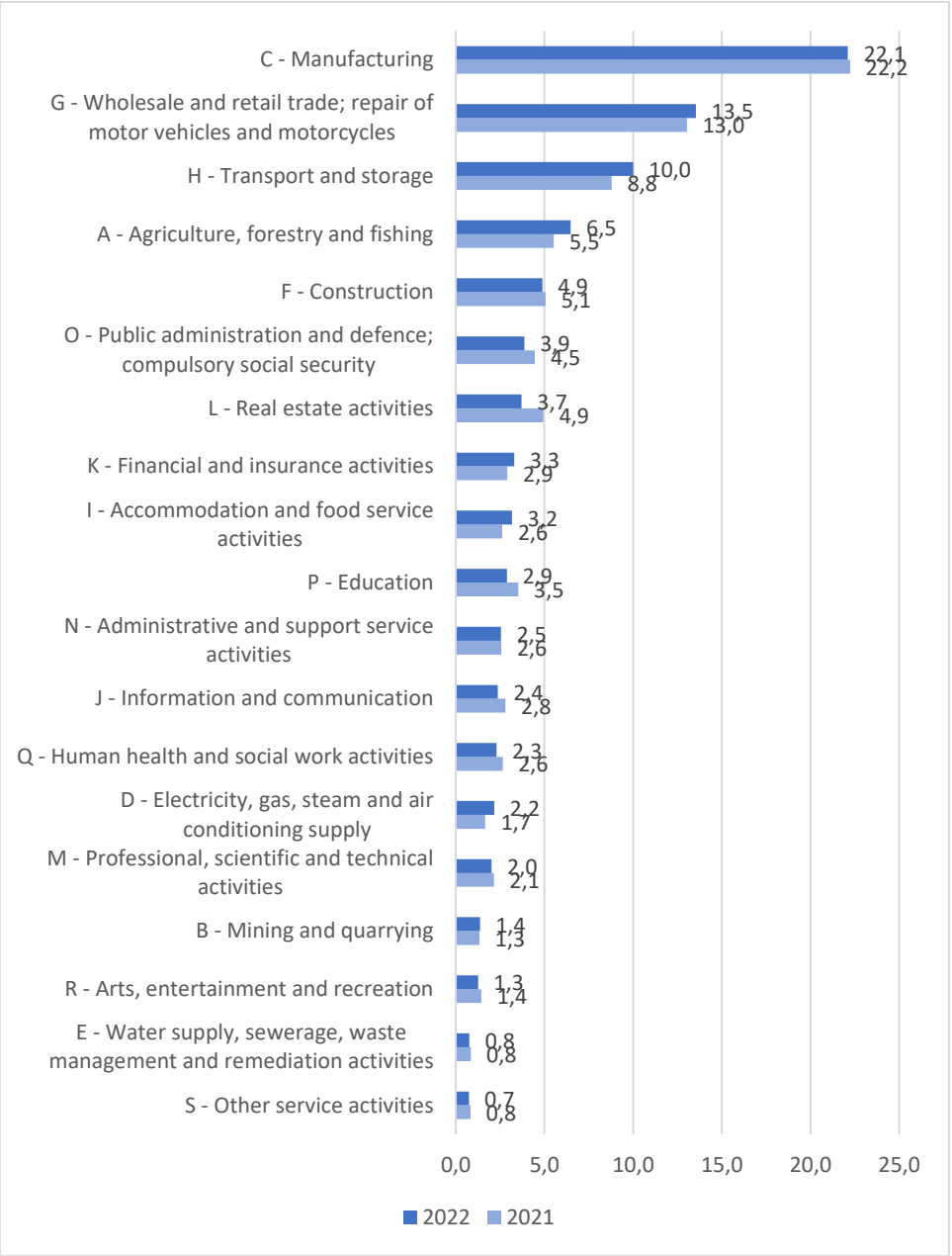


Figure 9. Shares in gross domestic product, at current prices, at A21 level, by economic activity, 2021-2022

One of Türkiye's main goals is to improve production by sectors that mainly produce import-oriented intermediate products and final products. The status of the technical infrastructure and the period of change during which the sector has undergone are critical in achieving such goals. New technologies play a significant role in achieving the competitiveness and low carbon targets in the global market. In order for enterprises to engage in a further challenging competition in the global economy, new technologies must be adopted and companies must be able to innovate, especially in the manufacturing industry.

When looking at the distribution of the number of companies in the sector in 2022 by technology levels, the share of high- and medium-high-technology companies is approximately 12.17% (Figure 10). However, in terms of turnover the share of high- and medium-high-technology enterprises increases to 27.8% (Figure 11).

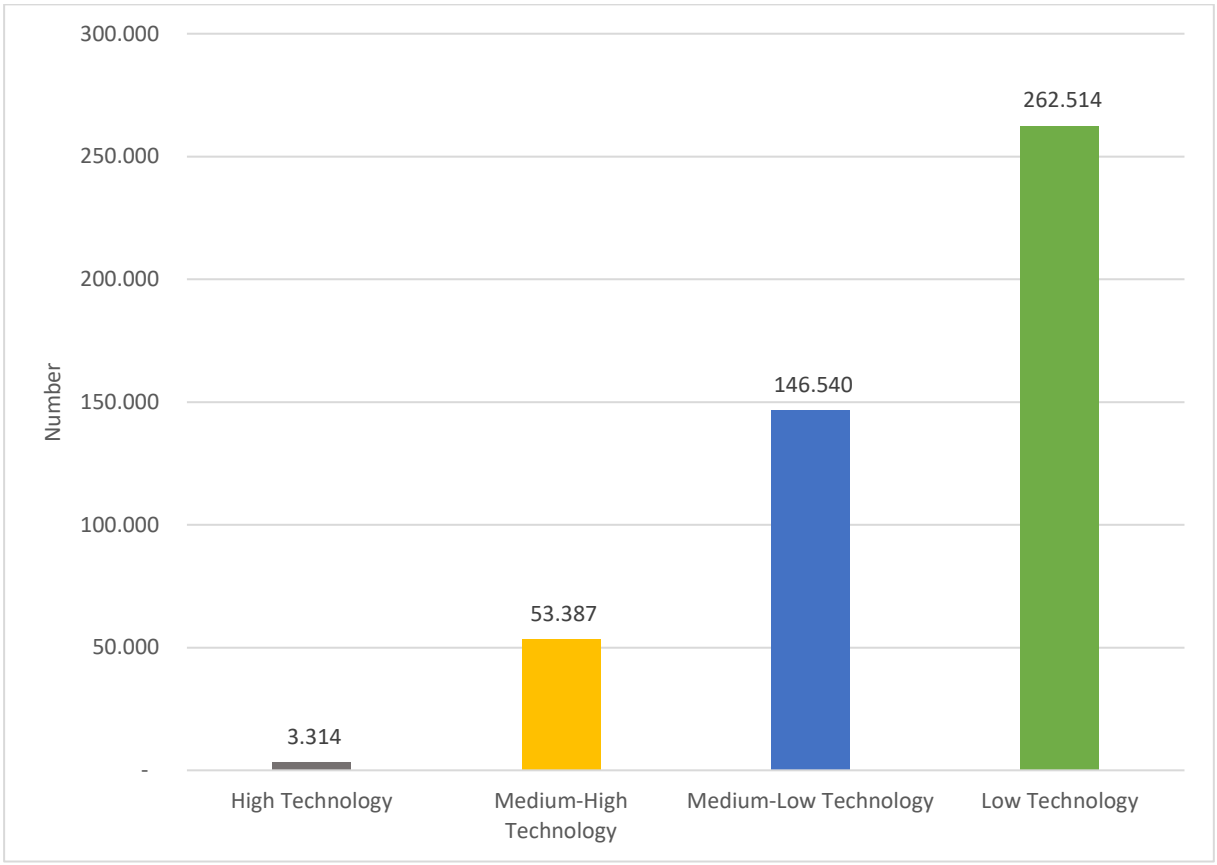


Figure 10. Level of technology in manufacturing industry by number of enterprises, 2022 [6]

While the high-technology companies account for 0.7% of the total, their share of turnover almost quadruples to 2.8%. The share of turnover of medium-high-technology companies is 25%, which is 2.2 times higher than their share in the number of enterprises. While the ratio of medium-low-technology remains unchanged, low-technology companies which account for more than half of the total number of industrial companies make up only 35.2% of turnover. The cost of low-carbon development will depend on the technological profile in the industry sector.

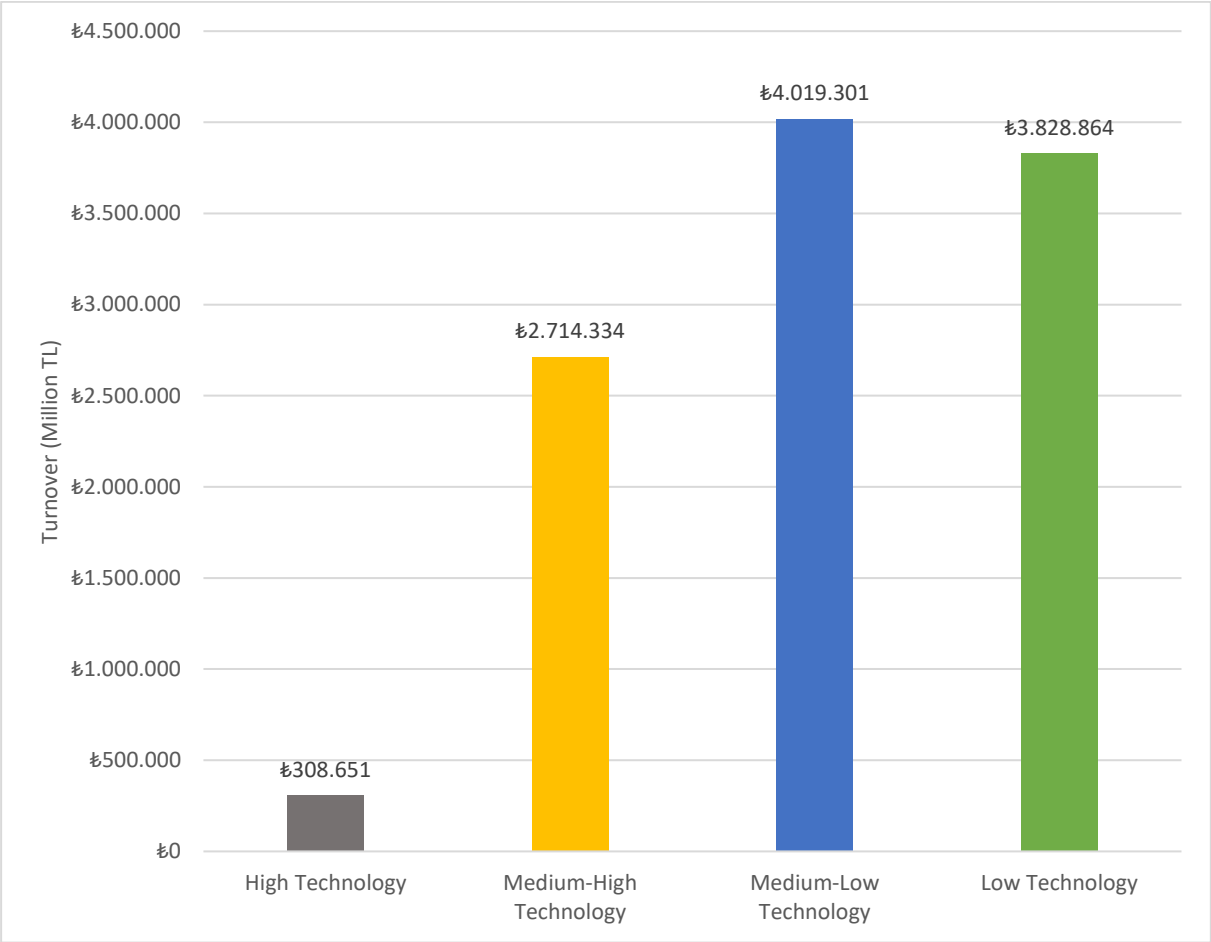


Figure 11. Level of technology in manufacturing industry by enterprise turnover, 2022 [6]

In 2021, the industry sector emissions were 141.4 Mt $CO_{2\text{-eq}}$, accounting for 25% of the overall emissions in Türkiye. These emissions include energy and process emissions with 66.24 and 75.14 Mt $CO_{2\text{-eq}}$, respectively. The emissions discussed in this section are direct emissions only and do not include those arising from the electricity consumption of the sector. Total industrial emissions, which stood at 60.0 Mt $CO_{2\text{-eq}}$ in 1990, increased to 141.4 Mt $CO_{2\text{-eq}}$ in 2021. [1] (Table 8, Figure 12)

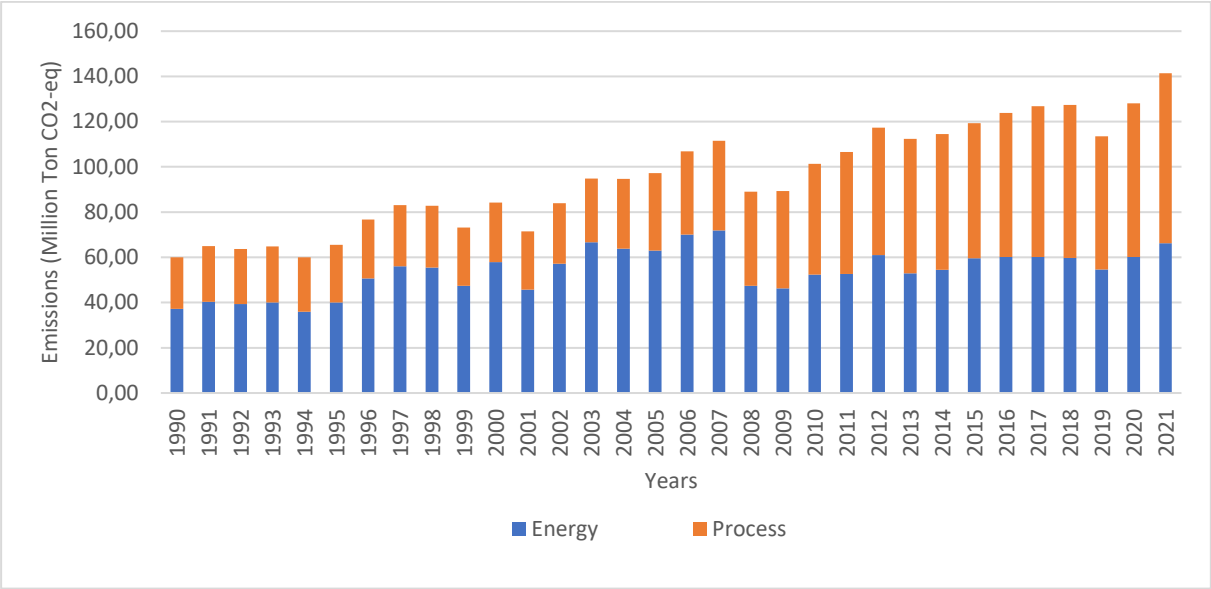


Figure 12. Industry sector energy and process emissions [1]

Table 8 presents the energy and process emission data for the industry sector.

Table 8. Industry sector energy and process emissions, Mt $CO_{2\text{-}eq}$ [1]

	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Energy	37.16	40.33	39.33	39.99	35.88	40.00	50.59	56.04	55.48	47.37	57.94	45.66	57.12	66.69	63.86	63.01
Process	22.86	24.58	24.29	24.80	24.11	25.52	26.16	27.01	27.31	25.78	26.20	25.85	26.83	28.18	30.76	34.25
Total	60.02	64.91	63.62	64.79	59.99	65.52	76.75	83.04	82.79	73.16	84.14	71.51	83.95	94.87	94.62	97.26
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Energy	70.09	71.88	47.36	46.23	52.33	52.59	61.06	52.98	54.44	59.59	60.08	60.19	59.67	54.56	60.19	66.24
Process	36.76	39.67	41.69	43.07	49.06	53.96	56.27	59.33	60.06	59.72	63.75	66.63	67.74	59.00	67.96	75.14
Total	106.85	111.55	89.04	89.30	101.39	106.55	117.32	112.31	114.50	119.31	123.83	126.82	127.41	113.57	128.15	141.37

Four main subsectors stand out when looking at the energy-related emissions of the industry sectors. Cement (non-metallic minerals), iron-steel, food, beverage, tobacco and paper production comprise a significant part of the energy-related emissions of the industry sector, maintaining the general trend although varying over years depending on order of magnitude and production amounts (Figure 13, Table 9).

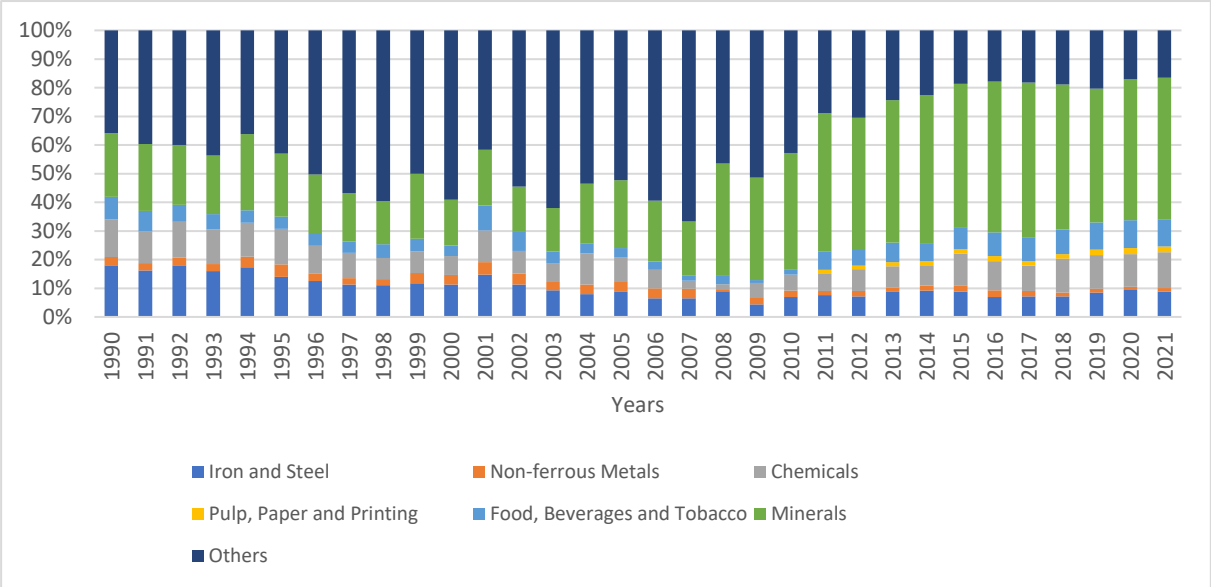


Figure 13. Industry sector combustion emissions [1]

Table 9 presents the data on combustion emissions of the industry sector over years.

Table 9. Industry sector combustion emissions, Mt $CO_{2\text{-}eq}$ [1]

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Iron and Steel	6.69	6.55	7.07	6.41	6.24	5.59	6.33	6.35	6.15	5.58	6.57	6.73	6.46	6.19	5.06	5.48
Non-ferrous Metals	1.09	1.02	1.07	0.98	1.31	1.76	1.36	1.25	1.17	1.70	1.95	1.99	2.14	1.94	2.19	2.23
Chemicals	4.89	4.46	4.93	4.81	4.24	4.96	4.88	4.95	4.09	3.59	3.76	5.07	4.56	4.39	6.86	5.35
Pulp, Paper and Print	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Food, Beverage and Tobacco	2.91	2.91	2.35	2.15	1.58	1.69	2.24	2.19	2.65	2.03	2.15	3.99	3.92	2.71	2.35	2.13
Minerals	8.26	9.40	8.20	8.16	9.51	8.79	10.35	9.50	8.40	10.76	9.25	8.85	8.91	10.15	13.22	14.88
Other	13.32	16.00	15.73	17.49	13.00	17.21	25.43	31.80	33.03	23.71	34.26	19.04	31.13	41.31	34.19	32.95
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Iron and Steel	4.52	4.64	4.22	2.04	3.66	3.99	4.38	4.64	4.99	5.29	4.19	4.33	4.27	4.62	5.63	5.82
Non-ferrous Metals	2.49	2.40	0.24	0.99	1.15	0.76	1.17	0.76	0.99	1.20	1.41	1.14	0.81	0.77	0.69	0.87
Chemicals	4.49	2.06	0.95	2.45	2.90	3.14	4.65	3.94	3.70	6.69	6.07	5.32	7.03	6.40	6.84	8.30
Pulp, Paper and Print	0.00	0.00	0.00	0.00	0.00	0.78	0.74	0.77	0.89	0.96	1.08	0.94	0.98	1.02	1.27	1.28
Food, Beverage and Tobacco	2.02	1.39	1.37	0.46	0.88	3.39	3.54	3.61	3.33	4.37	4.97	4.93	5.09	5.19	5.88	6.34
Minerals	14.90	13.50	18.59	16.51	21.36	25.34	27.94	26.37	28.26	29.95	31.63	32.58	30.22	25.45	29.62	32.72
Other	41.67	47.90	21.98	23.77	22.38	15.20	18.64	12.89	12.29	11.13	10.73	10.96	11.27	11.10	10.25	10.91

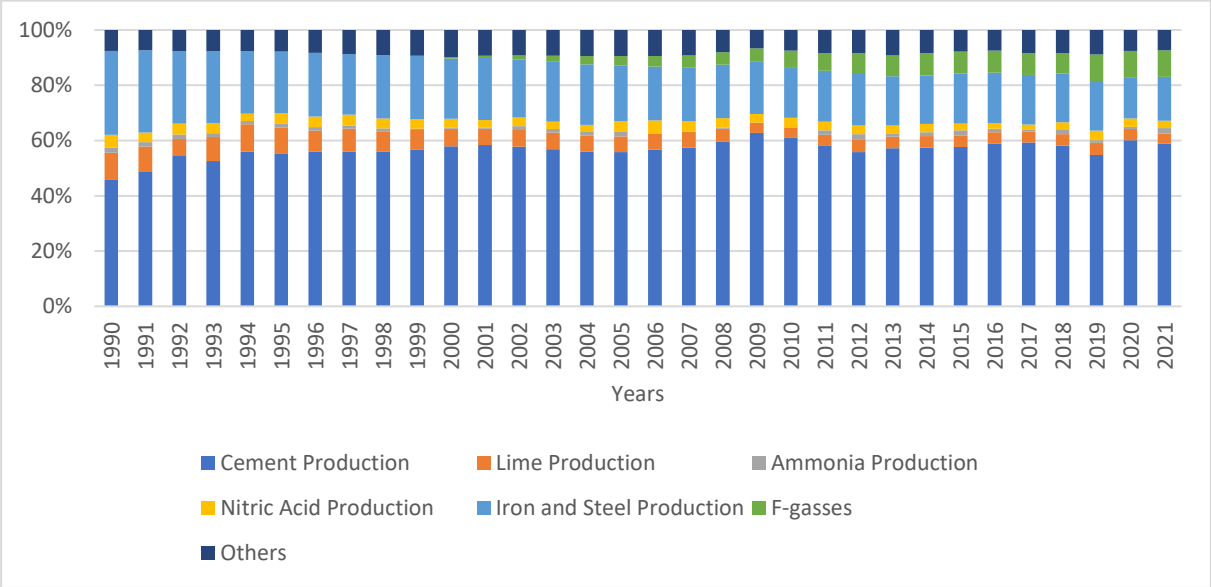


Figure 14. Industry sector process emissions [1]

Table 10 presents the data on process emissions of the industry sector over years.

Table 10. Industry sector process emissions, Mt $CO_{2\text{-}eq}$ [1]

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Cement Production	10.44	12.02	13.27	13.05	13.49	14.13	14.66	15.10	15.29	14.59	15.18	15.09	15.51	16.02	17.21	19.12
Lime Production	2.25	2.18	1.45	2.13	2.39	2.36	1.96	2.24	2.00	1.86	1.65	1.52	1.62	1.70	1.82	1.92
Ammonia Production	0.42	0.40	0.39	0.35	0.27	0.35	0.33	0.33	0.30	0.10	0.09	0.08	0.36	0.36	0.46	0.57
Nitric Acid Production	1.06	0.85	0.96	0.94	0.65	1.00	1.02	1.04	0.99	0.92	0.85	0.74	0.83	0.75	0.72	1.35
Iron and Steel Production	6.95	7.31	6.37	6.43	5.44	5.68	6.03	5.93	6.25	5.90	5.73	5.79	5.62	6.09	6.75	6.91
F-gases	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.23	0.42	0.63	0.91	1.15
Other	1.73	1.81	1.86	1.90	1.86	2.01	2.17	2.36	2.49	2.41	2.59	2.40	2.47	2.63	2.90	3.24
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Cement Production	20.84	22.78	24.85	27.04	29.98	31.45	31.37	33.91	34.50	34.44	37.53	39.47	39.41	32.35	40.81	44.23
Lime Production	2.08	2.28	1.92	1.61	1.71	2.03	2.61	2.49	2.51	2.43	2.66	2.68	2.79	2.56	2.81	2.75
Ammonia Production	0.12	0.00	0.15	0.00	0.12	0.86	1.04	0.64	0.82	1.19	0.79	0.52	1.05	0.56	0.54	1.49
Nitric Acid Production	1.68	1.53	1.47	1.34	1.65	1.74	1.78	1.79	1.81	1.45	1.22	1.16	1.82	2.02	2.01	2.02
Iron and Steel Production	7.16	7.73	8.05	8.11	8.88	9.93	10.48	10.58	10.49	10.74	11.72	11.93	11.95	10.62	10.15	11.91
F-gases	1.42	1.71	1.90	2.11	3.05	3.43	4.26	4.47	4.93	4.82	5.11	5.26	5.04	5.68	6.50	7.21
Other	3.45	3.64	3.34	2.86	3.66	4.52	4.73	5.45	5.01	4.65	4.73	5.61	5.68	5.22	5.15	5.52

Cement, and iron and steel production lead in the process emissions of the sector, accounting for approximately 74.4% of total process emissions in 2021 (Figure 14).

The key legislation as well as policy and strategy papers relating to the Turkish industry sector are shown in Table 11 and Table 12.

Table 11. Key legislation on industry sector

Key Legislation	Purpose and Scope
Law on Energy Efficiency (Law No. 5627)	The purpose of this Law is to increase efficiency in using energy sources and energy to ensure effective energy use , avoid waste, alleviate the burden of energy costs on the economy, and protect the environment. This law covers the practices to increase and promote energy efficiency in electricity generation, transmission, distribution and consumption phases at industrial establishments, buildings, electricity generation plants, transmission and distribution grids and transport, to raise energy awareness in the general public, and to utilize renewable energy sources.
Regulation on Monitoring of Greenhouse Gas Emissions	The purpose of this regulation is to lay down principles and procedures relating to the monitoring, reporting and verification of the GHG emissions that originate from the activities included in its scope. The regulation covers activity groups such as the combustion of fossil fuels, oil refining, iron and steel, ferrous and non-ferrous metal production, primary aluminium production, mining industry, pulp and paper production, chemical industry, and acid production. Since 2015, GHG emissions from more than 700 industrial plants, corresponding to approximately half of the total GHG emissions of Türkiye, have been monitored in the framework of this regulation. The MRV system in Türkiye is based on the European Union Emissions Trading System which is the largest international Emissions Trading System implemented since 2005.
Energy Labelling Framework Regulation	The purpose of this regulation is to establish a framework that applies to energy-related products placed on the market or put into service. It provides for the labelling of those products and the provision of standard product information on energy efficiency, energy consumption and consumption of other resources during use, and supplementary information concerning such products, thereby enabling customers to choose more efficient products in order to reduce their energy consumption. The regulation covers suppliers', dealers' and competent bodies' obligations regarding energy-related products placed on the market or put into service. It includesmarket surveillance, inspection and

	control of such products; procedure for dealing with products posing a risk at national level; procedure for protective measures; and other works and processes relating to the implementation and reclassification of labels and harmonization standards.
Regulation on Environmental Labelling	The purpose of this regulation is to promote the use of products and services with reduced environmental impact throughout their lifecycles. It aims to build an environmental labelling system on a voluntary basis, ensuring accurate and scientific knowledge flow to consumers, and regulate the administrative and technical issues in this respect as well as the system, in accordance with sustainable environmental objectives. The environmental labelling system established by this regulation aims to prevent ecosystem degradation and mitigate adverse impacts on environment, human beings, health, climate and wildlife in the consumption of natural resources. This includes all processes of the lifecycle, from the use of natural resources to raw material until final disposal of products and services, including production, utilization, consumption, and recycling phases.
Regulation on Fluorinated Greenhouse Gases	The purpose of this regulation is to lay down principles and procedures regarding the management of fluorinated GHGs and other fluorinated substances in order to control the emission of fluorinated GHGs, which are partially included in the scope of the Montreal Protocol on Substances that Deplete the Ozone Layer to which our country is a party. With this amendment, it is undertaken to gradually reduce the consumption of fluorinated GHGs in Türkiye by a total of 80% $CO_{2\text{-eq}}$ until 2045, starting from 2024. This regulation covers the labelling, data collection, leakage detection, reporting, placing on the market, import, export and use, quota distribution, and recovery and disposal of fluorinated GHGs and other fluorinated substances, including those in the product and equipment, and the rules regarding the training and certification of natural and legal persons who deal with equipment containing fluorinated GHGs or whose operation is based on these gases.
Regulation on Substances that Deplete the Ozone Layer	This regulation aims to regulate the use and termination of substances that are controlled by the Montreal Protocol on Substances that Deplete the Ozone Layer, to which our country is a party. The regulation covers reporting and informing the public of any and all information on the production, foreign trade, use, placement on the market, recovery, recycling, reclamation and destruction of controlled substances, new substances, products or equipment that contain or function with these substances.

Regulation on Environmentally-Sensitive Design of Energy-related Products	The purpose of this regulation is to establish a framework on and lay down the requirements for environmentally-sensitive design in the placement on the market or putting into service of energy-related products, with a view to contributing to sustainable development by increasing the environmental protection level and security of energy supply.
Communiqué on Voluntary Carbon Market Project Registration	The purpose of this communiqué is to regulate the registration of the projects aimed at GHG reduction and developed to obtain carbon certification.

Table 12. Key policy papers relating to industry sector

Policy Papers	Goals and Objectives
Twelfth Development Plan 2024-2028	The main objective is to transition to a high value-added production structure by enhancing competitiveness and productivity in terms of green and digital transformation in all sectors of the manufacturing industry, and priority sectors in particular. The plan includes the following measures: Green transformation in the manufacturing industry will be supported, and circular and sustainable production practices will be increased. R&D activities and technology transfer for the employment, improvement and expansion of sustainable production and green transformation will be supported. Generation and use of clean energy will be promoted. The green transformation awareness of SMEs will be raised and sectoral transformation profiles will be created. Support for the energy efficiency practices of enterprises will be increased, and high-technology investments with high energy efficiency and savings potential that contribute to facility and process optimization will be supported. Standardized national applications will be developed for carbon and water footprint calculation and verification. The development and commercialization of components, equipment and systems through domestic and national means will be supported with regard to production, storage, transport and industrial utilization processes, particularly in the hydrogen value chain, as part of green transformation. Institutional capacity and awareness of the public and private sectors will be increased in terms of the green transformation of industry.
National Climate Change Strategy 2010-2023	This strategy covering 2010-2023 lays down the national mitigation, adaptation, technology, finance, and capacity-building policies in the framework of its short- and long-term objectives, with a view to contributing to reducing GHG emissions and combating climate change within the special circumstances and capabilities of Türkiye.

	It focuses on such objectives as replacing the resources used in the industry with those suitable for clean production and utilizing alternative materials; encouraging heat recovery and industrial cogeneration systems; promoting R&D activities and technology transfer; commissioning encouraging mechanisms to make people choose clean production technologies, climate-friendly and innovative technologies; effectively implementing inspection and enforcement mechanisms.
NDC 2023	Türkiye's main mitigation policies for the industry sector for 2030, as declared in the NDC include: to increase using biofuels, refuse-derived fuel (RDF), alternative fuel, and raw materials in industrial facilities; to reduce the carbon footprint of industrial products and increase using renewable energy and resource and energy efficiency in the industry sector; to prepare National Cooling Action Plan covering sustainable and natural cooling technologies, as well as innovative financing solutions and higher energy efficiency cooling gases (being prepared); to conduct Green Growth Technology Roadmap studies for the iron-steel, aluminium, cement, chemicals, plastics and fertiliser sectors, which are critically important for the Turkish economy and have high carbon emissions; to support "Green Transition in the Industry" by prioritizing certification of industrial facilities that use "Best Available Techniques" as an indicator for clean and green industrial production.
National Energy Efficiency Action Plan 2017-2023	Under the National Energy Efficiency Action Plan implemented in the period of 2017-2023, it was aimed to reduce the primary energy consumption of Türkiye by 14% by 2023 through 55 actions defined in 6 categories,, buildings and services, energy, transport, industry and technology, agriculture, and cross-cutting areas. It was also projected to achieve savings of 23.9 Mtoe cumulatively by 2023, for which 10.9 billion USD of investment would be made. According to the progress report prepared for 2017-2020, works were conducted through national and international collaborations in such areas as process efficiency, energy management, industrial symbiosis, and the creation of green OIZs. As part of the Efficiency Increasing Project Support Scheme, between 2011 and 2023, 122 million TRY of support was provided to 517 projects, achieving financial savings of 803 million TRY and energy savings of 117,000 TOE.
Industry and Technology Strategy 2023	Prepared with the vision of "National Technology, Strong Industry" and targeting the year 2023, this strategy is divided into five main components and 23 sub-policies: (1) High Technology and Innovation, (2) Digital Transformation and Industry Movement, (3) Entrepreneurship, (4) Human Capital and (5) Infrastructure. The Strategy aims to increase the number of software engineers across Türkiye from 140,000 to 500,000 and make Türkiye a world leader by releasing at least 23 smart products or services based on disruptive technologies on a global scale by 2023. The paper also

	localizes the concept of "unicorn" ventures, which start at venture level and reach valuation of 1 billion USD or more. In this context, it is estimated that by 2023, the number of Turcorn-Turkish technology ventures exceeding 1 billion USD in value will reach at least 10, and the investment capacity of technology-based firms will exceed 5 billion TRY.
Green Deal Action Plan (2021)	The Action Plan, prepared with a view to aligning Türkiye with EU Green Deal and Carbon Border Adjustment Mechanism (CBAM) and achieving green transformation in certain sectors, aims to support circular and greener economy and includes a total of 32 goals and 81 actions under 9 main headings. The main headings under the Action Plan to achieve these goals are carbon border adjustments; green and circular economy; green finance; clean, affordable and secure energy supply; sustainable agriculture; sustainable smart mobility; combating climate change; diplomacy, and awareness-raising regarding European Green Deal.
National Climate Adaptation Strategy and Action Plan 2011-2023	This paper focuses on these five main areas relating to the country's vulnerability to climate change: water resources management; agriculture and food security; ecosystem services, biodiversity and forestry; natural disaster risk management; and public health. While the industry sector is not included in these five priority areas in terms of vulnerability, it is regarded as a stakeholder for numerous efficiency-driven activities in the actions which were designated based on vulnerable sectors and themes. The climate risks involved in the industry sector were assessed as part of the Joint Programme on Enhancing the Capacity of Türkiye to Adapt to Climate Change, and the Eco-Efficiency (Cleaner Production) Programme was implemented as the industry-related component of the Joint Programme. Seyhan River Basin Eco-Efficiency and Cleaner Production Pilot Studies were conducted under the responsibility of the Eco-Efficiency (Cleaner Production) Programme of the United Nations Industrial Development Organization, and capacity-building works were undertaken in the areas of clean production and eco-efficiency in industry.
Water Efficiency Strategy and Action Plan in the Framework of Adaptation to the Changing Climate 2023-2033	This paper aims to mitigate the impacts of climate change on water supply in all sectors, and particularly urban, agricultural, industrial water utilization. The plan includes the following strategies: strengthening the legal, administrative and technical infrastructure to increase water efficiency in the industry sector; raising awareness in the context of water efficiency practices in industry, disseminating good practices and ensuring cooperation between public institutions, universities, NGOs relating to the industry and private sectors; developing the institutional connection and cooperation structure between the institutional structure of basin water management and organized

	industrial zone managements, chambers of industry, and industrial NGOs for the control of efficient use of water; establishing regulations on water pricing that will encourage efficiency in industrial water use; calculating the size of the blue and grey water footprint in agriculture and industry, and establishing reduction measures as well as incentives and support mechanisms.
Climate Council 2022	The Council decided for the following actions: within the framework of the 2053 Net Zero Emission Target, determining the long-term shares of the manufacturing industry and its sub-sectors, and preparing projections; developing low-carbon roadmaps for manufacturing sectors; increasing renewable energy utilization and energy efficiency in industry; conducting studies to determine and developing support mechanisms for the mandatory use rates of reuse of waste, use of waste as by-products and alternative raw materials, and products obtained through recycling/recovery; establishing the infrastructure for the implementation of the Green Organized Industrial Zone (OIZ) and Green Industrial Zone certification system; scaling up other alternative emission reduction methods such as green hydrogen and its derivatives and carbon capture, use and storage in all sectors, especially in carbon-intensive sectors, and developing support mechanisms.

2.2.2. Strategies and actions

Eight strategies focusing on mitigation were designated for the industry sector which has one of the largest shares in the GHG emissions of Türkiye. These strategies cover ensuring energy efficiency, increasing the use of renewable energy, reducing carbon footprint and carbon intensity, promoting corporate sustainability reporting, promoting circular economy and resource efficiency, developing new technologies through R&D and innovation with national resources, providing sources of finance, and capacity building.

Strategy S-S.1: Optimizing energy efficiency potential for manufacturing industry

The industry sector accounts for a significant share in energy consumption and, by extension, GHG emissions. For this reason, energy efficiency is an important area of application for the manufacturing industry in climate response. Industry is the second sector with the largest share of emissions globally, after the electricity generation sector. Global response to climate change, increased energy prices and limited resources require the prevalent execution of energy efficiency schemes to mitigate energy consumption in energy-intensive manufacturing sectors.

Energy efficiency can be addressed under two main complementary headings which are reducing the final demand for energy through less energy use, and making further efficient use of energy by optimizing generation. Reducing the final demand for energy features technical solutions and awareness-raising activities for employees.

Energy efficiency investments can be enhanced in terms of financial support, through designating subsidies to reduce investment costs and efforts to be undertaken based on return

on investment and total ownership costs. In this context, surveys and benchmarking studies will be conducted for energy efficiency in the emission- and energy-intensive manufacturing industry sectors. Additionally, numerous factors other than the operating practices that affect energy efficiency independent of the operator must be considered on a sub-sector basis, by also considering normalization.

The objectives addressed under this strategy include performance assessment based on the amounts presented in the project and the actual values, and in the case of the manufacturing industry, domestic production of heat pumps and exploring their potential use, as a result of the surveys and benchmarking studies for energy efficiency in the emission- and energy-intensive manufacturing industry sectors.

Strategy	Actions
Strategy S-S.1: Optimizing energy efficiency potential for manufacturing industry	**S-S.1.1** Preparing mandatory energy efficiency survey reports and conducting benchmarking studies under the energy efficiency legislation and updating savings potential
	S-S.1.2 Increasing the amount of support by removing through a legislative amendment the limit for efficiency increasing project fees, setting performance criteria by considering climate change, and supporting projects with relatively high potential for savings
	S-S.1.3 Promoting verified energy efficiency performance enhancements through carbon pricing instruments
	S-S.1.4 Providing support for the expansion of heat pumps in the manufacturing industry sectors, conducting awareness-raising studies and preparing guiding documents.
	S-S.1.5 Promoting the establishment of digitalization systems for energy efficiency measurement, monitoring and reporting activities in SMEs

Strategy S-S.2: Increasing use of renewable energy in manufacturing industry

A great majority of the emissions caused by the manufacturing industry sector arise from energy utilization. Different options for transitioning from renewable energy sources to alternative methods of electricity generation are being considered in the sector in order to reduce the use of fossil energy. The development and implementation of renewable energy options as an alternative to fossil fuels are critical in terms of achieving increasing innovation, growth and competitiveness in global clean electricity generation.

Although it requires significant amounts of investment, transitioning to renewable energy in the manufacturing industry production will achieve longer term energy security and a structure that is resilient to climate risks. Diversification of energy sources is important in terms of financial sustainability against the fluctuations in fossil fuel prices and can reduce the rate of exposure to supply disruptions.

The number of commercial entities that request suppliers to declare their goals and strategies on renewable energy use increases day by day. Increasing the use of renewable energy will significantly contribute to reducing supply chain emissions, as well. For this reason, a diversified energy portfolio will be among the key determinants of sustainable development for producers in the future. Additionally, the use of existing renewable energy sources such as solar and wind resources will advance the potential to utilize new technologies such as green hydrogen in the near future.

This strategy aims for the reduction of GHG emissions through incentives for generation and utilization of renewable energy for the industry sector establishments, procurement of the heat required by industrial processes from renewable energy sources, and activities to increase the use of electricity generated from certified renewable energy by industrial plants.

Strategy	Actions
Strategy S-S.2: Increasing use of renewable energy in manufacturing industry	**S-S.2.1** Increasing the use of renewable energy in terms of self-consumption in the industry sector
	S-S.2.2 Considering the options for alternative raw materials and additional fuel for non-recoverable waste, and engaging in legislative improvement and promotion activities to increase the use of waste as resources

Strategy S-S.3: Reducing carbon footprints and CO2-eq intensity per GDP in manufacturing industry

Product demand, including for manufacturing industry products, is linked to the production and consumption of goods and services which enable sustainable development and reduced carbon footprint.

Climate response requires transitioning to carbon neutral operations within producing entities as well as transitioning to carbon neutral value chains. Conducting product carbon footprint studies to calculate the total GHG emissions produced by a product is a significant step towards reducing the carbon footprint of the manufacturing industry.

It will be a significant starting point for the efforts to be undertaken by 2030 to develop a roadmap which covers all industry sub-sectors and particularly energy- and carbon-intensive sectors and includes an implementation schedule.

The prominent areas of action under this strategy include reducing the clinker ratio in the cement used in public construction and infrastructure investments, conducting infrastructure works to introduce a low-carbon intensity criterion for iron and steel, designating newly developed techniques and innovative applications as financial support criteria, analysing and planning necessary activities to monitor the performance of SMEs which are critical in reducing

GHG emissions, based on achieving green transformation throughout the supply chain and the principle to leave no one behind, in order to reduce carbon footprint on a product basis.

Strategy	Actions
Strategy S-S.3: Reducing carbon footprints and $CO_{2\text{-eq}}$ intensity per GDP in manufacturing industry	**S-S.3.1** Developing a roadmap on reducing carbon footprint in sub-sectors
	S-S.3.2 Conducting works to reduce the clinker ratio in the cement to be used in public construction and infrastructure investments, with a view to reducing carbon footprint on a product basis
	S-S.3.3 Creating mechanisms to provide technical and financial support in the commercialization phase of new technological solutions for carbon footprint reduction in industry sectors
	S-S.3.4 Reviewing the policies on the provision of the scrap metal supply required for low carbon emission steel production
	S-S.3.5 Identifying the SMEs which are critical in GHG emission reduction and creating a monitoring system for their climate performance, in order to contribute to green transformation

Strategy S-S.4: Promoting sustainability reporting

The introduction and transformation of new frameworks and standards for sustainability reporting have recently gathered momentum, and voluntary reporting will soon be changed to become a part of mandatory legislation. In this context, the establishments that prepare for such new regulations early and adopt the legislative changes will yield extensive benefits, starting with competitive edge and reputation management.

Currently, the global environment for sustainability reporting is mainly on a voluntary basis, comprising an increasing number of voluntary reporting frameworks and standards, in addition to certification and sustainability rating institutions. However, many changes have occurred with the transition to mandatory reporting in recent years.

There is still an evolving relationship between climate transitioning criteria and European Union's taxonomy works. In the current situation, the EU pressing forward in terms of climate change, sustainability, and sustainability reporting requirements. While the EU leads the integration of broader sustainability material issues into a mandatory reporting regime, the United Kingdom is currently more focused on integrating climate-related issues into the annual Task Force on Climate-Related Financial Disclosures reporting. The mandatory EU Directive 537/2014 on Corporate Sustainability Reporting published at the end of 2022 requires enterprises to engage in gradual reporting on sustainability, depending on their size, starting in 2024.

Having closely monitored these developments, Türkiye has been building an institutional and technical infrastructure in this regard. With the amendment to the Turkish Commercial Code

No. 6102 which was published in the Official Gazette of 2022 and issue 31856, the Public Oversight, Accounting and Auditing Standards Authority was authorized to designate and publish the Sustainability Reporting Standards for Türkiye.

The Authority has published drafts in line with the Sustainability Reporting Standards published by the International Sustainability Standards Board (ISSB), and continues efforts to publish the Sustainability Reporting Standards for Türkiye which is aligned with international standards. In light of all these advancements, building a platform to which the public and private sectors are members to promote sustainability reporting will be useful in ensuring alignment with global developments. The sustainability working group, participated by the relevant institutions, has conducted a scope determination for the enterprises to engage in mandatory reporting, by seeking the benefit-cost relationship.

This strategy also aims to conduct an assessment to increase the international reliability of sustainability reporting and building a third-party assurance or verification system and implement this system, and to prepare and implement a gradual transition schedule for Türkiye in the framework of a detailed transition schedule, ranging from sustainability reporting which has become mandatory in the EU to SMEs.

Strategy	Actions
Strategy S-S.4: Promoting sustainability reporting	**S-S.4.1** Promoting Corporate Sustainability Reporting and building a platform with the public and private sectors as members
	S-S.4.2 Publishing Sustainability Reporting Standards for Türkiye aligned with international standards and building a third-party assurance and verification system for sustainability reporting
	S-S.4.3 Preparing a gradual transition schedule aligned with the European Union on a scale basis with regard to mandatory sustainability reporting
	S-S.4.4 Reviewing the CMB's Sustainability Principles Coherence Framework in the context of international standards and developments

Strategy S-S.5: Building capacity for manufacturing industry stakeholders

It is important for the success of the Action Plan to review the institutional capacity-building needs and plan the next steps to achieve the targets. As in with many sectors, change of behaviour in climate response is also key for the decarbonization of the industry sector.

How industrial enterprises, and particularly small and medium enterprises (SMEs) manage their mitigation and adaptation activities in the light of current developments is directly relating to their institutional capacity.

For SMEs to become more open to share and reuse their mitigation and adaptation activities regarding climate change will be decisive in their sustainability management and decarbonization process in a further knowledge-intensive environment.

The activities covered by this strategy include determining priority stakeholder groups, holding consultation meetings, reviewing good practices and building knowledge and experience sharing platforms with a view to strengthening the know-how capacity for mitigating and adapting to climate change impacts.

Furthermore, all of these activities will include the assessment of the results of just transition and transformation in employment in terms of women's employment, and projection of measures to increase women's employment.

Strategy	Action
Strategy S-S.5: Building capacity for manufacturing industry stakeholders	**S-S.5.1** Strengthening the know-how of industrial enterprises, particularly SMEs, on climate change impact mitigation and adaptation
	S-S.5.2 Building capacity and developing a roadmap for just transition and transformation of employment

Strategy S-S.6: Promoting circular economy and resource efficiency across manufacturing industry

In addition to its environmental, economic and social benefits, transition to a further resource efficient and circular economy is also important in terms of climate response. The objectives covered by this strategy include awareness-raising activities for the context of climate change in the national strategies developed and planned on sustainable material management, resource efficiency and circular economy, and supporting pilot applications and investments.

Transitioning to circular economy can be an opportunity for the sectors that are more resilient to the pressures on ecosystem services, in addition to its economic benefits at the macroeconomic level, such as resource efficiency, competitiveness, new job opportunities and innovation. The areas of implementation of this strategy in the context of circular economy practices include holding informative, training and other activities covering resource efficiency, reuse, recovery and alternative raw materials for industry sector representatives, encouraging pilot applications and investments, and developing policies to promote circular economy.

Additionally, it is aimed to identify the critical raw materials for green transformation, and develop policies to achieve security of supply.

Strategy	Actions
Strategy S-S.6: Promoting circular economy and resource efficiency across manufacturing industry	**S-S.6.1** Conducting awareness-raising activities on circular economy and resource efficiency for sub-sectors
	S-S.6.2 Conducting the Green Transformation Support Scheme which aims to support the investments covering circular economy and resource efficiency practices, with a view to achieve the green transformation of the manufacturing industry
	S-S.6.3 Drafting legislation on a product initiative and digital product passport system aligned with the European Union, with a view to implementing and promoting the circular economy model
	S-S.6.4 Developing policies to promote circular economy models
	S-S.6.5 Identifying the raw materials critical for green transformation and developing policies to achieve security of supply

Strategy S-S.7: Developing new technology options through R&D and innovation with national resources

Technological development plays a critical role in climate response. The ability to steer change and manage the transition to climate-friendly technologies is extremely important in the decarbonization process at the national and sectoral scale.

Achieving the net zero targets will be impossible without R&D and innovation. On the path to the net zero target in the industry sector, the primary areas of development are regarded as technological innovations relating to electricity generation from renewable sources and storage capacities; electrification of suitable processes; CO_2 capture, utilization and storage; and use of hydrogen and hydrogen-based fuels.

Through capacity-building activities and pilot applications, it is aimed to support R&D and innovation activities aimed at GHG reduction.

The areas of action also covered by this strategy also include conducting studies and implementing pilot applications for the use of hydrogen technologies in industry, and supporting projects on carbon capture, utilization and storage.

Strategy	Actions
Strategy S-S.7: Developin	**S-S.7.1** Supporting R&D and innovation activities aimed at GHG reduction
	S-S.7.2 Developing patented pilot applications and technological solutions

g new technology options through R&D and innovation with national resources	**S-S.7.3** Conducting studies and implementing pilot applications for the use of hydrogen technologies in industry, creating incentive mechanisms for use in the industry sector
	S-S.7.4 Supporting projects on carbon capture, utilization and storage (CCUS)
	S-S.7.5 Developing R&D and application projects on the electrification of low and medium heat treatments in industrial sectors

Strategy S-S.8: Developing sustainable investment instruments and creating suitable sources of finance for investors

The need for climate finance continues despite the rapid increase in private sector investment in recent years. Reducing emissions and promoting adaptation to existing impacts require financial resources and sound investments. Furthermore, the benefits yielded from these investments are significantly more valuable than any initial cost.

It is aimed to increase public investment for infrastructure, R&D and renewable energy technologies that will support and encourage the flow of climate finance into the private sector; review and improve the data gaps and reporting standards for sustainable finance, and make efficient use of sustainable sources of finance.

It is also aimed to harmonize the taxonomy and reporting framework, and plan for studies to provide technical and financial support for the decarbonization of the production and supply chain of SMEs.

Strategy	Actions
Strategy S-S.8: Developing sustainable investment instruments and creating suitable sources of finance for investors	**S-S.8.1** Making efficient use of sustainable sources of finance and harmonizing the necessary taxonomy and reporting framework in the transformation process of the industry sector
	S-S.8.2 Providing technical and financial support for the efforts to decarbonize the production and supply chain of SMEs
	S-S.8.3 Developing incentive and support mechanisms to replace existing electric engines with efficient engines, particularly in SMEs
	S-S.8.4 Supporting through regulations the export of green/sustainable labelled debt instruments in order to support green transformation, energy efficiency and technology development projects

2.3. Buildings Sector

2.3.1. Current situation

Türkiye's growing population and increasing urbanization rate, combined with rising prosperity, are among the driving forces underlying the increase in the number and floor area of buildings

in Türkiye. According to an estimation based on the Turkish Statistical Institute's (TURKSTAT) statistics on building and construction permits and utilization permits and the depreciation rate of Türkiye's building stock, there are approximately 9.5 million buildings (residential and non-residential) with a total floor area of 3.6 billion m^2 in Türkiye. According to the energy balance table of the Ministry of Energy and Natural Resources (MoENR), about 38.3 Mtoe of energy (directly used primary energy sources and electrical energy) was used in buildings (residential, commercial, and services) in 2021. Between 1990 and 2021, energy use increased by 82%, and emissions from buildings increased by 136%, while the emission intensity of buildings decreased by 33% (Figure 15).

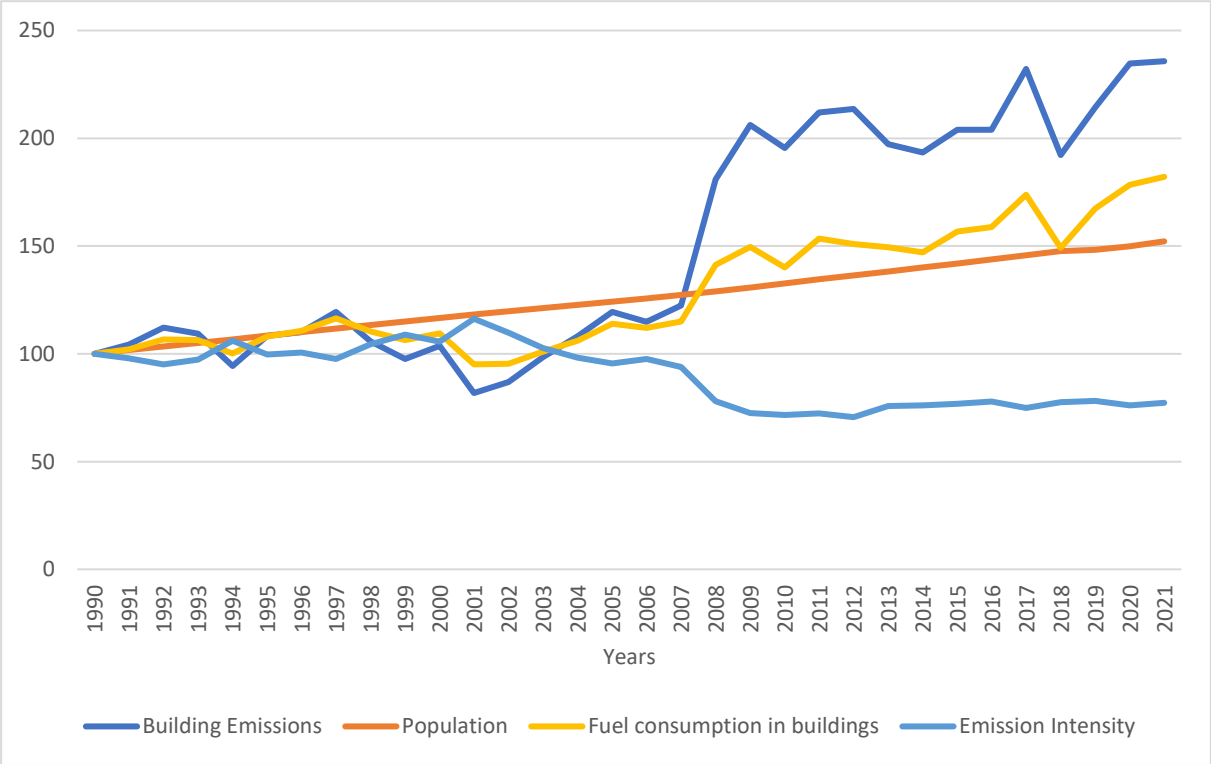


Figure 15. Change in key indicators relating to buildings [1] [2] [7]

Buildings are divided into two main groups based on energy use: "residential" and non-residential "commercial and services". In 2021, 53% of the total energy used in residential buildings is determined to come from natural gas, 20% from electricity, 14% from coal, 11% from renewables and 2% from petroleum products (Figure 16a). In terms of energy use in the non-residential sector, electricity accounts for the largest share (53%). This is followed by natural gas (32%), coal (7%), renewable energy sources (4%) and petroleum products (4%) (Figure 16b) [2]. As the energy statistics for commercial and services before 2015 are not included in the energy balance tables, it is not possible to analyse the change compared to the resource distribution in 1990. However, reviewing the data in 2021, the fact that more than half of the energy used is electricity indicates that the reduction potential could be high.

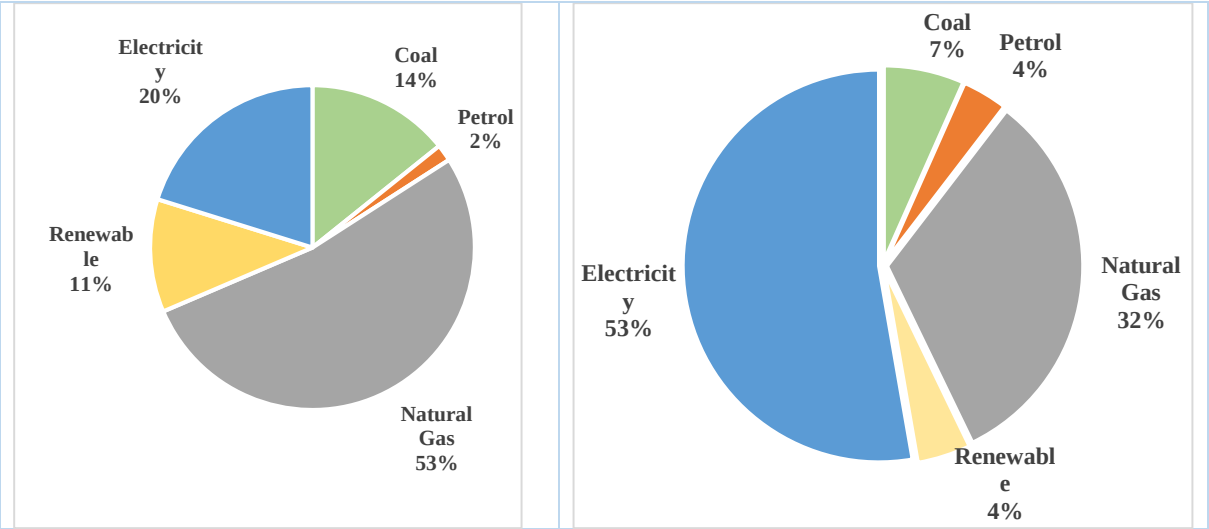


Figure 16. Distribution by residential (a) and non-residential (b) energy sources in 2021 [2]

Table 13 presents the distribution of GHG emissions. Observing the change in emissions between 1990 and 2021, it can be seen that residential, commercial, and services sectors were considered together in the emissions until 2015 and were reported separately after 2015. Accordingly, emissions, which were 27.3 Mt $CO_{2\text{-eq}}$ in 1990, increased by 93% by 2014 to reach 52.7 Mt. On the other hand, emissions from the residential sector increased from 32 Mt to 50 Mt between 2015 and 2021. The increase in emissions in this short term is about 56%.

Table 13. Greenhouse gas emissions from residential buildings, Mt [1]

Years	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
$CO_{2\text{-eq}}$	27.2	28.4	30.6	29.8	25.7	29.5	30.0	32.5	28.8	26.6	28.2	22.3	23.7	26.8	29.5	32.5
Years	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
$CO_{2\text{-eq}}$	31.3	33.4	49.3	56.2	53.3	57.7	58.2	53.8	52.7	32.2	33.4	42.6	38.8	43.7	50.3	50.3

Table 14 presents information on GHG emissions from commercial buildings and services. According to the GHG Emission Inventory Report of Türkiye, GHG emissions in the commercial and services sector declined. Emissions, which were 23.4 Mt in 2015, decreased by 40.5% to 13,949 Mt in 2021.

Table 14. Greenhouse gas emissions from commercial and services (in thousands of metric tonnes) [1]

Year	$CO_{2\text{-eq}}$
2015	23,353
2016	22,139
2017	20,647
2018	13,539
2019	14,678
2020	13,637

2021	13,949

The key legislation, policy and strategy documents relating to the buildings sector in Türkiye are listed in Table 15 and Table 16.

Table 15. Key legislation on buildings

Key Legislation	Purpose and Scope
Law on Energy Efficiency (Law No. 5627)	The purpose of this Law is to increase efficiency in using energy sources and energy in order to use energy effectively, avoid waste, alleviate the burden of energy costs on the economy, and protect the environment.
Regulation on Energy Performance of Buildings	It establishes principles and procedures for the effective and efficient use of energy and energy sources in buildings, the prevention of energy waste and the protection of the environment.
Regulation on Green Certificate for Buildings and Settlements	The objective is to establish evaluation and certification systems to reduce the negative impact of buildings and settlements on the environment through the efficient use of natural resources and energy, to lay down principles and procedures for the qualification of green certificate experts, green certificate evaluators and educational institutions, and to establish evaluation criteria for green buildings and green settlements.
Regulation on Eco-design of Energy-Related Products (EuP)	The objective is to establish the requirements to be met by creating a framework for eco-design requirements for energy-related products when they are placed on the market or put into service, in order to contribute to sustainable development by improving energy efficiency, level of environmental protection and security of energy supply.
Law on Land Development Planning and Control (Law No. 3194)	The purpose is to ensure that settlements and structures in these locations are developed in accordance with planning, scientific, health and environmental conditions.
Regulation on Making Spatial Plans	The objective is to lay down principles and procedures for the preparation and implementation of spatial plans, which are used to make decisions on land use and construction, and which are prepared to support sustainable development at the spatial level and to create a healthy and safe environment providing a high standard of living.
Planned Areas Zoning Regulation	The purpose of the regulation is to lay down principles and procedures for design and construction in accordance with scientific, health and sustainable environmental requirements, as well as for project design and inspection.

Presidential Circular No. 2023/15 on Energy Saving in Public Buildings	The energy efficiency target for public buildings, which are required to appoint energy managers, has been updated to increase from 15% to 30% by 2030.

Table 16. Key policy papers relating to buildings sector

Policy Papers	Goals and Objectives
Twelfth Development Plan 2024-2028	The plan outlines the following measures: To accelerate the energy transformation of buildings, energy-efficient buildings supported by renewable energy will be promoted and relevant regulations will be prepared. In the field of energy efficiency, particularly in buildings, alternative methods such as Energy Performance Contracts, the Energy Service Company model and the use of the Treasury Guarantee Scheme will be scaled up. Studies on heat market legislation will be completed, the use of district heating/cooling systems and heat pumps will be increased where technically and economically appropriate, and studies will be conducted to increase the use of geothermal resources for heating. The potential for increasing the use of renewable energy sources in the residential sector will be identified and a roadmap for the steps to be taken, including cost-benefit analysis, will be developed and implemented.
NDC 2023	The Nationally Determined Contribution includes the measures: renovation of existing buildings, construction of more energy efficient buildings, use of district heating solutions in densely populated areas, use of new techniques and technologies, and use of best available technologies throughout the design, construction and life cycle of buildings to increase resource and energy efficiency and reduce environmental impact and carbon emissions. Designing integrated buildings using techniques, developing and promoting Building Information Modelling (BIM) and modular construction technologies, introducing incentives for the use of grey water and rainwater, introducing zero waste systems, promoting self-consumption of renewable energy; implementing building performance codes and standards for residential and non-residential buildings, including renewable portfolio targets, energy efficiency labelling, strengthening existing buildings, implementing smart grids and regional energy systems, and increasing the use of energy efficient white goods and electrical appliances.

National Energy Efficiency Action Plan 2017-2023	In the Action Plan, the aim is to encourage the creation of a database containing energy consumption data for buildings, the renovation of existing buildings and the improvement of their energy efficiency, the promotion of the use of central and regional heating/cooling systems, the increase in the ownership rate of Energy Performance Certificates for existing buildings, the promotion of the certification of sustainable green buildings and settlements, the promotion of energy efficiency in new buildings, the improvement of the energy performance of existing public buildings and the expansion of the use of renewable energies and combined heat and power systems in buildings.
Energy Efficiency Strategy 2012-2023	The Strategy sets maximum energy demand and emission limits for buildings, imposes administrative sanctions on those whose CO_2 emissions exceed the minimum levels set by the relevant legislation from 2017, restricts the sale of products that use energy inefficiently and activates market control of annual energy consumption in buildings and facilities of public institutions. Strategies include reducing 20% reduction by 2023 and implementing efficiency-enhancing practices in public sector buildings and facilities through Energy Performance Contracts.
National Climate Change Strategy 2010-2020	The Strategy stipulates that the initial investment costs of renewable energy systems in new buildings will be recouped within 10 years for buildings with a floor area of up to 20,000 m^2 and within 15 years for buildings with a floor area of 20,000 m^2 or more, taking into account energy economics. This includes the construction of these systems and the support of the systems with solar power collectors in the central heating and sanitary hot water systems in newly constructed hotels, hospitals, dormitories and similar non-residential buildings with a useful area of more than 1,000 m^2, as well as sports facilities.
Climate Change Action Plan 2011-2023	In the Action Plan, at least 1 million residential, commercial and public buildings with a total floor area of more than 10,000 m^2 will be insulated and equipped with energy-efficient systems to meet standards by 2023, and at least 20% of the annual energy demand of new buildings will be met by renewable energy sources by 2017. By 2023, GHG emissions in new settlements will be reduced by at least 10% compared to existing settlements.
Climate Council 2022	The Council's decisions include the use of carbon pricing based incentive/support mechanisms for existing buildings, credit/tax support mechanisms for new buildings, and the creation of the necessary financial infrastructure to increase energy efficiency and renewable energy use in buildings, with the aim of limiting the energy demand of buildings and meeting this limited demand with renewable energy. Improving the legislative infrastructure for green certification and Nearly Zero Energy Building (nZEB) for green building/settlement, developing and promoting the use of integrated building design and Building Information Modelling (BIM) and modular construction

	technologies, creating legislation on water efficiency in buildings, building decisions including the creation of a database, infrastructure development, awareness and education to increase the share of use of environment-friendly building materials, energy saving and environment-friendly products in building construction.

2.3.2. Strategies and actions

In the buildings sector, there are six strategies to improve the energy efficiency of existing and new buildings, improve the energy efficiency of electrical appliances, equipment and devices used in buildings, increase the use of district heating and cooling systems, increase the use of environment-friendly design and construction materials, and ensure the digital transformation of the building ecosystem and actions to support the implementation of these strategies are identified.

Strategy B-S.1: Improving energy efficiency of existing buildings

The objective is to complete the preparation of a comprehensive set of indicators by 2025 through researching the existing data in institutions on buildings. There are many reasons for the objective of improving energy efficiency of existing buildings (residential and non-residential) and developing sanctions for obtaining an Energy Performance Certificate (EPC). These include the Law No. 5627 on Energy Efficiency, Regulation on Energy Performance of Buildings, Climate Change Action Plan, National Climate Change Strategy, National Climate Change Action Plan, National Energy Efficiency Action Plan and the decisions of the Climate Council. First of all, the completion of the EPC procurement for existing buildings is a necessary policy to calculate the building energy inventory in a transparent and accurate way. Considering that about one third of final energy consumption takes place in buildings, the EPC will fill the most important gap in the building inventory and monitor energy efficiency and renewable energy use practices on site in a bottom-up manner. Increasing the EPC class to reduce total final energy consumption will ensure that the overall dysfunction can be brought under control to meet the energy needs of buildings. It is envisaged that the EPC certification of existing buildings, as required by the Law No. 5627 on Energy Efficiency, will be completed by 2030.

Presidential Circular No. 2023/15 of 04/10/2023 updated the energy efficiency target for public buildings that are required to appoint energy managers, increasing it from 15% to 30% by 2030. It is estimated that public buildings (including education and hospitals) account for 1.5% of the total building stock. Energy efficiency improvements in public buildings will be closely monitored to set an example for improvements in existing buildings.

The aim is to effectively implement incentive and support mechanisms for energy efficiency improvements in existing buildings. With the amendment to the Law on Energy Efficiency, the building sector has been included in the support for efficiency improvement projects. Low-interest loans for thermal insulation of residential buildings have been implemented and it is

important to continue activities to increase the level of promotion and awareness. In order to increase the level of awareness of energy efficiency in buildings, awareness-raising activities on buildings will be continued in the framework of the Strategic Communication Plan on Energy Efficiency. The objective is to develop and disseminate Energy Performance Contracts (EPCs) for existing buildings, a financing mechanism based on the repayment of the initial investment costs of energy efficiency or renewable energy projects by means of the savings achieved in the following years.

Strategy	Actions
Strategy B-S.1: Improving energy efficiency of existing buildings	**B-S.1.1** Preparing a set of indicators by cross-checking the existing databases of the institutions in relation to buildings
	B-S.1.2 Including building indicator sets in the official statistics programme
	B-S.1.3 Establishing penalties to improve the energy efficiency of existing buildings and obtain an Energy Performance Certificate (EPC).
	B-S.1.4 Monitoring the progress made in improving the energy efficiency of public buildings obliged to appoint Energy Managers
	B-S.1.5 Providing incentives and support mechanisms for energy efficiency improvements in existing buildings and their sustainable operation.
	B-S.1.6 Conducting awareness-raising activities in order to increase the level of awareness of energy efficiency in buildings.
	B-S.1.7 Increasing the use of Energy Performance Certificate (EPCs) for existing public buildings

Strategy B-S.2: Improving energy efficiency of new buildings

The objective is to develop the standards and certification system for the missing workforce in the scope of professional competence in order to establish standards for the activities and qualifications of the workforce required for the dissemination of renewable energy and energy efficiency systems in buildings. In addition, architects, engineers and technicians need to be trained in the processes of building construction and use for the Nearly Zero Energy Building (nZEB) approach, with the aim of creating the workforce and capacity building required for the broad use of on-site and renewable energy sources and energy efficiency systems in buildings.

The amendment to the Regulation on Energy Performance of Buildings in 2022 adopted the nZEB approach and set targets for holistic energy management in buildings. Buildings with high energy performance and that use a certain amount of renewable energy are defined as nZEB in the Regulation on Energy Performance of Buildings. From 2023 to 2025, 5% of renewable energy should be used in buildings with a total floor area of 5,000 m^2, and after 2025, 10% of renewable energy should be used in buildings with a total floor area of 2,000 m^2. In addition, the increased use of renewable energy will reduce GHG emissions, CO_2 in particular.

Furthermore, by reducing the use of fossil fuels, it will be possible for buildings to become energy self-sufficient rather than energy consumers, and contribute to the energy supply by becoming direct producers. In addition to primary energy sources such as solar, wind and geothermal as renewable energy, heat pumps, which provide heat transfer and transfer natural energy to the required areas or points, and combined heat and power technologies, which allow the use of waste or waste heat, are also being evaluated in this context. The aim is to develop legislation so that all new buildings are constructed in accordance with the nZEB concept. This will complement the Energy Performance Certificate (EPC) classification, which shows that buildings using the nZEB approach consume less energy. It will be possible for households, businesses and the service sector to benefit from lower operating costs and contribute more to emission reduction. The main assumption of such a policy is that the nZEB approach can be applied to all new buildings after 2026 without imposing m^2 restrictions.

The objective is to improve the energy limits in TS 825 standard and to update it to take into account national/international energy efficiency approaches. The relevant standard needs to be updated to take into account the cooling requirement as well as the net heating energy, and the energy limits need to be improved to align them with the EU level.

Strategy	Actions
Strategy B-S.2: Improving energy efficiency of new buildings	**B-S.2.1** Preparing and updating national vocational standards and national qualifications for the workforce lacking in vocational qualifications, and implementation and dissemination of examination and certification activities according to the prepared national qualifications.
	B-S.2.2 Developing legal regulations for all new buildings aligned with the concept of Nearly Zero Energy Buildings (nZEB).
	B-S.2.3 Improving energy limits in TS 825 standard and updating them to take account of national/international energy efficiency approaches.

Strategy B-S.3: Improving energy efficiency in using electrical appliances, equipment and devices in buildings sector

It is intended to promote the use of the most efficient technologies in terms of energy consumption for lighting, electrical appliances, white goods and similar products used in residential and non-residential buildings. It also aims to determine and improve the energy efficiency of household electrical appliances and equipment by harmonising the regulations on energy efficiency and eco-design of white goods, to be implemented simultaneously with the EU. These studies will be conducted in the framework of the Law No. 5627 on Energy Efficiency, Energy Efficiency Strategy 2012-2023, Regulation on Eco-Design of Energy-Related Products, National Energy Efficiency Action Plan and Framework Regulation on Energy Labelling.

Strategy	Actions
Strategy B-S.3: Improving energy efficiency in using electrical appliances, equipment and devices in buildings sector	**B-S.3.1** Raising the awareness of end users on the use of devices, equipment and appliances with high energy efficiency levels
	B-S.3.2 Harmonizing regulations on energy efficiency and eco-design of white goods to be implemented simultaneously with the EU

Strategy B-S.4: Promoting use of district heating and cooling systems

As a prerequisite for this strategy, the implementation of studies to raise awareness and promote the diffusion of regional heating and cooling systems in mass settlements and indoor areas will improve energy efficiency by exploiting economies of scale. The use of renewable energy sources and technologies in regional energy use will both spread the nZEB approach and ensure the economic use of energy (reduction of energy intensity).

A mapping study is needed to match the potential of heat pumps, waste heat sources and renewable energy sources with the energy needs of buildings in order to implement district heating and cooling systems more efficiently.

Strategy	Actions
Strategy B-S.4: Promoting use of district heating and cooling systems	**B-S.4.1** Conducting studies to raise awareness and promote the increased use of regional heating and cooling systems.
	B-S.4.2 Conduct a mapping study to match the potential of heat pumps, waste heat sources and renewable energy sources with the energy requirements of the buildings.

Strategy B-S.5: Promoting use of eco-friendly design and construction materials through National Green Certification Scheme (YeS-TR) application "

The "Green Certificate Regulation for Buildings and Settlements" provides a legal basis for the use of environment-friendly materials and building design to be implemented while improving the energy performance of new and existing buildings in order to reduce emissions in the building sector in the framework of combating climate change in Türkiye. The regulation covers the evaluation and certification of sustainable environmental, social and economic performance of existing and new buildings and settlements. In this context, a green certificate for buildings and the use of eco-compatible materials can be promoted. In particular, the fact that energy efficiency and the use of environment-friendly materials can activate the emission reduction potential of buildings can be certified with the green certificate system. Dissemination of the use of the National Green Certification Scheme (YeS-TR) will be achieved by promoting certified new building and settlement projects and by making it mandatory to obtain a YeS-TR certificate for new public buildings.

Strategy	Actions
Strategy B-S.5: Promoting use of eco-friendly design and construction materials through National Green Certification Scheme (YeS-TR) application	**B-S.5.1** Promoting the National Green Certification Scheme (YeS-TR) and promoting certified new building and settlement projects.
	B-S.5.2 Introducing obligation to obtain a YeS-TR certificate for newly constructed public buildings

Strategy B-S.6: Ensuring and promoting use of Building Information Modelling (BIM) tools to ensure digital transformation of construction ecosystem

By incorporating comprehensive inventory, design and material information during the design, construction, use and demolition phases of buildings using Building Information Modelling (BIM), an infrastructure can be created to control and reduce GHG emissions. BIM processes will make it possible to determine the energy, raw materials and material inputs of the building at the design stage, and to select alternative building materials to reduce emissions. Strategies can be developed to disseminate and promote Building Information Modelling from the building permit to the occupancy permit process. To this end, training will be provided on the use of digital tools based on Building Information Modelling (BIM) in the life cycle of buildings, in particular in the design, construction and operation phases.

Strategy	Actions
Strategy B-S.6: Ensuring and promoting use of Building Information Modelling (BIM) tools to ensure digital transformation of construction ecosystem	**B-S.6.1** Increasing the use of Building Information Modelling (BIM) tools in the design, construction and operation of sustainable, energy-efficient and low-carbon buildings, and developing and promoting domestic BIM software.
	B-S.6.2 Ensuring and promoting the production and use of information laden smart objects relating to building materials and their adaptation to the global BIM ecosystem in the creation of a sustainable and performance-oriented built environment.

2.4. Transport Sector

2.4.1. Current situation

Transport sector is one of the key contributors to GHG emissions, mainly due to its energy-intensive structure and fossil fuel dependency. Additionally, the existence of a positive relationship between travel demand and economic development increases mobility along with development.

The increasing dominance of road transport emissions in Türkiye originates from increased vehicle ownership, increased mobility as measured by vehicle-kilometres travelled (VKT) and investments in road network infrastructure over the last two decades, and fossil fuel dependency of road transport motor vehicles.

Economic development since the 1990s has almost tripled the number of motor vehicles from 8.66 million in 2002 to 26.48 million in 2022. [8]

In Türkiye, where the total number of private vehicles is 14.27 million, these vehicles reached an average share of 55.5% in the national motor vehicle park. Considering that the population of Türkiye is 85.28 million [7] (2022), the current vehicle (private vehicle) ownership rate is around 161 vehicles per 1000 inhabitants, which is significantly lower than the rates in developed countries. It is expected to increase further in parallel with economic developments in the future. There has also been a sharp increase of 388% in the number of vans in the last two decades, reaching 4.28 million. [8]

According to the statistics of General Directorate of Highways of Türkiye, a high rate of increase in inter-city mobility was observed after the 1990s [9]. In 2022, the total amount of inter-city travel was measured as 140.53 billion-vehicle kilometres (BVKm), of which 92.46 BVKm (65.8%) was travelled on state roads and 28.74 BVKm (19.7%) on highways. In 2004, inter-city VKT was 57.77 BVKm, representing a total increase of 143%. The 270% increase in highway VKT over the same period is partly due to the increase in highway network length, but mainly due to the combined effect of increases in vehicle ownership, economic development, and related mobility [8].

Statistics on national VKT figures based on the vehicle registration system in 2021 indicated a total of 329.59 BVKm travelled, the majority of which was by private vehicle owners (178.83 BVKm). Vans and trucks contributed respectively 70.62 BVKm and 41.34 BVKm. In the same year, the total VKT on the inter-city road network was 142.48 BVKm, suggesting that demand for non-inter-city short distance (urban and suburban) travel accounted for 56.8% of total road mobility [10] (Table 17). While diesel vehicle trips reached 89.36 BVKm, LPG registered vehicles travelled 55.25 BVKm and gasoline powered vehicles travelled 34.22 BVKm [10].

Table 17. National Road Transport VKT value based on Vehicle Registration System Data [10]

	2020			2021		
Vehicle type	**Number of vehicles**	**Vehicle-km (million)**	**Average year-km**	**Number of vehicles**	**Vehicle-km (million)**	**Average year-km**
Total	**22,115,821**	**300,615**	**13,593**	**23,145,631**	**329,591**	**14,240**
Automobile	**13,099,041**	**163,402**	**12,474**	**13,706,065**	**178,832**	**13,048**
Gasoline	3,201,894	29,661	9,264	3,495,172	34,218	9,790
Diesel	5,087,129	80,577	15,839	5,287,618	89,362	16,900
LPG	4,810,018	53,164	11,053	4,923,275	55,252	11,223
Minibus	493,395	11,223	22,747	484,806	13,643	28,142
Bus	212,407	8,767	41,272	208,882	10,749	51,459
Van	3,938,732	63,540	16,132	4,115,205	70,621	17,161
Truck	859,670	40,748	47,400	886,303	41,340	46,643
Motorcycle	3,512,576	12,934	3,682	3,744,370	14,406	3,847

Air transport, significantly supported by deregulations in the sector and reductions in taxes and fees, has shown a rapid increase since 2003, particularly in domestic transport. Number of 33.78 million passengers in 2002 (8.7 million domestic passengers) reached 182.23 million passengers in 2022; 78.32 million of this demand was met by domestic flights [11]. Compared to 2002 values, there is an increase of more than 439% in total number of airline passengers, whereas the increase in domestic travel is approximately 797%. Additionally, air cargo transport has also increased consistently over this period. The main reason for this increase is the continuous support for the development of air transport in Türkiye. The number of active airports increased from 26 in 2006 to 57 today. [11]

Since railway transport is considered to be more sustainable than road and air transport, Türkiye invested especially in High-Speed Train (HST) services with large budgets in the last two decades. Currently, there are 13,919 km of railway network, consisting of 11,668 kilometres of conventional lines and 2,251 kilometres of HST and FT network. However, the share of railway transport in total mobility is low, with only 27 million inter-city railway passengers in 2022. Yet the number of trips made by HST has increased since its introduction in 2009, reaching 9.4 million in 2022, and this is achieved by shifting demand from conventional trains, inter-city bus and air travel, which it replaced. In 2022, the total number of passengers on inter-city railway lines reached 27 million passengers (9.36 million HST passengers) [12]. While the number of passengers transported by suburban trains in 2022 is registered at 209.7 million passengers, the short distances travelled by these services makes a much smaller contribution to the VKT. Railway cargo transport mainly serves bulk cargo types (i.e., minerals, coal, iron, etc.) between production and consumption points. Furthermore, the progress in electrification of railway lines and the further increase in this level creates a clean fuel advantage for this system.

Maritime passenger transport is mostly operated by the private sector and the private sector approaches such transport activities in free market conditions under supply and demand balance and evaluates them according to their operating costs. Passenger and vehicle transport is provided by ferries between the provinces Istanbul-Bursa, Istanbul-Yalova, Istanbul-Çanakkale, Tekirdağ-Balıkesir, Yalova-Izmit in the Marmara Sea in Türkiye. Maritime

passenger transport is used for urban passenger transport in Istanbul, Izmir and Çanakkale provinces. In order to regulate and encourage these transport services, SCT-free fuel application and Regulation on Regular Voyages by Ships were adopted. Additionally, under the Regulation on Incentivization of Building New Ships to Replace Turkish Flagged Ships To Be Scrapped, incentives were granted for the renewal of ships engaged in urban and inter-city cargo and passenger transport.

In maritime transport, alternative fuels are one of the key measures to ensure that the GHG emission reduction rates set by the International Maritime Organization (IMO) are achievable. A carbon-free maritime future depends on the availability of newly built ships or ships with green transformation that can operate on zero-emission fuels or other zero-emission energy sources.

The Directorate General of Maritime Affairs of the Ministry of Transport and Infrastructure aims to reduce the average age of Turkish-flagged vessels by providing incentives and support under the "Regulation on the Promotion of Building New Ships in Place of Turkish-Flagged Ships Scrapped" while also aiming to contribute to innovation, investment, and employment in the shipbuilding industry in Türkiye. The project, initially designed for ships between 1000 GT and 5000 GT, was expanded to include ships larger than 50 GT as of 2022. Additionally, the number of ships to benefit from the incentive was increased from 5 to 10 per year. Furthermore, the amount of support for conventional ships to be built in place of scrapped ships is increased from 1 time the scrap cost per tonne to 1.5 times the scrap cost per tonne, resulting in an increase of 50 percent. If an alternative environment-friendly energy source is used in the newly built ship, including LNG and hybrid systems, the amount of support is increased to 2.5 times the scrap cost per tonne. Ship owners transforming the main engines of existing ships from fossil fuels to an alternative environment-friendly energy source will be provided with a grant of 25 percent of the transformation cost.

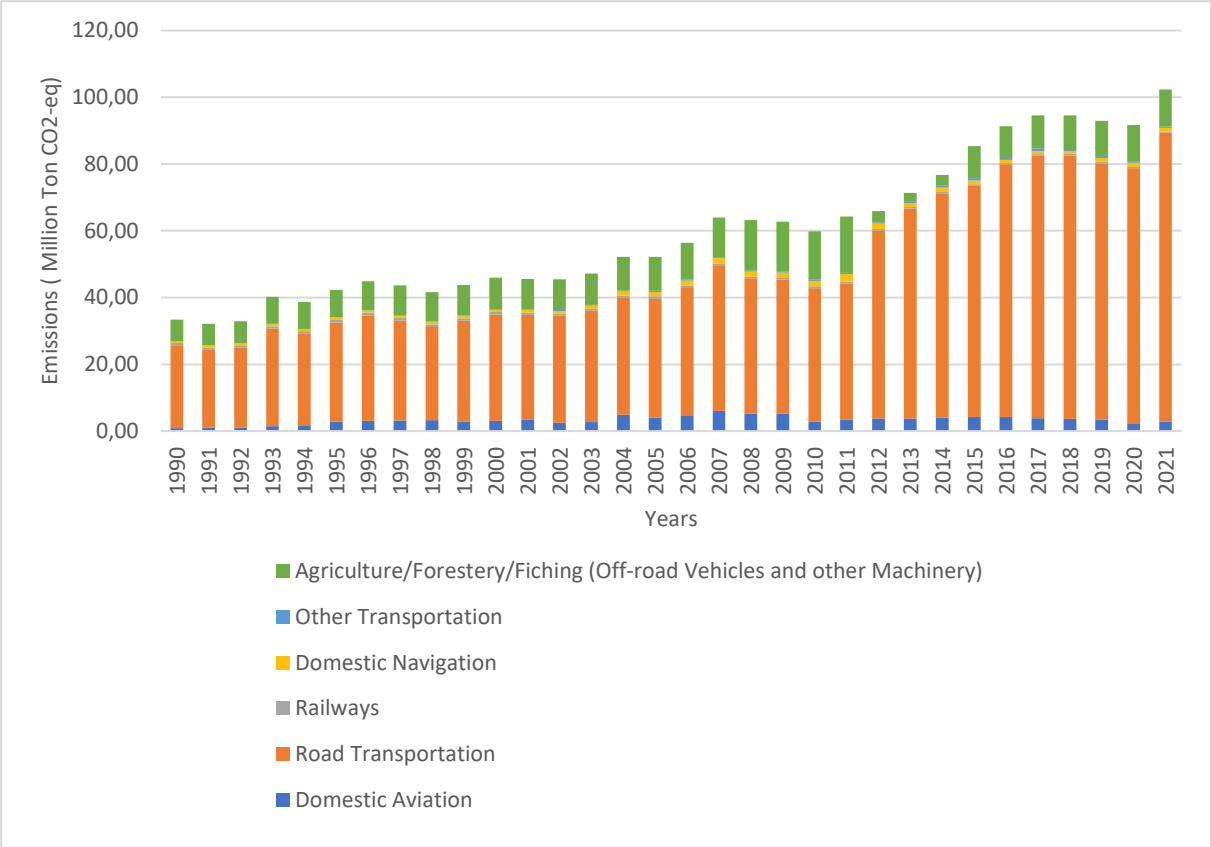


Figure 17. Greenhouse gas emissions for transport sector by main systems [1]

Since 1990s, total emissions have almost tripled to 102.3 Mt $CO_{2\text{-eq}}$. The largest contributor to these emissions is road transport sector with 86.5 Mt $CO_{2\text{-eq}}$ (84.5% share). The second largest share consists of vehicles used in agriculture, forestry, and fishing as well as land activities and machinery. However, these activities are often undertaken "off-network" without exposure to other transport modes/systems and are therefore addressed separately without being included in the integrated transport sector framework. [1] GHG emissions of transport sector are presented in Figure 17, Table 18. [1]

Table 18. Greenhouse gas emissions for transport sector by main systems, Mt $CO_{2\text{-eq}}$ [1]

	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Domestic Airline	0.92	1.05	1.12	1.49	1.76	2.78	3.05	3.21	3.31	2.87	3.10	3.36	2.50	2.71	4.86	4.09
Road	24.78	23.29	23.87	29.18	27.42	29.76	31.63	29.86	27.88	30.22	31.85	31.51	32.08	33.35	35.09	35.53
Railway	0.72	0.74	0.68	0.75	0.77	0.77	0.80	0.80	0.74	0.72	0.71	0.59	0.61	0.63	0.63	0.76

Domestic Maritime Transport	0.51	0.54	0.64	0.66	0.62	0.73	0.70	0.70	0.73	0.66	0.62	0.80	0.82	0.89	1.23	1.30
Other Transport	0.04	0.05	0.05	0.06	0.07	0.08	0.10	0.12	0.12	0.15	0.18	0.20	0.21	0.25	0.24	0.36
Agriculture/Forestry/Fisheries (Off-road Vehicles and Other Machinery)	6.46	6.49	6.50	8.01	8.05	8.22	8.66	8.98	8.89	9.14	9.52	9.11	9.25	9.39	10.09	10.18
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Domestic Airline	4.51	6.02	5.22	5.15	2.86	3.34	3.73	3.75	4.09	4.21	4.28	3.84	3.69	3.51	2.16	2.86
Road	38.37	43.67	40.56	40.20	39.94	40.90	56.31	62.89	66.97	69.31	75.59	78.71	78.91	76.72	76.60	86.50
Railway	0.76	0.47	0.50	0.48	0.52	0.53	0.49	0.50	0.56	0.48	0.37	0.41	0.43	0.40	0.32	0.36
Domestic Maritime Transport	1.46	1.60	1.54	1.63	1.68	2.24	1.61	1.15	1.35	1.15	0.97	0.94	0.93	1.22	1.26	1.13
Other Transport	0.32	0.34	0.35	0.44	0.39	0.37	0.38	0.56	0.59	0.66	0.62	0.76	0.54	0.58	0.33	0.36
Agriculture/Forestry/Fisheries (Off-road Vehicles and Other Machinery)	10.93	11.91	15.09	14.79	14.49	16.86	3.33	2.50	3.13	9.56	9.50	9.95	10.10	10.49	11.05	11.11

The key legislation on the transport sector as well as policy papers are shown in Table 19 and Table 20.

Table 19. Key legislation on transport sector

Key Legislation	Purpose and Scope
Regulation on Principles and Procedures Regarding Increasing Energy Efficiency in Transport	In order to increase energy efficiency in transport, the Regulation includes provisions on reducing the unit fuel consumption of motor vehicles, increasing efficiency standards in vehicles, encouraging the use of environment-friendly alternative fuels, reducing air pollutants and GHG emissions, promoting public transport, effective implementation of intelligent transport systems, improving transport infrastructures sustainably and developing urban transport plans.
Regulation on Environmental	The purpose of the Regulation is to make regulations on limiting the effects of gasoline and diesel types used in motor vehicles on environment and human health.

Impacts of Gasoline and Diesel Types	The Regulation addresses environmental issues relating to fuels used in positive ignition and compression ignition internal combustion engine vehicles, including inland water vehicles, non-road mobile machinery, agricultural and forestry tractors, in order to protect the environment and human health.
Combined Transport Regulation	The purpose of the Regulation is to establish, promote and encourage an integrated, balanced and environment-friendly transport system by determining the principles, procedures and conditions for combined cargo transport and green logistics activities.
Regulation on Monitoring of Greenhouse Gas Emissions from Aviation Activities	The purpose of the Regulation is to provide principles and procedures for monitoring, reporting and verification of GHG emissions from national and international aviation activities. The Regulation lays down principles and procedures for monitoring, reporting and verification of GHG emissions from national and international aviation activities. It determines the obligations of verification bodies and aircraft operators generating more than 10,000 tonnes of carbon dioxide emissions annually on international flights due to the use of aircraft with a certified maximum take-off weight of more than 5,700 kg, aircraft operators generating more than 5,000 tonnes of carbon dioxide emissions annually on national flights due to the use of aircraft with a certified maximum take-off weight of more than 5,700 kg.
Regulation on Bicycle Paths	The Regulation is prepared on the subjects relating to planning, design and construction of bicycle paths and bicycle parking stations in order to ensure that bicycles can be used for transport, recreation and sports purposes. The Regulation includes the principles of integration of different types of bicycle paths with each other, vehicle roads, pedestrian pavements, and transport systems.
Regulation on Electric Scooters	The Regulation determines the conditions of market entry and the rights, obligations and responsibilities of service producers and service beneficiaries in order to regulate shared electric scooter (e-scooter) operation activities. Its aim is to meet the needs of the national economy, ensure order and safety in these activities, protect environmental values by reducing the negative effects of transport on environment such as exhaust and carbon emissions, increase mobility and promote the use of shared e-scooters instead of personal vehicles for short-distance trips and ensure the development of shared e-scooters within a sustainable transport system integrated with other modes of transport.
Regulation on Supporting Transfer of Cargo Carried by	The Regulation aims to increase regular voyage frequencies between Turkish ports and ports of other countries, to increase maritime exports by increasing the usage rate of ports with more competitive prices, to reduce the traffic density at road border gates of Türkiye, to

Road to Maritime Transport	reduce long waiting periods and thus to reduce the emissions released.
Regulation on Incentivization of Building New Ships to Replace Turkish Flagged Ships To Be Scrapped	The incentives and supports under the Regulation aim to reduce and rejuvenate the average age of ships in Türkiye, while at the same time contributing to the shipbuilding industry in Turkish shipyards in terms of innovation, investment, and employment.

Table 20. Key policy papers relating to transport sector

Policy Papers	Goals and Objectives
Twelfth Development Plan 2024-2028	The main objective is to achieve domestic supply and technological development at all stages from design to production by adapting to the green and digital transformation process in accordance with developing global mobility vision, increasing added value, and increasing the share of branding in international markets. The Plan includes the following measures relating to transport sector: New generation production technologies affecting competitiveness in the automotive main and supply industry will be developed. Green transformation will be implemented in the automotive sector by ensuring transition to circular economy and market transformation. Increasing domestic supply and added value at all stages from design to production in the automotive industry supply chain will be supported. The quality of labour force for the automotive industry will be increased. Public procurement will be used more effectively to support domestic production in rail systems, and design and R&D activities will be encouraged. The main objective is to develop intermodal and multi-modal transport systems; to establish a safe, accessible, integrated, environment-friendly and cost-effective transport system; and to maximise the potential of being a regional centre in transport and logistics by providing the infrastructure supporting competitive production and exports. The Plan includes the following measures relating to logistics and transport sector: In order to minimise environmental impacts and costs and increase energy efficiency in transport and logistics sector, railway and maritime transport will be prioritised; alternative financing methods will be developed; safe, continuous, efficient, integrated and sustainable transport network and logistics centres will be established. Efficiency of the existing infrastructure will be increased by reviewing ongoing investments in transport sector in terms of feasibility, sustainability, effectiveness, accessibility, safety and efficiency. In order to increase the share of railway cargo and passenger transport and to improve combined transport opportunities,

	primarily ongoing railway projects will be completed; railway connections of important cargo centres such as OIZs, ports and mines will be provided. In order to ensure that Türkiye becomes a regional and continental interchange in maritime transport, coastal facilities in our country will be developed and the Turkish maritime trade fleet will be improved. Green port practices will continue to be supported by encouraging the use of low emission/non-emission producing machinery and equipment in order to increase energy efficiency in port operations and minimise environmental impacts. The back areas of coastal facilities will be improved, ports will be operationalised in accordance with holistic coastal planning so as to make maximum use of economies of scale, and their connections with international intermodal transport corridors will be enhanced.
Medium Term Programme 2024-2026	Increasing the use of technologies and materials with low noise levels and GHG emissions in road construction projects; implementing projects for the sustainability of transport to facilitate the transition to low-carbon systems in urban transport.
NDC 2023	In the Nationally Determined Contribution; ensuring balanced use of transport modes in cargo and passenger transport by reducing the share of road transport and increasing the share of maritime and railway transport for transport sector; developing combined transport; implementing sustainable transport approaches in urban areas; encouraging alternative fuels and clean vehicles; reducing fuel consumption and emissions in road transport under National Intelligent Transport System Strategy 2014-2023 and Action Plan 2014-2016; achieving high-speed train projects; increasing urban rail systems; removing old vehicles from traffic; implementing green port and green airport projects in order to ensure energy efficiency are included.
Mobility Vehicle Technologies and Roadmap	It is evaluated that the preparation of infrastructure enabling the charging of electric vehicles at home and workplaces and making the tax on the sale and use of electric vehicles more favourable compared to fossil fuel vehicles will have an impact on usage habits. With the published Roadmap, it is aimed to reach at least 75% of the electric vehicle localisation rate, 35% of the electric vehicle market share and approximately 2.5 million vehicles in the electric vehicle stock by 2030.
Energy Efficiency Strategy 2012-2023	The Strategy includes the strategic objective of “Reducing the unit fossil fuel consumption of motor vehicles, increasing the share of public transport by road, maritime and railway and preventing unnecessary fuel consumption in urban areas”. Ensuring the provisions of secondary legislation to be developed in line with the EU legislation on carbon dioxide emissions; preparing and implementing transport master plans in metropolitan areas;

	encouraging environment-friendly vehicles with low-emission (in accordance with the mandatory type approval legislation) small-sized engines, fuel cell or electric-powered hybrid vehicles and ensuring the gradual removal of vehicles from traffic at the end of their economic life; reducing the share of road transport in total transport, adequately developing the infrastructure of alternative modes of transport to road transport, increasing the share of maritime and railway cargo and passenger transport, ensuring network efficiency in transport and promoting intelligent transport systems and intelligent traffic management practices using information and communication technologies to increase energy efficiency; shifting the load of road transport to railway or maritime transport in long distance public transport by making adjustments especially in cargo transport in line with the "Combined Transport Strategy" based on the use of transport modes in the most technically and economically efficient places; making effective connections to the starting and ending points in railway and maritime transport; encouraging multi-modal transport especially in cargo and passenger transport; encouraging the use of biofuels or synthetic fuels from biomass resources in transport.
National Climate Change Action Plan 2011-2023	The Plan includes objectives for transport sector in the following specific 5 main subjects. These are development of intermodal transport system and balanced use of transport modes in cargo and passenger transport; preparation and implementation of Transport Master Plan; restructuring of urban transport in accordance with sustainable transport principles, increasing efficiency in energy consumption of transport sector for the use of alternative fuels and clean vehicles; development of information infrastructure in transport sector.
National Climate Adaptation Strategy and Action Plan 2011-2023	The Plan addresses transport sector, including ensuring a sustainable spatial development by creating an environmentally sensitive living area, establishing a sustainable urban transport system, and ensuring the integration of open and green spaces.
Transport and Logistics Master Plan	The Plan covers implementation details for construction including a total of 13,951 km of road expansion and 95 km of new divided road network and the development of a total of 5,839 km of additional highway network by 2035. A total of 8,554 km of railway routes are planned to be constructed by 2053, including 6,425 km of fast train routes (operating at slightly lower speeds than HST), 1,474 km of conventional routes, 393 km of high-speed trains and 262 km of very high-speed train routes connecting Ankara and Istanbul at 400 km/h. 76 km of additional HST network construction is included, while a 262 km "Very High-Speed Train" corridor connecting Ankara and Istanbul at 400 km/h is proposed.

	The current maritime transport volume of 254.34 Mt is aimed to reach 420.98 Mt in 2053. While the number of port facilities is currently 217, it is planned to increase to 255 in 2053. 344.39 million air passengers are expected to reach in 2053. Under this master plan, the major shift to railway is expected to be from inter-city busses. In 2053, the largest market share is expected to be consistently in road transport.
Türkiye Bicycle Path Network Master Plan	The main objective of the plan is "to develop cycling as a safer, cheaper and sustainable transport mode for various purposes in non-residential areas, which are mainly outside the jurisdiction and responsibility of municipalities". The plan thus focuses mainly on the needs and routes of long-distance cyclists travelling around Europe on holiday or cycling for recreation or sport. Bicycle paths for these long-distance cycling activities, also known as the EuroVelo network, are designed through several European countries, including the neighbouring countries Bulgaria and Greece. It has the capacity to connect Türkiye to European cyclists who may wish to visit Türkiye for vacation.
National Intelligent Transport Systems Strategy and 2020-2023 Action Plan	Strategy and 2020-2023 Action Plan are prepared in accordance with the vision of "human and environment-oriented transport system in Türkiye with advanced information technologies" and the mission of "creating an efficient, safe, effective, innovative, dynamic, environment-friendly, value-added and sustainable intelligent transport network in our country that is integrated to all transport modes, uses up-to-date technologies, utilises domestic and national resources". In the framework of this vision and mission; five main strategic objectives are determined as developing ITS infrastructure, ensuring sustainable intelligent mobility, ensuring road and driving safety, creating a habitable environment and responsible society, and ensuring data sharing and security.

2.4.2. Strategies and actions

All transport systems (railway, maritime, air and road) provide services to different transport demand groups with different characteristics (transport duration, capacities, costs, etc.). It is also observed throughout the historical development that it is not possible for one transport system to completely replace the others. Therefore, especially in terms of reducing transport emissions, it is important to create an optimised use of different systems by ensuring that they are increasingly used in the more advantageous demand areas. Additionally, increasing the efficiency of the systems that are currently used and will be used at different rates in the future will indirectly lead to emission reductions. Furthermore, the provision of energy sources used in transport services from cleaner resources also offers a potential for emission reductions. There are three main strategies for transport sector addressing all these issues together and total of four strategies including one inter-sectoral support.

Strategy U-S.1: Ensuring modal shift to maritime/railway transport

The main policy for the reduction of transport sector emissions is to ensure a shift towards maritime and railway transport, which are more efficient in terms of both energy use and emission per unit mobility (tonne-km and passenger-km). The objective here is to ensure that some of beneficiaries of road and air transport prefer maritime and railway transport without changing the total amount of mobility. In order to achieve this modal shift, it is important to provide services competing with road and/or air transport in both railway and maritime transport services. This is because railway/maritime services are designed as stop-to-stop systems and they usually have to take first-km and last-km connection services by road, which causes longer transport duration and less preferability.

In railway cargo and passenger transport, in order to ensure a shift to railway transport, it is aimed to provide support for the expansion of High-Speed Train and Fast Train line network and development of railway cargo transport in line with the 2053 Transport and Logistics Master Plan, development of railway passenger transport by urban rail systems and increase of integration.

It is aimed to create an uninterrupted public transport system by integrating public transport systems, especially suburban transport, and urban rail systems (metro, light rail system and trams) with the investments to be made in urban rail systems.

Maritime transport is a prominent option for our coastal provinces. The actions addressed at two levels in this context are the development of inter-city maritime passenger transport and the development of urban maritime passenger transport and infrastructure in coastal provinces. Additionally, the development of maritime cargo transport and infrastructure is addressed as a separate action.

Maritime and railway transport will create modal shift as alternative options and will additionally cause modal shift through “intermodal” services with intermodal transfers. Thus, the development of connections of railways to ports, organized industrial zones, logistics centres, factories and mining sites and promotion of railway and maritime intermodal and combined transport in cargo transport will be planned in corridors where these activities can be effective. In order to undertake and achieve these activities in integrity, it will be ensured that comprehensive plans are made in national transport and logistics sectors, a digital inventory is created, and monitoring-evaluation is conducted by taking emission values into account.

Strategy	Actions
Strategy U-S.1: Ensuring	**Ensuring modal shift to railway transport**
	U-S.1.1 Expanding High-Speed Train and Fast Train network in line with the Transport and Logistics Master Plan

modal shift to maritime/railway transport	**U-S.1.2** Developing railway cargo transport in line with the Transport and Logistics Master Plan
	U-S.1.3 Developing railway passenger transport with urban rail systems
	U-S.1.4 Providing support for increasing intermodal integration in Urban Rail System transport
	Ensuring modal shift to maritime transport
	U-S.1.5 Supporting inter-city maritime passenger transport
	U-S.1.6 Developing urban maritime passenger transport and infrastructure in coastal provinces
	U-S.1.7 Supporting maritime cargo transport and infrastructure
	Enhancing intermodal cargo transport
	U-S.1.8 Improving the connections of railways with cargo centres such as ports, organized industrial zones, logistics centres, factories, and mining sites
	U-S.1.9 Promoting railway and maritime intermodal and combined cargo transport

Strategy U-S.2: Increasing efficiency in transport sector

Increasing efficiency in transport systems allows both the energy used and the emissions to be reduced. One of the key actions is the development of a planning system to increase the attraction and preferability of public transport systems in order to reduce the use of private vehicles. Modal shift is not easy to achieve since public transport services are designed as stop-to-stop systems, whereas private vehicle transport is door-to-door. Therefore, there is always an issue of public transport accessibility and time cost.

In order to make public transport with lower resource use and emissions per passenger-km an attractive option, it is planned to promote public transport-oriented practices in urban planning in urban transport systems, to increase the share of rubber-tired public transport, and to plan public transport services in accordance with transport demand and accessibility standards in a holistic manner.

The speed and capacity of urban rail systems to be built on the main arteries of metropolitan areas will make public transport more attractive. However, in cases where it is not economically feasible to expand rail systems to low population density and demand areas due to their high costs, it is also important to encourage the use of other rubber-tired public transport systems. Thus, in order to make public transport a more attractive system, smart card systems enabling fare collection/charging will be introduced to encourage the use of public transport, and public

transport systems will be integrated with each other and with other urban rubber-tired transport modes.

Modes such as walking, cycling, e-scooters, etc., which generally have zero or low emissions, are considered under "micromobility" and increasing safe micromobility transport in urban transport is an action to be considered. Additionally, another important contribution of micromobility modes is their use as a connecting service at the starting and ending points of public transport services. Enhancing micromobility options around public transport stops, promoting rubber-tired shared/demand-based transport for urban areas or low-density rural areas where public transport cannot be a strong option, will allow the development of strong alternatives to reduce the use of private vehicles.

In addition to modal shifts, reduction of private transport emissions due to traffic flow and congestion is considered as a separate activity in order to prevent inefficiency in engine technologies during the time spent in traffic congestion. Low/zero emission vehicles will be encouraged in public vehicle fleets in order to increase technological efficiency. Studies will be conducted for the recycling of materials after the removal of vehicles from traffic at the end of their lifetime, and the use of low/zero emission vehicles in urban centres and attraction points will be encouraged. The preparation of a national road cargo transport emission reduction roadmap is also included in order to address the relevant activities with a general framework.

Strategy	Actions
Strategy U-S.2: Increasing efficiency in transport sector	**Promoting public transport systems and increasing efficiency**
	U-S.2.1 Promoting public transport-oriented practices in urban planning
	U-S.2.2 Introducing smart card systems enabling fare collection/charging to encourage the use of public transport
	U-S.2.3 Integrating public transport systems with each other and with other urban rubber-tired transport modes
	U-S.2.4 Enhancing micromobility/walking options around public transport stops
	U-S.2.5 Increasing the transition from private vehicle use to rubber-tired public transport
	U-S.2.6 Planning public transport services in accordance with transport demand and accessibility standards
	Making private and shared transport more efficient
	U-S.2.7 Increasing safe micromobility in urban transport
	U-S.2.8 Promoting rubber-tired shared/demand-based transport

	U-S.2.9 Reducing emissions due to traffic flow and congestion caused by private vehicle use
	Promoting the use of new generation, low/zero emission vehicles
	U-S.2.10 Promoting low/zero emission vehicles in public vehicle fleets
	U-S.2.11 Increasing the use of low/zero emission vehicles in urban centres and attraction points
	Making cargo transport more efficient
	U-S.2.12 Preparing a national road cargo transport emission reduction roadmap

Strategy U-S.3: Use of sustainable/clean energy sources in transport systems

Currently, transport technologies are generally fossil fuel based and diesel, gasoline, LPG are commonly used fuels. Electricity, used as an energy source in railway transport, is also an alternative energy source for road transport. Electrification with its power to zero exhaust emissions provides a considerable potential for the reduction of transport emissions. Thus, increasing electrification of vehicles used in railway/maritime transport and airline ground operations, supporting research on electrification of existing vehicles, supporting research on electric vehicle battery systems, and increasing their lifetime are important activities. Planning and development of charging station infrastructure in required numbers and locations in the road network for increased use of electric vehicles, encouraging the use of renewable energy sources in charging stations is an activity that can create a bidirectional effect in reducing national emissions.

It is aimed to increase the use of fuels such as CNG, biofuels, etc., which are still in use among alternative fuels, to increase the use of CORSIA compatible sustainable aviation fuels in air transport and alternative fuels in urban/rural bus transport and to support research for alternative fuelled vehicles (LNG/Hydrogen, etc.) as an investment for the future and to follow international developments.

Strategy	Actions
Strategy U-S.3: Use of sustainable / clean energy sources in transport systems	Expanding electrification in transport systems
	U-S.3.1 Supporting electrification of vehicles used in railway/maritime transport and airline ground operations
	U-S.3.2 Supporting research on electrification of existing vehicles
	U-S.3.3 Supporting research on electric vehicle battery systems and increasing their lifetime
	Increasing the use of alternative sustainable fuels

	U-S.3.4 Increasing the use of CORSIA compliant sustainable aviation fuels in air transport
	U-S.3.5 Increasing the rate of alternative fuel use in urban/rural bus transport
	U-S.3.6 Encouraging the use of renewable energy sources in electric vehicle charging stations
	U-S.3.7 Planning and development of charging station infrastructure in required number and location in the road network for increased use of electric vehicles
	U-S.3.8 Supporting research for alternative fuelled vehicles (LNG/Hydrogen, Bio-CNG, Bio-LNG, etc.)

U-S.4: Engaging in necessary infrastructure activities for sectoral decarbonisation

Considering the transport demand and mobility that is expected to increase in parallel with the developing economy and the transport technologies that are currently changing, the preparation of a transport emission database is one of the supporting activities required to be progressed rapidly in our country. The preparation of sustainable urban mobility plans (SUMP) and sustainable urban logistics plans (SULP) in metropolitan areas and urban and district centres with large population and mobility demand are critical actions in terms of reducing transport emissions. Developing new generation mobility management policies and legislation and preparing the necessary legislation in order to promote the use of new generation light vehicles are important support activities, as they are increasingly attracting attention worldwide.

In the transport sector, where electrification will have a significant impact, the development of a national smart integrated electric vehicle charging and parking management interface, the preparation of legislation on placing batteries on the market and recycling, providing research support for electric vehicle battery recycling, and for person/product-based transport related carbon footprint calculation support in passenger and cargo transport will be implemented.

Strategy	Actions
U-S.4: Engaging in necessary infrastructure activities for sectoral decarbonisation	**Modelling and estimation studies in transport systems**
	U-S.4.1 Creating a transport emissions database
	U-S.4.2 Preparing sustainable urban mobility plans (SUMP) and sustainable urban logistics plans (SULP) in metropolitan areas and urban and district centres
	U-S.4.3 Developing new generation mobility management policies and legislation
	U-S.4.4 Providing support for person/product-based transport related carbon footprint calculation in passenger and cargo transport
	Electric Vehicle Sector Support

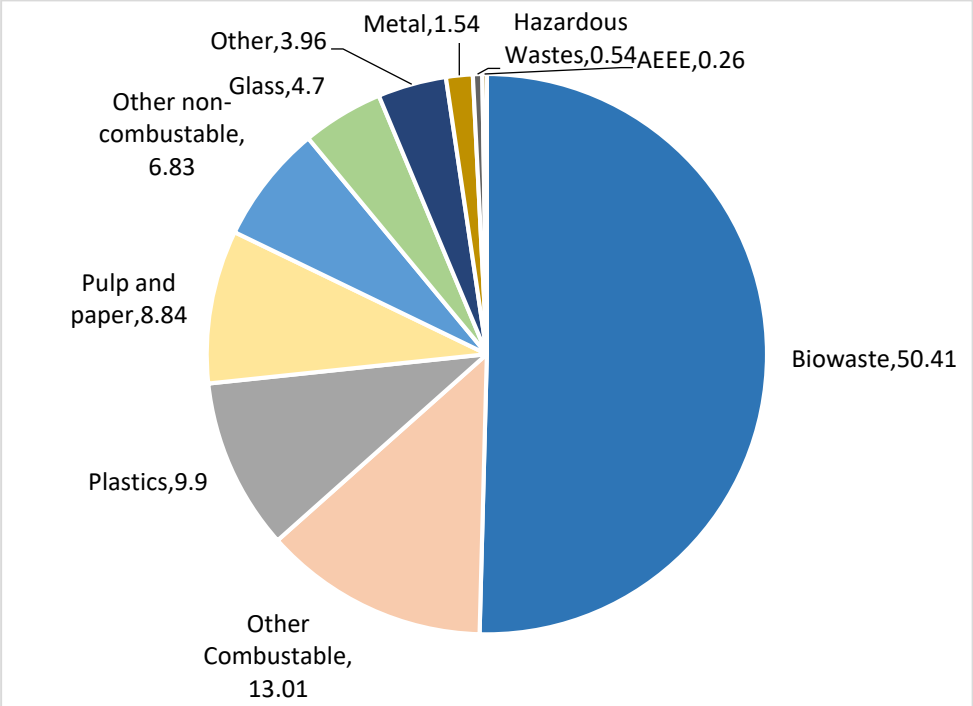
	U-S.4.5 Developing an electrical energy demand estimation model for transport purposes
	U-S.4.6 Developing a national intelligent EV integrated charging and parking management interface
	U-S.4.7 Preparing legislation on placing batteries on the market and recycling and providing research support for electric vehicle battery recycling

2.5. Waste Sector

2.5.1. Current situation

Due to population growth, industrialization, and shifting consumption habits, the amount of waste generated is increasing steadily. While the aim of waste policy is to protect a healthy urban life and the environment, the use of waste as secondary raw material and a source of energy has come to the fore over time. It is now essential to prevent or reduce waste and, where this is not possible, to reintroduce it into the economy. This new approach is also an important contribution to achieving the net zero GHG emission targets adopted by Türkiye and many countries worldwide. In Türkiye, municipalities report data to TURKSTAT regarding the waste they are responsible for collecting. This waste typically includes similar waste from households, commercial establishments, offices, public institutions, and schools. According to the latest figures published by TURKSTAT for 2020, the amount of waste collected by municipalities reached 32.3 Mt [13]. This amount corresponds to 1.13 kg of waste per person per day and is significantly higher than the EU-28 average of 1.38 kg per person per day [15], which is significantly higher than the world average of 0.74 kg per person per day [14] for the same year.

As part of the National Waste Management and Action Plan (NWMAP) 2023-2035, waste characterization studies have been conducted on a provincial basis and benchmarks have been established. The updated waste characterization for the entire country is shown in Figure 18.



*WEEE: Waste Electrical and Electronic Equipment

Figure 18. Waste characterization [16]

Türkiye is continuing to rely predominantly on landfills for waste management. The transition from irregular disposal of waste to sanitary landfills has accelerated in recent years, and almost all provinces now have sanitary landfills in operation. In 1994, when there were only 2 sanitary landfills in the whole country, municipal waste management was largely provided by irregular landfills. By 2007, the number of sanitary landfills had increased to 32, and today there are 93 sanitary landfills. Significant progress has also been achieved in waste management. Bio-methanization and composting facilities have been established and biodegradable waste has been assessed as products that can be used in energy and agriculture without the need for storage. The material recycling sector has developed very rapidly and recyclable waste has been introduced into the economy. According to the studies conducted in the framework of NWMAP prepared by MoEUCC, 59.6% of the 38.1 Mt of municipal waste generated in 2021 were disposed of in managed landfills and 13.2% in unmanaged landfills whereas 27.2% was recovered in waste treatment facilities (bio-methanization, composting, incineration, recycling facilities) [16]. Remarkably, the recovery rate reached 30.13% in 2022.

According to the newsletter "Water and Wastewater Statistics, 2020" [17], which includes the results of the Municipal Wastewater Statistics Survey conducted by TURKSTAT every two years covering all municipalities and published in 2021, 1,362 out of 1,389 municipalities were served by the sewer network. Of the 5 billion m^3 of wastewater collected by the sewer network, 49.2% was discharged into rivers, 38.5% into the sea, 3.1% into reservoirs, 1.3% into lakes, 0.4% into land, and 7.5% into other receiving water bodies. And, 4.4 billion m^3 of the 5 billion m^3 of wastewater discharged from the sewer system was treated in wastewater treatment plants. Of the wastewater treated, 50.7% was treated by advanced methods, 27.1% by biological treatment, 21.9% by physical treatment, and 0.3% by natural treatment. It was determined that 1.6% of the wastewater treated by municipalities is used in industry, agricultural irrigation, etc. [17].

On the other hand, as water resources are one of the most important components of environmental sustainability, and essential element of the environment and our limited resources, is of great importance for the sustainable management of these resources to protect, improve the quality, and use them by observing the balance between protection and use in the short, medium and long term. According to the Ministry of Environment, Urbanization, and Climate Change, the number of urban wastewater treatment facilities in our country will reach 1209 by 2023. Of these, 320 are advanced biological treatment facilities, 833 are biological treatment facilities, 4 are chemical treatment facilities and 52 are deep sea discharge facilities after pre-treatment.

Additionally, in the framework of the principle of “sustainability” in wastewater management, policies and strategies are defined that accept treated wastewater as an alternative source of water. Accordingly, wastewater management is taken up in an integrated manner such that the wastewater resulting from the economic use of water in both residential and industrial sectors

will be treated, taking into account the highest level of benefit-cost ratio, and that the reuse of treated wastewater will be implemented. Expanding the land area and its alternatives, improving the land by using treated wastewater and treatment sludge in areas that have lost their soil quality, recovering organic matter (nitrogen, phosphorus, etc.) from wastewater and treatment sludge, and ensuring its use as fertiliser in agricultural activities, ensuring that wastewater treatment facilities are operated as biorefineries, and soil and wastewater treatment.

With this approach, the reuse of treated wastewater can achieve large savings in clean water resources, protect water bodies from wastewater discharges prevent pollution of surface and groundwater, and make wastewater treatment facilities contribute to the country's economy by working like a factory, generating electricity from treatment sludge and recovering organic matter. To this end, the reuse rate of treated wastewater, which currently stands at 5.20% in Türkiye, is to be raised to 15% by 2030.

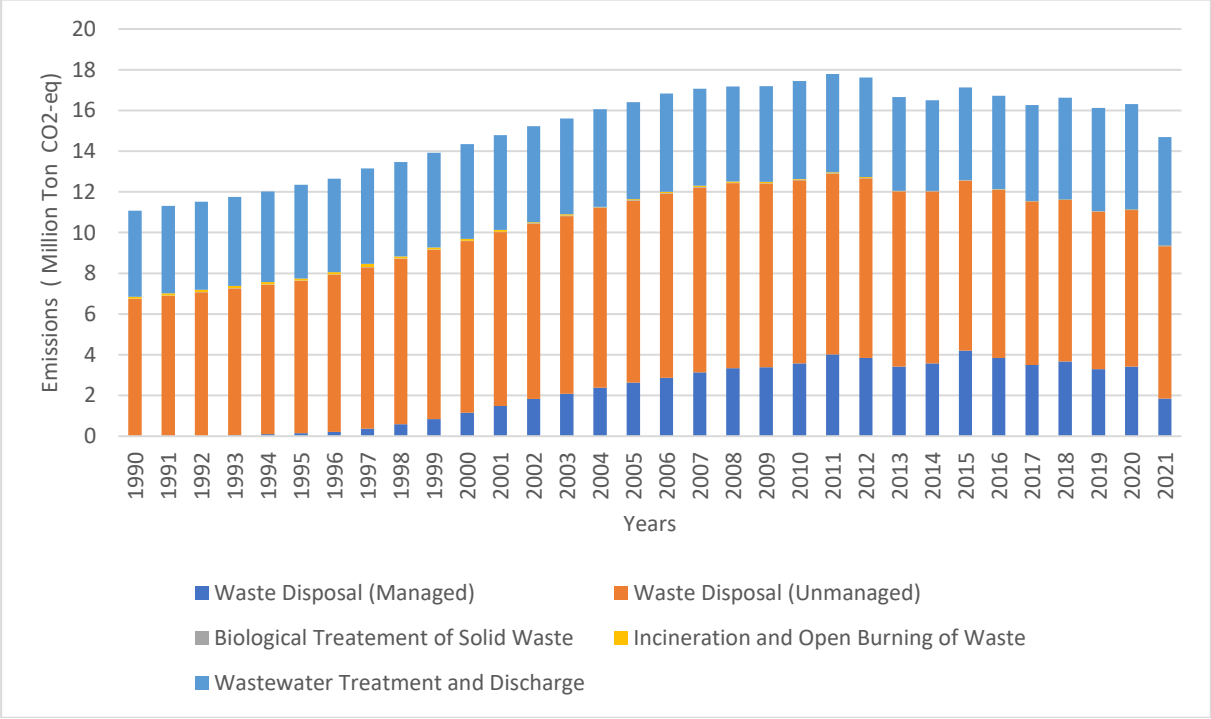


Figure 19. Greenhouse gas emissions of the waste management sector by year [1]

Data from TURKSTAT Waste Statistics and Water and Wastewater Statistics are used to prepare the waste part of the GHG inventories. According to the recently published GHG inventory for 2021, the emissions of the waste sector were calculated to be 14.7 Mt $CO_{2\text{-eq.}}$. This represents 2.6% of total emissions. Although the waste sector is considered to be a low-emitting sector, it is actually in a low-emitting position in its own right, indirectly contributing to the reduction of emissions mainly from the industrial sector by increasing material recovery. In addition, the energy sector includes emissions from the transport of waste or the incineration of waste for energy. According to the IPCC 2006 guidelines, emissions from the waste sector are reported under 4 main headings.

- Solid waste management
- Treatment of solid waste by biological methods
- Incineration and open burning of waste
- Wastewater treatment and discharge

According to the Türkiye 2021 Emission Inventory, solid waste disposal in managed sanitary and unmanaged landfills accounts for 63.5% of all waste sector emissions (12.5% managed sanitary landfills, 51% unmanaged landfills). The second largest emission source is wastewater treatment and discharge, which accounts for 36.3% of waste emissions [1]. Emissions from biological treatment of solid waste, waste incineration, and open burning are negligible. GHG emissions from the waste sector by year are shown in Figure 19 and Table 21.

Table 21. Greenhouse gas emissions from waste sector by year, Mt $CO_{2\text{-}eq}$ [1]

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Solid Waste Landfill (sanitary)				0.06	0.10	0.14	0.22	0.36	0.59	0.85	1.15	1.49	1.82	2.08	2.38	2.64
Solid Waste Landfill (unmanaged)	6.73	6.89	7.06	7.19	7.34	7.49	7.71	7.93	8.13	8.32	8.43	8.53	8.61	8.72	8.84	8.92
Biological Treatment of Solid Waste	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.03	0.04	0.03	0.03
Incineration of Waste and Open Burning	0.11	0.11	0.11	0.11	0.11	0.10	0.11	0.16	0.10	0.09	0.09	0.09	0.06	0.06	0.03	0.05
Wastewater Treatment and Discharge	4.23	4.29	4.34	4.37	4.45	4.60	4.60	4.69	4.64	4.65	4.66	4.67	4.71	4.70	4.79	4.76
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Solid Waste Landfill (sanitary)	2.86	3.14	3.34	3.39	3.58	4.01	3.84	3.41	3.57	4.21	3.85	3.49	3.66	3.29	3.42	1.84
Solid Waste Landfill (unmanaged)	9.05	9.06	9.08	9.02	8.98	8.88	8.82	8.60	8.46	8.35	8.25	8.03	7.94	7.75	7.69	7.50
Biological Treatment of Solid Waste	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Incineration of Waste and Open Burning	0.06	0.07	0.06	0.05	0.04	0.04	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Wastewater Treatment and Discharge	4.83	4.77	4.66	4.70	4.81	4.83	4.90	4.61	4.45	4.54	4.59	4.71	5.00	5.06	5.17	5.33

According to IPCC guidelines, biogenic CO_2 emissions from waste management are not included in national GHG emissions calculations. However, methane from the decomposition of biodegradable waste is the primary contributor to GHG emissions from the waste disposal sector. Methane (CH_4) has a much higher short-term global warming potential than CO_2. 83.9%

of the emissions from the waste sector reported in tonnes of carbon dioxide equivalent are methane [1].

Renewable electricity generation in Türkiye is supported by the Renewable Energy Sources Support Mechanism (YEKDEM) [18]. Both storage facilities producing landfill gas and bio-methanization facilities producing biogas are eligible for feed-in tariffs for the first 10 years. The number of such facilities supported by YEKDEM is growing rapidly. According to YEKDEM's 2021 data, the total annual production included in the license of 85 energy production facilities (landfill gas + biogas) in 55 provinces is 4,124,452 MWh. These facilities have reached a total installed power capacity of 378 MWe_{eq} and contribute to GHG reduction and renewable energy production through the use of methane. Investments in the biological treatment of solid waste have gained importance, especially in Türkiye, where the share of biodegradable waste in the municipal waste composition is high. The incentive mechanism has also been revised in order to reduce the amount of waste sent to landfills and to efficiently recycle waste in processing facilities.

In 2021, 470 kt of methane gas will be generated in landfills, of which 396 kt will be recovered and only 74 kt will be emitted into the atmosphere. In unmanaged landfills, methane recovery remained at a very low level and 300 kt of methane were emitted [1]. The amount of methane generated and recovered in landfills by year is shown in Figure 20.

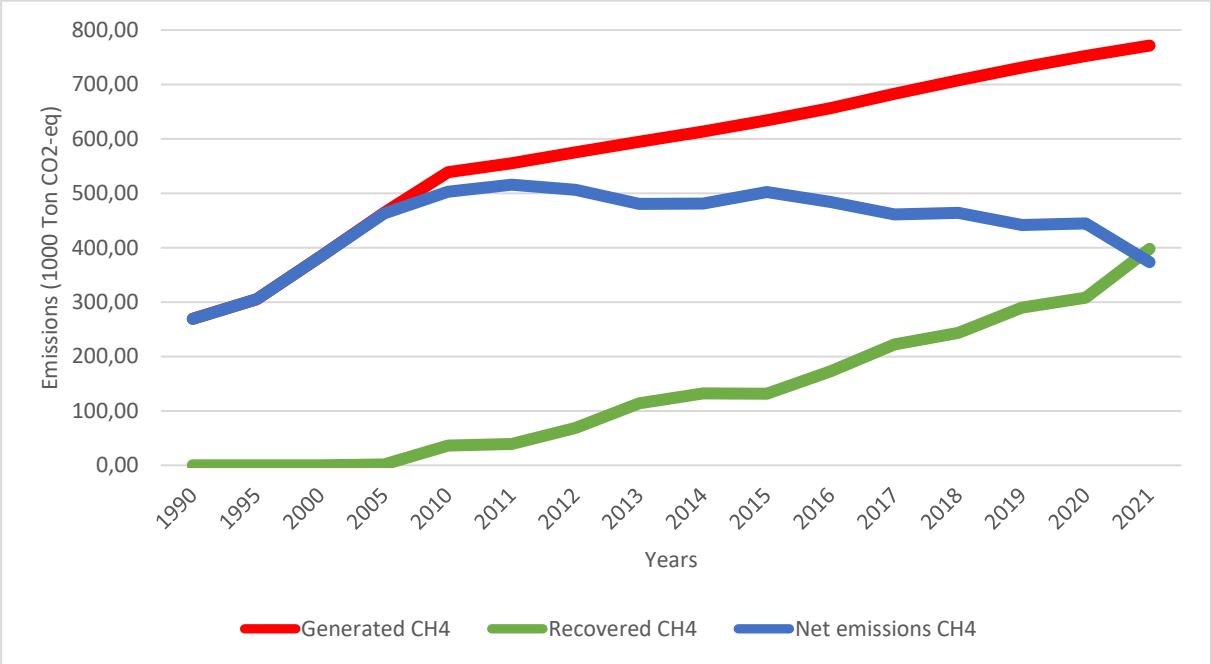


Figure 20. Amount of methane generated and recovered in landfills per year [1]

The key legislation, policy and strategy papers relating to the waste sector in Türkiye are listed in Table 22 and Table 23.

Table 22. Key legislation on waste sector

Key Legislation	Purpose and Scope
Environmental Law (Law No. 2872)	The purpose of the law is to ensure that the environment, which is the common existence of all living beings, is protected in accordance with the principles of sustainable environment and sustainable development. For waste management activities, the Law stipulates provisions on waste minimization at source, classification, collection, transportation, temporary storage, recovery, disposal, reuse of waste, conversion to energy, treatment of wastewater, and reuse of treated wastewater.
Zero Waste Regulation	The Regulation lays down the principles of the zero waste management system and the deadlines for all institutions and organizations to complete the transition to a zero waste management system. The main issues under the Regulation are the prevention of waste at source before generation, the recovery and/or recycling of the part that cannot be prevented, the establishment of a separate collection system, including at least double collection, the reduction of the amount of waste disposed of by at least 15% in order to obtain a qualified certificate, the separate collection of biodegradable waste and its recovery, the recording of data, the implementation of awareness-raising activities and the participation of points of sale in the deposit return system.
Zero Waste Implementation Guidelines	In order to provide guidance to target groups that need to establish the Zero Waste Management System, 11 "Zero Waste Management System Guidelines" have been prepared, specifically for hotels, restaurants and cafeterias, institutions/organizations, businesses, educational institutions and dormitories, etc. It also includes measures to prevent food waste and reduce food waste in different places.
Communiqué on Composts, and Communiqué on Management of Mechanical Separation, Bio-drying and Bio-methanization Facilities and Fermented Products	This legislation lays down the principles for defining the technical criteria for these facilities. Should it not be possible to avoid or reduce biodegradable waste, it will not be landfilled, but will be recycled through pre-processing such as composting, bio-methanization and bio-drying.
Renewable Energy Sources Support	Electricity generation from renewable energy sources in Türkiye is supported by YEKDEM. Both landfill gas storage facilities and bio-methanization facilities are eligible for feed-in tariffs for the first 10 years. The number of such facilities supported by YEKDEM is growing rapidly. The use of methane in these

Mechanism (YEKDEM)	facilities contributes to the reduction of GHG emissions and the production of renewable energy.
Circular on Cleaner Production Practices in the Textile Industry	Clean production technologies are used to minimize the negative impact of the activities of the textile sector on the environment, to prevent air and water pollution, and to reduce water and energy consumption, as it is one of the leading sectors in Türkiye and also one of the sectors with the highest water consumption and water pollution. For the purpose of implementation, the Circular on Cleaner Production Practices in the Textile Sector No. 2022/20 has been published. With this circular, the production of textile materials (fibre, fibre, yarn, fabric (including non-woven fabric), carpet production, etc.), textile pre-treatment (washing (including wool washing), bleaching/bleaching, mercerization, etc.), printing and In all textile facilities that perform any of the dyeing processes and in all textile facilities that perform fabric mercerization; mandatory provisions have been introduced to reduce energy consumption and air pollutant emissions, and to reduce water consumption and pollutant load in wastewater.
Communiqué on Technical Procedures for Wastewater Treatment Plants	It lays down technology selection and design criteria for wastewater treatment plants treating wastewater from settlements, the basic technical procedures and practices to be used for disinfection and reuse of treated wastewater, and the disposal of sludge from deep-sea disposal and treatment activities. Annex 7 of the Communiqué has been revised and, in addition to the reuse of treated effluent as irrigation water, environmental (wetland creation, wetland recharge, surface and groundwater recharge), industrial (process water, cooling water, boiler feed water) and other (general cleaning) uses have been added. Regulations have been introduced for water reuse (fire water, dust control/field irrigation water, urinal and flush water, etc.).
Urban Wastewater Treatment Regulation	The objective of the Regulation is to protect the environment against adverse impacts of collection, treatment and discharge of urban wastewater and wastewater discharges from certain industrial sectors, and govern issues relating to collection and disposal of urban wastewater with a population equivalent of more than 2,000.
Water Pollution Control Regulation	The objective of the Regulation is to lay down legal and technical principles necessary to prevent water pollution, in accordance with the objectives of sustainable development, in order to protect the potential of the country's underground and surface water resources and to ensure their optimum use. The Water Pollution Control Regulation sets standards for all types of wastewater discharges into receiving waters, monitors and inspects discharges, and carries out all types of permitting and approval

	procedures in this regard. In addition, in regions where irrigation water is scarce and of economic value, the use of purified wastewater that meets the irrigation water quality criteria specified in the Technical Procedures Communiqué of the Water Pollution Control Regulation is encouraged as irrigation water. In addition, to increase the reuse of treated wastewater, regulations and deadlines have been established for metropolitan and provincial municipalities to ensure that at least 10% of the total wastewater treated in urban wastewater treatment facilities is used for agricultural irrigation and recreational purposes, as well as reuse in industrial, environmental and other areas.

Table 23. Key policy papers relating to waste sector

Policy Papers	Goals and Objectives
Twelfth Development Plan 2024-2028	The plan outlines the following measures for the waste sector The industrial use of waste and circular economy practices will be increased. The waste management process will be improved in preventive manner starting from sorting at source. Infrastructure will be supported and developed to ensure that animal waste is stored under appropriate conditions and processed in biogas facilities. Efforts will be accelerated to remove existing barriers such as lack of control, technical knowledge and capacity in the construction and operation of wastewater treatment plants, and to develop support mechanisms for their operation in accordance with standards and alternative systems for the disposal of sludge from wastewater treatment facilities. Solid waste management will be made more effective by applying circular economy principles. Zero waste practices will be disseminated and public awareness of waste recycling will be raised. In the framework of the "Zero Waste Project", educational awareness activities will be undertaken and zero waste practices will be implemented at all levels of education.
NDC 2023	As part of the Nationally Determined Contribution, prevent waste generation and reduce the amount of waste generated in line with principles of circular economy, increase the rate of recovery of municipal waste to 60% by 2035, increase the rate of recovery of methane gas from biodegradable waste, municipalities not subject to pre-treatment as of 2053. The objectives include ending the managed landfilling of wastewater, increasing the production of RDF from municipal waste, converting wastewater treatment facilities into biorefineries, increasing the percentage of reuse and expanding the areas of use of treated wastewater.
Green Deal Action Plan 2021	The Action Plan lays down steps to be taken in a wide range of areas, including tackling climate change, managing green finance, EU border carbon regulation, a green and circular economy, clean,

	economic and secure energy, sustainable agriculture, sustainable and smart transport and diplomacy.
National Waste Management and Action Plan (NWMAP) 2023-2035	The National Waste Management Plan 2023-2035 is being finalised. The NWMAP aims to identify the issues that need to be improved or developed in the field of waste management, taking into account the current situation data, and to present periodic waste management models, providing the required population and waste projections for 2035.
Türkiye's National Strategy and Action Plan for the Prevention, Reduction and Management of Food Waste and Loss	"Türkiye's National Strategy and Action Plan on Prevention, Reduction and Management of Food Loss and Waste" was launched and circulated on 20 May 2020. Thus, for the first time in Türkiye, a National Strategy on Preventing, Reducing, and Managing Food Loss and Waste and an Action Plan to implement this strategy have been prepared. The National Strategy and Action Plan, which are based on the "Food Use Hierarchy", aim to prevent and reduce food loss and waste, conserve and redistribute food for direct human consumption, use substances no longer used as food and previously subject to food legislation as animal feed, and dispose of food waste. It contains almost 100 action points aimed at achieving the strategic objectives of ensuring recovery.
Wastewater Treatment Action Plan 2017-2023	The objective is to develop a management system that will ensure the protection, improvement and sustainable use of water resources in terms of quantity and quality. In order to comply with the EU acquis, the status of sewer, rainwater and wastewater treatment facilities of the provinces in the catchment areas will be assessed, in order to examine both the quantity and quality parameters of underground and surface water resources in the basins and the status of wastewater infrastructure systems, and to determine the investment and financing requisites necessitated by the needs, strategic priorities and objectives in the wastewater sector.

2.5.2. Strategies and actions

Policies, measures, objectives, relevant actions, and indicators that will contribute to emission reductions in the waste sector can be examined under different subheadings, taking into account the national GHG inventory report. In the following, strategies (4) with direct reduction potential are first described in the waste sector section of the report according to the IPCC 2006 guidelines. Strategies (3) in the waste sector whose GHG reduction potential cannot be calculated but which support the reduction are then described. Finally, strategies (2) that enable or support GHG emission reductions, although relating to the waste sector, are listed in the national inventory reporting of other sectors.

Strategies for the direct reduction of GHG emissions in the reporting of the waste sector

The strategies in this section are listed according to the waste hierarchy. A strategy for wastewater management has also been identified.

A-S.1: Preventing and reducing waste and wastewater before generation

Pursuant to the waste hierarchy, preventing or reducing waste before generation is the preferred method. The most prominent measures are the preparation of the National Waste Prevention Plan and the issuance of a qualified Zero Waste Certificate in the framework of Zero Waste Practices.

The major contributor to GHG emissions from the waste sector in Türkiye is the uncontrolled release of methane gas from landfills into the atmosphere. Food waste is also a biodegradable waste and it is possible to prevent and reduce the generation of this waste by taking precautions at all stages from production to consumption and by raising the awareness of all stakeholders, which is the most significant policy for the waste sector.

Additionally, the reuse of waste within principles of circular economy is also a type of waste reduction and prevention strategy. Actions to be taken in this regard will directly contribute to the reduction of GHG emissions.

GHG emissions from wastewater will be reduced thanks to studies on the efficient use of industrial and municipal water.

Strategy	Actions
A-S.1: Preventing and reducing waste and wastewater before generation	**A-S.1.1** Preparing a National Waste Prevention Plan
	A-S.1.2 Conducting best practice studies with different stakeholders (farmers, producers, hotels, restaurants, wholesalers, retailers, workplaces, consumers, etc.) to prevent and reduce food waste and other biodegradable waste before it occurs, and establish a roadmap on this issue.
	A-S.1.3 Conducting studies on best practices, including extended producer responsibility, to increase the rate of waste reuse in compliance with circular economy principles.
	A-S.1.4 Issuing qualified zero waste certificate
	A-S.1.5 Conducting water efficiency studies to reduce the amount of wastewater subject to treatment and discharge.

A-S.2: Improving waste recycling and recovery rates

Preventing the generation of waste is the most effective way of avoiding the waste of both energy and raw material resources and is a fundamental factor in protecting the environment and ensuring the sustainable use of natural resources. Waste reduction involves reducing the quantity and hazardous nature of waste. For this reason, waste prevention and waste reduction

have been identified as a top priority in all waste management legislation, particularly environmental legislation.

The waste management hierarchy is used as a tool to determine the priority of waste management, to view waste as a valuable resource, and to evaluate processes that protect the environment from the most appropriate to the least appropriate. The hierarchy indicates the order of preference in the actions to be taken by creating a pyramidal scheme to reduce waste and protect and manage resources. According to the ideal waste management hierarchy, preventing and reducing waste where it is generated and reusing waste where it cannot be prevented are the priority steps in the waste management hierarchy. Wastes that cannot be reused must be recycled, recovered, or recovered as energy in order to be introduced into the economy. However, if no suitable recovery method is available, final disposal of waste should be preferred. Therefore, effective implementation of the waste management hierarchy through prevention and reduction at source, reuse, and recycling of waste through treatment in the nearest and most appropriate facility ensures minimization of environmental impacts.

Proper collection of waste, depending on its type, with at least a dual collection system or, for some wastes (e.g. beverage packaging), a deposit return system, and delivery to the appropriate recycling facility is the essential first stage of material recycling.

From 12 January 2020, the "Zero Waste Certificate" will be issued to local administrations that have established the "Zero Waste Management System" in the framework of the "Waste Regulation", which was prepared for the purpose of adopting, implementing, and disseminating the zero waste approach across the country by establishing the general principles and application principles for the establishment of the "Zero Waste Management System" in the framework of the "Zero Waste Project" has been initiated. With the Law No. 7261 of 24.12.2020 on the Establishment of the Turkish Environment Agency and Amendments to Certain Laws, in order to prevent environmental pollution and ensure the protection, improvement, and development of green areas, and to undertake activities for the establishment, operation, monitoring, and control of a waste management system at the national level. The Turkish Environmental Protection Agency (TEA) was established. In line with all these developments, the rate of municipal waste recycling has been accelerated. On the way to the 2053 Net Zero Emission Target, the municipal waste recycling rate target for 2035 has been set at 60%. In order to achieve these goals, it is planned to increase the number and capacity of biological treatment facilities and the amount of biodegradable waste sent to these facilities, increase the production of solid-liquid fermented products and compost suitable for use in agriculture, and reduce the amount of waste sent to managed landfills.

Strategy	Actions
A-S.2: Improving waste	**A-S.2.1** Updating NWMAP, taking into account policies to reduce GHG emissions
	A-S.2.2 Improving waste-sorting at source by type (biodegradable waste and other recyclable waste).

recycling and recovery rates	**A-S.2.3** Expanding the deposit return system for the collection of high value materials
	A-S.2.4 Increasing the number and capacity of biological treatment facilities for the recovery of biodegradable waste and the amount of biodegradable waste diverted to these facilities.
	A-S.2.5 Increasing the amount of solid-liquid fermented products and compost produced from biodegradable waste with criteria suitable for agricultural use.
	A-S.2.6 Treating waste not suitable for material recovery using thermal technologies suitable for energy recovery

A-S.3: Reducing amount of untreated waste deposited to sanitary landfills

In accordance with the studies on municipal waste management conducted since 1991, the number of sanitary landfills has increased significantly. The number of sanitary landfills has increased from 2 in 1994 to 93 at present. These facilities provide regular storage services to 1,241 municipalities and 89% of the urban population.

The target is to end regular landfilling of municipal waste not subject to pre-treatment by 2053.

Strategy	Actions
A-S.3: Reducing amount of untreated waste deposited to sanitary landfills	**A-S.3.1** Updating and implementing Provincial Zero Waste Management System Plans
	A-S.3.2 Increasing the number and production capacity of facilities for the preparation of refuse derived fuels (RDF) from municipal waste that is not suitable for recycling or recovery.
	A-S.3.3 Terminating acceptance of waste at unmanaged landfill sites

A-S.4: Improving wastewater management and treatment infrastructure

87.9% of the wastewater discharged by municipal agglomerations was treated in 2020, and the share of advanced biological treatment among the wastewater treatment processes has increased in recent years. While in 2018, 48% of the waste water generated in the urban areas was treated by advanced biological treatment, in 2020 this rate approaches 51%. [17]. This trend is expected to contribute to the reduction of GHG emissions. In addition, the increase in anaerobic digestion units at wastewater treatment plants is enabling methane recovery applications to become prevalent. According to studies by the Ministry of the Environment, Urbanization, and Climate Change, 46% of the sewer sludge produced in 2020 would be used as an additional fuel, alternative raw material, or for energy recovery, while 39% would be landfilled.

The objective is to ensure fully sustainable management of the sludge produced in Türkiye by 2053 and to establish a wastewater treatment infrastructure based on circular economy principles.

Strategy	Actions
A-S.4: Improving wastewater management and treatment infrastructure	**A-S.4.1** Increasing methane recovery rates at wastewater treatment plants
	A-S.4.2 Increasing the number of wastewater treatment plants with sustainable sludge management that prioritises the beneficial reuse of sludge within principles of circular economy.
	A-S.4.3 Establishing sustainable waste water management in the framework of principles of circular economy

Strategies to support the reduction of GHG emissions in the reporting of the waste sector

A-S.5: Developing human resources and social awareness as part of zero waste practices and reduction of GHG emissions

The Climate Council adopted a recommendation: "In order to increase social awareness in the framework of zero waste practices and reduction of GHG emissions, capacity should be increased by first creating practical training modules for educational institutions and all stakeholders". Training of stakeholders and raising social awareness are very important for sustainable waste management and efforts will be made to achieve this goal. Measures will also be taken to improve working conditions in the waste sector and to address the need for skilled and qualified labour.

Strategy	Actions
A-S.5: Developing human resources and social awareness as part of zero waste practices and reduction of GHG emissions	**A-S.5.1** Incorporating and promoting climate change, zero waste, water use, circular economy, green and environmental competences and green jobs in formal education curricula.
	A-S.5.2 Building capacity of relevant stakeholders and trainers on zero waste, water use, circular economy and reducing GHG emissions
	A-S.5.3 Promoting written, audio, visual and social media activities (promotional videos, website, etc.) that raise awareness of zero waste, water use, circular economy and GHG emission reduction among all stakeholders.
	A-S.5.4 Identifying skills and qualifications required by circular economy principles in the waste sector and conducting studies to train a workforce equipped with these skills and improve employment conditions.

A-S.6: Developing incentive and financing mechanisms to improve waste management, taking into account circular economy principles and GHG emission reduction

The Climate Council adopted a Recommendation: "Incentive mechanisms should be developed to improve effective waste management in order to reduce GHG emissions in the industrial and service sectors". Incentive and financing mechanisms need to be developed for the waste sector to develop in line with climate change mitigation targets and circular economy principles.

The key legislation on national waste and wastewater management will be revised taking into account EU harmonization processes, GHG emission impacts and targets. These revisions will pave the way for favourable and advantageous financing mechanisms.

Strategy	Actions
A-S.6: Developing incentive and financing mechanisms to improve waste management, taking into account circular economy principles and GHG emission reduction	**A-S.6.1** Updating national waste and wastewater management legislation by means of a participatory process, taking into account circular economy principles, zero waste and GHG emission reduction targets.
	A-S.6.2 Developing favourable financing mechanisms to support projects and investments that prevent waste at source, collect waste separately at source, reduce, reuse, recycle and recover waste, reduce the amount of waste diverted to landfills and increase the recovery and reuse of treated wastewater.
	A-S.6.3 Working on relevant specification formats in the context of circular economy requirements in line with Green Public Procurement (GPP) principles.

A-S.7: Increasing R&D activities and developing technological infrastructure to improve waste management, taking into account circular economy principles and GHG emission reduction

The Climate Council adopted a recommendation: "Necessary studies should be conducted to develop tools to support value chain and life cycle assessment and to determine GHG reduction impacts". In this context, material-based life cycle assessment studies will be conducted and GHG reduction effects will be determined.

The objective is to convert biogas from biodegradable waste into high value-added products and introduce them into the economy. R&D studies are intended to be conducted in this field.

Additionally, as part of the GHG emission reduction target and principles of circular economy, R&D studies will be conducted on reuse of treated wastewater, material recovery from wastewater and treatment sludge, reduction of the amount of treatment sludge produced at the facility, beneficial use of treatment sludge, and reduction of GHG emissions from wastewater treatment facilities.

It is planned to develop digital technology applications such as advanced sensor technologies, artificial intelligence and remote sensing to optimise waste and wastewater management processes and energy efficiency.

Strategy	Actions
A-S.7: Increasing R&D activities	**A-S.7.1** Establishing a legal framework for monitoring circular economy, identifying indicators for monitoring and including necessary indicators in the official statistical programme.

and developing technological infrastructure to improve waste management, taking into account circular economy principles and GHG emission reduction	**A-S.7.2** Developing technologies to convert biogas from biodegradable waste into biomethane equivalent to standards of natural gas, biobutanol or hydrogen that can be used as biofuel.
	A-S.7.3 Conducting material life cycle assessment studies to determine the GHG emission reduction potential of waste materials.
	A-S.7.4 Conducting R&D studies to support the sustainable management of wastewater treatment facilities in line with circular economy principles and GHG emission reduction targets.
	A-S.7.5 Developing digital technology applications such as advanced sensor technologies, artificial intelligence and remote sensing to ensure process optimization and energy efficiency in waste and wastewater management.

Strategies that ensure or support GHG emission reductions in the reporting of other sectors while related to the waste sector

A-S.8: Increasing use of waste as raw material / resource in production processes

The Climate Council adopted the following recommendations: "Relevant ministries, municipalities, and industrial facilities should work together to increase RDF production in order to reduce emissions" and "In the framework of the circular economy targets, reuse, use of waste as by-products, alternative raw materials and mandatory use of products obtained by recycling/recovery should be undertaken". The aim is to implement these decisions, which will have an impact on the reporting of GHG emissions in the industrial sector, in coordination with stakeholders in the waste sector.

A strategy and action plan paper is likewise being prepared, which will provide a roadmap for Türkiye in line with the EU Circular Economy Action Plan and its annexes (taking into account the principles of the EU Green Deal). The `National Circular Economy Strategy and Action Plan` is a national strategy and will focus on the entire life cycle of products and will include actions at the stages of product design, production and production processes, consumption, waste management, and use of secondary raw materials. The plan will also include sectoral actions on materials such as plastics, critical raw materials, construction, and biomass, as well as horizontal activities on innovation, investment, and monitoring.

It aims to establish and promote the use of the eco-label for various products and services, which is a voluntary reward system created to promote products/services with reduced environmental impacts from the raw material sourcing process to the disposal process, and to provide accurate, non-misleading, scientifically based information to consumers.

Industrial symbiosis refers to the merging of two or more economic entities, preferably in close proximity to each other and normally operating independently, to establish long-term partnerships and work in solidarity to improve both environmental performance and

competitiveness. In other words, industrial symbiosis brings together independent companies in a more sustainable and innovative approach to resource use. This collaborative network involves the sharing or joint use of all types of facilities, logistics, equipment and expert resources, including the physical exchange of materials, energy, water and/or by-products. As part of this strategy, the aim is to create the legislative infrastructure for industrial symbiosis practices by 2030.

Strategy	Actions
A-S.8: Increasing use of waste as raw material / resource in production processes	**A-S.8.1** Preparing a National Circular Economy Strategy and Action Plan
	A-S.8.2 Establishing criteria for environmental labelling of different products and services and the dissemination of best practice.
	A-S.8.3 Creating a legal framework to promote industrial symbiosis practices

A-S.9: Reducing GHG emissions from waste handling equipment & vehicles

Waste must be collected separately at source and transported to waste treatment facilities. This operation uses vehicles that produce significant amounts of GHG emissions. Practices such as route optimization and reverse logistics aim to reduce these emissions by encouraging the use of electric vehicles and alternative fuels.

These initiatives, to be implemented by decision makers in the waste sector, are expected to reduce the GHG emissions reported in the Energy Sector Transport subheading.

Strategy	Actions
A-S.9: Reducing GHG emissions from waste handling equipment & vehicles	**A-S.9.1** Ensuring lower fuel consumption by standardizing and optimizing routes for waste collection and transport vehicles in accordance with spatial planning or by using reverse logistics options.
	A-S.9.2 Promoting the use of low-emission, alternative-fuelled and electric vehicles and, in appropriate cases, rail transport in waste collection and transport by means of appropriate incentive mechanisms.

2.6. Agriculture Sector

2.6.1. Current situation

Türkiye is endowed with a unique geography, climate and diversity of natural resources. Although these advantages give the chance of growing numerous agricultural products, they come with many different risks, options and scenarios with regard to adaptation and mitigation of climate change. Agriculture sector emission sources include soils where chemical fertilisers are used, rice cultivation, field burning and urea application in crop production; and in the case of livestock breeding, enteric fermentation generated by consumption of feed and manure management.

The agriculture sector has a significant place in Türkiye, because it meets food needs of the population of 85 million and constitutes 6% of the country's GDP and exports as well as 16% of employment [6]. Furthermore, the sector plays a substantial role by providing income to all actors in the agricultural system ranging from production to consumption such as input suppliers, farmers, merchants, workers, exporters, importers, stores, carriers, wholesalers and retailers. On the other hand, Türkiye is a primary producer and exporter of agricultural goods in global markets.

Table 24. Agricultural lands in Türkiye, 2022 [19]

	Thousand hectares	%	%
Grains and other crops	19,470	81.6	
Sown area	16,510		
Fallow land	2,960		
Area of fruits, beverage and spice crops	3,671	15.4	
Area of vegetable gardens	718	3.0	
Area of ornamental plants	6	0.0	
Total cultivated agricultural area	23,864	100.0	62.0
Land under permanent meadows and pastures	14,617		38.0
Total agricultural land	38,482		100.0

In accordance with TURKSTAT data, total agricultural land in Türkiye corresponds to 38 Mha in 2022, 23.9 Mha of which is cultivated area and 14.6 Mha is permanent meadows and pastures. Field crops are grown in 81.6% of the cultivated area, fruits in 15.4% and vegetables in 3.0%. Fallow land makes up 3 Mha of the area where field crops are cultivated [19] (Table 24). The last agricultural census in Türkiye shows that approximately 3 million agricultural enterprises have on average 6 ha of agricultural land and most are family farms.

Field crops are grown in 19 Mha of the cultivated agricultural land. In this regard, top three categories are wheat (34.1%), barley (16.4%) and maize (4.7%) which are in the cereals group. Sunflower is the most grown product among oil crops, sugar beet and cotton are the most

commonly cultivated crops whereas chickpeas, beans and lentils rank first among legumes and the most grown fodder crops are clover, vetch and sainfoin [19] (Table 25).

Table 25. Cultivation area, production and yield of field crops grown in Türkiye, 2022 [19]

Products	Cultivated Agricultural Land		Production Amount	Yield
	Thousand hectares	%	Tonnes	kg/ha
Wheat	6,629	34.0	19,750,000	2,979
Barley	3,199	16.4	8,500,000	2,657
Maize	912	4.7	8,500,000	9,321
Sunflower	981	5.0	2,550,000	2,599
Cotton	573	2.9	2,750,000	4,798
Sugar beet	298	1.5	19,253,962	64,717
Chickpea	457	2.3	580,000	1,270
Bean	97	0.5	270,000	2,782
Lentil	343	1.8	445,000	1,299
Clover	644	3.3	19,064,213	29,622
Vetch	342	1.8	4,020,433	11,750
Sainfoin	162	0.8	1,786,207	11,038
Other	1,873	9.6		
Fallow land	2,960	15.2		
Total land of field crops	19,470	100.0		

Field crops are usually produced through traditional methods. About 45,000 farmers grow organic plants in an area of 311,000 ha while 10,000 farmers implement the Good Agricultural Practices (GAP) in an area of nearly 207,000 ha. Organic agriculture and GAP are performed in 1.5% and 1.1% of the total cultivated agricultural land, respectively.

In line with the "Use of Chemical Fertilisers" data published by TURKSTAT and MoAF, nitrogen fertiliser is the most commonly used chemical fertiliser in Türkiye. As of 2022, 5.9 Mt of physical fertilisers and 2.3 Mt of plant-based fertilisers were consumed. Of the latter, 1,579,000 tonnes were nitrogen (N), 236,000 tonnes were phosphorus (P) and 108,000 tonnes were potassium (K) fertiliser (Figure 22). The average amount of plant-nutrient-based fertilisers used in 2022 corresponds to 97 kg/ha. Of the 11.3 Mt fertilisers consumed in the same year, 7.5 Mt make up nitrogen fertiliser, 3.5 Mt phosphorus fertiliser and 261,000 tonnes potassium fertiliser (Figure 21).

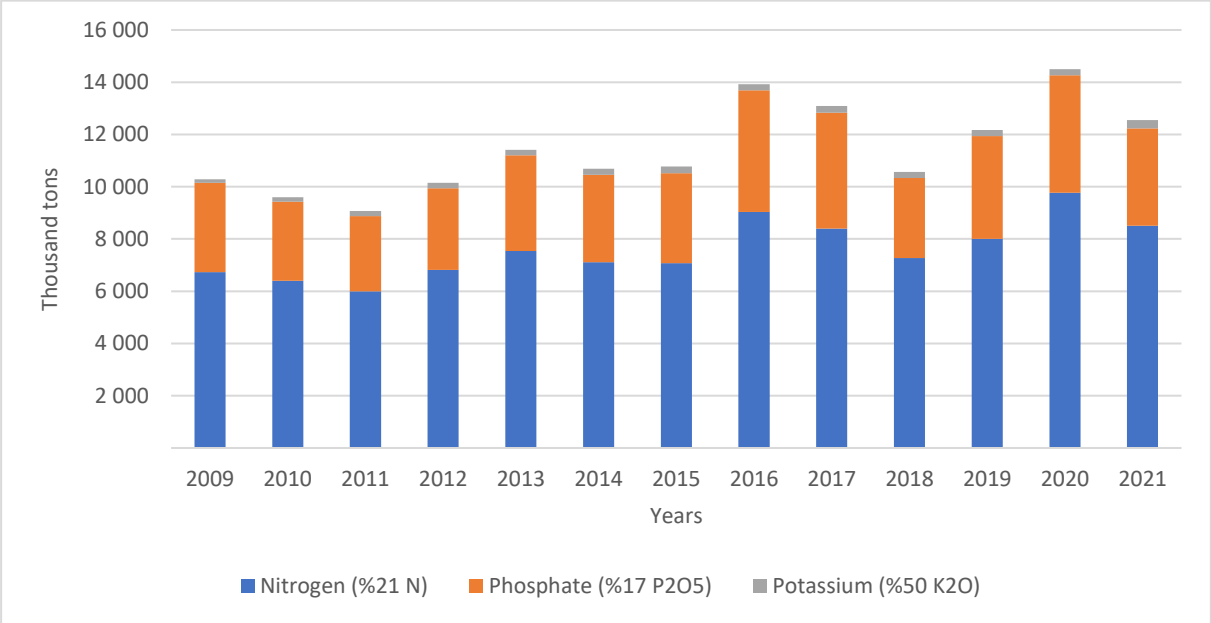


Figure 21. Use of chemical fertilisers in Türkiye [20]

The number of livestock in Türkiye rises owing to the supports provided to meet the animal protein needs of the growing population. In 2022, there were 17 million cattle, 45 million sheep and 12 million goats, and 22 Mt of milk and 2 Mt of red mead were produced (Figure 22). Moreover, poultry raising developed. Again in 2022, 2.4 Mt of chicken and 20 billion chicken eggs were produced [21].

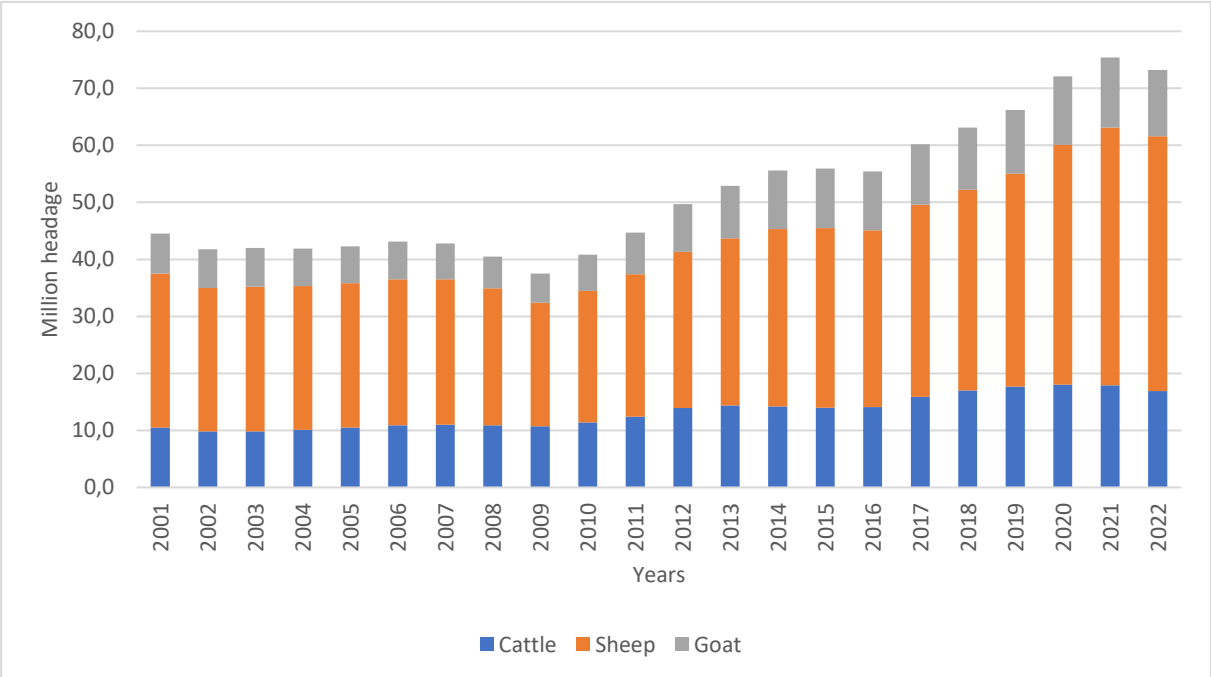


Figure 22. Number of livestock in Türkiye [21]

Figure 23 indicates GHG emissions from agriculture sector in Türkiye. In parallel with the climbing livestock number and use of chemical fertilisers, agriculture sector GHG emissions go up by years.

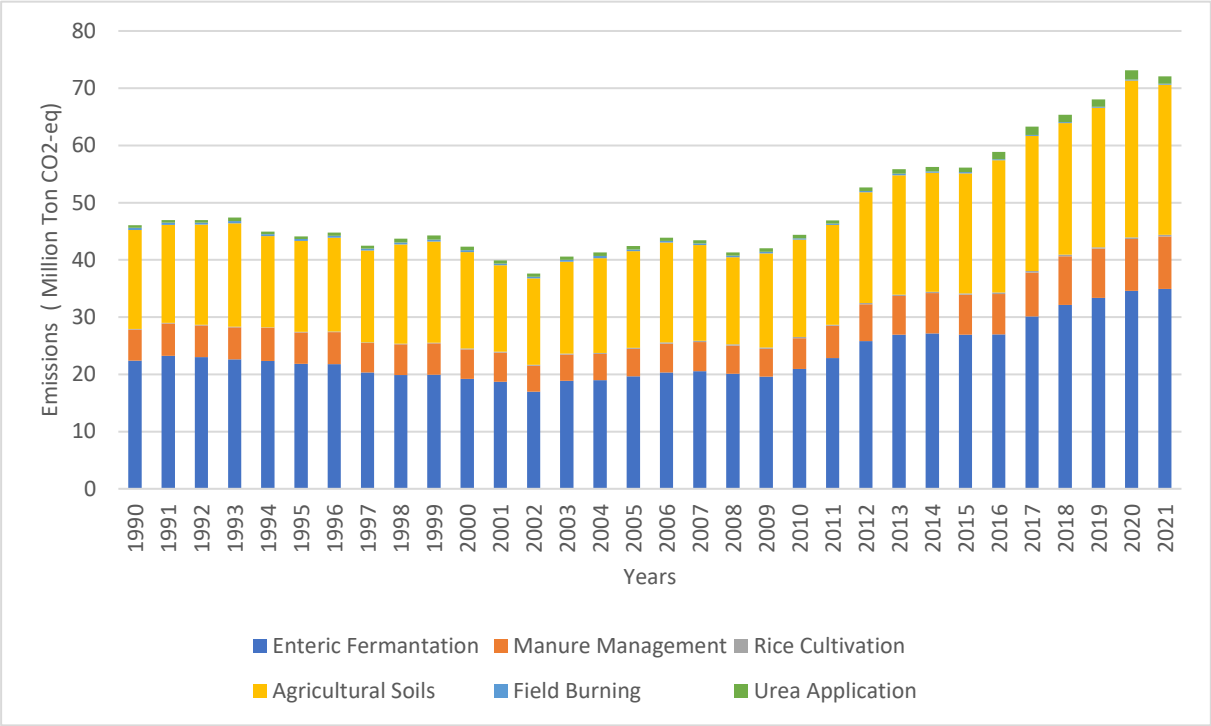


Figure 23. Greenhouse gas emissions from agriculture sector in Türkiye [1]

The emissions from agriculture sector which were 46 Mt $CO_{2\text{-eq}}$ in 1990 reached 72 Mt $CO_{2\text{-eq}}$ by 2021 [1]. (Table 26, Figure 23)

Table 26. Greenhouse gas emissions from agriculture sector in Türkiye, Mt $CO_{2\text{-eq}}$ [1]

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Enteric Fermentation	22.40	23.22	23.02	22.64	22.34	21.82	21.79	20.31	19.89	19.96	19.23	18.71	16.97	18.87	18.97	19.68
Manure Management	5.44	5.66	5.53	5.60	5.79	5.52	5.57	5.17	5.35	5.45	5.14	5.10	4.54	4.60	4.59	4.78
Rice Cultivation	0.10	0.10	0.09	0.10	0.09	0.11	0.13	0.12	0.14	0.15	0.13	0.13	0.13	0.14	0.16	0.18
Agricultural Lands	17.31	17.15	17.53	18.08	15.93	15.87	16.39	16.02	17.31	17.64	16.87	15.11	15.10	16.05	16.59	16.88
Field Burning	0.35	0.36	0.34	0.37	0.32	0.33	0.34	0.35	0.38	0.34	0.34	0.32	0.33	0.33	0.36	0.30
Urea Application	0.46	0.44	0.46	0.63	0.45	0.43	0.53	0.53	0.66	0.73	0.62	0.53	0.53	0.57	0.63	0.61
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Enteric Fermentation	20.35	20.58	20.08	19.61	20.95	22.85	25.79	26.91	27.15	26.95	26.98	30.11	32.14	33.37	34.61	34.95
Manure Management	5.03	5.08	4.93	4.86	5.39	5.64	6.43	6.77	7.07	6.96	7.06	7.70	8.51	8.60	9.06	9.14

Rice Cultivation	0.21	0.20	0.22	0.21	0.20	0.20	0.25	0.23	0.23	0.24	0.24	0.23	0.25	0.26	0.26	0.27
Agricultural Lands	17.42	16.74	15.25	16.47	17.01	17.42	19.33	20.90	20.76	21.01	23.15	23.61	23.02	24.34	27.39	26.25
Field Burning	0.29	0.26	0.26	0.29	0.22	0.23	0.22	0.24	0.22	0.17	0.16	0.17	0.16	0.16	0.17	0.16
Urea Application	0.59	0.57	0.56	0.59	0.64	0.56	0.64	0.81	0.79	0.81	1.30	1.45	1.26	1.29	1.66	1.30

Enteric fermentation constitutes greater part of the agriculture sector emissions. Its share in the total agriculture emissions is equal to 49%. Enteric fermentation is followed by agricultural lands (36%) and manure management (13%). Total share of the urea application, Field Burning and rice cultivation is about 2% (Figure 24) [1].

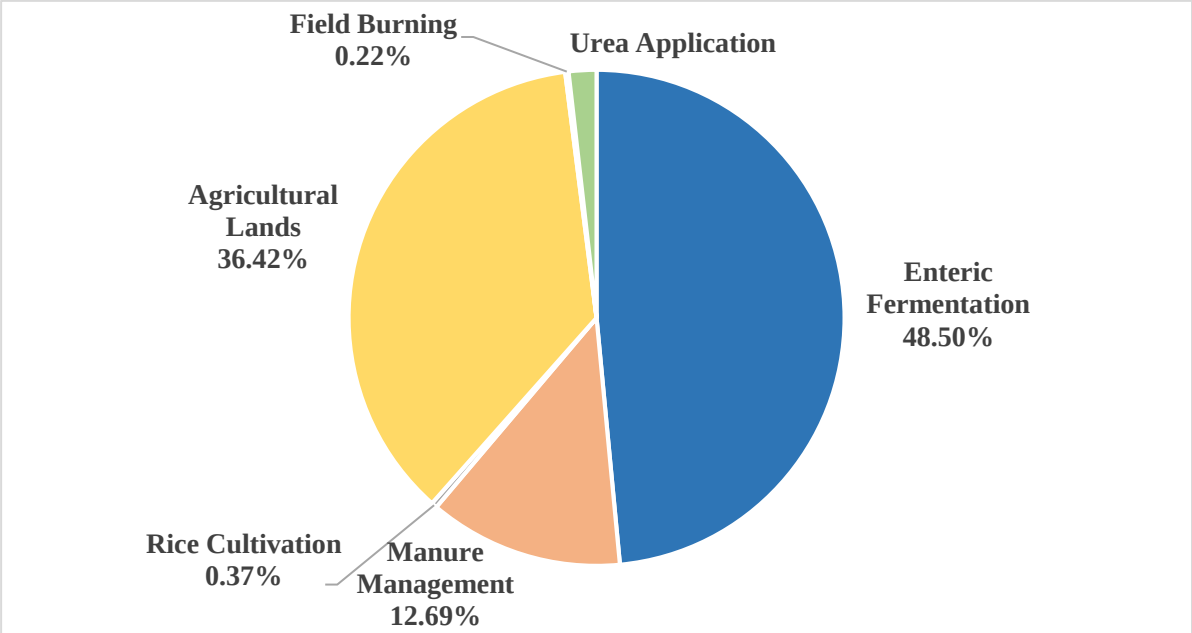


Figure 24. Shares of greenhouse gas emissions from agriculture sector in Türkiye by source, 2021 [1]

The key legislation and policy and strategy papers relating to the agriculture sector in Türkiye are given in Table 27 and Table 28.

Table 27. Key legislation on agriculture sector

Key Legislation	Purpose and Scope
Law on Soil Conservation and Land Use (Law No. 5403)	The purpose of the law is to ensure soil conversation and development, classification of agricultural lands, determination of sizes for minimum- and sufficient-revenue-earning agricultural lands, prevention of land disaggregation and planned use of the minimum- and sufficient-revenue-earning agricultural lands in line with the principle of sustainable development prioritising environment.

	The law covers principles and procedures on the classification of lands and soil resources based on scientific rules, determination of sizes for minimum- and sufficient-revenue-earning agricultural lands, prevention of land disaggregation, preparation of land use plans, assessment of their social, economic and environmental dimensions through participatory methods throughout the conversation and development process, prevention of non-purpose and wrong utilization and setting of the protective procedures, and the relevant duties, powers and responsibilities.
Law on Agriculture Reform Regarding Land Arrangement in Irrigation Areas (Law No. 3083)	The purpose of the Law is to ensure that in irrigation areas and areas deemed necessary by the President, the soil shall be efficiently operated and operation thereof shall be protected, that maximum economic yield shall be achieved from unit area, agricultural production shall be raised and utilized continuously and employment opportunities in this area shall be increased, that farmers with inadequate soil or no soil shall be provided and supported with state-owned lands and shall be trained in order to establish agricultural family enterprises, that the agricultural lands which were fragmented in a way that hinders economic production, shall be subject to aggregation through expansion when needed and within the bounds of possibility; that fragmentation and shrinking of the agricultural lands shall be prevented so that the owner family will be able to live off and make use of its workforce in a sufficient manner; that allocation of agricultural lands for other purposes shall be regulated when it is mandatory; that utilization method for the complete agricultural land shall be identified; and that ownership and disposal procedures for the immovables in other areas deemed necessary by the President shall be subject to regulations due to national security.
Regulation on Control of Water Use and Reduction of Water Losses in Irrigation Systems	Pursuant to the regulation, irrigation efficiency should be boosted to 55% until 2024. The regulation aims to ensure efficient use of the irrigation water, reduction of losses, prevention of its unauthorized use, supply and distribution of irrigation water and decrease in the relevant usage costs, and to consolidate the coordination between institutions for use of agricultural water.

Table 28. Relevant policy papers relating to agriculture sector

Policy Papers	Goals and Objectives
Twelfth Development Plan 2024-2028	The plan, covering the years 2024-2028, offers a long-lived Türkiye perspective depending on the vision of creating “a stable, strong, prosperous, environmental-friendly and disaster-resilient Türkiye which produces high added value based on advanced technology

	and sustains fair income distribution in the Century of Türkiye". Fundamental purpose is to create an organized and competitive agriculture sector that approaches economic, social and environmental dimensions of production holistically, uses technology at a high and efficient level, undertakes planned production in the framework of supply-demand equilibrium, utilizes natural resources in an effective and sustainable manner and ensure sufficient and balanced nutrition of society. The plan includes the following measures: Smart agricultural practices shall be scaled up by means of the work models based on digitalization, artificial intelligence and data. Conversation, sustainable use and effective management of agricultural lands shall be achieved. Crop production shall take place in a planned way, yield shall be boosted by using qualified genetic materials and production shall be raised through development of greenhouse growing, particularly in the metropolitan areas with dense population. Investments for improving the infrastructure shall continue in order to achieve food security. Besides, food inspection and services for fighting against plant and animal diseases and pests shall be implemented. Prevention of waste and development of the infrastructure and practices for efficient stock management and marketing shall be ensured to achieve food security. Environmental-friendly agricultural practices shall be supported and promoted with the aim of mitigating GHG emissions as part of the environmental protection and combating climate change.
Medium Term Programme 2024-2026	Medium Term Programme contains the following relevant actions: ensuring more effective utilization of soil and water resources by extending climate change-resilient agricultural practices and new technologies, maintaining the training, capacity building, R&D projects and efforts for early warning system in order to combat agricultural drought, increasing arable and irrigable areas by implementing compelling and encouraging regulations for the protection of agricultural lands, prevention of their use outside intended purpose and effective use.
Strategic Plan of the Ministry of Agriculture and Forestry 2019-2023	In the Strategic Plan, mission was set as "ecological resource management acting as a model on global scale". On the other hand, the plan adopted the mission of "assuring food security, security of food supply and human health through ecologic and value-added plant and livestock breeding by mobilizing ecologic resources of our country in an efficient, productive and sustainable manner under the development model of these resources." The plan consists of 7 goals. Objectives of MoAF in the Strategic Plan 2019-2023 are listed as follows:

	- Raising the capacity to cope with climate change, erosion and desertification - Detecting and preventing land degradation and erosion - Measuring possible effects of climate change on agriculture and developing recommendations for taking measures Some of the actions and strategies set as part of these objectives are: compliance and measures against the effects of climate change on agriculture and R&D projects for identifying agricultural drought and reducing its impacts; promotion of the R&D projects for measurement, monitoring and mitigation of the GHG emissions from agricultural activities (plant-based and livestock); development of preventive measures against climate change-driven land degradation and erosion in agricultural land and grasslands; calculation and reporting of GHG emissions and sinks originating from land use and changing land use in our country; updating of the National Agricultural Drought Strategy and Action Plan for 2023-2027, increase of the institutional capacity regarding climate change; and expansion of the awareness of climate adaptation.
NDC 2023	Agricultural policies specified by the Nationally Determined Contribution of Türkiye are as follows: controlling methane emissions by regulating animal feed rations; ensuring optimum use of nitrogen fertiliser in crop production; raising fertilisation process in biogas facilities; reducing the use of nitrogen fertilisers alternately with legumes in crop production; improving regulation practices of rational feeding and the number of animals in cattle breeding; using agricultural biomass and fertilisers for electricity generation; mitigation of methane emissions through the advancement of subsurface irrigation system technology in rice production; improving application methods and standards of minerals and organic fertilisers; training farmers on new methods and technologies; reducing the risks against natural hazards for food security with the practices such as crop rotation, use of agrotechnical methods in forecasting, development of soil and water conservation applications, and forecasting and soil conservation practices to reduce drought and wind erosion and dividing up the available water through sectoral use (e.g. irrigation, industry, energy production) and water allocation plans to making use of the volume of available water in every basin and to maintain the ecosystem.
National Climate Change Strategy 2010-2023	Short term, medium term and long-term objectives were set for the mitigation in agricultural sector. Rational fertiliser use will be promoted; carbon emissions will be limited by using modern techniques for irrigation, soil cultivation, pesticide use, etc.; organic agriculture, and production and use of drought-tolerant plants and certified seeds will be supported and increased. Techniques will be developed to boost carbon sequestration in soil and agricultural

	producers shall be encouraged to adopt such techniques. In order to reduce methane emissions from agricultural activities, appropriate livestock feeding methods, manure management and good drainage conditions in rice cultivation will be increased. In agriculture, mitigation and adaptation strategies reinforce each other. Mitigation technologies increase the resilience of farmers to climate change. Thus, mitigation and adaptation in agriculture will be planned collectively, because the synergy to be created by mitigation and adaptation strategies with effective planning and implementation will also lead to effective results in production increase and reduction of poverty.
Climate Change Action Plan of Türkiye 2011-2023	The Climate Change Action Plan covers the following actions. Under the objective of "lowering the increase rate of GHG emissions from plant and animal production", Türkiye's fertiliser consumption inventory will be prepared; analysis-based fertiliser use will be promoted; utilization of animal sourced fertiliser will be raised and farmers will be provided training on this subject; the support programme required for spreading grassland-based animal husbandry will be established; feed ratios will be identified and farmers will be trained to reduce methane gas originating from enteric fermentation; measures will be identified to ensure animal production with high genetic performance for meat and milk production; training programmes will be prepared for management and use of animal-sourced fertilisers and establishment of biogas production facilities.
Climate Adaptation Strategy and Action Plan of Türkiye 2011-2023	The Strategy and Action Plan identifies the provisions relating to data compilation, reporting, monitoring and validation and focuses on five primary areas that are significant for Türkiye in setting the reporting requirements arising from international obligations. They are water resources management, agriculture and food security, natural disaster risk management, ecosystem services, biodiversity and forests and public health. The subjects associated with agriculture are about impact and adaptation.
Green Deal Action Plan 2021	In the Action Plan, the topics on GHG mitigation are development of organic agriculture, reduction of chemical fertilisers, improvement of waste and residue management in agricultural production, land aggregation activities and increase of renewable energy in agriculture.
Water Efficiency Strategy and Action Plan in the Framework of Adaptation to	Action Plan aims to mitigate the impacts of climate change on water supply in all sectors, particularly residential, agricultural and industrial water uses. One of the objectives of the plan is to achieve water recovery of up to 50% by applying clean production techniques and water efficiency measures in industry. In line with this objective, a

Changing Climate 2023-2033	national goal was set, preferred strategies were identified and a 10-Year Industrial Water Efficiency Action Plan was prepared for 2023-2033. The plan contains the strategies below: advancing measurement and monitoring systems as well as creating up-to-date inventories; developing legal regulations and creating incentive mechanisms for the expansion of alternative (non-conventional) water resources; calculating size of the blue and grey water footprint in agriculture and industry, determining measures to reduce it, and establishing incentives and support mechanisms; and conducting studies to take virtual water content into account in international trade of goods.
Climate Council 2022	Some of the decisions taken by the Climate Council are as follows: For combating climate change and reducing GHGs in the agricultural sector, short, medium and long-term national strategies and actions will be formulated and implemented with a focus on farmers. A "Climate-Friendly Agricultural Support Model" will be designed and applied. Agriculture-food value chain will be made sustainable and cyclical by creating an ecosystem-oriented food production model through an integrated approach. In agricultural production, resource efficient consumption of chemical fertilisers and plant protection products will be ensured and monitored. In order to develop organic agriculture in the country, studies will be conducted to raise the production areas and quantities. Necessary studies will be conducted under management and utilization of methane emissions originating from agriculture and waste sectors. For the purpose of reducing the use of chemical fertilisers in agricultural production, effective new generation fertiliser production technologies and the fertilisation systems based on internet of things (IoT), artificial intelligence and sensor technologies will be developed. In line with the zero-waste target, green and environmental-friendly technologies will be upgraded for the production of high economic value biofertilisers (compost, organo-mineral, microbial) protein, dietary fibre and bioactive substances from residues in agriculture and food sector.
National Energy Efficiency Action Plan	Under the Action Plan, the actions below were defined: promoting the replacement of tractors and harvesters with new, energy-efficient ones, switching to energy efficient irrigation methods, supporting energy efficiency projects in the agriculture sector, encouraging the use of renewable energy sources in agricultural production, identifying agricultural by-products and waste potential to produce biomass and promoting its use, supporting energy efficiency in aquaculture sector.

2.6.2. Strategies and actions

In section of agriculture sector, there are seven strategies and actions for reaching these strategies. Relevant strategies cover the mitigation of emissions particularly with respect to the activities that make the highest contribution to GHG emissions, and enhancement of efficiency, implementation of loss, waste & residue and soil management, providing financing to implement actions, and training and capacity-building activities.

Strategy T-S.1: Mitigating methane emissions from livestock breeding

Emissions from livestock have the highest share in the agriculture sector GHG emissions, so regulations on livestock are at the forefront in mitigation of agriculture sector emissions in Türkiye.

In the world, the options for reduction of emissions in livestock concentrate on boosting efficiency in production and resource utilization. Functional practices suggested for reducing emissions in cattle and small ruminant breeding are genetic improvement of livestock, and improvements in their feeding, health, management etc., reuse of manure, their utilization in electricity generation from renewable sources (biogas), achievement of sustainability in intensive production and regulations regarding livestock management in meadows and pasture (rotational grazing and regenerative grazing).

In line with the strategy of ensuring a healthy and sustainable food and animal feed production and developing alternative resources, the options to mitigate emissions from livestock breeding can also be listed as opting of low-emission food such as fowl, and plant-based alternative protein resources, investigation of cellular agriculture (animal proteins and all cells are produced in bioreactors), searching of alternative protein resources as animal feed, developments in the use of synthetic amino acid, algae, fungi, microbial protein and insects instead of high-protein animal feed and reduction of enteric methane emissions with animal feed additives (vegetable oils, seaweed etc.).

For the purpose of reducing emissions in management of enteric fermentation and fertilisers which lead agriculture sector emissions most in Türkiye, the feed additives that repress methane emission in animal feed rations should be researched, defined and approved and their use should be promoted. In this respect, research will be commissioned on the impacts of using animal feed additives in feed rations; a pilot system will be developed to record the feed rations used in big farms; those farms which utilize the additives that repress methane emission in animal feed rations will be identified and training programmes on this subject will be held. Moreover, research for genetic-based animal breeding considering methane emission will be increased, a report that suggests the ideal animal species, breeds and optimum system for each geographical region will be prepared and pilot applications will be put into practice. In order to improve animal manure collection system and methods to make use of manure, application projects will be developed and promoted and pasture land designation, delimitation and improvement works will continue at a rising pace.

Strategy	Actions
Strategy T-S.1: Mitigating methane emissions from livestock b reeding	**T-S.1.1** Conducting R&D studies on investigation, identification, approval and use of the feed additives that repress methane emission in animal feed rations and ensuring the use of approved feed additives
	T-S.1.2 Increasing studies on genetic-based animal breeding considering methane emission
	T-S.1.3 Increasing research studies on alternative feed resources and executing pilot applications
	T-S.1.4 Improving animal manure collection system and manure utilization methods and disseminating improved methods
	T-S.1.5 Supporting sustainable livestock grazing through improving grasslands

Strategy T-S.2: Increasing efficiency in using chemical fertilisers

Excessive use of chemical fertilisers, particularly nitrogen fertilisers, needs to be avoided and fertilisers should be applied at appropriate levels in order to mitigate the agriculture sector emissions. Effective use of fertilisers and improvement of manure management increase food production and reduce emissions. Using the right fertiliser at the right ratio at the right time and place protects soil and water resources as well as ensuring optimum nutrient intake of the plant. Therefore, rational application of chemical fertilisers in crop production and crop rotation with legumes are the most commonly used reduction alternatives.

In this sense, fertiliser consumption inventories will be first improved and training for farmers regarding optimum fertiliser use will be increased. Economic and environmental impact analyses on organic and organo-mineral fertilisers will be conducted. It will be searched to discover the opportunities to use granular and liquid fertilisers from biogas plants and domestic organic waste as green fertiliser and compost. As a result, research and assessment reports will be issued.

In order to reduce the use of nitrogen fertilisers, supports will be expanded for extending crop rotation with legumes. Awareness-raising activities that aim to generalize Good Agricultural Practices (GAP) and organic agriculture will be increased. Climate-friendly and sustainable crop and livestock production application lists will be prepared specific to each of the seven geographical regions, pilot practices will be implemented and training courses will be organized for the purpose of extending the applications and R&D studies to be conducted for climate-friendly, sustainable and digital agriculture.

Strategy	Actions
Strategy T-S.2: Increasing efficiency in using chemical fertilisers	**T-S.2.1** Preparing fertiliser consumption inventories.
	T-S.2.2 Increasing research, training and extension activities to promote rational fertiliser use.
	T-S.2.3 Promoting R&D projects on the use of organic, organo-mineral, compost, green fertiliser etc. as an alternative to chemical fertilisers and disseminating the results of such projects.
	T-S.2.4 Increasing training and extension activities to extend crop rotation with legumes and their cultivation sites in crop production.
	T-S.2.5 Increasing awareness-raising activities that promote Good Agricultural Practices (GAP) and organic agriculture.
	T-S.2.6 Increasing extension activities to speed up R&D studies in climate-friendly, sustainable and digital agriculture and to disseminate results of the studies.

Strategy T-S.3: Reducing use of pesticides and antimicrobials

It is aimed to promote R&D studies aiming at developing the products which are alternative to pesticides and antimicrobials, and to expedite registration processes of the developed products. In this respect, research on alternative agricultural control methods will be encouraged to realize the objective of generalizing registration and use of the newly-developed products.

Strategy	Actions
Strategy T-S.3: Reducing use of pesticides and antimicrobials	**T-S.3.1** Promoting R&D studies to develop alternatives to pesticides and antimicrobials and expediting registration process for such products.
	T-S.3.2 Reducing use of pesticides and antimicrobials and increasing extension activities for use of alternative products registered and licensed.

Strategy T-S.4: Developing loss, waste and residue management in agricultural production

Loss and waste in agricultural production refer to the fall in the quantity and quality of agricultural products which happens at all stages of the products from production to consumption. Agricultural residues are the unused parts of the crops. For example, stubble left in the field after wheat is harvested make up residues. The wheat which falls onto the field during the harvest and is not used later becomes a loss. Bread, the last ring of the chain is a residue if it is not consumed.

Inventory studies on recycling of agricultural waste and residues will be completed. Furthermore, R&D and awareness activities undertaken to reduce food loss and waste will be boosted.

Strategy	Actions
Strategy T-S.4: Developing loss, waste and residue management in agricultural production	**T-S.4.1** Expediting and scaling up R&D studies on reduction of crop losses in crop production and reuse of waste and residues.
	T-S.4.2 Completing inventory studies in recycling of agricultural waste and residues.
	T-S.4.3 Increasing R&D and awareness activities to reduce food loss and waste.

Strategy T-S.5: Increasing efficiency of land and soil management

This strategy aims to prevent non-agricultural use, fragmentation, destruction and misuse of the agricultural lands and to create an infrastructure for planning agricultural production. This will be achieved by completing land aggregation registration activities, preparing current detailed soil maps in accordance with international standards and putting them into use, generalizing and monitoring the activities for mitigating land destruction and increasing the relevant R&D studies, and planning agricultural production on the basis of agricultural basins or enterprises and revising agricultural supports to realize the goals under such planning. Besides, direct sowing methods and reduced tillage procedures, agro-forestry and shelterbelt activities will be extended.

Strategy	Actions
Strategy T-S.5: Increasing efficiency of land and soil management	**T-S.5.1** Completing land aggregation registration activities.
	T-S.5.2 Preparing and putting into use current detailed soil maps in accordance with international standards.
	T-S.5.3 Promoting and monitoring activities to mitigate land destruction and monitored and increasing relevant R&D studies.
	T-S.5.4 Planning agricultural production on the basis of agricultural basins or enterprises and revising agricultural supports to realize the goals under such planning
	T-S.5.5 Increasing extension activities to extend direct sowing methods and reduced tillage procedures.
	T-S.5.6 Extending agro-forestry and shelterbelt activities in cultivated areas.

Strategy T-S.6: Providing farmers with access to affordable financing

In order to mitigate emissions in agriculture sector, additional financing will be required for the practices to be executed, particularly at farmers' level. In the framework of the policy to reduce GHG, environmental impact of the agricultural support and incentives will be analysed and the relevant legislation will be arranged to update such support and incentives as part of the said policy. Data needed to facilitate farmers' collaboration with banks and women farmers' access to loans will be identified. Another goal is to design and implement the programmes for enhancing economic diversity in rural areas. In this context, it is planned to prepare green transformation analysis report and green transformation strategy paper and to improve supporting programmes for rural areas.

Strategy	Actions
Strategy T-S.6: Providing farmers with access to affordable financing	**T-S.6.1** Establishing financing and support models for mitigation activities.
	T-S.6.2 Identifying and sharing data needed to facilitate farmers' collaboration with banks and women farmers' access to loans.
	T-S.6.3 Designing and implementing programmes for enhancing economic diversity in rural areas.

Strategy T-S.7: Promoting training, awareness-raising and capacity-building activities for stakeholders operating in agriculture sector considering gender balance

Training is significant for ensuring that all activities aiming at reducing agriculture sector emission, are embraced and undertaken by the stakeholders of agriculture sector. It is aimed to designate the target audience to be subjected to training for switching to low-carbon production in agriculture sector, in line with the sustainable development goals. Thus, a fair transition process will be implemented with a programme in which social dialogue mechanism functions effectively, everyone is treated equally and green and decent job opportunities are increased. It is planned to provide training to all stakeholders in agriculture sector, especially less privileged groups, farmers and technical workers.

Strategy	Actions
Strategy T-S.7: Promoting training, awareness-raising and capacity-building activities for stakeholders operating in agriculture sector considering gender balance	**T-S.7.1** Identifying target audience to receive training in line with Sustainable Development Goals.
	T-S.7.2 Promoting training and capacity-building activities for stakeholders in agriculture sector.

2.7. Land Use, Land Use Change and Forestry (LULUCF) Sector

2.7.1. Current situation

Türkiye has experienced favourable developments in the last four decades in terms of forest cover. According to forestry statistics, forest cover increased from 20.19 Mha to 23.11 Mha in the 1972-2021 period. The main strategy in the LULUCF sector is defined as "proactive sustainable forest management" as it is essential to focus on enhancing the productivity of ecosystems and forest cover in order to utilise the full mitigation and adaptation capacity of forests, and protect forests from the harmful impacts of climate change and pressure from other land uses.

Since Türkiye is located in an ecologically fragile geographical region, sink areas, especially forests, are considered as the most important basis for combating climate change, erosion and desertification.

The current data of General Directorate of Forestry (GDF) [22] indicates that the forest lands reached 23,245,000 ha as of 2022, and that the area of undisturbed forests over 10%, defined as productive forests, reached 13,707,843 ha. According to the same source, the size of degraded (intermittently disturbed: below 10% cover) forest lands is 9,537,157 ha. It can be said that most of these degraded forest lands are not suitable for conversion to productive forests and some of them should be preserved in their current state for biodiversity. The forest land subject to the national GHG inventory is 22.9 Mha in 2021 in accordance with the EU Copernicus programme, of which 19.7 Mha is forest cover and 3.2 Mha is intermittently disturbed woodland (degraded forest).

According to current GHG inventory data, total emissions in 2021 increased by 157% compared to 1990; sequestration by the LULUCF sector, which covered approximately 30.2% of all emissions in 1990, decreased to 8.3% in 2021. The reason for this decrease is the fact that the increase rate of emissions is higher than the increase rate of sink areas and the factors such as forest fires, drought, etc. threatening the LULUCF sector due to climate change.

With a new system established in 2019 in the General Directorate of Forestry and General Directorate of Agricultural Reform, which are the responsible institutions for LULUCF GHG inventory and reporting (NIR Türkiye, 2023), Türkiye used an international forest definition to ensure international comparability in UNFCCC reports. The calculation differences resulting from this definition are explained in the NIR report. The new system uses sensitive spatial infrastructures enabling the monitoring of land and land use changes. According to the new system, country areas are divided into 8 ecozones.

The data sent by GDF to the Food and Agriculture Organization and published in the Global Forest Resources Assessments report (2020) indicate that the forest land in our country is increasing rapidly (Table 29).

Table 29. Changes in forest lands in Türkiye according to Food and Agriculture Organization Global Forest Resources Assessments Report [22]

	1990-2000	2000-2010	2010-2015	2015-2020
	1000 ha/y			
Forest land expansion (a)	38.71	94.85	110.47	119.18
Afforestation	22.65	62.91	75.36	80.20
Naturally	16.06	31.94	35.11	38.98
Deforestation (b)	2.22	1.38	1.03	1.17
Forest land net change (a-b)	36.49	93.47	109.44	118.01

LULUCF (Land Use, Land Use Change and Forestry) in Türkiye is a net sink based on the growth of wood biomass and forest expansion, where the key sector is forest lands and harvested wood products. The annual GHG sequestration amount, which was 66.5 Mt $CO_{2\text{-eq}}$ in 1990, reached 77 Mt $CO_{2\text{-eq}}$ in 2014, but decreased over time and according to the recent inventory figures, it decreased to 47 $CO_{2\text{-eq}}$ in 2021. Based on the growth and increment figures, due to large forest fires (the 2021 mega fire alone has emissions of about 10 Mt $CO_{2\text{-eq}}$), drought and high wood production, carbon sequestration in 2021 was quite low compared to previous years, being approximately 20 Mt $CO_{2\text{-eq}}$ below the 1990 sequestration level. Approximately half of this decrease is due to the 2021 fires, and the other half is due to climate-related productivity loss and increased wood production due to the utilisation of wood from trees damaged by forest fires and felling in burned areas due to the increasing demands of the wood sector to use domestic materials. [1](Table 30, Figure 25).

Table 30. Total greenhouse gas emissions and LULUCF sequestration in Türkiye, Mt $CO_{2\text{-eq}}$ [1]

	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Total Emissions	219.5	226.8	233.1	240.8	234.4	248.2	267.6	278.8	280.3	277.8	298.9	279.7	285.6	304.8	314.4	337.6
LULUCF Removals	-66.5	-67.4	-67.5	-66.6	-68.0	-67.8	-67.1	-70.4	-70.6	-71.2	-68.1	-70.8	-69.3	-71.2	-69.7	-71.8
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Total Emissions	358.0	391.7	388.5	395.2	398.8	428.6	448.2	440.2	459.5	475.0	501.1	528.6	523.1	508.7	524.0	564.4
LULUCF Removals	-71.5	-71.8	-67.9	-70.8	-71.9	-75.6	-73.4	-76.5	-76.9	-72.8	-73.1	-75.0	-69.8	-62.7	-56.9	-47.1

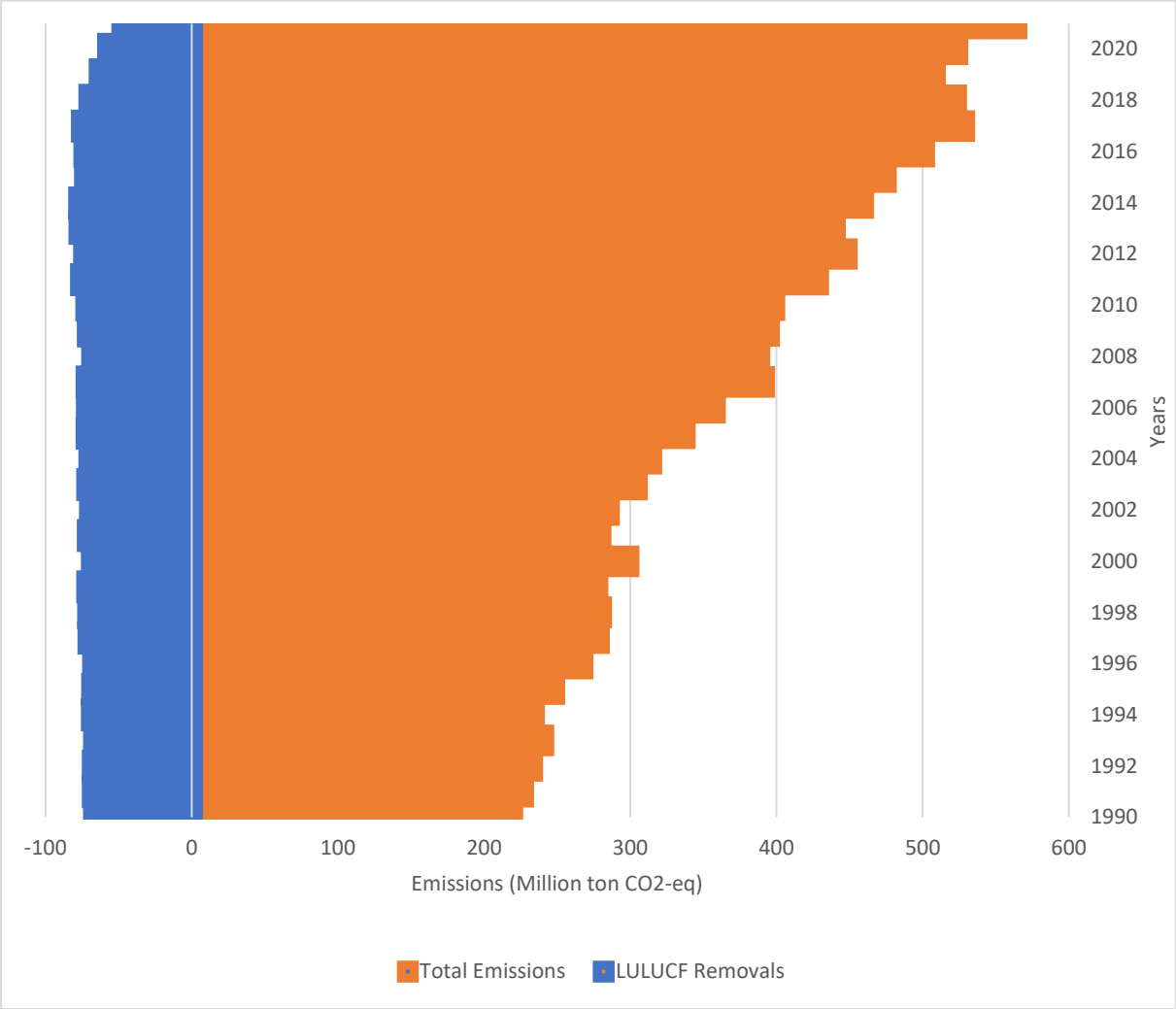


Figure 25. Total greenhouse gas emissions and LULUCF sequestration in Türkiye [1]

A detailed analysis of sequestration of the LULUCF sector indicates that there is a decrease in the forest category after 2017 (Table 31, Figure 26).

Table 31. Distribution of LULUCF sector sequestration by categories, Mt $CO_{2\text{-}eq}$ [1]

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Forest land	-63.60	-65.08	-64.72	-64.85	-66.61	-65.33	-65.33	-67.73	-68.22	-68.69	-64.38	-67.31	-65.54	-66.81	-65.61	-66.60
Agricultural land	0.00	0.08	0.15	0.14	0.22	0.15	0.14	0.08	0.15	0.11	0.04	0.09	0.31	0.18	0.43	0.21
Grassland	0.00	0.08	0.19	0.25	0.38	0.29	0.42	0.23	0.41	0.42	0.10	0.12	0.29	0.18	0.41	0.26
Wetland	0.00	0.04	0.09	0.25	0.22	0.16	0.12	0.15	0.37	0.26	0.18	0.01	0.15	0.03	0.08	0.03
Settlement		0.03	0.07	0.10	0.10	0.13	0.14	0.13	0.16	0.16	0.14	0.15	0.20	0.19	0.27	0.27

Other lands		0.04	0.13	0.14	0.17	0.18	0.25	0.17	0.29	0.26	0.19	0.18	0.28	0.22	0.39	0.31
Harvested Wood Products (HWP)	-2.91	-2.57	-3.38	-2.62	-2.51	-3.36	-2.88	-3.49	-3.77	-3.73	-4.34	-4.04	-5.00	-5.18	-5.70	-6.28
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Forest land	-66.93	-66.14	-62.38	-65.08	-65.87	-67.51	-65.70	-67.47	-67.11	-62.94	-62.37	-65.32	-60.19	-54.00	-48.22	-33.95
Agricultural land	0.44	0.29	0.47	0.21	0.45	0.20	0.42	0.22	0.31	0.46	0.34	0.37	0.35	0.38	0.39	0.39
Grassland	0.55	0.42	0.61	0.49	0.64	0.40	0.64	0.47	0.75	0.98	0.66	0.71	0.71	0.77	0.78	0.72
Wetland	0.11	0.05	0.14	0.10	0.41	0.17	0.61	0.38	0.17	-0.02	0.27	0.29	0.22	0.19	0.19	0.23
Settlement	0.35	0.35	0.38	0.36	0.43	0.39	0.44	0.40	0.42	0.42	0.41	0.41	0.41	0.41	0.42	0.42
Other lands	0.49	0.46	0.54	0.43	0.60	0.44	0.65	0.54	0.56	0.76	0.62	0.65	0.65	0.67	0.70	0.69
Harvested Wood Products (HWP)	-6.50	-7.25	-7.70	-7.41	-8.59	-9.74	-10.51	-11.08	-12.05	-12.54	-13.10	-12.13	-11.97	-11.22	-11.28	-15.73

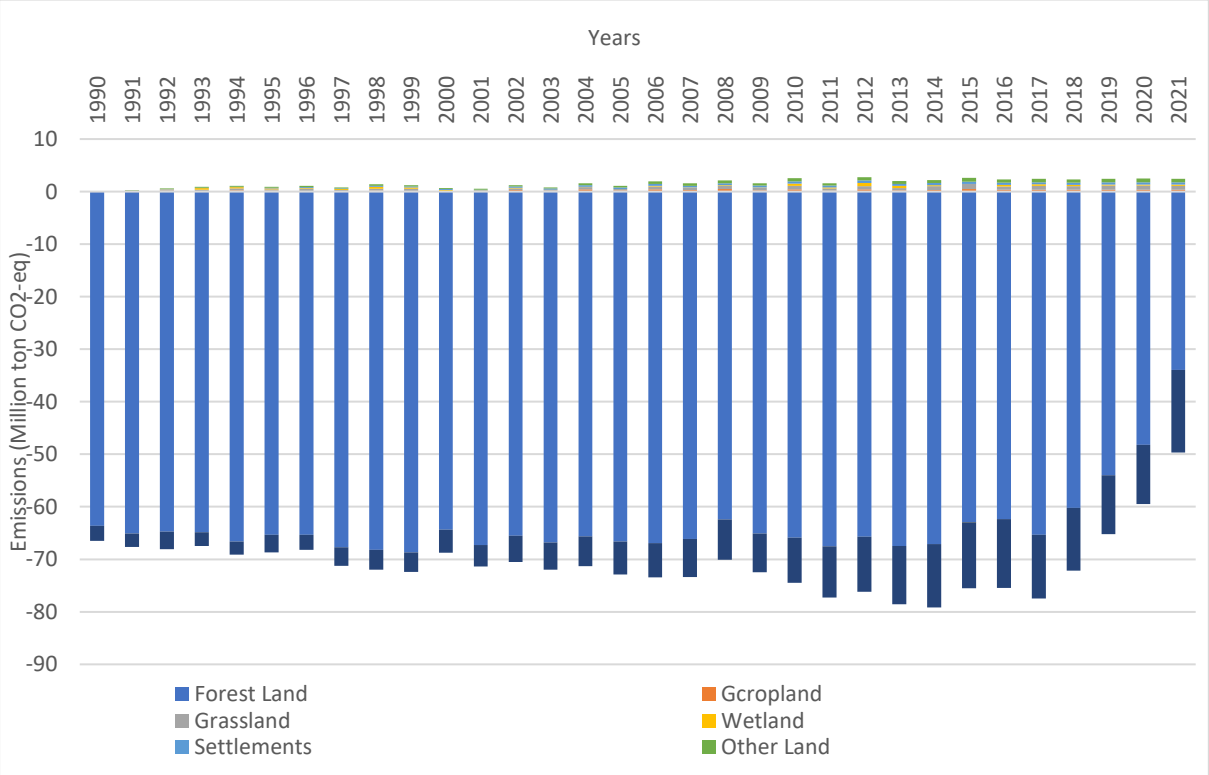


Figure 26. Distribution of LULUCF sector sequestration by categories. [1]

According to the recent GHG national inventory report (NIR, 2023), the mitigation capacity of the LULUCF sector is substantially left to forest management and secondly to the Harvested

Wood Products subcategory, while the contribution of lands converted to forest land (LCFL) remains limited. While all other five land categories are net emission sources according to the recent inventory data (1990-2021), lands converted to forest lands (LCFL) and Harvested Wood Products (HWP) with forest lands have mitigated close to 47.15 Mt $CO_{2\text{-eq}}$. However, the share of AR was less than 1% of total mitigation. As a result, harvested wood products (HWP) and Forest Management (FLRFL) accounted for up to 96% of emissions and sequestration in the sector. Additionally, these two categories (FLRFL and HWP) are key categories of the sector in the GHG inventory of Türkiye (ranking in the top 95% of total emissions). However, HWP pool should not be considered as true sequestration. Carbon sequestered in the HWP category has a half-life depending on the product type. Therefore, according to the IPCC 2006 guidance, at the end of the half-life, all sequestered carbon is released to the atmosphere. In other words, it is a carbon reserve assumed to be released into the atmosphere over time instead of sudden oxidation (emission) of the wood raw materials produced, and it is in fact a spread of emission over time. The release of this reserve into the atmosphere slows down as long-life wood products are used. From another point of view, the use of these harvested wood products instead of products with high carbon footprint will contribute to the decrease due to the substitution of products with low carbon footprint [1] (Table 32).

Table 32. Greenhouse gas emissions/sequestration of LULUCF categories in 2021 [1]

-47,145.76	NET
-33,605.74	Forest lands (+10,000 Forest fires emissions included) (FL)
-339.71	Lands converted to forest lands (LCFL)
387.48	Agricultural lands (CL)
722.48	Grasslands (GL)
229.99	Wetlands (WL)
420.85	Settlements (SL)
685.80	Other lands (OL)
-15,700	Harvested wood products (HWP)
-49,670.49	**Sequestration**
2,446.59	**Emissions (Excluding forest fires)**

The key legislation as well as policy and strategy papers relating to Turkish LULUCF sector are shown in Table 33 and Table 34.

Table 33. Key legislation on LULUCF sector

Key Legislation	Purpose and Scope
Forest Law (Law No. 6831)	The purpose of the Forest Law is to ensure the protection, management, and development of forests, as well as the ownership of forests by the state. The law requires the state to combat all

	kinds of damages to forests (human-induced damages such as forest fires, felling, clearing, utilisation, grazing, occupation; abiotic damages such as snowfall, blizzards, avalanches and snow fractures; and biotic damages such as insects, fungi, and animal related damages). Furthermore, utilisation of forests, management and all kinds of permits and easements are undertaken by the state. The state has the responsibility to undertake activities to increase the number of forests (afforestation, combating erosion, soil conservation operations against disasters such as floods, landslides, avalanches, etc., reconstruction, rehabilitation works, integrated and holistic basin projects to combat desertification and to improve the socio-economic status of people residing in forest villages). Additionally, the follow-up and penal provisions of forest offences are clearly stated in the law.
Law on Pastures (Law No. 4342)	The purpose of this Law is to ensure the identification, delimitation and allocation of grasslands, summer quarters, winter quarters and public grasslands and pastures, previously allocated by various laws or in use since ancient times, on behalf of village or municipal legal entities, their use in accordance with the determined rules, increasing and maintaining their productivity through maintenance and rehabilitation, continuous supervision of their use, their protection and changing their intended use when necessary.
Law on Soil Conservation and Land Use (Law No. 5403)	The purpose of the law is to lay down principles and procedures for soil conversation and development, classification of agricultural lands, determination of sizes for minimum- and sufficient-revenue-earning agricultural lands, prevention of land disaggregation and planned use of the minimum- and sufficient-revenue-earning agricultural lands in line with the principle of sustainable development prioritising environment.

Table 34. Key policy papers relating to LULUCF sector

Policy Papers	**Goals and Objectives**
Twelfth Development Plan 2024-2028	Forests resilient to climate change will be established and management plans will be developed to increase the sink area functions of forests. The contribution of forests to combating disasters, drought, and desertification, protecting biodiversity and water resources, improving ecosystem services and balancing land degradation, as well as to health, food, tourism and energy sectors will be increased. The use of forest products for the longest possible period within a circular economy will be encouraged, and their reuse and recycling rates will be increased. Voluntary carbon market and green certification practices relating to forestry will be developed. Internationalisation of Turkish companies in the forestry sector will

	be supported. Forestry statistics will be harmonised with international standards. Forest-based products and services will be diversified with a focus on exports in accordance with the principles of sustainable forest management, and the share of sector in the economy will be increased. Preventive measures against forest fires will be increased and firefighting capacity will be enhanced.
National Climate Change Strategy 2010-2023	The National Climate Change Strategy covering the period 2010-2023 includes short-, medium- and long-term strategic objectives. Such objectives include evaluating the status of the forestry in Türkiye with a focus on deforestation and forest degradation, which are of critical importance in terms of combating climate change, and developing strategies to address the problems; afforesting and rehabilitating 2.3 Mha of land under the National Afforestation Campaign; establishing a central geographical information system for all land use categories in Türkiye and developing a monitoring model based on maps and satellite data to calculate the changes between land use categories; promoting the increase of open green space systems in urban areas and improving urban forestry.
National Climate Change Action Plan 2011-2023	In the scope of the action plan; under the objective of increasing the amount of carbon sequestered in forests, preparation and implementation of a new action plan for 2013 and following years in terms of carbon sequestration of Afforestation Action Plan; under the objective of integrating the climate change factor into land use and land use change management strategies until 2015; encouraging energy forestry on lands ecologically and economically inconvenient for agricultural use; enhancing the protection status of peat bogs in Türkiye, taking into account their high carbon sequestration properties; determining the carbon sequestered in settlements. Among the actions under the objective of enhancing institutional capacity is the restructuring of the Climate Change and Bioenergy Working Group established within GDF.
National Action Plan to Combat Desertification 2015-2023	The Plan includes the objectives of improving degraded forest lands with appropriate techniques and methods in order to increase forest cover; protecting and developing natural resources with a holistic and participatory approach in accordance with the principles of sustainable land management.
National Water Basin Management Strategy 2014-2023	The Strategy includes the following objectives relating to climate change: implementing erosion control, afforestation and in-forest grassland improvement projects on 1,620,000 ha of land until 2023; increasing normal/productive forest lands, which currently account for 50% of forests in the basins, to 75% in 2023, to be achieved in degraded forest lands with improvement and afforestation activities; increasing the amount of carbon sinks, which is currently 15.5 Mt per year, to 16.7 Mt in 2015 and 20 Mt in 2023.

Strategic Plan of the Ministry of Agriculture and Forestry 2019-2023	In the Strategic Plan, the vision is "a model ecological resource management on a global scale" and the mission is "to mobilise the ecological resources in our country in an effective, productive and sustainable manner with a development model perspective and to ensure economic security, food supply security and human health through ecological, plant and animal added value". There are seven objectives in the plan and the objectives relating to climate change in the 2019-2023 Strategic Plan of MoAF are as follows: - Increasing the capacity to combat climate change, erosion, and desertification - Identifying and preventing land degradation and erosion - Measuring the possible impacts of climate change on agriculture and developing preventive measures Within the scope of these objectives; adaptation and measures against the impacts of climate change on agriculture and R&D projects for determining agricultural drought and reducing its impacts, measurement-monitoring and mitigation of GHG emissions from agricultural activities (crop and livestock) and expansion of R&D projects for low carbon agriculture, development of measures to prevent land degradation and erosion due to climate change in agricultural lands and grassland lands, actions and strategies such as calculating and reporting GHG emissions and sinks originating from land use and land use change in Türkiye, updating the Agricultural Drought Mitigation Strategy and Action Plan of Türkiye so as to cover years 2023-2027, increasing institutional capacity on climate change, and raising awareness on climate adaptation.
General Directorate of Forestry Strategic Plan 2019-2023	GDF Strategic Plan presents objectives under four goals: (G1): To Protect Forests and Forest Resources Against Biotic and Abiotic Pests, (G2): Develop Forests, Increase Efficiency and Expand Lands, (G3): Provide Social Benefits from Goods and Services Produced by Forests, (G4): Improve Institutional Capacity. The objectives within the scope of G1 are to increase preventive measures and strengthen response capacity in combating forest fires; to monitor the health of forest ecosystems and to preserve forest existence and health primarily through natural and naturally appropriate preventive measures. The objectives within the scope of G2 are to increase the fertile forest area to 14 Mha; to increase the implementation rate from 9% to 100% in a total potential area of 330,000 ha determined to be suitable for industrial afforestation; to increase the forest cover to 30% of the country's total surface area; to combat erosion in order to reduce soil loss and to improve grassland improvement studies. Within the scope of G4, to complete the information systems and technology infrastructure; to develop and scale up the forest information system.

Climate Council 2022	Outputs and decisions of the Climate Council relating to the Land Use sector include promotion of sustainable land use, prevention of erosion and degradation, environment-based solutions, preservation of wetlands, restoration and protection of ecosystems (forest, grassland, wetlands, etc.). Carbon stocks will be preserved through protective land use policies. The report on land use also emphasises the need to harmonise EU policies on forestry and land use with global initiatives. A further decision of the Council is the need for a stronger forest fire management system.
NDC 2023	In the NDC, combating desertification is prioritised for 2023-2030 in the LULUCF sector. Under combating desertification, the objectives include improved/sustainable forest management; promoting nature and/or technology-based solutions increasing sink capacity, such as afforestation, rural and agricultural land conservation and grassland improvement; and preventing, controlling and mitigating desertification and land degradation.

2.7.2. Strategies and actions

The LULUCF sector includes six carbon pools (above and belowground biomass, soil, litter, deadwood and wood products) in six land use categories (forest, agricultural, grassland, wetland, settlement, other). All of forestry except energy use, carbon dioxide emissions and sequestration of the agricultural sector, carbon cycles in grasslands and wetlands, and GHGs sequestered and emitted in settlements are included in the scope of this sector. Therefore, LULUCF action plan is relating to multiple subsectors. However, since the main sink area is forests and the agriculture sector is addressed separately in the Action Plan, the emphasis of the LULUCF sector in the Plan is on forests. Five key policies are included within the scope of this sector. Sectoral framework transition projects are proposed to implement and strengthen these strategies in the following years.

Strategy L-S.1: Increasing GHG sequestration annually by protecting and sustainably managing ecosystems and increasing sink areas, and reducing ecosystem-based emissions

This strategy constitutes the basis of LULUCF policies. The basis of the sector is to continuously increase the sink capacity in carbon pools annually. As the sink capacity increases, annual carbon sequestration also increases. The sink capacity can be increased primarily by the correct use of land and good management of the ecosystems on it. Increasing the sink capacity in forests is mainly possible in two ways: first, carbon-oriented forest management, and second, conservation of ecosystems. By implementing this conservation-utilisation balance correctly in the forestry category, carbon will be sequestered in ecosystems and long-life wood products, and substitution benefits will be provided by reducing the use of fossil-fuelled alternative products.

This group of actions aim to increase the live biomass per unit area in all ecosystems, particularly forests, over time, to protect it and partially to preserve it in long-life wood

products. Balanced forest management and conversion of all activities into carbon positive is required for maximum carbon sequestration. This is called "carbon-oriented forest management" or "advanced forest management" and constitutes the basic component of climate-friendly forestry.

Two approaches are proposed for afforestation. The first one is basin-based planning of afforestation. This will facilitate the integrated management of mitigation and adaptation in the LULUCF sector. For instance, conflicts relating to mitigation such as afforestation, forest management and grassland improvement may have a risk reduction effect against disasters such as floods and droughts. The other approach is proactive afforestation. Proactive forest management can also be included in this approach. The important point is to consider a management approach in which all activities are planned, particularly afforestation and restoration, taking into account the possible impacts of climate change by evaluating the medium- and long-term effects.

Strategy	Actions
SL-S.1- Increasing GHG sequestration annually by protecting and sustainably managing ecosystems and increasing sink areas, and reducing ecosystem-based emissions	**L-S.1.1** Developing and monitoring sector-wide strategies, action plans, macro-planning, and targets, particularly in forestry and agriculture, in a manner to increase sink capacity
	L-S.1.2 Transitioning to a proactive, result-oriented, and basin-scale approach in afforestation/rehabilitation/restoration, taking into account the integrity of ecosystems, and creating a basin-based afforestation roadmap
	L-S.1.3 Identifying potential areas suitable for afforestation/plantation by supporting geographical information systems and remote sensing methods in addition to field measurements
	L-S.1.4 Protecting soil carbon sinks by enhancing the combat against land degradation, erosion-sedimentation, and desertification due to land misuse
	L-S.1.5 Promoting digitalisation across the sector to cover all land types (wetlands, grasslands, etc.), especially forestry and agriculture
	L-S.1.6 Initiating technical and legal arrangements to prevent emissions from all practices that may damage forests and other land uses
	L-S.1.7 Developing and disseminating carbon, water and biodiversity objective functions in forest planning and management in technical terms
	L-S.1.8 Increasing the technical capacities of institutions by conducting applied pilot studies with Climate Change Focused Framework Transition Projects
	L-S.1.9 Increasing the effectiveness of regulations to limit human activities that may damage natural life and ecosystems in and around forests, wetlands and forests close to urban areas

	L-S.1.10 Establishing a technical and legal mechanism in cooperation with municipalities and relevant ministries to determine, monitor and increase the proportion of woody green spaces in urban areas
	L-S.1.11 Promoting projects and studies for the restoration and rehabilitation of river corridors and ecosystems in agricultural lands, grasslands, wetlands, and settlements
	L-S.1.12 Supporting poplar, fruit farming, olive farming and climate-friendly agricultural practices in agricultural areas, especially women and young entrepreneurs, technically and financially with new incentives
	L-S.1.13 Strengthening and promoting incentives for afforestation of fast-growing and income-generating species in unproductive agricultural lands, unless it is possible to restore these lands to agriculture
Strategy L-S.1: Increasing GHG sequestration annually by protecting and sustainably managing ecosystems and increasing sink areas, and reducing ecosystem-based emissions	**L-S.1.14** In all land planning scales and processes, focusing on nature-based solutions (NBS) that will increase green carbon sink capacity instead of grey solutions in a manner to prioritise upstream basin management
	L-S.1.15 Preparing and putting into effect an action plan for the rehabilitation of grassland areas in a manner to increase soil carbon stock annually in the period between 2025-2038
	L-S.1.16 Implementing and promoting climate-friendly agricultural practices in agricultural lands in a manner to increase soil carbon stock annually in the period between 2025-2038
	L-S.1.17 Disseminating good practices (nature-based solutions, biochar, reduced ploughing, etc.) that promote soil fertility and carbon stock increase in all land uses
	L-S.1.18 Identifying desertified areas subject to erosion and land degradation, monitoring these areas with various indicators, particularly soil carbon stocks, and developing and disseminating basin management practices and tools to find solutions
	L-S.1.19 Increasing the total amount of protected areas and developing site-specific management strategies to enhance the mitigation and adaptation capacities of these areas
	L-S.1.20 Reducing pressures on wetlands, protecting them from harmful impacts, especially drainage and pollution, and rehabilitation of damaged wetlands
	L-S.1.21 Enhancing the process for prevention of forest fires, early detection of fires and early and effective response to fires
	L-S.1.22 Increasing the use of technology in firefighting, increasing the efficiency of resource utilisation with artificial intelligence supported decision support systems

	L-S.1.23 Increasing the proportion of land and marine protected areas to 30% in line with the targets of the Kunming-Montreal Global Biodiversity Framework adopted by the 15th Conference of the Parties to the Convention on Biological Diversity and the EU Biodiversity Strategy
	L-S.1.24 Preparing an Ecosystem-Based National Management Strategy for Protected Areas, Ecosystem-Based Climate Change Action Plan and ensuring their integration into management plans
	L-S.1.25 Preparing an Ecosystem-Based National Spatial Planning Strategy and integrating it into Spatial Plans

Strategy L-S.2: Ensuring transition of forestry and agricultural enterprises to a circular bioeconomy with high added value

This action set aims to contribute to value-added, sustainability and circular economy, and includes actions that will ensure the efficient use of wood raw material and mitigate the increasing demand.

The action set also includes actions aimed at enabling all small, medium and large enterprises to get a larger share of global markets.

Strategy	Actions
Strategy L-S.2: Ensuring transition of forestry and agricultural enterprises to a circular bioeconomy with high added value	**L-S.2.1** Supporting family , small/medium and large-scale enterprises with high production and marketing capacity that can reach international markets in the non-wood forest products sector by increasing and expanding the support, supporting social projects to reduce wood consumption in forest villages and supporting economic income-increasing activities to prevent rural migration
	L-S.2.2 Within the scope of climate-friendly agriculture, support for family, small/medium and large-scale enterprises with high production and marketing capacity that can reach international markets should be maintained and increased, and the sector, especially women entrepreneurs, should be supported technically and financially with new incentives
	L-S.2.3 Expanding and enhancing incentives for forest industry companies to increase added value, efficiency and recycling

Strategy L-S.3: Doubling project supports to 2020 level by 2030 to strengthen sector in terms of R&D and innovation

In order to improve added value and circularity in the land use sector, support for R&D and innovation should be increased. Supports will increase the added value of production in the sector and thus improve the efficient use of raw materials and increase the use of technology in combating climate change, particularly in forestry and agriculture.

The strategy aims to scale up R&D and innovation across the sector in a wide spectrum from GHG inventory reporting to the use of new technologies in combating climate related external factors and disasters.

Precision forestry, digitalisation and the increase in efficiency to be achieved through the use of artificial intelligence are also included in this strategy. In the sector, these two approaches can create a positive impact especially in decision support processes and can lead to efficiency increases and related emission reductions over time. Additionally, the use of technology and innovation have a key role in identifying and mitigating climate-related negative impacts. Strengthening ecosystem monitoring systems in this context is also important in terms of understanding the impacts of climate change. In parallel with international studies on carbon sequestration by plants growing in aquatic environments, which is called blue carbon, the subject of increasing R&D supports is also included.

Drought is another subject where R&D and innovation activities should be increased. There is a serious risk of drought in our country. It can cause a decrease in production in agriculture, a decrease in yield in forestry and grasslands, as well as diseases and deaths. It is aimed to increase support for integrated innovative solutions to mitigate the effects of drought in this context.

Strategy	Actions
Strategy L-S.3: Doubling project supports to 2020 level by 2030 to strengthen sector in terms of R&D and innovation	**L-S.3.1** Strengthening the combat against disaster and climate change-related forest damages that may cause damage to sink areas through technological, preventive, and educational projects and increasing R&D support on the effects of these damages on carbon stocks
	L-S.3.2 Enhancing technical infrastructure for GHG emission and sequestration calculations
	L-S.3.3 Supporting research on the technology-based requirements of the Land Use and Forestry sector and developing a sector specific project incentive mechanism
	L-S.3.4 Increasing the use of digitalisation, remote sensing methods (such as satellite-based, drone use) and robotic technologies to improve productivity in forestry and land use
	L-S.3.5 Supporting projects for conducting climate projections and vulnerability analyses for forestry and land use by using projection outputs
	L-S.3.6 Promoting scientific studies and technologies for integrated drought solutions, including the development of drought-resilient species, taking into account biodiversity in afforestation and planting
	L-S.3.7 Integrating data-driven artificial intelligence into decision-making processes
	L-S.3.8 Ensuring more effective participation in ecosystem monitoring networks such as Long-Term Ecological Monitoring Network, ICP Forests, Integrated

	Carbon Observation System and similar ecosystem monitoring networks, encouraging long-term experimental basin and ecosystem monitoring studies for detailed and precise monitoring and analysis of precipitation-runoff processes, promoting them in different ecozones of our country
	L-S.3.9 Supporting research on the development of underwater ecosystems in coasts and seas and creating blue carbon sinks

Strategy L-S.4: Increasing number of technical personnel and professionals trained in carbon management in sector

The strategy aims to develop sector-wide scientific, institutional, and human capacity. Development of the public and private sector capacities is emphasised. It is also emphasised that local governments should be supported in order to ensure the increase and management of green spaces.

Actions on increasing technical and human capacity in various subsections such as forest damages, erosion, desertification, climate-friendly agriculture, wetlands, climate change risks, GHG calculations are included.

Strategy	Actions
Strategy L-S.4: Increasing number of technical personnel and professionals trained in carbon management in sector	**L-S.4.1** Improving scientific, institutional, and human capacity in combating forest losses and damages (fire, disease, etc.)
	L-S.4.2 Raising awareness in combating forest losses and damages (fire, disease, etc.)
	L-S.4.3 Increasing scientific, institutional, and human capacity and awareness on the effects of climate change on desertification and erosion
	L-S.4.4 Improving scientific, institutional and human capacity in combating wetland losses and damages (drought, drying, misuse of wetlands, etc.), raising awareness
	L-S.4.5 Providing climate-friendly and low-carbon agriculture training for researchers, technical personnel and farmers
	L-S.4.6 Providing training on wetland conservation and climate-friendly fisheries practices to technical personnel and people engaged in agriculture, livestock and fisheries with traditional methods in wetlands
	L-S.4.7 Providing training for technical personnel on climate-friendly forestry, especially on mitigation and management of climate change risks
	L-S.4.8 Preparing and implementing a training programme for municipalities on river corridor restoration
	L-S.4.9 Training technical personnel on GHG emission and sequestration calculations and international reporting obligations in the LULUCF sector

	L-S.4.10 Establishing climate change units in institutions directly relating to the management and reporting of sink areas, improving institutional capacity on the basis of experts and authority

Strategy L-S.5: Developing technology infrastructure for LULUCF sector

Two actions are included in this strategy. First, it is aimed to develop early warning systems and to support R&D and innovation investments in this field.

The second action is on remote sensing technologies and modelling in GHG projections and monitoring. It is aimed to support technology-oriented cooperation projects between private sector and public sector and start-up companies established by young entrepreneurs and to increase the level of technology in the sector continuously.

Strategy	Actions
Strategy L-S.5: Developing technology infrastructure for LULUCF sector	**L-S.5.1** Developing and operationalising estimation and early warning systems for drought, floods, forest fires and landslides
	L-S.5.2 Increasing R&D capacity for the estimation and verification of emissions and sequestration on land use with remote sensing and atmospheric models, particularly developing satellite-based observation, and analysis systems

2.8. Cross-Cutting Issues

2.8.1. Just Transition

When implementing mitigation and adaptation policies as part of climate response, it is important to achieve just transition by providing all segments of society with justice and employment, without further deepening social inequalities. In this context, the principles of gender equality and women's empowerment become even more significant among the core principles that determine development efforts. This approach, developed with a human-oriented understanding of development, emphasizes women's empowerment and grounds on the effective engagement of women and men in development-related processes. Actions are taken at different levels to develop a gender sensitive approach and create an inclusive content in climate change policies and mitigation strategies. They include:

- Grounding on an inclusive approach which is careful to ***leave no one behind*** (e.g., identifying and taking measures to overcome the obstacles to engagement in training planning by different segments of society),
- Ensuring that everyone equally benefits from any activity ***for an approach that avoids the reproduction of inequality***,
- Identifying and taking measures against the issues that may lead to the reproduction of inequality in existing activities ***for a corrective approach to achieve equality***.

Implementing a transformative approach to achieve equality involves identifying how the social segments that require support/empowerment, including women, affect the topic of climate change and mitigation, how they are affected by it, and how they will be affected by the actions to be taken in this regard, and acting with an inclusive and participatory approach in all the processes.

However, social differences such as gender, age, disability status, educational level, socio-economic status, etc., may lead to differences in terms of the impacts to result from the mitigation strategies and actions and the outputs and results they aim to achieve. For this reason, it is important that the following measures are taken in implementing mitigation actions.

Analytical Steps: Analytical studies and informed, concretely applicable and inclusive works will be executed in order to take into consideration the needs that vary based on gender, age, disability and socio-economic status, etc.

Steps towards Engagement and Inclusion: As a core principle that enables the inclusion of different experiences in the actions and the visibility of different needs, engagement is regarded as the most important tool of inclusion. It is important to employ methods such as analysing the areas of concern and priority of stakeholders and ensuring favourable conditions for engagement suitable for anyone, with a view to ensuring the effective participation of women

and men from different sectors, areas of concern, socio-economic levels, disability status, age range, etc., in the processes relating to climate change.

Approach to Include People with Disability: The United Nations launched its Disability Inclusion Strategy in June 2019. In 2020, it was aimed to make disability a part of the climate change solution process by ensuring the engagement of individuals and disability organizations in Conference of the Parties meetings, other United Nations climate change meetings and organizations and by identifying the relevant capacity-building tools, in order to improve the inclusion of people with disabilities.

Educational and Informative Steps: During the training and capacity-building activities, an inclusive approach covering different subject positions such as gender, age, disability and socio-economic status will be developed in the informative phases and the stages of designating the target audience. All materials to be used in the training and capacity-building activities will be presented in accessible formats.

Sustainable lifestyles and sustainable patterns of consumption and production are essential to reduce GHG emissions and enhance resilience to the unavoidable impacts of climate change. Success in this regard requires broad cooperation among public and private sectors, NGOs, and people.

Education, training, public awareness, public engagement, public access to information, as well as encouraging all members of society to engage in the climate action through international and national cooperation, are key to successful climate actions. In this context, it is essential to plan for the inclusion of the youth in the process, as well.

Steps for Adopting New Technologies: Given the central importance of developing and deploying new technologies for mitigation targets, gender, disability, and age variables should be considered in identifying the target audience for the adoption of technological innovations.

Steps relating to Green Jobs and Research and Development Activities: In the context of the action plan, progress with egalitarian principles is crucial in the development process of new jobs, new research areas, and new sectors that have emerged within the framework of the green economy across all sectors.

Steps relating to Incentives, Employment and Entrepreneurship: The Action Plan includes actions covering entrepreneurship support, incentives for enterprises, and creation of employment areas. In order to avoid creating new inequalities and maintaining the existing ones and to encourage equality and take transformative steps, an inclusive and egalitarian approach will be taken in implementing these actions.

Regarding all these factors, the topic of just transition stands out especially in the context of European Green Deal studies. After the European Green Deal was announced by the EU on 11 December 2019 in line with the target to make Europe the first climate neutral continent by

2050, the Türkiye Green Deal Action Plan was published on 16 July 2021. Additionally, with Türkiye becoming a Party to the Paris Agreement in 2021, the process of transitioning to green economy with a net zero emission target gained momentum. With the Presidential Circular No. 2021/15, 20 specialized working groups including the Specialized Working Group on Just Transition Policies governed by the Ministry of Labour and Social Security were created with a view to following up on the implementation of the Green Deal Action Plan, guide the efforts in line with global policy developments, and ensure the required coordination. In this context, based on the requirement to manage the green economy transformation process with a just transition process and to leave no one behind, efforts were launched to minimize the direct impacts of climate change, the changes that will be introduced by the green economy transformation efforts to respond to climate change, and the adverse impacts on labour markets and all social segments, particularly women and vulnerable groups.

As indicted in the Climate Council, climate response cannot be considered separately from economic and social components. Türkiye aims to formulate a "holistic" just transition strategy which includes macro-economic and social impacts on a national and regional scale, especially in terms of employment and energy poverty; the differences based on gender, disability and age, as well as impact analyses for such differences. This strategy will be prepared in a way to enable the energy sector to align with low-carbon transformation, without obstructing the right to economic and social development. Policies and programmes on training and employment should be prepared in coordination in order to manage just transition in all sectors, and especially in the energy sector. It is aimed to execute the just transition process through a programme in which the social dialogue mechanism is effectively implemented, no one is left behind, and decent green job opportunities are increased. The energy sector must be transformed without causing energy poverty. In this context, with the approach to leave no one behind in energy and technology transformation, it is aimed to ensure that women, in particular, and vulnerable groups are included in decision-making processes and can make effective use of vocational training and skills development programmes and job opportunities.

Strategy	Actions
AG-S.1: Building capacity for just transition and employment transformation	**AG-S.1.1** Formulating a national just transition strategy to achieve green transformation in labour markets and ensure a transition in just conditions
	AG-S.1.2 Improving the just transition process and social dialogue
	AG-S.1.3 Identifying the new qualification and skill requirements that will be introduced with the green transformation process in the labour demand; conducting studies for edification of labour with new qualifications in line with sectoral and regional needs
	AG-S.1.4 Creating standards for the occupations that will change or newly emerge during the green transformation process
	AG-S.1.5 Conducting studies to harmonize the learning curriculum and higher education programmes with the designated new skills framework, preparing and

	implementing training programmes to meet the labour need that will emerge with the transformation process
	AG-S.1.6 With an approach to leave no one behind in the green transformation process of sectors, ensuring the engagement of women, in particular, and groups that require special policies in decision-making processes, and conducting studies to ensure their effective use of vocational training, skills building and development programmes and job opportunities
	AG-S.1.7 Preventing the transformation in the energy sector to lead to energy poverty and conducting studies to protect vulnerable groups in this framework

2.8.2. Carbon pricing mechanisms

Carbon pricing instruments encourage emissions reduction by setting a price for GHG emissions. The price signal created changes the patterns of consumption and investment and aligns economic development with climate response.

There are two most commonly practiced examples of carbon pricing instruments in the world. One is the Emissions Trading System (ETS), which is a market-based approach, and the other is the carbon tax. ETS is a mechanism that is used to set a cap for GHG emissions causing climate change in order to achieve mitigation targets. Enabling the internalization of a negative externality, this system allows for the cheapest mitigation options to be implemented. In sectors and production methods where mitigation cannot be achieved, allocation (emission permit) is purchased from the market while allocation prices are determined by market dynamics. Furthermore, companies that have completed their green transformation through ETS are able to make use of their excessive allowances on the market, covering a certain extent of their investment costs.

Strategy K-S.1: Establishing Emissions Trading System (ETS) in Türkiye

Measures for the establishment of ETS in Türkiye are laid down in the Medium Term Programme 2024-2026. Türkiye also aims to establish ETS in line with the 2053 Net Zero Emission Target and Nationally Determined Contributions.

The main design element of ETS is to determine which sectors will be covered by the system. The actions under the first strategy include determining the scope of ETS according to existing infrastructure needs and projections. Additionally, Türkiye seeks to align its environment policies with the European Union and accordingly, aims to expand the scope of ETS in line with our current nationally determined contributions and the European Union legislation.

After the scope of ETS is determined comes the stage of setting an emissions cap for this scope. At this point, the total amount of emissions (cap) that the enterprises in the scope can release in a certain period will be determined in the context of the current situation of sectors, mitigation targets, international treaties and national circumstances.

The carbon pricing implemented to achieve climate targets may increase the production costs of facilities in the short term. In regions where this increase is high and in facilities experiencing intense international competition, production may shift to countries that lack carbon pricing or that are relatively more relaxed in this regard. In this direction, economic, financial, social and technical impact analyses will be performed for energy-intensive sectors, taking into account the 2053 Net Zero Emission Target, assumed, current and projected carbon prices, and the risk of carbon leakage.

The market phase begins after the allocation of allowances within the cap designated under ETS. Allowance prices are determined by supply and demand dynamics whereas demand and supply are shaped in the framework of mitigation targets and costs. When examining the examples of ETS worldwide, having financial actors in addition to the sectors covered by ETS in these markets is regarded as a design option. In order to consider this issue, evaluations will be conducted on the inclusion of financial actors in the ETS market and legislation will be formulated on financial actors.

The allocation of allowances involves two main methods which are free allocation and auction. The auction method enables income generation from ETS. Accordingly, it is envisaged to conduct planning studies and prepare the necessary legislative and practical infrastructure in order to use the income to be generated as part of ETS in a way that secures low-carbon economy and just transition in line with the green development target, by also considering the Nationally Determined Contributions.

A pilot period will be launched to ensure the testing of methodologies, institutions and policies and provide participants with a learning period before the implementation phase of ETS. During this period, it is aimed to determine the problems relating to data collection and database management, the potential disruptions in implementing the current legislation, and determine the need for new legislation. In this context, one of the activities under the action includes establishing a pilot period which facilitates the system entry of the facilities that are covered by ETS before the ETS implementation period.

Offsetting is a mechanism which enables the creation and sale of carbon credit as a result of reducing the emissions not covered by ETS or removing the emissions in the atmosphere. Allowing the use of offsets in ETS will increase the mitigation options in the market and enables the installations covered by ETS to reduce their mitigation costs. In this context, options and conditions will be defined for offset mechanisms that can be used to fulfil these obligations.

It is aimed to consider the needs arising from international conditions in the design of EU-ETS and make designs accordingly, by also taking into consideration the Carbon Border Adjustment Mechanism (CBAM), which was built to prevent the production in the EU from shifting to countries without carbon pricing due to the increased costs caused by the carbon fees under the European Union ETS, or similar applications.

Free allocation of allowances in ETS design can be based on the historical emissions of installations or a sector-specific benchmarking. Accordingly, it is expected to conduct sectoral benchmark / historical emissions (grandfathering) studies to determine the distribution of free allowances and the implementation period.

As ETS will be implemented for the first time in Türkiye, information and visibility studies will be conducted on ETS applications in order to ensure active stakeholder engagement and inform the stakeholders.

Strategy	Actions
Strategy K-S.1: Establishing Emissions Trading System (ETS) in Türkiye	**K-S.1.1** Determining the scope and functioning of ETS in line with the current infrastructure, needs and projections
	K-S.1.2 Expanding the scope of ETS and ensuring the necessary legislative alignment in line with the current Nationally Determined Contributions, in a way that ensures structural alignment and by taking into account the EU legislation
	K-S.1.3 Determining the emissions cap in the by taking into consideration the economic and social impacts, sectoral potential and technological means in the context of the current situation of emission-intensive sectors, mitigation targets, international treaties and national circumstances
	K-S.1.4 Conducting economic, financial, social and technical impact analyses for energy-intensive sectors by taking into consideration the 2053 Net Zero Emission Target, assumed, current and projected carbon prices, international adaptation and mitigation policies and the risk of carbon leakage
	K-S.1.5 Conducting evaluation studies for including financial actors in the ETS market and formulating legislation on financial actors
	K-S.1.6 Planning for the use of the income to be generated as part of ETS in a way that secures low-carbon economy and just transition in line with the green development target by taking into account the Nationally Determined Contributions, and preparing the necessary legislation and practical infrastructure in this regard
	K-S.1.7 Establishing a pilot period to facilitate the system entry of the installations covered by the scope before the ETS implementation period
	K-S.1.8 Defining the national and international offset mechanisms and conditions that can be used in fulfilling the obligations
	K-S.1.9 Assessing the ETS design needs arising from international conditions and making designs accordingly
	K-S.1.10 Conducting sectoral benchmark/historical emissions (grandfathering) studies to determine the distribution of free allowances and implementation period
	K-S.1.11 Conducting information and visibility studies on ETS practices on a sectoral basis

Strategy K-S.2: Conducting infrastructure studies on other carbon pricing instruments

The second strategy of carbon pricing mechanisms is to conduct infrastructure studies on other carbon pricing instruments.

By implementing complementary carbon pricing within or outside the ETS, emission reductions can be incentivized through carbon pricing in designated sectors. In this context, analyses will be conducted regarding the role of a complementary carbon pricing mechanism to ETS which is planned to be established in Türkiye.

Türkiye applies an indirect carbon pricing method based on fuel. Transforming the indirect pricing under Special Consumption Tax (SCT) into open pricing is an internationally applied method that can contribute to emissions reduction. In this context, it is aimed to conduct studies to add carbon content into the tariffs list No. (I), annexed to the Special Consumption Tax Law in the Turkish Taxation System, with a view to designing a complementary carbon tax mechanism to establish a national carbon price where required.

Strategy	Actions
Strategy K-S.2: Conducting infrastructure studies on other carbon pricing instruments	**K-S.2.1** Conducting analyses on the role of a complementary carbon pricing mechanism to the Emissions Trading System in the carbon pricing process
	K-S.2.2 Conducting studies to add carbon content into the tariffs list No. (I), annexed to the Special Consumption Tax Law under the Turkish Taxation System

Strategy K-S.3: Building infrastructure for voluntary carbon market and national offset system

Voluntary carbon market is a non-central market in which private actors exchange, on a voluntary basis, certified carbon credits representing the removal or reduction of GHGs in the atmosphere.

The Communiqué on Voluntary Carbon Market Registration, published in the Official Gazette of 09.10.2013, regulates the principles and procedures regarding the registration of the projects developed with a view to achieving GHG emissions reduction and obtaining carbon certification in Türkiye. The Communiqué includes an obligation whereby project owners, international voluntary carbon standards institutions and independent verifiers must register through the registration system. As a component of this strategy, it is aimed to update the existing voluntary carbon market registration system.

It is also aimed to build a national carbon crediting system, due to the possibility that the ETS could allow for offsetting and since the reduction achieved in the country as a result of Article 6 of the Paris Agreement is important for the Nationally Determined Contributions. As part of this target, evaluation studies will be conducted to build a national carbon offset system.

Accordingly, it is aimed to determine the sectoral focal points of the national system that is aligned with international systems, developing national standards and methodologies aligned with international standards for selected sectors, and conducting authorization and accreditation works required for the verification system.

Works will be undertaken for the effective promotion of the voluntary carbon market in order to ensure stakeholder engagement and information on the studies on the national offset system and voluntary carbon market.

Strategy	Actions
Strategy K-S.3: Building infrastructure for voluntary carbon market and national offsetting	**K-S.3.1** Updating the existing carbon market registration system
	K-S.3.2 Conducting evaluation studies to establish a national carbon offset system
	K-S.3.3 Determining the sectoral focal points of the national system, developing international standards and methodologies in line with international standards and building infrastructure for selected sectors
	K-S.3.4 Conducting the authorization and accreditation works required for a verification system under the national system that is aligned with international systems
	K-S.3.5 Working on the effective promotion of the voluntary carbon market

Strategy K-S.4: Conducting studies to evaluate participation in Article 6 of Paris Agreement

Article 6 of the Paris Agreement includes the market-based mechanisms and non-market approaches that member states can use to achieve the targets set in their Nationally Determined Contributions. Market-based mechanisms, which are addressed under Articles 6.2 and 6.4. Article 6.2 covers the transfer of internationally transferred mitigation outcomes (ITMO) through intergovernmental bilateral agreements, whereas Article 6.4 represents the central market built under UNFCCC, in which the private sector can also participate. Article 6.8 of the Agreement, on the other hand, covers supporting all other actions, which are non-market-based and do not include mitigation outcome transfer, required for the parties to achieve their climate targets.

The final strategy involves conducting studies to evaluate participation in the collaborative approach practices of Article 6 of the Paris Agreement. The activities planned as part of the evaluation include studies on determining Türkiye's role in the applications relating to Article 6 of the Paris Agreement, and sectoral evaluation studies on participation in the pilot applications launched by various countries for the purpose of such applications.

Strategy	Actions
Strategy K-S.4: Conducting studies to evaluate participation in Article 6 of Paris Agreement	**K-S.4.1** Conducting studies to determine Türkiye's role in the applications relating to Article 6 of the Paris Agreement as part of Nationally Determined Contributions
	K-S.4.2 Conducting sectoral evaluation studies on participation to the pilot applications launched by various countries in the applications covered by Article 6 of the Paris Agreement

3. Climate Change Mitigation Strategy and Action Plan (CCMSAP)

3.1. Energy Sector

Action No	Action	Responsible Institution	Relevant Institutions	Implementation Period	Monitoring Indicators	Description
Strategy E-S.1: Reducing carbon intensity of electricity generation						
E-S.1.1	Increasing installed solar power capacity	MoENR	EMRA TEIAS TEDAS	2024-2030	● Installed power capacity reaches 32,900 MW	In line with the Türkiye National Energy Plan, it is aimed to increase the amount of installed solar power capacity, which is a renewable energy source, in the supply of electricity.
E-S.1.2	Increasing installed wind power capacity	MoENR	EMRA TEIAS	2024-2030	● Installed power capacity reaches 18,100 MW	It is aimed to increase the installed wind power capacity in line with Türkiye National Energy Plan. It is aimed to focus on applications that will increase the lifetime of wind and solar power plants through innovative maintenance and repair techniques, and create standards for the disposal of the power plants after decommissioning without harming the environment.
E-S.1.3	Increasing installed hydropower capacity	SWH MoEUCC	MoENR EMRA EUAS TEIAS TEMSAN	2024-2030	● Installed power capacity reaches 35,100 MW	It is recommended to continue assessing the economic potential of hydropower, and implement pumped-storage HPP applications by considering economic, social and environmental factors.
E-S.1.4	Increasing both installed geothermal and biomass power capacity	MoENR MoAF MoEUCC	EMRA TEIAS Municipalities	2024-2030	● Geothermal and biomass installed power capacity reaches 5,100 MW in total	It is aimed to increase the total installed geothermal and biomass power capacity, which are renewable energy sources, in line with the Türkiye National Energy Plan.
E-S.1.5	Boosting hydrogen use in electricity generation and increasing installed electrolyser power capacity during the plan period	MoENR	TENMAK EMRA TEIAS BOTAS	2024-2030	● Electrolyser installed power capacity reaches 2,000 MW ● Roadmap on Electrolyser	It is aimed to increase the installed power capacity as required by the Türkiye Hydrogen Technologies Strategy and Roadmap and the Türkiye National Energy Plan. It is aimed to increase the use of green hydrogen as an energy storage and flexibility instrument in electricity generation from

					Techniques is developed	renewable energy sources. It is aimed to follow the principle recommended in EU's 4th Energy Package, to meet the renewable electricity generation which is required for hydrogen production from the additional resource that is allocated for hydrogen production.
E-S.1.6	Developing a biomass roadmap	MoAF MoENR MoEUCC	EMRA Universities Private sector organizations	2024-2025	● Roadmap is developed	It is aimed to increase the installed biomass power capacity, which is listed as another renewable energy source in the Türkiye National Energy Plan, and update the legislation in line with the EU legislation.
E-S.1.7	Supporting R&D activities to mitigate carbon intensity in electricity generation	TENMAK	MoIT MoENR MoTF MoAF TUBITAK Universities	2024-2030	● Number of projects supported (count)	It is aimed to support projects in the energy sector, particularly for R&D activities on carbon capture, storage and hydrogen technologies
E-S.1.8	Increasing use of Renewable Energy Source Guarantee System (YEK-G) and green tariff	EMRA	MoEUCC EXIST MoENR	2024-2025	● YEK-G utilization rate	It is aimed to develop supply- and demand-side instruments through renewable energy support mechanisms
E-S.1.9	Increasing distributed renewable energy applications for small-scale grid users, and residential units in particular	EMRA	MoENR MoT MoIT MoAF MoTF MoLSS PSB KOSGEB	2024-2025	● Roof type solar power plant installed capacity (kW) for residential users ● Roof type solar power plant installed capacity (kW) for commercial users	It is aimed to increase the use of renewable energy sources to the general public
E-S.1.10	Boosting Renewable Energy Source Area (YEKA) applications and identifying potential YEKAs	MoENR	EMRA TEIAS	2024-2030	● Amount of installed power capacity built with YEKA method (MW)	It is aimed to develop project lists for large-scale applications that will become potential YEKAs on the production side, through renewable energy support mechanisms.

E-S.1.11	Designating a roadmap on wind, solar and wind power technologies	TENMAK	MoTI MoTF MoENR SWH EMRA TEIAS EUAS Universities TUBITAK Private sector organizations	2024-2025	● Roadmap is developed	It is aimed to formulate a strategy on the use of innovative renewable energy sources that are open to improvement
E-S.1.12	Developing and supporting R&D activities on technologies to generate electricity from wave energy	TENMAK	MoIT MoENR MoTF MoTI TUBITAK EMRA TEIAS Universities Private sector organizations	2024-2030	● Number of projects supported (count)	It is aimed to support R&D studies for the use of renewable energy sources that are open to improvement
E-S.1.13	Reducing carbon intensity in electricity generation through increasing low-carbon energy investments	MoENR	EMRA EUAS TEIAS TEDAS	2024-2030	● CO_2 emissions per electricity generation is reduced by 20%	It is aimed to reduce the emission factor, grid emission factor of which is 0.437 kg CO_2/kWh in 2020, to 0.352 kg CO_2/kWh through the new renewable energy installed power capacity
E-S.1.14	Increasing installed nuclear power capacity	MoENR	EMRA EUAS TENMAK TENAS NRA	2024-2030	● Installed power capacity reaches 4,800 MW	It is aimed to increase the installed nuclear power capacity in electricity supply, in line with the Türkiye National Energy Plan
Strategy E-S.2: Coupling electricity sector with other sectors and supporting demand-side engagement						
E-S.2.1	Boosting battery capacity	MoENR	EMRA TEIAS TENMAK	2024-2030	● Battery capacity reaches 2,100 MW	It is aimed to increase storage capacity to ensure the security of electricity supply

			EUAS			
E-S.2.2	Enhancing integration of renewable energy systems into charging infrastructures	EMRA	MoENR MoIT MoEUCC MoTI MoTF TEIAS EXIST	2024-2025	● Number of green charging stations (count)	It is aimed to increase the number of Green Charging Stations described in the Charging Services Regulation
E-S.2.3	Raising awareness of energy efficiency in electricity consumption	MoENR	MoT MoIT EMRA TEIAS EUAS CHE MoNE NGOs	2024-2025	● Number of training, promotion and awareness activities conducted (count) ● Number of mass media used (count)	It is aimed to conduct training and awareness-raising activities to maintain a high level of public awareness on the efficient use of electricity considering gender balance
E-S.2.4	Promoting R&D studies for the use of solar power in agriculture	TENMAK	MoAF MoENR MoEUCC MoIT TUBITAK EMRA	2024-2025	● Number of R&D projects supported (count)	It is aimed to conduct R&D studies to promote R&D on the use of renewable energy in agriculture, in such a way that the studies will not adversely affect agricultural lands
E-S.2.5	Delivering training aligned with green transition on distributed systems and low-carbon energy technologies	MoENR	BOTAS MoLSS MoNE VQA EMRA TEIAS, EUAS TENMAK NGOs Electricity Distribution Companies CHE	2024-2030	● Vocational training is delivered to at least 5,000 personnel ● Training programmes updated and developed (count)	It is aimed to increase qualified labour and green jobs for transformation in energy. Gender balance and equal opportunities will be considered in the training delivered.

			Universities			
E-S.2.6	Developing a white certification system and market in energy efficiency	MoENR	MoTF EMRA EXIST	2024-2027	● White certification system and market built	It is aimed to develop a market that is based on a certification system between energy producers and users, to be significantly used in the energy efficiency and saving of financial instruments. White certification standards will be created and verification processes determined under a regulatory framework. These processes will be monitored and evaluated in a transparent manner
E-S.2.7	Certification of sustainable biogas and green hydrogen, establishing legislation and standards for biogas, conducting works for injection into natural gas networks	MoENR EXIST	MoAF EMRA MoEUCC TENMAK BOTAS	2024-2030	● Certification system built	It is aimed to conduct studies on setting biogas legislation standards in sustainable biogas and green hydrogen certification studies, and injection of biogas into natural gas networks.
Strategy E-S.3: Strengthening electrical infrastructure, and reducing technical loss rate in transmission and distribution by increasing efficiency						
E-S.3.1	Reducing nationwide technical loss rate	EMRA	MoENR TEIAS Electricity Distribution Companies	2024-2030	● Levels of technical loss identified in the region of distribution (%)	It is aimed to reduce the technical loss rate which is currently 12%
E-S.3.2	Extensifying smart meters and supporting R&D activities	EMRA	TEDAS MoENR Electricity Distribution Companies TUBITAK	2024-2030	● Rate of smart meter use (%) ● Number of projects supported (count) ● Rate of transforming existing meters into smart meters each year, starting from 2026 (%)	It is aimed to ensure the integration of digital systems with energy technologies
E-S.3.3	Raising awareness to ensure the energy sector makes more and better use of efficiency boosting projects	MoENR	EMRA	2024-2025	● Number of training sessions delivered (count)	It is aimed to continue training activities to be able to manage the continuously increasing energy demand

E-S.3.4	Strengthening transmission and distribution lines and taking supportive measures for smart grid and micro grid applications to ensure effective system integration of renewable energy sources	MoENR TEIAS TEDAS	EMRA Electricity Distribution Companies	2024-2030	● Reduction in technical loss rate (%) ● Number of micro grids built (count) ● Number of smart grids built (count)	It is aimed to ensure the integration of smart grids with distributed systems, and digital systems with digital technologies
E-S.3.5	Rehabilitating distribution grids, including transformers	TEDAS Electricity Distribution Companies	MoENR MoIT EMRA EUAS Electricity Generation Companies	2024-2025	● Number of rehabilitation studies conducted (count)	It is aimed to regularly renovate grids and transformers for the further efficient use of energy in the distribution system
E-S.3.6	Developing a roadmap for digital transformation in energy	TENMAK	MoENR MoIT EMRA EUAS Electricity Generation Companies	2024-2025	● "Digital Transformation Technologies Roadmap for Energy in Türkiye" is published	It is aimed to ensure the integration of digital systems with energy technologies
Strategy E-S.4: Promoting use of low-carbon production technologies and strengthening alternatives in electricity generation						
E-S.4.1	Conducting technical and commercial feasibility studies and exploring potential sites for use of small modular reactors	MoENR	PSB MoTF EMRA TENMAK TUNAS Association of Turkish Electricity Industry EUAS NRA	2024-2030	● Feasibility report prepared	It is aimed to promote small modular reactors with an installed power capacity of less than 300 MW

E-S.4.2	Implementing education and training programmes at different levels to rapidly develop the competent human resource relating to nuclear energy and security	MoENR MoNE CHE	MoLSS EMRA NRA TUNAS ISKUR CHE VQA TENMAK Universities	2024-2025	● Number of secondary education, vocational high school, associate, graduate, post-graduate training programmes (count) ● Number of nuclear energy experts, engineers / technicians (count)	It is aimed to improve the vocational and technical training capacities in nuclear energy technologies. Gender balance will be considered in the training delivered.
E-S.4.3	Supporting R&D projects for the production, storage, distribution and use of hydrogen	TENMAK	MoENR EMRA BOTAS TKI TUBITAK	2024-2030	● Number of R&D projects supported (count)	It is aimed to deal with hydrogen within the integrity of an energy system, as required by the Türkiye Hydrogen Technologies Strategy.
E-S.4.4	Mapping out green and pink hydrogen storage areas, conducting the feasibility studies required for transmission and distribution through existing natural gas pipelines, implementing training programmes at different levels for the rapid development of competent human resources, and undertaking legislative works to determine the appropriate ratio of the hydrogen mixture to be added to distribution lines	MoENR TENMAK BOTAS	EMRA GAZBIR	2024-2030	● Volume of green and pink hydrogen in the natural gas distribution network is increased to 2% ● Legislation published ● Technical report prepared	It is aimed to increase installed power capacity and ensure the distribution of hydrogen through the existing natural gas infrastructure, as required by the hydrogen and energy strategies
E-S.4.5	Identifying the potential supply and areas of use for resources such as synthetic methane, synthesis gas, sodium	TENMAK	MoENR BOTAS MoIT ETI MADEN	2024-2030	● Technical feasibility report prepared	It is aimed to promote and utilize alternative energy sources

	borohydride, ammonia, methanol, and fuel cell					
E-S.4.6	Creating an incentive mechanism regarding hybrid systems in which small modular reactors and clean energy technologies (hydrogen, power-to-fuel, power-to-x, etc.) can be used concomitantly	MoENR	MoIT EMRA TENMAK TUBITAK	2024-2030	● Incentive mechanism established	Small-scale modular reactors can be promoted through medium-scale installed power capacity, less overall costs, and rapid building processes.
Strategy E-S.5: Developing a roadmap on carbon capture, utilization and storage to reduce avoided GHG emissions						
E-S.5.1	Exploring emission reduction technologies such as carbon capture, utilization and storage, and their economic potential, appropriate supply chain infrastructure and processes for fossil-fired power plants, and setting targets	MoENR	MoIT MoTI TENMAK EMRA EUAS Electricity Generation Companies GDMRE TENMAK	2024-2025	● Technical feasibility reports prepared (count)	It is aimed to install clean coal technologies for power plants that have not completed their operating life by monitoring the advancements in and conducting a cost analysis for carbon capture, utilization and storage technologies
E-S.5.2	Preparing a carbon storage atlas for Türkiye	TENMAK	MoENR MoIT EMRA EUAS GDMRE Electricity Generation Companies TUBITAK TPAO BOTAS Private sector organizations	2024-2025	● Number of regions for which a carbon storage atlas was prepared (count)	It is aimed to identify Türkiye's potential for carbon storage
E-S.5.3	Developing a roadmap on carbon capture, utilization and storage	TENMAK	TUBITAK MoIT	2024-2025	● Roadmap developed	It is aimed to identify Türkiye's potential for carbon storage

			MoENR GDMRE EUAS TENMAK			
E-S.5.4	Supporting R&D activities on carbon capture, utilization and storage, implementing pilot facilities, and creating incentive mechanisms	TENMAK	MoTF PSB MoENR EUAS EMRA TUBITAK	2024-2030	● Number of pilot facilities built (count) ● Amount of incentive granted (TRY) ● Number of R&D projects supported (count)	It is aimed to support the sectoral initiatives for carbon capture, utilization and storage

3.2. Industry Sector

Action No	Action	Responsible Institution	Relevant Institutions	Implementation Period	Monitoring Indicators	Description
Strategy S-S.1: Optimizing energy efficiency potential for manufacturing industry						
S-S.1.1	Preparing mandatory energy efficiency survey reports and conducting benchmarking studies under the energy efficiency legislation and updating savings potential	MoENR	MoIT MoEUCC TOBB Sector Unions	2024-2026	● The mandatory energy efficiency survey report and benchmark report prepared ● Benchmarking reports prepared with indicators relating to energy efficiency in selected energy-intensive sectors	It is aimed to conduct energy efficiency surveys and benchmark studies as well as studies to determine energy efficiency and savings potential on a sectoral basis (iron-steel, cement, glass, etc.) in emission- and energy-intensive manufacturing industry sectors. On a sub-sector basis, many factors (furnace age, product type, product colour, ratio of cullet used depending on supply, etc.) other than the operating practices that affect energy efficiency independent of the operator will be taken into consideration, by also considering normalization.
S-S.1.2	Increasing the amount of support by removing through a legislative amendment the limit for efficiency increasing project fees, setting performance criteria by considering climate change, and supporting projects with relatively high potential for savings	MoENR	MoIT, PSB MoEUCC TOBB Sector Unions MoTF KOSGEB	2024-2025	● Number of projects supported on a sectoral basis (count) ● Energy efficiency savings achieved (toe) ● Amount of CO_2 emissions avoided (tonne $CO_{2\text{-eq}}$)	Wil be categorized based on the energy intensity (high-medium-low depending on the amounts to be designated) of plants or by sub-sectors. After implementing efficiency increasing projects, it is planned to conduct a performance assessment based on the amounts presented in the projects and the actual values.
S-S.1.3	Promoting verified energy efficiency performance	DCC MoENR	MoIT MoT MoTF TSE	2024-2028	● Total GHG emissions reduction achieved through verified energy efficiency performance	It is aimed to utilize verified energy efficiency performance enhancements in the offsetting activities in the carbon pricing system.

	enhancements through carbon pricing instruments				enhancement (tonne $CO_{2\text{-}eq}$) ● The incentive mechanism created	
S-S.1.4	Providing support for the expansion of heat pumps in the manufacturing industry sectors, conducting awareness-raising studies and preparing guiding documents	MoENR	MoIT	2024-2030	● Number of heat pumping projects supported (count) ● Guiding document prepared for practitioners	Technical analysis and mapping studies will be conducted with regard to the utilization potential of heat pumps in the manufacturing industry sector, and efficiency increasing project support schemes will be encouraged to increase its use
S-S.1.5	Promoting the establishment of digitalization systems for energy efficiency measurement, monitoring and reporting activities in SMEs	MoIT KOSGEB	MoENR	2024-2025	● The monitoring and verification system implemented	The aim is to promote measurement, monitoring and verification systems to monitor energy efficiency performance and be able to set accurate targets.
Strategy S-S.2: Increasing use of renewable energy in manufacturing industry						
S-S.2.1	Increasing the use of renewable energy in terms of self-consumption in the industry sector	MoENR	MoEUCC MoIT EMRA	2024-2030	● Amount of emissions avoided (tonne $CO_{2\text{-}eq.}$) ● Amount of renewable energy used in industry through self-consumption (MWh) ● Number of YEK-G certificate utilization in industry (count)	The aim is to increase the use of renewable energy (electricity generated from certified renewable energy) in terms of the energy utilization of industrial plants.
S-S.2.2	Considering the options for alternative raw materials and additional fuel for non-recoverable waste, and engaging in legislative improvement and promotion	MoEUCC	MoIT MoENR MoT TOBB Sector Unions	2024-2026	● The updated legislation	The aim is to revise the legislation on additional fuel and alternative raw material use in a way to ensure the expansion of the use of waste as resources.

	activities to increase the use of waste as resources					
Strategy S-S.3: Reducing carbon footprints and $CO_{2\text{-eq}}$ intensity per GDP in manufacturing industry						
S-S.3.1	Developing a roadmap on reducing carbon footprint in sub-sectors	MoIT	MoENR MoT MoEUCC TUBITAK TOBB TUSIAD MUSIAD Sectoral Associations TSE	2024-2026	● The sectoral emission reduction roadmap published (count)	It is aimed to prepare a roadmap including mitigation strategies and implementation timeline to cover all industry sub-sectors including primarily energy- and carbon-intensive ones. Women experts will be encouraged to participate in the processes.
S-S.3.2	Conducting works to reduce the clinker ratio in the cement to be used in public construction and infrastructure investments, with a view to reducing carbon footprint on a product basis	YFK	MoEUCC PPA MoIT MoENR MoAF (SWH) MoTI (KGM) MoTF TOKI TOBB TUSIAD MUSIAD Sectoral Associations TURKCIMENTO	2024-2027	● Number of tender specifications made by public institutions, that include clinker criteria (count)	In public procurements relating to cement, this article will be implemented by making amendments to the technical specifications included in tender documents.
S-S.3.3	Creating mechanisms to provide technical and financial support in the commercialization phase of new technological solutions	TUBITAK	MoTF MoEUCC MoENR TENMAK TOBB TUSIAD MUSIAD	2024-2025	● Number of projects implemented through partnership by universities/research centres aiming at technological	New techniques and innovative applications developed to reduce product carbon footprint will be supported. Gender balance will be considered in project teams.

	for carbon footprint reduction in industry sectors		Sectoral Associations KOSGEB Universities		transformation and the industry sector (count) ● Number of projects aiming at technological transformation, that are financially supported (count) ● Amount of GHG reduction targeted as part of the projects supported (tonne $CO_{2\text{-eq.}}$)	
S-S.3.4	Reviewing the policies on the provision of the scrap metal supply required for low carbon emission steel production	MoEUCC	MoIT MoT	2024-2025	● Amount of scrap metal collected in the country (tonnes)	The aim is to review the policies relating to the demand management of scrap metal, which is a critical input for the steel production sector, particularly for arc furnace facilities, with a perspective of GHG reduction.
S-S.3.5	Identifying the SMEs which are critical in GHG emission reduction and creating a monitoring system for their climate performance, in order to contribute to green transformation	MoIT KOSGEB	MoEUCC TOBB MoENR MoLSS	2024-2026	● The monitoring system established for SMEs	It covers the activities required to analyse and monitor the performance of SMEs that are critical in reducing GHG emissions, based on the principle to leave no one behind, in order to achieve green transformation throughout the supply chain and reduce GHGs. The activities will be planned to include the said SMEs and industrial enterprises, particularly innovative firms described as start-ups. Furthermore, the areas of application under the action include identifying the start-ups that work on carbon emission reduction, integrating digital transformation and green transformation, etc., and creating a platform on which they can exchange experiences with industrial enterprises.
Strategy S-S.4: Promoting sustainability reporting						

S-S.4.1	Promoting Corporate Sustainability Reporting and building a platform with the public and private sectors as members	POA CMB	Public institutions Private sector organizations	2024-2025	● Number of industrial enterprises that report on sustainability (count) ● The platform created	The platform will aim to ensure the development/harmonization of the necessary standards, and international acceptability of verifications. It includes creating a platform, comprised of relevant public and private institutions and organizations, in order to follow the global agenda, contribute to the sustainable growth and competitiveness of Turkish enterprises, inform on the expanding and further detailed reporting frameworks, and exchange experiences.
S-S.4.2	Publishing Sustainability Reporting Standards for Türkiye aligned with international standards and building a third-party assurance and verification system for sustainability reporting	POA CMB	MoEUCC TURKAK	2024-2025	● The standard issued ● The third-party assurance and verification system established	The aim is to conduct an assessment on building a third-party assurance or verification system for the international recognition of sustainability reports, and implement this system.
S-S.4.3	Preparing a gradual transition schedule aligned with the European Union on a scale basis with regard to mandatory sustainability reporting	POA CMB	MoEUCC TURKAK	2024-2025	● Transition schedule, prepared on a scale basis, regarding mandatory sustainability reporting	It covers the preparation and implementation of a transition schedule for Türkiye in the framework of a detailed transition schedule expanding from sustainability reporting which became mandatory in the EU in November 2022 to SMEs in 2027.
S-S.4.4	Reviewing the CMB's Sustainability Principles Coherence Framework in the context of international standards and developments	CMB	POA	2024-2025	● The updated CMB Sustainability Principles Coherence Framework	The aim is to update the CMB's Sustainability Principles Coherence Framework in the framework of ISSB Standards and GRI (Global Reporting Initiative), with a view to reporting on the impact of sustainability risks and opportunities on business value and stakeholders in publicly-traded companies.
Strategy S-S.5: Building capacity for manufacturing industry stakeholders						
S-S.5.1	Strengthening the know-how of industrial enterprises, particularly SMEs, on climate	MoIT MoENR KOSGEB	PSB MoEUCC MoAF	2024-2026	● Guidelines regarding good practices in terms of GHG reduction (count)	This includes information, training and workshops that include the hand-in-hand assessment and management of climate risks, mitigation and adaptation. Additionally,

	change impact mitigation and adaptation		MoTF MoLSS CHE TOBB TUSIAD MUSIAD Sectoral Associations		● Training on enhancing technical capacity in mitigation and adaptation works, delivered to at least 2,000 SME representatives	it is planned to include women's business platforms such as KAGIDER and TOBB women entrepreneur boards in the planning relating to training and workshop participants, and to look out for gender balance in the training and workshops. The activities will be planned to include the said SMEs and industrial enterprises, particularly innovative firms described as start-ups.
S-S.5.2	Building capacity and developing a roadmap for just transition and transformation of employment	MoLSS	MoEUCC MoIT MoNE MoENR MoFSS TOBB CHE ISKUR VQA Private sector organizations	2024-2025	Number of capacity-building activities conducted (count)	The roadmap will include all vulnerable groups (unemployed youth, vocational high school graduates, employees who are likely to become unemployed after green and digital transformation, people with disabilities, and women). It will also include assessing the results of just transition and transformation in employment on women's employment, and the provision of measures to maintain and increase women's employment in the roadmap. Assessment criteria for the capacity-building training will be determined.
Strategy S-S.6: Promoting circular economy and resource efficiency across manufacturing industry						
S-S.6.1	Conducting awareness-raising activities on circular economy and resource efficiency for sub-sectors	MoEUCC	MoENR NGOs MoIT MoAF	2024-2026	● Number of training delivered to industry sector stakeholders (count) ● Delivering training to at least 500 sector representatives	In the context of circular economy practices, it includes holding informative, training and other activities covering resource efficiency, reuse, recovery and alternative raw materials for industry sector representatives. Gender balance will be considered in the activities conducted.
S-S.6.2	Conducting the Green Transformation Support Scheme which aims to support the investments covering circular economy and resource efficiency	MoIT	MoENR MoEUCC TUBITAK TSE Universities	2024-2030	● Number of projects supported (50/year)	The aim is to support, through the Investment Incentive System, investments which are aligned with the circular economy approach in Türkiye, protect natural resources, contribute to climate and sustainability targets, and aim at resource efficient and low-carbon production.

	practices, with a view to achieve the green transformation of the manufacturing industry		Private sector organizations			
S-S.6.3	Drafting legislation on a product initiative and digital product passport system aligned with the European Union, with a view to implementing and promoting the circular economy model	MoT	MoEUCC MoIT MoENR TOBB	2024-2030	● The digital product passport system established ● The legislation issued	The aim is to conduct assessments and develop legislation on sustainable product initiative and digital product passport system, including the sector's adaptation. In this framework, it will be ensured that a traceability standard is formulated, made mandatory, and rendered internationally valid.
S-S.6.4	Developing policies to promote circular economy models	MoT	MoIT MoAF MoEUCC MoENR TOBB	2024-2026	● The updated legislation	The aim is to develop and manage reuse, recycling, second-hand and repair options with a view to keeping materials within the cycle.
S-S.6.5	Identifying the raw materials critical for green transformation and developing policies to achieve security of supply	TENMAK	MoEUCC MoT MoENR ETİ MADEN TOBB TUBITAK	2024-2026	● The legislation issued ● The policies developed and the roadmap designated on critical raw materials	The aim is to ensure the sustainability of the industry sector in terms of supply and costs by identifying critical raw materials. A roadmap on critical minerals will be developed by TENMAK with a view to introducing national underground resources into the economy with high added-value, meeting the energy and industry raw material demand in a safe and economic manner, diversifying and improving supply resources, and processing the raw materials produced and turning them into final products. The Roadmap on Rare Earth Element Technologies will also be prepared in this context. Furthermore, the green and digital transformation process, which is also known as the "twin process", deeply affects competition and employment policies. There are numerous risks to the sustainable and secure supply of the raw materials which sit at the centre of the twin transformation process at competitive prices. In

						this regard, formulating a National Strategic/Critical Raw Material Strategy is extremely important.
Strategy S-S.7: Developing new technology options through R&D and innovation with national resources						
S-S.7.1	Supporting R&D and innovation activities aimed at GHG reduction	TUBITAK	MoEUCC MoENR TENMAK Universities	2024-2030	● Number of studies supported (count) ● Amount of budget and/or active support reserved for these activities (TRY)	The support will be delivered in the form of capacity-building and pilot applications.
S-S.7.2	Developing patented pilot applications and technological solutions	TUBITAK	MoEUCC MoENR TENMAK	2024-2030	● Number of projects supported (count)	The aim is to support value-added energy source, product, application and technology development phases after the R&D phase.
S-S.7.3	Conducting studies and implementing pilot applications for the use of hydrogen technologies in industry, creating incentive mechanisms for use in the industry sector	TENMAK TUBITAK	MoEUCC MoIT MoENR Private sector organizations	2024-2026	● Number of studies on utilization of hydrogen technologies in industry (count) ● At least 3 pilot applications implemented	This action will be implemented by taking into consideration the "Türkiye Hydrogen Technologies Strategy and Roadmap" published by TENMAK in 2023.
S-S.7.4	Supporting projects on carbon capture, utilization and storage (CCUS)	TENMAK TUBITAK	MoEUCC MoIT MoENR Private sector organizations	2024-2030	● Number of studies on utilization of CCUS technologies in industry (count) ● The CO2 Capture, Utilization and Storage Technologies Roadmap for Türkiye	The aim is to support the studies on CCUS regarding unavoidable emissions. Goals and policies will be determined by taking into consideration the creation of conditions that will encourage private sector investments, the development of industrial centres with CO_2 infrastructure, and increasing R&D and innovation to encourage CO_2 storage technologies and reducing CO_2 capture costs in emission-intensive sectors. With this roadmap to be developed, it is projected that the number of studies and projects implemented for the utilization of CCUS technologies in industry will increase.
S-S.7.5	Developing R&D and application projects on the electrification of low and	TUBITAK	MoENR MoIT MoEUCC	2024-2030	● Number of projects implemented (count)	The aim is to conduct studies for the electrification of low and medium heat treatment processes, with a

	medium heat treatments in industrial sectors		TUSIAD MUSIAD TOBB Sectoral Associations			view to directly reducing GHG emissions in the sector.
Strategy S-S.8: Developing sustainable investment instruments and creating suitable sources of finance for investors						
S-S.8.1	Making efficient use of sustainable sources of finance and harmonizing the necessary taxonomy and reporting framework in the transformation process of the industry sector	MoIT MoEUCC	MoTF TUBITAK KOSGEB MoENR TOBB	2024-2030	● Number of projects and applications supported through sustainable sources of finance (count)	The aim is to ensure that the industry sector makes further efficient use of the international funding options which are positioned under the main heading of climate response.
S-S.8.2	Providing technical and financial support for the efforts to decarbonize the production and supply chain of SMEs	KOSGEB	MoEUCC MoIT MoTF MoENR MoLSS TUBITAK TOBB	2024-2030	● Number of training and information activities conducted (count) ● Amount of financial support provided (TRY)	Activities including information and training, workshops, international and national financial support are projected for SMEs that may experience further challenges in technical capacity building and access to finance. On the other hand, if needed, it will be brought to the agenda to provide support to large firms in this scope.
S-S.8.3	Developing incentive and support mechanisms to replace existing electric engines with efficient engines, particularly in SMEs	KOSGEB	MoENR TOBB Private sector organizations	2024-2025	● The incentive and support mechanism established ● Number of energy survey reports issued (count) ● Amount of emissions avoided ($CO_{2\text{-eq.}}$) ● Amount of financial support provided (TRY)	It is planned to make an assessment according to criteria such as the efficiency classification, operating time, operating load of electric motors, and whether an “inverter” is used in variable-speed motor applications.
S-S.8.4	Supporting through regulations the issuance of green/sustainable labelled debt instruments in order to support green transformation, energy efficiency and	CMB	MoTF MoIT MoENR MoEUCC MoT	2024-2030	● The regulatory framework which diversifies the Green/Sustainability labelled debt instruments	The aim is to support the ecosystem through regulations relating to the issuance of green/sustainability labelled debt instruments.

	technology development projects					

3.3. Buildings Sector

Action No	Action	Responsible Institution	Relevant Institutions	Implementation Period	Monitoring Indicators	Description
Strategy B-S.1: Improving energy efficiency of existing buildings						
B-S.1.1	Preparing a set of indicators by cross-checking the existing databases of the institutions in relation to buildings	MoI (GDLRC)	MoEUCC MoENR Municipalities Special provincial administrations TURKSTAT	2024-2025	● Prepared indicator set	The purpose is to reconcile the Spatial Address Registration System (MAKS), the Land Registry and Cadastre Information System (TAKBIS) and related databases regarding the existing buildings in the institutions and to create a set of indicators.
B-S.1.2	Including building indicator sets in the official statistics programme	TURKSTAT	MoI GDLRC MoEUCC MoENR Municipalities Special provincial administrations	2026-2030	● Construction statistics published as part of the official statistics programme	Statistics on buildings in terms of sets of indicators, compiled on the basis of databases of existing buildings in institutions, need to be published and updated on a regular basis.
B-S.1.3	Development of sanctions for the Improving energy efficiency of existing buildings and acquisition of an Energy Performance Certificate (EPC)	MoEUCC	MoTF MoENR	2024-2030	● All existing buildings to be certified with an EPC by 2030 ● At least 50% of the EPCs of existing buildings must have an energy performance of class C or above.	There are approximately 9.5 million buildings in Türkiye and 1.4 million buildings that receive an EPC. The possible amendment to the Law No. 5627 on Energy Efficiency aims to impose sanctions on existing buildings that do not receive EPC and to improve their energy performance.
B-S.1.4	Monitoring of energy efficiency improvements in public buildings with an obligation to appoint energy managers	MoENR	Public institutions	2024-2030	● Energy efficiency improvement rate in public buildings obliged	As stipulated in Circular 2023/15 on Energy Saving in Public Buildings, the aim is to improve and monitor the energy efficiency of public buildings with a floor area of 10,000

					to appoint an energy manager (%)	m^2 or more by 2030, according to the reference consumption.
B-S.1.5	Providing incentives and support mechanisms for energy efficiency improvements in existing buildings and their sustainable operation.	MoEUCC	MoENR MoTF	2024-2030	● Number of buildings benefiting from energy efficiency improvements (count)	With the amendment to the Law on Energy Efficiency, the building sector has been included in the subsidies for efficiency projects. However, incentives for the building sector still need to be implemented. Low-interest loans for thermal insulation of residential buildings have been introduced. The aim is to implement energy unit price applications based on energy consumption in buildings with energy performance classes.
B-S.1.6	Conducting awareness-raising activities in order to increase the level of awareness of energy efficiency in buildings.	MoENR	MoNE MoEUCC Municipalities NGOs	2024-2030	● Training provided to at least 100,000 people ● At least 2 awareness-raising activities per year undertaken on different communication platforms across the country ● Raising the Energy Efficiency Awareness Index to the high-low level (168-184)	Awareness-raising activities on buildings will continue as part of the Energy Efficiency Strategic Communication Plan. In 2021, the Energy Efficiency Awareness Index was measured at 163.8 (0-200). The aim is to increase this score, which is in the medium-high range, to the high-low range. Awareness activities will continue considering gender balance in training.
B-S.1.7	Increasing the use of Energy Performance Contracts (EPCs) for existing public buildings	MoENR	MoEUCC MoTF	2024-2025	● Number of signed Energy Performance Contracts (EPCs) (count)	The Energy Performance Contract (EPC) is a financing mechanism based on repaying the initial investment costs of energy efficiency or renewable energy projects through the savings achieved in subsequent years, and is intended to be widely used.
Strategy B-S.2: Improving energy efficiency of new buildings						
B-S.2.1	Preparing and updating national vocational standards and national qualifications for the workforce lacking in vocational qualifications,	VQA	MoEUCC MoNE MoENR MoLSS	2025-2030	● Number of professional standards prepared (count)	It is intended to set standards for the activities and qualifications of the workforce required to promote renewable energy and energy efficiency systems in buildings.

	and implementation and dissemination of examination and certification activities according to the prepared national qualifications.		ISKUR CHE Universities NGOs		● Number of updated vocational standards (count) ● Number of VQA Vocational Qualification Certificates issued (count)	
B-S.2.2	Developing legal regulations for all new buildings that are to be constructed in accordance with the concept of Nearly Zero Energy Buildings (nZEB)	MoEUCC	MoENR	2024-2026	● Published amendment to the Regulation on Energy Performance of Buildings	The objective is to construct new buildings using the energy-efficient building approach.
B-S.2.3	Improving energy limits in TS 825 standard and updating to take account of national/international energy efficiency approaches.	TSE	MoEUCC MoENR	2024-2025	● Updated TS 825 standard	The standard TS 825 Thermal Insulation Requirements in Buildings and the current legislation will be revised taking into account EU practices. In this context, the standard TS 825 Thermal Insulation Requirements in Buildings needs to be updated to take into account the cooling demand as well as the net heating energy and to improve the energy limits to bring them to the EU level. The objective is to update the energy limits of the standard according to energy policies and changing climate conditions.
Strategy B-S.3: Improving energy efficiency in using electrical appliances, equipment and devices in buildings sector						
B-S.3.1	Raising the awareness of end users on the use of devices, equipment and appliances with high energy efficiency levels	MoENR	MoEUCC MoT MoIT	2024-2030	● At least 1 communication campaign conducted each year ● Raising the Energy Efficiency Awareness Index to the high-low level (168-184)	Awareness-raising activities will be undertaken on the use of tools, equipment and appliances with a high level of energy efficiency.

B-S.3.2	Harmonization of regulations on energy efficiency and eco-design of white goods to be implemented simultaneously with the EU	MoIT	MoEUCC MoENR MoT White Goods Manufacturers' Association	2024-2030	● Published amended legislation	It is designed to determine and improve the energy efficiency status of electrical household appliances and equipment.
Strategy B-S.4: Promoting use of district heating and cooling systems						
B-S.4.1	Implementation of awareness and promotion studies for the expansion of the use of regional heating and cooling systems.	MoENR	MoEUCC ILBANK Municipalities	2024-2025	● Preparation of a pre-feasibility report ● Awareness-raising activities undertaken (count)	The objective is to promote regional heating and cooling systems, particularly in mass housing estates.
B-S.4.2	Conducting a mapping study to match heat pump potential, waste heat sources and renewable energy sources with energy demand in buildings	MoENR	MoEUCC MoI TOKI ILBANK Municipalities Universities NGOs	2024-2025	● Creation of GIS-based maps	The objective is to reduce GHG emissions and save energy by meeting the energy needs of buildings with energy efficient and renewable energy sources. The objective is to determine the potential of ground source heat pumps, produce GIS-based maps and integrate renewable energy and waste heat sources into the map.
Strategy B-S.5: Promoting use of eco-friendly design and construction materials through National Green Certification Scheme (YeS-TR) application						
B-S.5.1	Promoting the National Green Certification Scheme (YeS-TR) and promoting certified new building and settlement projects.	MoEUCC	TEA	2024-2025	● Number of buildings receiving YeS-TR certificate (count)	As per the Green Certificate Regulation for Buildings and Settlements published in 2022, obtaining a green certificate has been defined as optional. The purpose of this measure is to promote buildings that will be awarded the YeS-TR certificate.
B-S.5.2	Introducing obligation to obtain a YeS-TR certificate for newly constructed public buildings	MoEUCC	TEA	2024-2030	● Legislation made public and in force ● Number of public buildings that receive a YeS-TR certificate each year (count)	Achieving YeS-TR certification for new public buildings is an opportunity both to lead by example and to share lessons learned.

Strategy B-S.6: Ensuring and promoting use of Building Information Modelling (BIM) tools to ensure digital transformation of construction ecosystem						
B-S.6.1	Increasing the use of Building Information Modelling (BIM) tools in the design, construction and operation of sustainable, energy-efficient and low-carbon buildings, and developing and encouraging domestic BIM software.	MoEUCC	MoENR MoLSS ISKUR VQA Universities Municipalities The Union of Chambers and Commodity Exchanges of Türkiye (TOBB) Private sector organizations NGOs	2024-2028	● Legislation made public and in force ● Training provided to at least 1,000 members of profession ● Number of seminars and workshops organized (count) ● Developed domestic BIM software (count)	Building Information Modelling (BIM) is used in the life cycle of buildings, in particular in the design, construction and operation phases. The objective is to develop the technological infrastructure for the use of digital tools based on digital tools, to harmonize national legislation with Building Information Modelling (BIM) methodologies, to provide training to technical personnel considering gender balance in participation, and to support the digital transformation of the construction sector.
B-S.6.2	Ensuring and promoting the production and use of information-laden smart objects relating to building materials and their adaptation to the global BIM ecosystem in the creation of a sustainable and performance-oriented built environment.	MoEUCC	MoIT NGOs Private sector organizations	2024-2028	● Number of smart objects manufactured (units) ● Foundation of a National BIM Library	The objective is to produce BIM-based projects that integrate information-rich digital building materials, providing the necessary environment for the construction, dissemination and global integration of sustainable and performance-oriented structures.

3.4. Transport Sector

Action No	Action	Responsible Institution	Relevant Institutions	Implementation Period	Monitoring Indicators	Description
Strategy U-S.1: Ensuring modal shift to maritime/railway transport						
Ensuring modal shift to railway transport						
U-S.1.1	Expanding High-Speed Train and Fast Train network in line with the Transport and Logistics Master Plan	MoTI TCDD	DGRTS GDII TCDD Transport Inc. DHMI DGCA Logistics Coordination Board	2024-2030	● Increase in Fast Train line use (passenger and passenger-km) ● Increase in High-Speed Train line use (passenger and passenger-km) ● Increase rate in the share of railway passenger transport in total road+railway passenger transport (%) ● Increase rate in the share of railway passenger transport in total air+railway passenger transport (%) ● Increase in Fast Train line lengths (km) ● Increase in High-Speed Train line lengths (km)	It is aimed to provide a shift from road and air to railway.
U-S.1.2	Developing railway cargo transport in line with the Transport and Logistics Master Plan	MoTI	TCDD TCDD Transport Inc. Private sector organizations operating railway transport	2024-2030	● Increase in line lengths (km) ● Increase in cargo transport on Fast Train lines (tonnes and tonne-km) ● Increase in cargo transport on all railway lines (tonnes and tonne-km) ● Increase rate in the share of railway cargo transport in total railway-road transport (%)	It is aimed to provide a shift from road and air to railway.

U-S.1.3	Developing railway passenger transport with urban rail systems	MoTI Municipalities	TCDD TCDD Transport Inc. GDII	2024-2030	● Shift rate (vehicle-km) from rubber-tired transport (private and public transport) to urban railway passenger transport (vehicle-km) ● Increase in Urban Rail System line lengths (km), ● Increase in the number of lines with connection between urban rail system and suburban operation on main railway (count) ● Increase in Urban Rail System use (passenger and passenger-km) ● Number of transfers from suburban lines to urban public transport systems (number of passengers)	It is aimed to provide a shift in passenger transport to urban rail systems. Suburban transport and urban rail systems are included in the Urban Rail System.
U-S.1.4	Providing support for increasing intermodal integration in Urban Rail System transport	MoTI	MoEUCC TCDD ILBANK Municipalities	2024-2030	● Increase in the amount of resources allocated (TRY) ● Number of Urban Rail System connection/transfer feasibility projects (count) ● Number of new Urban Rail System connection/transfer projects (count)	Supports may include grants, financing, credit facilities, etc. for both feasibility studies and implementation projects.
Ensuring modal shift to maritime transport						
U-S.1.5	Supporting inter-city maritime passenger transport	MoTI	Municipalities	2024-2030	● Annual amount of support and incentives granted (TRY)	Municipalities operating inter-city ferries will be stakeholders.
U-S.1.6	Developing urban maritime passenger transport and infrastructure in coastal provinces	MoTI Municipalities		2024-2030	● Increase in the number of urban maritime services (number of trips) ● Increase in the number of urban maritime users (passengers, passenger-km)	It is aimed to support and develop maritime passenger transport within the coastal provinces.

U-S.1.7	Supporting maritime cargo transport and infrastructure	MoTI	MoTF Municipalities	2024-2030	● Increase in maritime cargo transport (tonnes and tonne-miles) ● Increase in the amount of incentives granted for cabotage transport (TRY)	It is aimed to support and develop maritime cargo transport.
Enhancing intermodal cargo transport						
U-S.1.8	Improving the connections of railways with cargo centres such as ports, organized industrial zones, logistics centres, factories, and mining sites	MoTI	TCDD MoIT	2024-2030	● Increase in the number of railway lines operating to Organized Industrial Zones, ports, etc. (count); increase in transport on these lines (tonnes and tonne-km); ● Increase rate of facilities, logistics centres and OIZs with railway connection (%) ● Increase rate in the share of railway cargo transport in total railway-road transport (%)	It is aimed to improve the service network of railways, ports, organized industrial zones, logistics centres, factories, and mining sites in coordination with the Transport and Logistics Master Plan.
U-S.1.9	Promoting railway and maritime intermodal and combined cargo transport	MoTI		2024-2030	● Increase in the amount of containers transported (TEU) ● Increase in the number of vehicles transported (count)	It is aimed to promote intermodal and combined railway and maritime cargo transport.
Strategy U-S.2: Increasing efficiency in transport sector						
Promoting public transport systems and increasing efficiency						
U-S.2.1	Promoting public transport-oriented practices in urban planning	Municipalities	MoEUCC MoTI	2024-2030	● Published public transport-oriented urban planning legislation and roadmap; ● Published legislation/guidance on design, operation and promotion of park-and-ride systems	Public Transport-Oriented Urban Planning can be briefly explained as the establishment of "Urban Transport Demand Analysis Zones (UTDAZs)" where basic needs (education, health, work, etc.) are provided within 15-20 minutes access by public transport.

					● Published legislation/policy papers on micromobility and pedestrian service level ● Number of Urban Transport Demand Analysis Zone (UTDAZ) maps prepared (count) ● Increase in commercial, educational, etc. units due to density and diversity in land use around the main stops of UTDAZs (count)	
U-S.2.2	Introducing smart card systems enabling fare collection/charging to encourage the use of public transport	Municipalities MoTI	MoEUCC MoFSS PTT Intelligent Transport Systems (ITS) relevant institutions and organizations	2024-2030	● National smart card and/or mobile system that can be used in public transport implemented at the national scale ● Increase in smart card use in public and intermediate public transport (passenger)	Support on gender, age, disability, and social equality/justice will be provided. Coordination with the Türkiye Card project will be ensured.
U-S.2.3	Integrating public transport systems with each other and with other urban rubber-tired transport modes	Municipalities	MoEUCC MoTI TCDD TCDD Transport Inc. DoTMC	2024-2030	● Increase in the number of transfer stops between public transport and other modes (count) ● Increase in transport services/modes included in smart card systems (count) ● Increase in the number of intermodal transfers (count) ● Increase in the capacity and use of park-and-ride systems around public transport stops (number of vehicles)	Coordination with developments regarding smart cards will be ensured. Technical and training support for implementation will be provided to municipalities by the central government.

					● Amount of shift from private vehicle use to public transport (passenger and vehicle-km) ● Increase in safe bicycle parking capacity (number of parking spaces)	
U-S.2.4	Enhancing micromobility/walking options around public transport stops	Municipalities	MoEUCC MoTI	2024-2030	● Increase in the use of shared micromobility systems with public transport (passenger, passenger-km) ● Increase in the length (km) and use of bicycle paths around public transport stops (passenger-km) ● Pedestrian service level increase (number of pedestrians) ● Prepared urban micromobility roadmap	In order to enhance access to public transport (first-km and last-km), stops will be ensured to comply with accessibility standards, bicycle paths will be constructed, infrastructure and sharing systems for micromobility vehicles such as bicycles and e-scooters will be supported.
U-S.2.5	Increasing the transition from private vehicle use to rubber-tired public transport	Municipalities	MoEUCC MoTI	2024-2030	● Increase in the number of urban rubber-tired public transport lines and frequencies (count); ● Increase in rubber-tired public transport line use (passenger and passenger-km), ● Amount of shift from private vehicle use to rubber-tired public transport (passenger, passenger-km)	Support on gender, age and social equality/justice will be provided; compliance of public transport system components (vehicles, stops, etc.) with accessibility standards for people with mobility restrictions (people with disability, elderly, pregnant, with children, etc.) will be ensured.
U-S.2.6	Planning public transport services in accordance with transport demand and accessibility standards	Municipalities	MoTI MoEUCC MoFSS Universities	2024-2030	● Published public transport service planning guidance ● Increase in public transport occupancy rates (%),	Implementation of accessibility standards is a requirement to ensure the inclusiveness of public transport services. Intelligent Transport Systems application for optimised public transport will be developed through TUBITAK guided projects;

					● Reduction in emissions per passenger-km ($tCO_{2\text{-}eq}$/passenger-km)	research centres in universities will be supported.
Making private and shared transport more efficient						
U-S.2.7	Increasing safe micromobility in urban transport	MoTI MoEUCC Municipalities	ILBANK TEA	2024-2027	● Published integrated micromobility mobility plan preparation legislation ● Number of awareness-raising activities for micromobility transport modes such as bicycles, e-scooters (pcs, number of campaigns, number of people reached) ● Length of bicycle paths divided from traffic (km)	Micromobility modes shall be defined and legislation on their priorities and integration in urban plans shall be developed. Bicycle lanes on existing and new roads to be constructed will be addressed with different roadmaps.
U-S.2.8	Promoting rubber-tired shared/demand-based transport	Municipalities	MoTI MoTF MoEUCC MoFSS	2024-2030	● Published legislation and roadmap for shared vehicle/demand-based transport ● Increase in the number of organizations providing shared transport services (count) ● Increase in the use of shared transport (passengers, passenger-km)	Support on gender, age, disability, and social equality/justice will be provided; compliance of public transport line elements (vehicles, stops, etc.) with accessibility standards for people with mobility restrictions (people with disability, elderly, pregnant, with children, etc.) will be ensured.
U-S.2.9	Reducing emissions due to traffic flow and congestion caused by private vehicle use	MoEUCC	MoTF MoTI KGM Municipalities ITS Türkiye	2024-2030	● Published urban traffic management legislation and roadmap for emission reduction ● Published Intelligent Transport systems for Road Transport Emission Reduction legislation ● Amount of congestion reduction in intelligent transport systems corridors (delay times) ● Amount of congestion reduction in urban centres (delay times)	Definition and criteria of traffic congestion shall be elaborated; emission reduction can be achieved by implementing Intelligent Transport Systems ensuring fluidity in congested areas. Congestion charging will be introduced in urban centre/attraction points. Since emission levels increase at speeds other than the lowest emission range of current engine technologies (30 km/h-80 km/h), exceeding 50 km/h for private transport in urban transport creates a considerable time saving advantage over public transport. However, motor vehicle

					● Increase in the number of 30 km/h speed limit control corridors in urban centres and pedestrian priority areas (km) ● Reduction in emissions on roads operated above 50 km/h in urban areas (t CO2/km) ● Reduction in emissions on inter-city roads operated above 90 km/h (t $CO_{2\text{-eq}}$ / km)	speeds above 50 km/h have a negative impact on micromobility due to traffic safety.
Promoting the use of new generation, low/zero emission vehicles						
U-S.2.10	Promoting low/zero emission vehicles in public vehicle fleets	All Public Institutions	MoTF	2024-2030	● Increase in the number of low/zero emission vehicles (count); increase in their usage (vehicle-km)	Since the vehicle-km values of public fleets (municipal buses, corporate vehicles, etc.) are very high compared to private vehicles, it is aimed to prioritise the replacement of these vehicles with low/zero emission vehicles.
U-S.2.11	Increasing the use of low/zero emission vehicles in urban centres and attraction points	Municipalities	MoEUCC MoIT MoENR MoTI EMRA	2024-2030	● Published "Urban Centres Low Emission Zones" roadmap ● Increase in the capacity of parking spaces allocated/prioritised for low/zero emission vehicles in urban centres (count) ● Increase in the number of Electric Vehicle charging stations in urban centres (count)	It is aimed to increase the use of low/zero emission vehicles for health benefits in urban centres and pedestrian priority areas.
Making cargo transport more efficient						
U-S.2.12	Preparing a national road cargo transport emission reduction roadmap	MoTI	MoIT MoENR	2024-2030	● Published National Roadmap for Road Cargo Transport Emission Reduction ● Published ITS Strategy and Action Plan for Emission Reduction in Road Cargo Transport	It is aimed to conduct studies in coordination with the Transport and Logistics Master Plan in order to reduce road cargo transport emissions.
Strategy U-S.3: Use of sustainable/clean energy sources in transport systems						

Expanding electrification in transport systems						
U-S.3.1	Supporting electrification of vehicles used in railway/maritime transport and airline ground operations	MoTI	MoTF MoENR EMRA MoEUCC Municipalities MoIT TCDD TCDD Transport Inc. DoTMC Railway train operators	2024-2030	● Increasing the length of electric railway lines (km) ● Increase in the number of electric sea vessels (count) ● Increase in electricity supply infrastructure capacity at coastal facilities (kwh) ● Increase in the number of electric railway vehicles (count)	Transition to electric vehicles in sea vessels and railway vehicles will be supported.
U-S.3.2	Supporting research on electrification of existing vehicles	TUBITAK	MoIT TENMAK Universities	2024-2030	● Amount of research incentives granted (TRY)	Making existing vehicles capable of operating with electric motor/battery will facilitate the financing of electric vehicle transition.
U-S.3.3	Supporting research on electric vehicle battery systems and increasing their lifetime	TUBITAK	MoIT TENMAK Universities	2024-2030	● Amount of research incentives granted (TRY)	It is aimed to support the development of domestic and long-range battery technologies required for the transition to electric vehicles.
Increasing the use of alternative sustainable fuels						
U-S.3.4	Increasing the use of CORSIA compliant sustainable aviation fuels in air transport	MoTI DGCA	MoENR EMRA TOBB	2024-2030	● Increase in CORSIA compliant sustainable aviation fuel production (tonnes) and usage (tonnes)	In addition to the fact that the use of CORSIA compliant sustainable aviation fuel is mandatory for international flights, it is aimed to increase its use in domestic flights in order to reduce national emissions.
U-S.3.5	Increasing the rate of alternative fuel use in urban/rural bus transport	Municipalities	MoTI MoEUCC MoIT EMRA ILBANK	2024-2030	● Number of alternative fuelled buses (count) and increase in their usage (vehicle-km) ● Increase in the number of hybrid/new generation public transport buses (count)	It is aimed to plan in coordination with the developments in the electric bus sector.

					● Transition rate from diesel buses to alternative fuelled buses (%)	
U-S.3.6	Encouraging the use of renewable energy sources in electric vehicle charging stations	MoENR	MoEUCC MoTF EMRA	2024-2030	● Published renewable energy sources roadmap and guidance for Electric Vehicle charging points/stations ● Increase in the renewable energy usage rate in transport (%)	Renewable energy investment supports for residential charging points and commercial charging stations will be separately planned.
U-S.3.7	Planning and development of charging station infrastructure in required number and location in the road network for increased use of electric vehicles	MoTI MoIT	MoENR EMRA	2024-2030	● Number of vehicle charging stations (count) ● Amount of incentives granted (TRY)	It is aimed to develop charging infrastructure for electric vehicles.
U-S.3.8	Supporting research for alternative fuelled vehicles (LNG/Hydrogen, Bio-CNG, Bio-LNG, etc.)	TUBITAK	MoIT MoTI TURASAS TURK PATENT TENMAK		● Amount of support granted (TRY)	In addition to Electric Vehicles, it is aimed to support research on alternative fuels such as LNG, hydrogen, methanol, etc.
U-S.4: Engaging in necessary infrastructure activities for sectoral decarbonisation						
Modelling and estimation studies in transport systems						
U-S.4.1	Creating a transport emissions database	MoTI	MoEUCC Municipalities TURKSTAT	2025-2030	● Prepared province-based, vehicle and fuel technology based national transport and mobility database	It is aimed to establish a database for transport-related GHG emissions based on distance (urban, suburban, inter-city), transport system and mode, and vehicle technology.
U-S.4.2	Preparing sustainable urban mobility plans (SUMP) and sustainable urban logistics plans (SULP) in metropolitan	Municipalities	MoEUCC MoTI MoT ILBANK	2024-2027	● Published Sustainable Urban Mobility Plan (SUMP) legislation ● Number of metropolitan municipalities, provincial municipalities, and district	It is aimed to make emission calculations under the Sustainable Urban Mobility Plan and to calculate the emission reduction potentials of scenarios and to ensure complementarity between Sustainable Urban Mobility Plan / Sustainable Urban

	municipalities and urban and district centres				municipalities with Sustainable Urban Mobility Plans (count) ● Published Sustainable Urban Logistics Plan (SULP) legislation	Logistics Plans and local climate action plans.
U-S.4.3	Developing new generation mobility management policies and legislation	MoTI	MoEUCC DoTMC MoIT Municipalities	2024-2030	● Published "Mobility Service" legislation and policy ● Published "shared mobility" (vehicle and ridesharing) legislation and policy papers ● Published "Sustainable and Smart Mobility Strategy and Action Plan"	It is aimed to develop Sustainable and Smart Mobility Strategy and Action Plan, Shared Mobility and Mobility Service legislation and Next Generation Mobility Management policies.
U-S.4.4	Providing support for person/product-based transport related carbon footprint calculation in passenger and cargo transport	MoTI	TSE	2024-2027	● Developed carbon footprint calculation application tool for passenger/cargo transport based on routes and modes ● Number of carbon footprint tool users (count) ● Number and use of total emission calculation interface and Intelligent Transport Systems reporting applications for commercial vehicle fleets (count)	It is aimed to provide support to EU harmonisation studies.
Electric Vehicle Sector Supports						
U-S.4.5	Developing an electrical energy demand estimation model for transport purposes	MoENR	PSB MoEUCC MoTI EMRA MoIT TURKSTAT	2024-2025	● Developed National Transport Electricity Estimation Model	This action will be coordinated with the energy sector.
U-S.4.6	Developing a national intelligent EV integrated charging and parking management interface	MoEUCC	MoENR EMRA Municipalities	2024-2027	● Published national roadside EV charging and parking legislation ● Number of developed management interfaces and users (count)	In provinces with multistorey building stock and insufficient vehicle parking facilities in each parcel, it will be required to establish slow charging stations in public areas (vehicle parks, roadsides, etc.) and operate them along with the demand for vehicle parking. Coordination with the

						services provided by EMRA will be ensured.
U-S.4.7	Preparing legislation on placing batteries on the market and recycling and providing research support for electric vehicle battery recycling	MoEUCC TUBITAK MoIT	MoENR CHE TENMAK TURK PATENT	2024-2027	● Legislation on batteries and recycling of batteries harmonised with the EU ● Support budget for Electric Vehicle battery recycling focused project (TRY)	It is aimed to plan the end-to-end management of battery production, secondary use and recycling with the Energy and Waste sectors.

3.5. Waste Sector

Action No	Action	Responsible Institution	Relevant Institutions	Implementation Period	Objectives / Monitoring indicators	Description
Strategies for the direct reduction of GHG emissions in the reporting of the waste sector						
A-S.1: Preventing and reducing waste and wastewater before generation						
A-S.1.1	Preparing a National Waste Prevention Plan	MoEUCC		2024-2028	● Preparation of a National Waste Prevention Plan	A plan will be drawn up to include national and regional measures for the prevention and reduction of waste.
A-S.1.2	Conducting best practice studies with different stakeholders (farmers, producers, hotels, restaurants, wholesalers, retailers, workplaces, consumers, etc.) to prevent and reduce food waste and other biodegradable waste before it occurs, and establish a roadmap for achieving this objective.	MoEUCC MoAF Municipalities	MoNE MoLSS TOBB (Union of Chambers and Commodity Exchanges of Türkiye) NGOs Private sector organizations MoIT	2024-2030	● Development of a roadmap for the prevention and/or reduction of food waste and other biodegradable waste ● Completion of at least 10 studies/projects with stakeholder involvement	Exemplary good practice studies will be conducted, such as data collection and inventory, demand-driven agricultural production planning, information on production technologies used to value production residues and by-products, dissemination of packaging solutions that reduce food loss and waste, and increasing food literacy. Studies will be conducted to ensure gender and age balance in training, meetings and workshops, and to identify the qualified workforce, competencies and vocational needs that will be required.

A-S.1.3	Conducting studies on best practices, including extended producer responsibility, to increase the rate of waste reuse in line with circular economy principles.	MoEUCC	MoIT MoLSS MoTF MoAF MoNE Municipalities TOBB NGOs Private sector organizations	2024-2027	● At least 10 completed studies/projects in the field of reuse	Studies will be conducted to promote the reuse of waste. Gender and age balance will be considered in training, meetings and workshops, and the qualified workforce, competences and vocational needs that will be required will be identified.
A-S.1.4	Issuing qualified zero waste certificate	MoEUCC		2024-2030	● Number of qualified zero waste certificates issued (units)	Criteria and rating for Silver, Gold and Platinum Zero Waste Certificates, which also measure waste prevention and reduction, will be determined by principles and procedures to be published.
A-S.1.5	Conducting water efficiency studies to reduce the amount of wastewater diverted for treatment and discharge.	MoEUCC Municipalities	MoAF MoIT MoLSS MoNE NGOs	2024-2030	● Completion of at least 5 clean production studies/projects in the field of reduction of industrial water consumption and efficient use of water. ● Completion of at least 5 studies/projects in the field of urban water use reduction and water use efficiency ● The maximum average quantity of water per person per day that is drawn from the potable water and utility water network by the municipalities is 120 litres.	Exemplary best practice studies will be conducted, such as the installation and reuse of rainwater harvesting systems in urban areas and the reduction of leakages in water transmission. Gender and age balance will be considered in the studies, training, meetings and workshops, and the qualified workforce, qualifications and vocational needs that will be required will be identified.
A-S.2: Improving waste recycling and recovery rates						
A-S.2.1	Updating NWMAP, taking into account policies to reduce GHG emissions	MoEUCC		2024	● Updated NWMAP	NWMAP will be updated to cover the period 2023-2035.

A-S.2.2	Improving waste-sorting at source by type (biodegradable waste and other recyclable waste).	MoEUCC TEA	MoNE Municipalities Buildings and premises	2024-2030	● Number of local governments, buildings and premises that have implemented and certified a zero-waste management system with separate collection at source (count) ● The ratio of the amount of waste that is collected separately at source to the total amount of waste (in %).	As part of the studies to be conducted under the Zero Waste Regulation, the aim is to promote the separate collection of waste at source.
A-S.2.3	Expansion of the deposit and return system for the collection of high value materials	TEA	NGOs Private Sector Organizations	2024-2030	● The ratio of the amount of beverage packaging collected through the deposit refund system to the amount of beverage packaging placed on the market has reached 90%.	With the deposit refund system, the target for the collection rate is expected to reach 90% by the year 2030.
A-S.2.4	Increase the number and capacity of biological treatment facilities for the recovery of biodegradable waste and the amount of biodegradable waste sent to these facilities.	Municipalities Private Sector Organizations	MoEUCC	2024-2030	● Number (count) and capacity (tonnes) of biological processing facilities ● Amount of biodegradable waste collected separately at source and sent directly to biological treatment facilities (tonnes)	The first step is to ensure that market and market waste, park and garden waste, biodegradable waste from food production facilities and points of sale (retail, restaurants, catering) are sent to bioprocessing facilities without being mixed with other waste.

A-S.2.5	Increasing the amount of solid-liquid fermented products and compost produced from biodegradable waste with criteria suitable for agricultural use.	Municipalities	MoAF MoEUCC	2024-2030	● Amount of compost produced from biodegradable waste and used in agriculture (in tonnes) ● Amount of solid-liquid fermented products produced from biodegradable waste (tonnes) ● Number and capacity of facilities producing compost and solid-liquid fermented products according to appropriate criteria (number, tonnes)	Through the expansion of separate collection activities at source, the efficiency of the production of compost and fermentation products from biodegradable waste will be increased.
A-S.2.6	Treatment of waste that is not suitable for material recovery by means of thermal technologies suitable for energy recovery	Municipalities	MoEUCC	2024-2030	● Rate/quantity of municipal waste treated in thermal facilities that is not suitable for material recovery (%, tonnes)	The use of thermal technologies will be assessed as part of NWMAP and relevant legislation.
A-S.3: Reducing amount of untreated waste deposited to sanitary landfills						
A-S.3.1	Updating and implementing Provincial Zero Waste Management System Plans	MoEUCC Local Environmental Boards	Municipalities	2024-2025	● Number of provinces adopting completed waste management plans (count)	Provincial Zero Waste Management System Plan: Plans will be prepared in a format determined by MoEUCC, prepared by the Local Environment Board and containing the principles of the Zero Waste Management System to be implemented by local administrations within the borders of the province.
A-S.3.2	Increasing the number and capacity of facilities for preparing refuse derived fuel (RDF) from municipal waste that is not suitable for recycling/recovery.	MoEUCC Municipalities	NGOs Private sector organizations	2024-2030	● Amount of RDF produced from municipal waste (tonnes) ● Number of facilities producing RDF from MSW (units) and total production capacity (tonnes)	In line with principles of circular economy, waste that cannot be materially recycled is processed in RDF's treatment facilities by defining its standards.

A-S.3.3	Terminating acceptance of waste at unmanaged landfill sites	Municipalities	MoEUCC	2024-2025	● Reduction of municipal waste sent to irregular dumping landfills and dumping sites (%, tonnes)	Necessary investments will be made to ensure that waste is processed in waste treatment facilities and that waste intake is discontinued through monitoring and inspection activities at unmanaged landfills.
A-S.4: Improving wastewater management and treatment infrastructure						
A-S.4.1	Increasing methane recovery rates at wastewater treatment facilities	Municipalities Management of the wastewater infrastructure	MoEUCC	2024-2030	● Number of anaerobic digesters in waste water treatment plants operated by local administrations in Türkiye (count)	The aim is to increase the efficiency and capacity of existing anaerobic digesters in wastewater treatment plants or to build new ones. Anaerobic digesters are present in 29 of the municipal wastewater treatment plants in Türkiye and this number will be increased.
A-S.4.2	Increasing the number of wastewater treatment facilities with sustainable sludge management that prioritizes the beneficial reuse of sludge in accordance with principles of circular economy.	Municipalities Management of the wastewater infrastructure	MoEUCC	2024-2030	● Number of wastewater treatment facilities equipped with sludge management systems ● Rate of reduction in the amount of sewer sludge disposed of in sanitary landfill sites (%)	This measure aims to operate the plants in a circular economy by using the organic-rich stabilised sludge generated in the wastewater treatment plants as a raw material, fuel or supplementary fuel, while at the same time reducing the amount of sludge sent to landfill.
A-S.4.3	Establishing sustainable waste water management in the framework of principles of circular economy	MoEUCC Management of the wastewater infrastructure Municipalities	MoAF MoIT	2024-2030	● The reuse rate of treated wastewater reached 15%.	This measure aims to operate wastewater treatment facilities in a resource- and energy-efficient manner that contributes to climate change and sustainability goals in line with the circular economy approach, to protect water resources and to save water by reducing the amount of wastewater discharged into the receiving environment.
Strategies to support the reduction of GHG emissions in waste sector reporting						
A-S.5: Developing human resources and social awareness as part of zero waste practices and reduction of GHG emissions						

A-S.5.1	Incorporating and promoting climate change, zero waste, water use, circular economy, green and environmental skills and green jobs in formal education curricula.	MoNE	MoEUCC	2024-2025	● Number of schools offering elective courses (count)	At present, issues relating to the environment, climate change and energy efficiency have been introduced into teaching materials and the inclusion of these subjects in the curriculum as electives has been put on the agenda. For example, the "Environmental Education and Climate Change" course, which has been approved by the Board of Education and Discipline, will be taught as an elective in 6th, 7th or 8th grade secondary schools for a total of 72 hours, 2 hours per week.
A-S.5.2	Building capacity of relevant stakeholders and trainers on zero waste, water use, circular economy and reducing GHG emissions	MoEUCC	MoNE Universities Municipalities İSKUR (Turkish Employment Agency)	2024-2025	● Training of at least 10,000 people through education and awareness-raising activities	Training will be extensively implemented, including distance learning, documented, monitored and evaluated, and training content will be regularly updated. To ensure accessibility for people with disabilities, audio description, sign language, visual description, voice-over, etc. will be included in content formats. Age and gender balance will be considered in the training.
A-S.5.3	Promoting written, audio, visual and social media activities (promotional videos, website, etc.) that raise awareness of zero waste, water use, circular economy and GHG emission reduction among all stakeholders.	MoEUCC	MoCT (RTUK)	2024-2025	● Number of news releases and announcements in printed, audio, visual and social media (count)	The aim is to raise awareness of the circular economy and climate change in society and to increase public understanding.

A-S.5.4	Identifying skills and qualifications required by circular economy principles in the waste sector and conducting studies to train a workforce equipped with these qualifications and improve employment conditions.	MoLSS	MoEUCC MoNE CHE Universities İSKUR VQA NGOs Private Sector Organizations	2024-2030	● Number of studies conducted (count)	The aim is to take measures to improve working conditions in the management of waste and to address the need for skills and qualified labour.
A-S.6: Developing incentive and financing mechanisms to improve waste management, taking into account circular economy principles and GHG emission reduction						
A-S.6.1	Updating national waste and wastewater management legislation through a participatory process, taking into account circular economy principles, zero waste and GHG reduction targets.	MoEUCC		2024-2030	● Update on national waste and wastewater management legislation	Legislation on national waste and wastewater management is being revised under the coordination of the Ministry of Environment, Urbanization and Climate.
A-S.6.2	Developing advantageous financing mechanisms to support projects and investments that prevent waste at source, collect waste separately at source, reduce, reuse, recycle and recover waste, reduce the amount of waste disposed of in landfills and increase the recovery and reuse of treated wastewater.	MoEUCC	MoIT MoTF Municipalities NGOs Private Sector Organizations TSKB National Banks	2024-2030	● Number of incentive and funding mechanisms developed (count) ● Amount of incentive awarded (TRY)	Incentive and financing mechanisms will be developed led by MoEUCC to develop the waste sector in line with climate change objectives and circular economy principles.
A-S.6.3	Working on relevant specification formats in the context of circular economy requirements in line with Green Public Procurement (GPP) principles.	PPA	MoTF MoEUCC MoT	2024-2030	● Updated tender formats	The aim is to integrate circular economy requirements into the relevant specification formats.

A-S.7: Increasing R&D activities and developing technological infrastructure to improve waste management, taking into account circular economy principles and GHG emission reduction						
A-S.7.1	Establishing a legal framework for monitoring circular economy, identifying indicators for monitoring and including necessary indicators in the official statistical programme.	MoEUCC	TURKSTAT	2024-2026	● Legal framework for the definition of indicators for monitoring and supervision	A monitoring and tracking system will be developed in line with principles of circular economy.
A-S.7.2	Developing technologies to convert biogas from biodegradable waste into biomethane of a standard equivalent to natural gas, biobutanol or hydrogen that can be used as biofuel.	TUBITAK	MoIT MoNE EMRA Universities Private Sector Organizations	2024-2030	• Amount of aid granted (TRY) ● Number of projects assisted (units)	The aim is to convert the biogas into products with a high added value and to introduce them into the economy.
A-S.7.3	Conducting material life cycle assessment studies to determine the GHG emission reduction potential of waste materials.	MoEUCC TUBİTAK	MoNE MoIT Universities NGOs Private Sector Organizations	2024-2030	● Number of material-based life cycle assessment studies conducted (count)	The aim is to identify, report and manage the GHG impacts of the various stages of the life cycle, starting with the acquisition of raw materials, including all relevant production, transport, use by the consumer and disposal as waste after use, and to determine the GHG emission reduction potential.
A-S.7.4	Conducting R&D studies to support the sustainable management of wastewater treatment facilities in line with circular economy principles and GHG emission reduction targets.	MoEUCC MoIT TUBİTAK	Universities NGOs Private Sector Organizations	2024-2030	● Number of R&D studies conducted (count)	As part of the GHG reduction target and principles of circular economy, the aim is to conduct R&D studies on the reuse of treated wastewater, the recovery of materials from wastewater and treatment sludge, the reduction of the amount of treatment sludge produced at the facility, the beneficial use of treatment sludge and the reduction of GHG emissions from the wastewater treatment plant.

A-S.7.5	Developing digital technology applications such as advanced sensor technologies, artificial intelligence and remote sensing to ensure process optimization and energy efficiency in waste and wastewater management.	MoIT	MoEUCC MoENR TUBİTAK Universities Private Sector Organizations	2024-2030	● Number of patented technologies developed (count)	The aim is to increase the use of local technologies in the management of waste and wastewater.
Strategies that provide or support GHG emission reductions in the reporting of other sectors, regardless of their relevance to the waste sector.						
A-S.8: Increasing use of waste as raw material / resource in production processes						
A-S.8.1	Preparing a National Circular Economy Strategy and Action Plan	MoEUCC	PSB	2024	● Prepared National Circular Economy Strategy and Action Plan	The National Circular Economy Strategy and Action Plan will be prepared under the coordination of MoEUCC.
A-S.8.2	Establishing criteria for environmental labelling of different products and services and the dissemination of best practice.	MoEUCC	MoT Private Sector Organizations	2024-2027	● Number of products and services for which eco-label criteria are set (count) ● Number of eco-labelled products and services (count)	The Ecolabel is a label that represents a voluntary reward system created to promote products/services with reduced environmental impacts from raw material sourcing to disposal and to provide accurate, non-misleading, scientifically based information to consumers.
A-S.8.3	Creating a legal framework to promote industrial symbiosis practices	MoEUCC	MoIT MoENR MoAF MoT Organized Industrial Zones Private Sector Organizations Municipalities TOBB	2024-2030	● Number of training and awareness-raising activities undertaken on the practices of industrial symbiosis	The aim is to lay down the legal infrastructure for the practice of industrial symbiosis.
A-S.9: Reducing GHG emissions from waste handling equipment & vehicles						

A-S.9.1	Ensuring lower fuel consumption by standardizing and optimizing routes for waste collection and transport vehicles in accordance with spatial planning or by using reverse logistics options.	Municipalities Relevant Private Sector Organizations	MoEUCC	2024-2030	● GHG emissions from waste collection and transport vehicles (tonnes $CO_{2\text{-eq}}$)	This measure aims to reduce the number of vehicle rounds and the total number of rounds in the high-cost waste collection process.
A-S.9.2	Promoting the use of low-emission, alternative-fuelled and electric vehicles and, in appropriate cases, rail transport in waste collection and transport through appropriate incentive mechanisms.	Municipalities Union of Municipalities of Türkiye Relevant Private Sector Organizations	MoTI MoEUCC TCDD	2024-2030	● Amount of GHG emissions from vehicles used to collect and transport waste (in metric tonnes of $CO_{2\text{-eq}}$) ● Number of low emission vehicles, vehicles powered by alternative fuels and electric vehicles used for waste collection and transport (count) ● Amount of fossil fuel saved (tonnes)	The aim is to reduce the use of transport related fossil fuels in the collection and transport of waste.

3.6. Agriculture Sector

Action No	Action	Responsible Institution	Related Institutions	Implementation Period	Monitoring Indicators	Comment
Strategy T-S.1: Mitigating methane emissions from livestock breeding						
T-S.1.1	Conducting R&D studies on search, identification, approval and use of the feed additives that repress methane emission in animal feed rations and ensuring the use of approved feed additives	MoAF (TAGEM), (GKGM)	NGOs (TURKIYEMBIR, CBAT, TUYEKAD) TUBITAK, Universities, Private Sector Organizations	2024-2030	● At least three research studies conducted to discover impacts of the use of feed additives in animal feed rations ● Pilot system which will record the developed feed rations used in farms with livestock of 100 and more heads ● Number of farms which use the feed additives that repress methane emission, in feed rations ● Training programme for instructors held for the use of feed additives in animal feed rations (count)	Additives and their usage rates will be identified depending on the species, race and current weight of livestock. Recovery of the microbial flora in digestive system of the animals will be evaluated as well. Participation of at least 20 people in every training will be ensured and gender balance will be considered.
T-S.1.2	Increasing studies on genetic-based animal breeding considering methane emission.	MoAF (TAGEM, TIGEM)	TUBITAK, Universities, NGOs (TURKIYEMBIR, CBAT, TUDKIYEB)	2024-2030	● At least five research studies conducted to identify methane emission in breeding evaluation index ● At least five research studies on animal improvement ● Report that suggests the ideal animal species, breeds and optimum system for each geographical region	Consideration of methane emission in animal improvement will be ensured.

T-S.1.3	Increasing research studies on alternative feed resources and executing pilot applications.	MoAF (TAGEM)	TUBITAK Universities, Private Sector Organizations	2024-2030	● At least 10 research studies on the production of animal feed with domestic resources ● At least 10 Pilot applications which reflect the research results about the production of animal feed with domestic resources, on the field	Pastures, water resources, coarse fodder, different geographical areas and other types of animal feed will be identified to reduce import and cost of feed in large livestock, small livestock, poultry raising and fisheries.
T-S.1.4	Improving animal manure collection system and manure utilization methods and disseminating improved methods	MoAF (TAGEM, DTP, GDAR)	MoEUCC MoENR Municipalities, Producer Organizations, NGOs, RDAs IPARD Managing Authority, IPARD Agency, Agriculture-Based Specialised Organized Industrial Zones (TDİOSB), Universities, TUBITAK	2024-2030	● At least seven application projects about animal manure collection systems, one in each geographical region ● Number and capacity (MW) of biogas facilities ● Manure-based waste quantity (tonne) collected for the biogas facilities in Agriculture-Based Specialised Organized Industrial Zones ● At least three R&D pilot studies applied ● Training courses held for animal manure management (count) ● Number of livestock enterprises with developed waste collection infrastructure (count) ● Number of equipment pools established with animal manure application and climate-friendly machinery and equipment (count)	Innovative approaches will be sought to minimize loss of organic substances in manure collection system and utilization of manure. Gender balance will be considered in training courses.

T-S.1.5	Supporting sustainable livestock grazing through improving pastures.	MoAF (DGPP, TAGEM)	Municipalities, TUBITAK, Universities, Producer Organizations, NGOs	2024-2030	● Increased pasture area found to be 13.14 Mha in 2022 to 14.6 Mha ● Increased delimited pasture area found to be 12.67 Mha in 2022 to 14.6 Mha ● Improved pasture area of minimum 0.2 Mha Increase of the number of grazing plans which was 1773 in 2020, by 100% ● Two scientific research studies and pilot applications performed in at least two regions for monitoring, control and feedback of the grazing plan ● Number of pilot applications which involve the use of granular and liquid fertilisers generated at biogas facility	Efforts for supply of qualified coarse fodder will be raised.
Strategy T-S.2: Increasing efficiency in using chemical fertilisers						
T-S.2.1	Preparing fertiliser consumption inventories	MoAF (DGPP)	Producer Organizations, NGOs, Universities	2024-2030	Fertiliser consumption inventory comprised by the products which have the largest cultivation area and require fertiliser most	Quantity of fertilisers used based on the plant species will be specified and monitored.

T-S.2.2	Increasing research, training and extension activities to promote rational fertiliser use.	MoAF (TAGEM, DTP)	MoAF (DGPP, GDAR), Producer Organizations, NGOs, Universities, TUBITAK	2024-2030	● Research with a focus on conducting and generalizing soil and leaf analyses and developing practical methods for these analyses at farmers' level (count) ● Training courses for farmers and extension activities held for optimum fertiliser use (count)	As a result of identifying the fertiliser-intensive crops across the country, it is aimed to hold training and extension activities in the provinces and districts where fertiliser-intensive crops are produced most, and to achieve the optimum fertiliser use by giving the fertiliser quantity needed by the plant in line with the recommendations on fertiliser use. For this reason, soil analyses are significant and it will be ensured that fertilisation programmes will be prepared based on the soil analyses and Right Fertiliser Use strategies (4R-4 Right Precise Nutrient Usage - application of the right fertiliser at the right ratio at the right time and in the right place) will be implemented and extended.
T-S.2.3	Promoting R&D projects on the use of organic, organo-mineral, compost, green fertiliser etc. as an alternative to chemical fertilisers and disseminating the results of such projects.	MoAF (DGPP, TAGEM, DTP)	MoAF (GDAR), Universities, TUBITAK, Municipalities, Producer Organizations, NGOs,	2024-2030	● Number of environmental impact analyses regarding organic and organo-mineral fertiliser supports ● Number of R&D projects on the use of agricultural waste and residues through enrichment with different methods (compost, biocoal etc.) ● Investigation about the opportunities to use plant and residential organic waste as green fertiliser and compost and research and assessment reports issued as a result (count)	R&D projects regarding the use of agricultural waste and residues through enrichment with different methods (compost, biocoal etc.) will be undertaken.

T-S.2.4	Increasing training and extension activities to extend crop rotation with legumes and their cultivation sites in crop production.	MoAF (DTP, DGPP)	MoAF (GDAR) Universities, Municipalities, Producer Organizations, Legumes Industrialists, National Legumes Council, NGOs	2024-2030	● Number of training and extension activities undertaken for planting of legumes (count) ● Number of extension activities (count) ● Expansion of the cultivation areas for legumes by 10% ● Reduction of fallow land by 10% ● Establishment of monitoring, control and reporting mechanisms ● Public service ad prepared for boosting consumption of legumes ● Number of training courses held for instructors ● Cooking shows with legumes content which are broadcast continuously (count)	Planting of the same crops consistently will be prevented. Fallow lands will be shrunk. Nitrogen content in soil will be increased with artificial methods. Legumes planting will be raised to include more plant-based protein food in food consumption. A gender sensitive approach will be adopted in content and method of training courses.
T-S.2.5	Increasing awareness-raising activities that promote Good Agricultural Practices (GAP) and organic agriculture.	MoAF (DGPP, TAGEM, DTP)	TURKAK, TSE, Municipalities, Producer Organizations, NGOs, RDAs, IPARD Managing Authority, IPARD Agency, Universities	2024-2030	● Two needs analysis prepared as part of GAP (Good Agricultural Practices) and organic agriculture ● Impact analysis report on GAP (Good Agricultural Practices) and organic agricultural support ● Increase of production amount as part of GAP and organic agriculture by 20% (In 2022, production amount of GAP crops and organic crops corresponded to 6 Mt and 1.5 MT, respectively ● A minimum of 1000 training courses organized at least one in each region (seven geographical regions)	To generalize nature-friendly agricultural techniques in Türkiye which are increasingly applied around the world in terms of cultivation area and production, the challenges and barriers to GAP and organic agriculture will be identified and objectives and actions will be defined to overcome such challenges and barriers. A gender sensitive approach will be adopted in content and method of training courses.

T-S.2.6	Increasing extension activities to speed up R&D studies in climate-friendly, sustainable and digital agriculture and to disseminate results of the studies.	MoAF (GDAR, DTP, TAGEM)	STB (Ministry of Industry and Technology), TUBITAK, Universities	2024-2030	● Lists of climate-friendly and sustainable crop production and livestock practices prepared in at least two provinces in every region (seven geographical regions) ● At least five pilot practices executed ● Number of training courses held At least one climate-friendly digital agriculture-themed R&D project promoted in every region (seven geographical regions) in order to develop national technology for reduction of GHG emissions	It will be ensured that emission-reducing practices are identified for every product in every region and they are turned into recommendation lists. One of the important tools employed in reduction is digitalization (e.g. lower input usage with UAVs, sensors, chips, robots, software etc.). In particular, national technologies to be advanced for small family businesses will contribute considerably. A gender sensitive approach will be adopted in content and method of training courses.
Strategy T-S.3: Reducing use of pesticides and antimicrobials						
T-S.3.1	Promoting R&D studies to develop alternatives to pesticides and antimicrobials and expediting registration process for such products.	MoAF (TAGEM)	STB, TUBITAK, Municipalities, RDAs, Universities	2024-2030	● At least 10 research studies promoted regarding alternative agricultural control procedures ● At least two registered and licensed products	Alternative products will be developed to avoid excess use of agricultural pesticides which are harmful for environment, human health, biodiversity etc, to lower costs and to reduce import.
T-S.3.2	Reducing use of pesticides and antimicrobials and increasing extension activities for use of alternative products registered and licensed.	MoAF (DTP, GKGM, DGPP)	Municipalities, Producer Organizations, NGOs, RDAs	2024-2030	● At least seven training courses held for instructors regarding alternative control methods ● Number of training courses organized for farmers (count) ● Number of extension activities (count) ● Area of application (ha) identified for the use of alternative products ● Amount of support (TRY) provided for the use of alternative products	Use of the alternative products developed will be scaled up. A gender sensitive approach will be adopted in content and method of training courses.
Strategy T-S.4: Developing loss, waste and residue management in agricultural production						

T-S.4.1	Expediting and scaling up R&D studies on reduction of crop losses in crop production and reuse of waste and residues.	MoAF (TAGEM, DTP)	MoEUCC, MoI, TUBITAK, Municipalities, RDAs, Producer Organizations, NGOs	2024-2030	● At least three research studies and training programmes prepared for every product group ● Implementation of at least one chosen research study in each of seven geographical regions of Türkiye ● Number of training courses held for lowering loss of products during and after harvest ● Appropriate instructional content formed for female and male producers (videos, handbooks, posters, illustrated descriptions etc.) (name) ● At least five public service ads, social media campaigns and public disclosure and awareness activities	Utilization of plant waste with a cyclical approach will be ensured. A gender sensitive approach will be adopted in content and method of training courses.
T-S.4.2	Completing inventory studies in recycling of agricultural waste and residues.	MoAF	MoEUCC, MoI, TURKSTAT, Municipalities, Producer Organizations, NGOs, Development Agencies, RDAs, Universities	2024-2030	● Inclusion of agricultural waste and residue recycling in the official statistical programme ● Completed inventory	The prepared inventory on waste and residue recycling aims to compile and monitor information.

T-S.4.3	Increasing R&D and awareness activities to reduce food loss and waste.	MoAF (TAGEM, GDEUFR)	MoEUCC, MoI, Municipalities, RDAs, Producer Organizations, Consumer Organizations, NGOs	2024-2030	● At least three research studies conducted ● At least one research study implemented ● Number of awareness activities undertaken ● Number of training courses organized	Current studies will be broadened by adding gender analysis and/or through a gender sensitive content and method.
Strategy T-S.5: Increasing efficiency of land and soil management						
T-S.5.1	Completing land aggregation registration activities.	MoAF [State Hydraulic Works (DSİ)]	Municipalities, Producer Organizations, NGOs	2024-2030	● Area of 14.3 Mha subjected to aggregation	Ongoing studies will be speeded up.
T-S.5.2	Preparing and putting into use current detailed soil maps in accordance with international standards.	MoAF (GDAR)	MoAF [General Directorate of Forestry (OGM)], Universities	2024-2027	● National Soil Information System which was improved and made sustainable	It will be ensured that the mapping processes which have been already made to identify the nature of agricultural land are executed in accordance with international standards. Current National Soil Information System will be improved.
T-S.5.3	Promoting and monitoring activities to mitigate land destruction and monitored and increasing relevant R&D studies.	MoEUCC (GDCDE), MoAF (GDAR, TAGEM, DTP)	MoAF (OGM), TUBITAK, Universities, Municipalities, RDAs, Producer Organizations, NGOs	2024-2030	● Reduction in the quantity of spoilt (destructed) areas (ha) ● Quantity of restored areas in agriculture sector (ha) ● Number of research studies conducted ● Training courses organized for disseminating research results (count) ● Quantity of areas subjected to the practices aiming at balancing land destruction (ha) ● At least one R&D project executed in every region (seven geographical regions) for balancing land destruction	Activities for conserving agricultural land will be expanded.

T-S.5.4	Planning agricultural production on the basis of agricultural basins or enterprises and revising agricultural supports to realize the goals under such planning.	MoAF (DGPP, GDL)	MoAF (GDAR), MoTF TUBITAK, Universities, Municipalities, RDAs, Producer Organizations, NGOs	2024-2030	● Action plan prepared for every province (or for every pilot province) ● Quantity of areas subjected to planning (ha) ● Amount of support given based on the action plan (TRY)	Action plans will be prepared for every province to ensure the growing of proper crops for soil, water and ecosystem. They will be integrated with the supporting system.
T-S.5.5	Increasing extension activities to extend direct sowing methods and reduced tillage procedures.	MoAF (GDAR, DTP)	Universities, Municipalities, RDAs, Producer Organizations, NGOs	2024-2030	● Increase in the areas subjected to direct sowing (%) ● Increase in the areas subjected to reduced tillage (%) ● Monitoring, control and reporting mechanism established ● Number of training courses for farmers (count) ● Number of extension activities (count)	The aim is to boost the quantity of areas subjected to direct sowing and reduced tillage and to establish a monitoring, control and reporting mechanism for such systems. A gender sensitive approach will be adopted in content and method of training courses.
T-S 5.6	Extending agro-forestry and shelterbelt activities in cultivated areas.	MoAF (GDAR, DTP, OGM)	Universities, Municipalities, RDAs, Producer Organizations, NGOs	2024-2030	● At least five pilot practices about agro-forestry and shelterbelt activities ● Number of training courses on agro-forestry works which were held for instructors in every region (seven geographical regions) ● Number of training courses on shelterbelt works which were held for instructors in every region (seven geographical regions) ● Number of public service ads, social media campaigns, public disclosure, training and awareness activities undertaken regarding agro-forestry and shelterbelt	It is aimed to execute agro-forestry and shelterbelt practices which are among nature-based solutions for reduction. A gender sensitive approach will be adopted in content and method of training courses.
Strategy T-S.6: Providing farmers with access to affordable financing						

T-S.6.1	Establishing financing and support models for mitigation activities.	MoAF (GDAR, DGPP, GDL, DGFA, SDD)	PSB, MoTF, BRSA, BAT, Banks, Agricultural Credit Cooperatives, Producer Organizations	2024-2030	● Report issued under the analysis on environmental and economic impacts of the current agricultural support and incentives in the framework of GHG mitigation ● Legislation introduced for updating of agricultural support and incentives in the framework of GHG mitigation	It is aimed to bring agricultural support and incentives of banks up to date in line with the reduction strategies and expand credit facility opportunities.
T-S.6.2	Identifying and sharing data needed to facilitate farmers' collaboration with banks and women farmers' access to loans.	MoAF (DGPP, GDL, DGFA, SDD, DTP)	PSB, MoAF (GDAR), BRSA, BAT, Banks, Agricultural Credit Cooperatives, Producer Organizations	2024-2030	● Prepared data report required by the financing institutions ● Pilot system established to share the necessary data with the financing institutions ● Pilot system established to identify loan need of women farmers and raise their loan usage	Pursuant to PDPL, livestock breeders should declare Operation Registration Certificate, which contains recorded operation information (ear tag no.) and is obtained via Livestock Information System. The certificate can be received from Provincial and District Directorate of Agriculture and through e-government portal. In case that the women farmers registered to Farm Accountancy Data Network system where their economic and physical data are recorded, share their information in this way, priority will be given to them in loan usage process.

T-S.6.3	Designing and implementing programmes for enhancing economic diversity in rural areas.	MoAF (GDAR, OGM)	MoAF (ARDSI), MoLSS, SGK, Development Agencies, TZOB, Cooperatives, Women's Cooperatives, Producer Associations, Provincial Directorates, Regional Directorates, Municipalities, International Organizations, NGOs	2024-2030	● Green transformation in rural areas and impact analysis report issued ● Green transformation strategy paper issued ● Supporting programmes prepared/applied (count) ● Number of projects bolstered up under the Programmes to Promote Rural Development Investments	Broadscale and accessible support programmes should be prepared and put into use for the purpose of enhancing economic variety in rural areas as part of green transformation process.
Strategy T-S.7: Promoting training, awareness-raising and capacity-building activities for stakeholders operating in agriculture sector considering gender balance						
T-S.7.1	Identifying target audience to receive training in line with Sustainable Development Goals.	MoAF (TAGEM, PERGEM)	TZOB, Cooperatives, Producer Associations, Municipalities, International Organizations, NGOs	2024-2025	● A guide prepared for identifying the target audience	The aim is to form and publish a guide in order to identify the target audience considering gender balance.

T-S. 7.2	Promoting training and capacity-building activities for stakeholders in agriculture sector.	MoAF (PERGEM, TAGEM),	MoAF (OGM), Universities, TZOB, Cooperatives, Women's Cooperatives, Producer Associations, Municipalities, International Organizations, NGOs	2024-2025	● Training provided to at least 500 technical personnel employed in public sector ● Training provided to at least 20 enterprises in private sector, NGOs and producer organizations ● At least three training courses on project preparation provided to international sources of funds	Training for producer organizations and all kinds of technical personnel, especially agricultural engineers, veterinarians, food engineers and technicians will be increased. A gender sensitive approach will be adopted in content and method of training courses.

3.7. LULUCF Sector

Action No	Action	Responsible Institution	Relevant Institutions	Implementation Period	Monitoring Indicators	Description
Strategy L-S.1: Increasing GHG sequestration annually by protecting and sustainably managing ecosystems and increasing sink areas, and reducing ecosystem-based emissions						
L-S.1.1	Developing and monitoring sector-wide strategies, action plans, macro-planning, and targets, particularly in forestry and agriculture, in a manner to increase sink capacity	MoAF (GDF, GDAR, TAGEM, DGPP, GDNCNP)	DCC	2025-2030	● Increase in the annual net sequestration (gains-losses) in the forest category (forest management) each year in the period 2025-2030 compared to the previous year ● Average annual increment (m3/ha/year) in the period 2025-2030 being above the average of the previous 5 years for all forest types (coniferous, leafy, mixed and intermittently disturbed) ● Negative net emissions in agricultural land and grassland categories (tonnes $CO_{2\text{-eq}}$ sequestration).	It is aimed to strengthen the planted volume representing the living biomass in forest ecosystems and the increment determining the annual carbon sequestration.
L-S.1.2	Transitioning to a proactive, result-oriented, and basin-scale approach in afforestation/rehabilitation/restoration, taking into account the integrity of ecosystems, and creating a basin-based afforestation roadmap	MoAF (GDF)	MoAF (GDAR, DGPP) MoEUCC (GDCDE)	2024-2025	● Amount of afforestation/ rehabilitation/ restoration area (forest, grassland, wetland, etc.) (ha/year) ● Prioritisation for investment with a scientific approach at the river sub-basin scale	Mitigation and adaptation in the LULUCF sector should be planned and monitored at the basin scale in order to see the interaction between mitigation and adaptation and to manage them more effectively. It is aimed to conduct studies in line with the relevant strategy papers, especially the National Basin Rehabilitation Strategy (NBRS), and to establish legislation on basin-based management by establishing NBRS regulations and instructions for the results according to parameters such as

						prioritising, where, which species, for what purpose and what kind of forest structure are to be used.
L-S.1.3	Identifying potential areas suitable for afforestation/plantation by supporting geographical information systems and remote sensing methods in addition to field measurements	MoAF (GDF) MoEUCC (GDCDE)	MoAF (GDAR, TAGEM, DGPP) MoEUCC (DGGIS) Municipalities	2024-2030	● Total amount of area suitable for afforestation/plantation identified on Treasury lands (ha)	Studies on areas suitable for afforestation were conducted in our country. It is aimed to update and elaborate these studies so as to include planting, to identify the potential and to enable prioritisation.
L-S.1.4	Protecting soil carbon sinks by enhancing the combat against land degradation, erosion-sedimentation, and desertification due to land misuse	MoAF (GDF, GDAR) MoEUCC (GDCDE)	MoAF (TAGEM) MoEUCC (DGGIS) TURKSTAT Universities	2024-2030	● Amount of change in land cover monitored spatially in certain periods with the help of the National Land Cover Classification and Monitoring System (NLCC&MS) (ha/year) ● Change in soil carbon stock (tonnes C/ha/year) ● Net increase in soil carbon stock value measured at fixed sampling points in response to prevention of land misuse (tonnes C/ha) ● Amount of desertification, erosion and sedimentation identified and reported temporally and spatially every two years	Land use planning should be enhanced through integrated plans and practices in main basins and sub-basins in accordance with the ability categories.
L-S.1.5	Promoting digitalisation across the sector to cover all land types (wetlands,	MoAF (GDAR, DGPP, GDNCNP, GDF)	MoEUCC	2024-2025	● Number of digitised data (count) ● Number of digitalised applications (production, afforestation, etc.) (count)	Intra and inter-institutional data flows will be enabled by digitalisation.

	grasslands, etc.), especially forestry and agriculture	MoEUCC (GDCDE)			● Decision Support System Platform for Balancing Land Destruction	
L-S.1.6	Initiating technical and legal arrangements to prevent emissions from all practices that may damage forests and other land uses	MoAF (GDF, GDAR)	DCC MoENR (GDMPA)	2024-2025	● Number of technical and legal regulation studies put into practice (count) ● Amendments to national forestry legislation, particularly Forest Law and National Parks Law ● Published land use change bases (count)	It is aimed to minimise emissions with the technical and legal arrangements to be made.
L-S.1.7	Developing and disseminating carbon, water and biodiversity objective functions in forest planning and management in technical terms	MoAF (GDF)	Universities and research institutes	2024-2030	● Amount of forest area managed for carbon, water, and biodiversity purposes (ha) ● Relevant legal and technical regulation updates (Communiqués No. 295, 298, 299, 302 and 308) ● Number of Forest Management Plans in which forest ecosystem services are integrated in forest areas (count) ● Forest ecosystem services map prepared ● Number of Forest Management Directorates with Ecotourism Management Plan ● Number of ecosystem-based functional integrated forest management plans (count) ● Number of published Fire Management Plans (count)	Functions in ecosystem-based planning, particularly carbon sequestration, biodiversity, and water production, are required to be continuously improved with technical and scientific data. In addition, it is appropriate to expand these functions to all forests, aiming to strengthen mitigation and adaptation.

L-S.1.8	Increasing the technical capacities of institutions by conducting applied pilot studies with Climate Change Focused Framework Transition Projects	MoAF (GDAR, TAGEM, GDF)	MoAF (GDNCNP) MoEUCC (GDCDE)	2025-2030	● At least 100 experts trained in carbon management (managing land use mitigation), climate adaptation, disaster risk reduction and disaster management ● Number of research studies and pilot projects developed and implemented (count) ● Practical training provided to at least 1000 people on sustainable land management, particularly on desertification and erosion	The sub-sectors of LULUCF are required to be enhanced and transformed in order to contribute more to combating climate change and to be minimally affected by its negative impacts. The capacities of all institutions involved in this process should be continuously increased to follow and internalise technical and technological developments. Gender balance will be considered in capacity-building processes.
L-S.1.9	Increasing the effectiveness of regulations to limit human activities that may damage natural life and ecosystems in and around forests, wetlands and forests close to urban areas	MoAF (GDF, GDNCNP) Municipalities	MoAF (GDWM) Universities Public Institutions Private sector organizations	2024-2025	● Published new legal and technical regulations ● Rate of recovery in wildlife population (number, diversity). ● Rate of decrease in the number of fires in urban forests (%) ● Rate of improvement in wetland water quality (%)	Ecotourism movements and ecotourism management plans that can be executed under the control of relevant institutions in forests near urban areas can reduce the potential negative impacts of human activities.
L-S.1.10	Establishing a technical and legal mechanism in cooperation with municipalities and relevant ministries to determine, monitor and increase the proportion of woody green spaces in urban areas	MoEUCC MoAF (GDF) Municipalities	MoEUCC, (GDCDE) NGOs	2024-2025	● Calculating the forest area per capita for each province, publishing it on the website of the Ministry and notifying the relevant municipalities by the end of 2024 ● Publishing the amount and target of forest area per capita for each province and urban centre on the website of the Ministry and notifying the	The forest area per capita for each province and urban centre will be calculated by MoEUCC, communicated to the municipalities and the municipalities will be ensured to set targets and monitor accordingly. In this context, it is also aimed to increase the number of green spaces by providing incentives for municipalities to increase urban forest areas.

					municipalities by the end of 2025 ● Amount, rate and annual change of forest area per capita in the urban centre and province (for each year from 2000 and after) (ha/person) ● Number of published legal regulations (count) ● Number of projects developed and/or incentives granted by municipalities to increase the number of forests and green spaces (count)	
L-S.1.11	Promoting projects and studies for the restoration and rehabilitation of river corridors and ecosystems in agricultural lands, grasslands, wetlands, and settlements	MoAF (GDNCNP, GDAR) MoEUCC	MoAF (GDF) Municipalities	2024-2030	● Length (km) and area (ha) of restored/rehabilitated river corridor) ● Number of incentivised (supported) projects (count) ● Improvement rate in water quality values of our rivers, dams, and lakes (%)	It is aimed to increase biomass and soil carbon sinks by restoring river corridors in residential, agricultural, grassland and wetland areas.
L-S.1.12	Supporting poplar, fruit farming, olive farming and climate-friendly agricultural practices in agricultural areas, especially women and young entrepreneurs, technically and financially with new incentives	MoAF (GDAR, TAGEM)	MoAF (GDF)	2024-2030	● Increase in the amount of poplar, olive and fruit farming areas and climate-friendly agricultural lands (ha) ● At least 500 new entrepreneurs supported in the agricultural sector and gender balance in support ● Number of projects supported	It is aimed to promote all woody agricultural products and to pay attention to the distribution of the number of women/young entrepreneurs involved.

L-S.1.13	Strengthening and promoting incentives for afforestation of fast-growing and income-generating species in unproductive agricultural lands, unless it is possible to restore these lands to agriculture	MoAF (GDAR, GDF)		2024-2030	● Amount of area subject to incentive (ha). ● Amount of incentives granted (TRY) ● Amount of afforestation (ha)	It is aimed to use non-productive agricultural land as agricultural land, to alleviate the pressure of wood raw material production in natural forests by encouraging fast-growing species afforestation, to reduce the production pressure in natural forests by providing support to the forest industry to shift towards industrial plantations in order to meet their own raw materials.
L-S.1.14	In all land planning scales and processes, focusing on nature-based solutions (NBS) that will increase green carbon sink capacity instead of grey solutions in a manner to prioritise upstream basin management	MoAF (GDF) MoEUCC (GDCDE)	MoAF (SWH, GDNCNP)	2024-2030	● Number of projects to implement nature-based solutions (e.g., integrated basin projects) ● Amount of projected area (ha)	It is aimed to enhance mitigation and adaptation capabilities by disseminating the projects at basin scale.
L-S.1.15	Preparing and putting into effect an action plan for the rehabilitation of grassland areas in a manner to increase soil carbon stock annually in the period between 2025-2038	MoAF (DGPP)	MoAF (GDAR, TAGEM, GDF)	2025-2030	● At least 0.2 Mha new grassland area rehabilitated each year ● Annual carbon stock increase of 0.16% per hectare in grassland areas ● Amount of grassland area in and near forests rehabilitated (ha)	It is aimed to develop and implement management plans for grasslands by increasing soil carbon stock and improving livestock breeding through correct practices planned to be executed in large areas. This action refers to the target of an increase in soil carbon stocks by close to 2% per hectare by 2038 on approximately 2-3 Mha of grassland land through multiple restoration projects.
L-S.1.16	Implementing and promoting climate-friendly agricultural practices in agricultural lands in a manner to increase soil	MoAF, (GDAR)	MoAF (TAGEM, GDF, DGPP) TZOB	2025-2030	● 0.2 Mha of new areas with climate-friendly agricultural operations each year and an annual carbon stock increase of 0.16% per hectare in these areas	It is aimed to achieve a significant increase in soil carbon stocks through a wide range of climate-friendly agricultural practices.

	carbon stock annually in the period between 2025-2038				● Amount of incentives granted (TRY)	It is aimed to increase soil carbon stocks by close to 2% per hectare by 2038 on approximately 2-3 Mha of agricultural land.
L-S.1.17	Disseminating good practices (nature-based solutions, biochar, reduced ploughing, etc.) that promote soil fertility and carbon stock increase in all land uses	MoAF (GDF, GDAR) MoEUCC (GDCDE)	MoAF (TIGEM, DGPP)	2025-2030	● At least 10 good practices each year ● Amount of implemented area (ha)	It is aimed to protect and increase soil carbon stock through the development and dissemination of good practices to prevent or mitigate erosion/sedimentation.
L-S.1.18	Identifying desertified areas subject to erosion and land degradation, monitoring these areas with various indicators, particularly soil carbon stocks, and developing and disseminating basin management practices and tools to find solutions	MoEUCC (GDCDE) MoAF (TAGEM)	MoAF (GDF)	2024-2030	● Amount of area subject to various levels of erosion and at risk (ha) ● Change in soil carbon stocks (t C/ha/year) ● Number of projects, applications, and tools (application, model, etc.) to combat erosion and desertification (count) ● Sediment load carried in rivers	It is aimed to establish integrated approaches relating to desertification and erosion, water quality, rural development, agricultural yield, sedimentation, etc. at the basin scale.
L-S.1.19	Increasing the total amount of protected areas and developing site-specific management strategies to enhance the mitigation and adaptation capacities of these areas	MoEUCC MoAF (GDNCNP), GDF		2024-2030	● Amount of protected areas reaching 14% of national surface area. ● Protected natural old growth forest area (ha)	It is aimed to increase the protected areas so as to prioritise natural ecosystems, taking into account natural old-growth forests in particular.
L-S.1.20	Reducing pressures on wetlands, protecting them from harmful impacts, especially drainage and	MoAF (GDNCNP)	MoAF (GDF, DGPP and GDAR, SWH) Municipalities	2024-2030	● Increase in the amount of registered wetlands (ha)	It is aimed to rehabilitate the wetlands damaged due to climate change and drought; and restore them to the wetland system.

	pollution, and rehabilitation of damaged wetlands				● Amount of rehabilitated wetlands (ha) ● Monitoring system established for wetlands and protected areas	It is aimed to ensure the harmonisation and coordination of agriculture and water policies with wetlands conservation policy, and to prevent the pressure of construction and industrialisation on wetlands. It is aimed to reduce the pressure on the wetland ecosystem by providing alternative livelihoods.
L-S.1.21	Enhancing the process for prevention of forest fires, early detection of fires and early and effective response to fires	MoAF (GDF)	MoI (AFAD) MoNE MoAF (SWH) KGM Municipalities	2024-2030	● Reduced number of fires and amount of burnt area (ha) ● Number of fire prevention studies and awareness-raising activities (meetings for local people, brochure-poster campaigns, public service announcements, etc.) (count) ● Increased number of fire fighting vehicles, equipment, and personnel (count)	It is aimed to continuously improve fire management system in order to reduce the number of fires and the amount of burnt areas.
L-S.1.22	Increasing the use of technology in firefighting, increasing the efficiency of resource utilisation with artificial intelligence supported decision support systems	MoAF (GDF)	Universities Municipalities Private and public sector technology companies	2024-2030	● Number of projects implemented to increase the use of artificial intelligence (count) ● Reduced amount of burnt area (ha) ● Reduction in fire response time (min)	It is aimed to use resources more effectively in fire management with artificial intelligence methods such as machine learning.
L-S.1.23	Increasing the proportion of land and marine protected areas to 30% in line with the targets of the Kunming-Montreal Global Biodiversity Framework	MoEUCC (GDPNA)	MoAF (GDF)	2024-2030	● Protected area rate (%)	It is aimed to increase land and marine protected areas in line with international conventions and EU strategies.

	adopted by the 15th Conference of the Parties to the Convention on Biological Diversity and the EU Biodiversity Strategy					
L-S.1.24	Preparing an Ecosystem-Based National Management Strategy for Protected Areas, Ecosystem-Based Climate Change Action Plan and ensuring its integration into management plans	MoEUCC (GDPNA)		2025-2030	● Strategy and action plan prepared ● Number of integrated management plans (count)	It is aimed to prepare ecosystem-based National Management Strategy and ecosystem-based Climate Change Action Plan and to ensure their integration into management plans.
L-S.1.25	Preparing an Ecosystem-Based National Spatial Planning Strategy and integrating it into Spatial Plans	MoEUCC (GDPNA)		2025-2030	● Strategy prepared ● Number of integrated spatial plans (count)	It is aimed to prepare an ecosystem-based National Spatial Planning Strategy and integrate it into spatial plans.
Strategy L-S.2: Ensuring transition of forestry and agricultural enterprises to a circular bioeconomy with high added value.						
L-S.2.1	Supporting family and small/medium and large-scale enterprises with high production and marketing capacity that can reach international markets in the non-wood forest products sector by increasing and promoting the support, supporting social projects to reduce wood consumption in forest villages and supporting economic income-	MoAF (GDF)	Cooperatives Municipalities NGOs SMEs	2024-2025	● At least 500 new enterprises established per year (50% of which will be women or young investors) ● Number of enterprises supported (count) ● Information and support training provided to 200 people for the establishment of new enterprises (50% of them will be women and young investors) ● Amount of incentives given to enterprises, cooperatives and	It is aimed to prioritise the supports so as to ensure rural development and the participation of rural youth and women in production stronger.

	increasing activities to prevent rural migration				unions for production and sales (TRY)	
L-S.2.2	Within the scope of climate-friendly agriculture, support for family, small/medium and large-scale enterprises with high production and marketing capacity that can reach international markets should be maintained and increased, and the sector, especially women entrepreneurs, should be supported technically and financially with new incentives	MoAF (GDAR)	GDF MoT Cooperatives Municipalities	2024-2025	● Number of new enterprises established (count) ● Number of families supported (count)	It is aimed to establish companies with higher capacity in marketing, logistics and advertising processes by considering gender balance for entrepreneurs.
L-S.2.3	Expanding and enhancing incentives for forest industry companies to increase added value, efficiency, and recycling	MoAF (GDF)	MoT MoTF Chambers of Commerce	2024-2025	● Number of companies supported (count) ● Amount of incentives granted (TRY) ● Number of recycling facilities established with incentives (count) ● Amount of recovered material (tonnes)	It is aimed to increase design, technology, i.e. added value in the wood products sector.
Strategy L-S.3: Doubling project supports to 2020 level by 2030 to strengthen sector in terms of R&D and innovation						
L-S.3.1	Strengthening the combat against disaster and climate change-related forest damages that may cause damage to sink areas through technological, preventive,	MoAF (GDF, TAGEM, DGFA) MoEUCC (GDCDE) Universities	MoAF (GDNCNP) TUSIAD TUBITAK	2024-2030	● Number of projects implemented and completed (count) ● At least 15 projects prepared for mitigation of damages caused by floods and landslides	It is aimed to support R&D studies to reduce the negative impacts of climate-related disasters and damages on sink areas.

	and educational projects and increasing R&D support on the effects of these damages on carbon stocks					
L-S.3.2	Enhancing technical infrastructure for GHG emission and sequestration calculations	MoAF (GDF, TAGEM, GDAR)	MoEUCC (DGGIS) Universities TUBITAK	2024-2030	● Developed, updated and recently created new GIS and land use sub-datasets ● Number of R&D projects implemented and completed (count)	It is aimed to continue research and development activities to improve the level and precision of the LULUCF sector reporting on the basis of emission factors which are based on remote sensing, geographical information systems and scientific studies.
L-S.3.3	Supporting research on the technology-based requirements of the Land Use and Forestry sector and developing a sector specific project incentive mechanism	MoAF TUBITAK	MoEUCC (GDCDE) Universities TUSIAD	2024-2025	● Incentive mechanism created ● Amount of incentives granted (TRY) ● Number of research projects implemented (count)	It is aimed to establish a sector-specific funding mechanism to improve the current national level of technology and innovation in the LULUCF sector.
L-S.3.4	Increasing the use of digitalisation, remote sensing methods (such as satellite-based, drone use) and robotic technologies to improve productivity in forestry and land use	MoAF TUBITAK	MoEUCC (GDCDE), Universities TUSIAD	2024-2030	● Number of projects implemented (count)	It is aimed to increase the precision and accuracy of carbon stock and emission calculations by supporting the development of technologies such as digitalisation, precision monitoring, use of robots etc. in forestry.
L-S.3.5	Supporting projects for conducting climate projections and vulnerability analyses for forestry and land use by using projection outputs	MoAF (TAGEM) MoEUCC (GDCDE, DCC) TUBITAK Universities	MoAF (GDF, GDAR)	2024-2030	● Updating climate projections in line with SSP scenarios ● At least 5 research projects on climate projections and land use supported in the period between 2023-2030 ● Number of vulnerability analyses conducted	It is aimed to update climate projections in line with SSP scenarios and to contribute to the development of land use sector through sectoral vulnerability analyses.

					● Amount of support granted (TRY)	
L-S.3.6	Promoting scientific studies and technologies for integrated drought solutions, including the development of drought-resilient species, taking into account biodiversity in afforestation and planting	MoAF (TAGEM, GDF) MoEUCC (GDCDE)	MoAF (GDNCNP) TUBITAK Universities TUSIAD	2024-2030	● Support for at least 5 research projects on drought annually ● Implementation of 5 R&D projects to increase the success of afforestation and planting in arid lands for the relevant period	It is aimed to support drought-resilient origins and technological solutions against the risk of increasing drought intensity and frequency, as well as to tolerate the water shortage due to increasing temperatures.
L-S.3.7	Integrating data-driven artificial intelligence into decision-making processes	MoAF	TUBITAK Universities Private sector organizations	2024-2030	● At least 2 supported projects on big data, data analysis and artificial intelligence ● Rate of artificial intelligence use in internal decision-making and estimation processes	It is aimed to review the data collection, storage and analysis activities of the institutions in sector; to enhance the technological infrastructure for reporting, analysis, data dashboarding, advanced estimation and big data management.
L-S.3.8	Ensuring more effective participation in ecosystem monitoring networks such as Long-Term Ecological Monitoring Network, ICP Forests, Integrated Carbon Observation System and similar ecosystem monitoring networks, encouraging long-term experimental basin and ecosystem monitoring studies for detailed and precise monitoring and analysis of precipitation-runoff processes, promoting	MoAF	MoAF (GDNCNP, GDF) MoEUCC (GDCDE, GDM) TUBITAK Universities	2024-2030	● Number of Long-Term Ecological Monitoring Network monitoring sites established (count) ● Number of ICP Level 2 monitoring sites (count) ● Experimental co-basin monitoring system established and operated to cover all components of the ecosystem ● Number of long-term experimental projects supported (count)	It is aimed to monitor the impacts of climate change on forests with the help of mentioned networks and to understand the impacts of climate change through more effective participation.

	them in different ecozones of our country					
L-S.3.9	Supporting research on the development of underwater ecosystems in coasts and seas and creating blue carbon sinks	TUBITAK	MoAF (DGFA) DCC Universities	2024-2030	● Number of blue carbon projects (count) and their areas (ha)	It is aimed to obtain information about blue carbon potential and feasibility by undertaking scientific and technical studies in the Mediterranean geography with blue carbon mitigation potential.
Strategy L-S.4: Increasing number of technical personnel and professionals trained in carbon management in sector						
L-S.4.1	Improving scientific, institutional, and human capacity in combating forest losses and damages (fire, disease, etc.)	MoAF (GDF)	TUBITAK Universities NGOs Municipalities	2025-2030	● At least 2 projects created each year at national and international scale ● Training provided to at least 100 people each year and ensuring gender balance in training ● At least 10 training courses provided each year ● Number of scientific publications released (count)	It is aimed to improve technical capacity in terms of the management, monitoring and reporting of emissions due to losses and damages in ecosystems as a result of changing climatic conditions.
L-S.4.2	Raising awareness in combating forest losses and damages (fire, disease, etc.)	MoAF (GDF)	MoNE NGOs	2025-2030	● At least 10 awareness-raising activities (e.g., public service announcements, documentaries, etc.) each year ● Number of posts on social media platforms to raise awareness on the issue (count) ● Number of projects implemented to increase the awareness of forest villagers in firefighting (count)	It is aimed to undertake awareness-raising activities based on an approach that does not lead to gender inequality and that promotes equality and participation.
L-S.4.3	Increasing scientific, institutional, and human capacity and awareness on	MoEUCC (GDCDE)	MoAF (GDF)	2025-2030	● At least 2 projects created each year at national and international scale	It is aimed to improve the capacity for desertification and erosion prevention activities.

	the effects of climate change on desertification and erosion	MoAF (TAGEM)			● Training provided each year and ensuring gender balance in training ● At least 10 training courses provided each year ● Number of R&D projects implemented and scientific publications released (count) ● Technical training on climate change, desertification, erosion control provided to at least 100 technical personnel each year (count) ● Awareness activities (e.g., public service announcements, documentaries, etc.) on climate change, desertification, erosion control (count)	
L-S.4.4	Improving scientific, institutional, and human capacity in combating wetland losses and damages (drought, drying, misuse of wetlands, etc.), raising awareness	MoAF (GDNCNP)	MoAF (GDF) MoEUCC TUBITAK Universities	2024-2030	● At least 2 projects created each year at national and international scale ● Training provided to at least 100 people each year ● At least 5 training courses provided each year ● At least 5 international and 10 national scientific publications released each year ● At least 5 awareness-raising activities (e.g., public service announcements, documentaries, etc.) each year	It is aimed to undertake awareness-raising activities based on an approach that does not lead to gender inequality and that promotes equality and participation.

L-S.4.5	Providing climate-friendly and low-carbon agriculture training for researchers, technical personnel, and farmers	MoAF (GDAR, PERGEM, DTP)	MoEUCC (GDCDE) MoAF (GDF) Chamber of Agricultural Engineers Universities NGOs	2024-2030	● At least 10 training courses provided each year ● Training provided to at least 100 people each year	It is aimed to increase climate-friendly agriculture training by considering gender balance in order to increase the sink capacity of agriculture for emission mitigation purposes.
L-S.4.6	Providing training on wetland conservation and climate-friendly fisheries practices to technical personnel and people engaged in agriculture, livestock, and fisheries with traditional methods in wetlands	MoAF (GDNCNP, DGFA)	Universities	2024-2030	● At least 5 training courses provided each year ● Training provided to at least 200 people each year and ensuring gender balance in training	It is aimed to increase training on wetland conservation and climate-friendly fisheries.
L-S.4.7	Providing training for technical personnel on climate-friendly forestry, especially on mitigation and management of climate change risks	MoAF (GDF) Chamber of Forest Engineers	MoEUCC (GDCDE) NGOs	2024-2025	● Training provided to at least 500 forest engineers each year ● At least 10 training courses provided each year	It is aimed to increase various training on climate-friendly forestry by considering gender balance.
L-S.4.8	Preparing and implementing a training programme for municipalities on river corridor restoration	MoAF MoEUCC Municipalities	MoAF (GDF) Chamber of Forest Engineers Chamber of Agricultural Engineers NGOs	2024-2027	● At least one capacity-building project prepared until 2025 for the establishment of training programme ● At least one training programme covering at least 100 municipalities	It is aimed to train the relevant units in municipalities to gain technical knowledge, skills and experience in river corridor restoration.
L-S.4.9	Training technical personnel on GHG emission and sequestration calculations and	MoAF (GDF, GDAR) Universities	DCC, MoAF (TAGEM)	2024-2030	● Providing at least two training courses each year on the LULUCF sector GHG and BTR, NC reporting	It is aimed to train LULUCF sector experts on new reporting system of UNFCCC which will enter into force at the end of 2024.

	international reporting obligations in the LULUCF sector				● Number of courses, master's and doctorate programmes on Climate Change established in universities ● Providing at least 10 training courses on GHG emission and sequestration calculations and data supply for calculations, training 100 experts as certified experts ● Providing both technical and foreign language training within the scope of training of trainers in cooperation with universities to at least 50 technical personnel working in the relevant units within the responsible institutions and establishing a certification system	
L-S.4.10	Establishing climate change units in institutions directly relating to the management and reporting of sink areas, improving institutional capacity on the basis of experts and authority	MoAF (GDF, GDAR, TAGEM, DGFA) MoEUCC (GDCDE)	DCC	2024-2030	● New units established in relevant institutions ● Number of technical and research personnel in relevant institutions	It is aimed to ensure that the structuring of institutions relating to the development, monitoring and reporting of the LULUCF sector includes units which will undertake the activities of establishing ecosystem-based climate change policies and strategies, ensuring carbon management in ecosystems, undertaking studies on carbon credits, fulfilling UNFCCC obligations and mitigation commitments, determining the impact of climate change on ecosystems and the framework for effective combat against these impacts, and increasing the capacity of technical personnel and researchers providing data for reports.
Strategy L-S.5: Developing technology infrastructure for LULUCF sector.						

L-S.5.1	Developing and operationalising estimation and early warning systems for drought, floods, forest fires and landslides	MoAF (GDF, TAGEM, GDWM, SWH)	AFAD	2023-2027	● Number of estimation and early warning systems developed (feasibility, design, operational) (count)	It is aimed to support and implement R&D and innovation in order to develop, implement and disseminate early warning systems in combating disasters to other countries and to export technology.
L-S.5.2	Increasing R&D capacity for the estimation and verification of emissions and sequestration on land use with remote sensing and atmospheric models, particularly developing satellite-based observation, and analysis systems	TUBITAK MoAF (GDF, GDAR, TAGEM) MoEUCC (DGGIS, GDCDE)	Universities Private sector organizations	2024-2030	● Utilisation rate of satellite-based systems (%) ● Number of models initiated to be used in the verification of GHG inventory (count) ● Number of R&D projects developed (count)	It is aimed to support initiatives and projects on remote sensing technologies and modelling in the LULUCF sector.

3.8. Cross-Cutting Issues

3.8.1. Just Transition

Action No	Action	Responsible Institution	Relevant Institutions	Implementation Period	Monitoring Indicators	Description
AG-S.1 Building capacity for just transition and employment transformation						
AG-S.1.1	Formulating a national just transition strategy to achieve green transformation in labour markets and ensure a transition in just conditions	MoLSS	PSB MoEUCC MoIT MoENR MoFSS MoNE CHE	2024-2026	● Just transition strategy papers issued (count)	According to sectoral and regional analyses, National Just Transition Strategy covering different policy areas including labour edification, employment, social protection, social assistance, occupational health and safety and immigration will be prepared by MoLSS with a view to managing the climate change and green transformation process through a just transition perspective.
AG-S.1.2	Improving the just transition process and social dialogue	MoLSS	Workers' and Employers' Unions and Confederations TOBB Turkish Exporters Assembly	2024-2026	● Number of awareness-raising exercises for social parties (count) ● Number of stakeholder meetings conducted (count) ● Number of reports prepared (count)	Awareness-raising and strengthening efforts will be undertaken in the sectors and workplaces that require action to protect the jobs and employment of priority employee groups who will be affected by the transformation during the just transition process, to ensure the active engagement of social parties in the process.
AG-S.1.3	Identifying the new qualification and skill requirements that will be introduced with the green transformation process in the labour demand; conducting studies for edification of labour with new qualifications in line with sectoral and regional needs	MoLSS	PSB MoEUCC MoIT MoENR MoT MoAF MoTI CHE ISKUR	2024-2027	● Number of reports prepared (count) ● Number of interinstitutional coordination exercises (count)	One of the requirements to achieve green transformation in sectors is edification of labour that is suitable for transformation. As part of the action, research, policy development and coordination studies will be conducted for such labour edification.

			VQA TOBB			
AG-S.1.4	Creating standards for the occupations that will change or newly emerge during the green transformation process	VQA	MoEUCC MoIT MoENR MoLSS	2024-2030	● Number of vocations with standards changed/updated (count) ● Number of vocational standards updated/published (count)	One of the requirements to achieve green transformation in sectors is edification of labour that is suitable for transformation. The aim is to create standards for the occupations that will change or newly emerge, as part of the action.
AG-S.1.5	Conducting studies to harmonize the learning curriculum and higher education programmes with the designated new skills framework, preparing and implementing training programmes to meet the labour need that will emerge with the transformation process	MoNE CHE TOBB	MoEUCC MoIT MoAF MoTI MoENR MoLSS ISKUR VQA	2024-2028	● Number of programmes updated (count) ● Number of new programmes prepared (count)	One of the requirements to achieve green transformation in sectors is edification of labour that is suitable for transformation. The aim is to prepare and implement training programmes to meet the labour need, as part of the action.
AG-S.1.6	With an approach to leave no one behind in the green transformation process of sectors, ensuring the engagement of women, in particular, and groups that require special policies in decision-making processes, and conducting studies to ensure their effective use of vocational training, skills building and development programmes and job opportunities	MoLSS	MoEUCC MoIT MoENR PSB MoFSS	2024-2028	● Number of decision-making processes participated by groups requiring special policies (count)	Studies will be conducted to improve the means of access of groups requiring special policies to decision-making mechanisms, training and employment and increase the inclusivity of employment during the transformation process.

AG-S.1.7	Preventing the transformation in the energy sector to lead to energy poverty and conducting studies to protect vulnerable groups in this framework	MoENR MoFSS	MoEUCC MoIT MoLSS	2024-2030	● Number of reports prepared (count) ● Number of workshops conducted (count)	The aim is to conduct studies for the protection of vulnerable groups, based on the principle of leaving no one behind after the energy policies to be implemented.

3.8.2. Carbon Pricing Mechanisms

Action No	Action	Responsible Institution	Relevant Institutions	Implementation Period	Monitoring Indicators	Description
Strategy K-S.1: Establishing Emissions Trading System (ETS) in Türkiye						
K-S.1.1	Determining the scope and functioning of ETS in line with the current infrastructure, needs and projections	DCC	CCACB Members MoLSS TOBB Business Representative Organizations	2024-2025	● Legislative provisions relating to the ETS scope drafted	Studies to determine sectoral scopes and emission threshold values will be conducted with regard to the establishment of ETS which is designated as a mitigation instrument in Türkiye's Nationally Determined Contributions (NDC). Competitiveness will be considered in determining the sectors to be included to ETS, and a just transition system will be established by considering sectoral differences and facility sizes.
K-S.1.2	Expanding the scope of ETS and ensuring the necessary legislative alignment in line with the current Nationally Determined Contributions, in a way that ensures structural alignment and by taking into account the EU legislation	DCC	CCACB Members TOBB Business Representative Organizations	2024-2027	● Legislation published	After ETS design is completed, harmonization studies will be conducted by also considering the regulations made or to be made by the EU.

K-S.1.3	Determining the emissions cap in the by taking into consideration the economic and social impacts, sectoral potential and technological means in the context of the current situation of emission-intensive sectors, mitigation targets, international treaties and national circumstances	DCC	CCACB Members TOBB Business Representative Organizations	2024-2025	● Emissions cap technical study report prepared	The current situation of sectors and mitigation targets, international treaties and national circumstances will be considered when determining the emissions cap in the design of ETS.
K-S.1.4	Conducting economic, financial, social and technical impact analyses for energy-intensive sectors by taking into consideration the 2053 Net Zero Emission Target, assumed, current and projected carbon prices, international adaptation and mitigation policies and the risk of carbon leakage	DCC	CCACB Members MoLSS TOBB Business Representative Organizations	2024-2025	● Analysis report prepared for the sectors covered	The impacts of ETS on energy-intensive sectors will be examined by considering Türkiye's long-term climate targets, projected carbon prices, allowance scenarios, and carbon leakage risks.
K-S.1.5	Conducting evaluation studies for including financial actors in the ETS market and formulating legislation on financial actors	DCC MoTF	CMB Borsa Istanbul EXIST EMRA TOBB Business Representative Organizations	2024-2026	● Assessment report prepared and relevant legislation	One of the alternatives in ETS design is to include financial actors in the market. It is planned to make the necessary evaluations and where required, draft legislation in this regard.
K-S.1.6	Planning for the use of the income to be generated as part of ETS in a way that secures low-carbon economy and just transition in line with the green development target by taking into account the Nationally	DCC MoTF	TOBB MoAF (GDF) MoIT MoENR MoT	2024-2025	● The technical report on the use of incomes and the relevant ETS legislation provisions	Income can be generated from ETS if the sale method is used in the allocation of allowances in ETS. International examples indicate that

	Determined Contributions, and preparing the necessary legislation and practical infrastructure in this regard		MoLSS Business Representative Organizations			revenues recovered from ETS are usually used in a way to secure low-carbon economy and just transition. The necessary planning and legislative works will be undertaken for the possibility of making decisions in line with this purpose.
K-S.1.7	Establishing a pilot period to facilitate the system entry of the installations covered by the scope before the ETS implementation period	DCC	CMB Borsa Istanbul MoENR EMRA EXIST TOBB Business Representative Organizations	2024-2025	● The report on the ETS Pilot Period design parameters	A pilot period that is informative and that facilitates adaptation will be defined for the installations covered, before the implementation period of ETS.
K-S.1.8	Defining the national and international offset mechanisms and conditions that can be used in fulfilling the obligations	DCC	CMB Borsa Istanbul TSE MoENR EMRA EXIST Business Representative Organizations	2024-2025	● The offsetting mechanism technical study report	One of the design elements of ETS is to allow for offset in the system. With this mechanism, the facilities covered can fulfil their obligations more cost-effectively.
K-S.1.9	Assessing the ETS design needs arising from international conditions and making designs accordingly	DCC	MoT Ministry of Foreign Affairs MoIT MoENR EMRA TOBB	2024-2026	● The report on ETS design parameters	Design elements will be updated in the context of the developments regarding the EU Border Carbon Regulation Mechanism and other potential similar applications.

			Business Representative Organizations			
K-S.1.10	Conducting sectoral benchmark/historical emissions (grandfathering) studies to determine the distribution of free allowances and implementation period	DCC	MoENR MoIT TOBB Business Representative Organizations	2024-2026	● The sectoral benchmark and grandfathering reports (count)	It is planned to conduct relevant technical studies in the event that sectoral benchmark and/or grandfathering data is used in the distribution of free allowances in ETS design.
K-S.1.11	Conducting information and visibility studies on ETS practices on a sectoral basis	DCC	TOBB MoENR MoIT EMRA Business Representative Organizations	2024-2028	● At least 10 training sessions held every year ● Reaching at least 500 persons through the Visibility Action Plan and visibility exercises	Information exercises will be conducted to facilitate the system entry and ensure the active engagement of stakeholders, as an emissions trading system will be established for the first time in Türkiye.
Strategy K-S.2: Conducting infrastructure studies on other carbon pricing instruments						
K-S.2.1	Conducting analyses on the role of a complementary carbon pricing mechanism to the Emissions Trading System in the carbon pricing process	DCC	CCACB Members PMM EMRA Business Representative Organizations	2024-2025	● The Carbon Pricing Instruments Analysis Report	In the context of Türkiye's mitigation commitment and international developments, analyses will be conducted on other carbon pricing instruments to establish carbon prices that are stable and aligned with Türkiye's targets.
K-S.2.2	Conducting studies to add carbon content into the tariffs list No. (I), annexed to the Special Consumption Tax Law under the Turkish Taxation System	Revenue Administration	DCC PSB MoTF Business Representative Organizations, MoENR	2024-2030	● Evaluation conducted to include carbon content in the list no (I) annexed to the Special Consumption Tax Law	Evaluation studies will be conducted to include carbon content into the tariffs list no (I) annexed to the SCT Law in the Turkish Taxation System.

Strategy K-S.3: Building infrastructure for voluntary carbon market and national offset system						
K-S.3.1	Updating the existing carbon market registration system	DCC	CCACB Members TSE TOBB Business Representative Organizations	2024-2025	● Updated and actively operating registration system	The registration system will be updated as part of the Communiqué on Voluntary Carbon Market Registration published in the Official Gazette of 09.10.2013.
K-S.3.2	Conducting evaluation studies to establish a national carbon offset system	DCC	MoENR TSE TOBB Business Representative Organization	2024-2025	● Guiding document published	The aim is to establish a national carbon crediting system, due to the possibility that the ETS could allow for offset and since the reduction achieved in the country as a result of Article 6 of the Paris Agreement is important for the Nationally Determined Contributions
K-S.3.3	Determining the sectoral focal points of the national system, developing international standards and methodologies in line with international standards and building infrastructure for selected sectors	DCC	MoAF MoEUCC MoIT MoENR TSE TOBB Business Representative Organizations	2024-2026	● Legislation and guiding documents published (count)	Taking into consideration the national circumstances of the system to be built, the methodologies and standards required to ensure Türkiye's recognition and acceptability in the international arena will be developed.
K-S.3.4	Conducting the authorization and accreditation works required for a verification system under the national system that is aligned with international systems	DCC	TSE TURKAK TOBB Business Representative Organizations	2024-2026	● Legislation and guiding documents published (count) ● Number of accredited institutions/organizations (count)	It is aimed to conduct the necessary works for the authorization and accreditation of verification institutions which are a part of carbon markets.

K-S.3.5	Working on the effective promotion of the voluntary carbon market	DCC	MoENR EMRA TSE TOBB TUSIAD	2024-2026	● At least 4 events/meetings, workshops, seminars conducted every year	More information exercises should be conducted due to the fact that the voluntary carbon market, which has existed in Türkiye since 2008, will gain prominence with the establishment of a national crediting system and ETS.
Strategy K-S.4: Conducting studies to evaluate participation in Article 6 of Paris Agreement						
K-S.4.1	Conducting studies to determine Türkiye's role in the implementation relating to Article 6 of the Paris Agreement as part of Nationally Determined Contributions	DCC	PSB MoTF MoENR Business Representative Organizations	2024-2030	● Article 6 policy paper prepared	It is planned to conduct the necessary studies to determine Türkiye's role (buyer/seller) under Article 6 of the Paris Agreement.
K-S.4.2	Conducting sectoral evaluation studies on participation to the pilot applications launched by various countries in the implementation covered by Article 6 of the Paris Agreement	DCC	PSB MoTF MoENR Business Representative Organizations	2024-2026	● Article 6 policy paper prepared	It is aimed to conduct a sectoral evaluation to guide the stage of determining a strategy for participation in the international carbon market.

4. Institutions Participating in CCMSAP Preparations

The following institutions and organizations participated in and/or contributed to the preparation of this Climate Change Mitigation Strategy and Action Plan (CCMSAP):

- Ministry of Environment, Urbanization and Climate Change (MoEUCC)
    - Directorate of Climate Change
    - Strategy Development Department
    - General Directorate of Combating Desertification and Erosion
    - General Directorate of Environmental Management
    - General Directorate of Environmental Impact Assessment, Permits and Inspections
    - General Directorate of European Union and Foreign Relations
    - General Directorate of Spatial Planning
    - General Directorate of Meteorology
    - Turkish Environment Agency
    - General Directorate of Construction Works
    - General Directorate of Infrastructure and Urban Transformation Services
    - General Directorate of Vocational Services
    - General Directorate of Land Registry and Cadastre
    - General Directorate of Local Governments
- Presidency of Strategy and Budget (PSB)
- Ministry of Energy and Natural Resources (MoENR)
    - Department of Energy Efficiency and Environment
    - General Directorate of Energy Affairs
    - General Directorate of Mineral Research and Exploration
- Ministry of Foreign Affairs (MoFA)
    - General Directorate of Energy and Environment
    - Directorate of European Union Affairs
- Ministry of Industry and Technology (MoIT)
    - General Directorate of European Union and Foreign Relations
    - General Directorate of Domestic Technologies
    - General Directorate of Industry
    - General Directorate of Strategic Research and Productivity
    - General Directorate of Industrial Zones
- Ministry of Agriculture and Forestry (MoAF)
    - General Directorate of European Union and Foreign Relations
    - General Directorate of Crop Production
    - General Directorate of State Hydraulic Works
    - General Directorate of Nature Conservation and National Parks
    - Department of Training and Publication
    - General Directorate of Food and Control
    - General Directorate of Livestock
    - General Directorate of Forestry
    - General Directorate of Water Management

    - Strategy Development Department
    - General Directorate of Agricultural Research and Policies
    - General Directorate of Agricultural Reform
- Ministry of Trade (MoT)
    - General Directorate of Exports
    - General Directorate of Trade Research and Risk Assessment
    - General Directorate of International Treaties and European Union
- Ministry of Treasury and Finance (MoTF)
    - General Directorate of Foreign Economic Relations
    - General Directorate of Economic Programmes and Research
    - Revenue Administration
    - General Directorate of Debt Office
- Ministry of Interior (MoI)
    - General Directorate of Population and Citizenship Affairs
- Ministry of National Education (MoNE)
    - General Directorate of Support Services
    - Strategy Development Department
- Ministry of Transport and Infrastructure (MoTI)
    - General Directorate of European Union and Foreign Relations
    - General Directorate of Maritime Affairs
    - General Directorate of Communications
    - General Directorate of Highways
    - Strategy Development Department
    - General Directorate of Civil Aviation
    - General Directorate of Regulation of Transport Services
- Ministry of Labour and Social Security (MoLSS)
    - General Directorate of Labour
- Ministry of Family and Social Services (MoFSS)
- Scientific and Technological Research Council of Türkiye (TUBITAK)
- TUBITAK-Marmara Research Centre
- Turkish Standards Institute (TSE)
- Turkish Statistical Institute (TURKSTAT)
- Small and Medium Enterprises Development Organization (KOSGEB)
- Bank of Provinces Inc. (ILBANK A.Ş.)
- Turkish Energy, Nuclear and Mineral Research Agency (TENMAK)
- Electricity Generation Corp. (EUAS)
- Turkish Electricity Transmission Corp. (TEIAS)
- Turkish Electricity Distribution Corp. (TEDAS)
- Energy Market Regulatory Authority (EMRA)
- Petroleum Pipeline Corporation (BOTAS)
- Agriculture and Rural Development Support Institution (ARDSI)
- Capital Markets Board
- Banking Regulation and Supervision Agency
- Public Oversight, Accounting and Auditing Standards Authority

- Central Bank of the Republic of Türkiye
- State Railways of the Republic of Türkiye (TCDD)
- TCDD Transport Inc.
- PTT Inc.
- Public Procurement Authority
- Turkish Accreditation Agency
- Vocational Qualifications Authority of Türkiye (VQA)
- Union of Municipalities of Türkiye (UMT)
- Union of Chambers and Commodity Exchanges of Türkiye (TOBB)
- Turkish Industry and Business Association (TUSIAD)
- Independent Industrialists' and Businessmen's Association (MUSIAD)
- Council of Higher Education
- Turkish Steel Producers Association
- TURKCIMENTO
- Istanbul Chamber of Industry (İSO)
- Ankara University
- Niğde Ömer Halisdemir University
- Kahramanmaraş Sütçü İmam University
- Kadir Has University
- METU Centre for Solar Power Research and Applications
- Boğaziçi University
- Gazi University
- Ankara Metropolitan Municipality
- Istanbul Metropolitan Municipality
- Gaziantep Metropolitan Municipality
- Eskişehir Metropolitan Municipality
- Konya Metropolitan Municipality
- Kayseri Metropolitan Municipality
- Kocaeli Metropolitan Municipality
- Izmir Metropolitan Municipality
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