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Türkiye's Net Zero Emission Target: Road Map for Transport

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Activity 1.1 Policy Review and Prioritisation Report

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LIST OF ABBREVIATIONS

AI	Artificial Intelligence
AFIF	Alternative Fuels Infrastructure Facility
AFIR	Alternative Fuels Infrastructure Regulation
BCR	Benefit/Cost Ratio
BRT	Bus Rapid Transit
CAJU	Clean Aviation Joint Undertaking
CBAM	Carbon Border Adjustment Mechanism
CCMSAP	Climate Change Mitigation Strategy and Action Plan
CEF	Connecting Europe Facility
CNG	Carbon Neutral Growth
COP29	29 th United Nations Climate Change Conference
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
EEA	European Environment Agency
EEDI	Energy Efficiency Design Index
EEXI	Energy Efficiency Index
EGD	European Green Deal
EIB	European Investment Bank
EMRA	Energy Market Regulatory Authority
ERDF	European Regional Development Fund
ETD	Energy Taxation Directive
EU	European Union
EVs	Electric Vehicles
GCF	Green Climate Fund
GFEI	Global Fuel Economy Initiative
GHG	Greenhouse Gas
ICAO	International Civil Aviation Organization
ICT	Information and Communication Technologies
IEA	International Energy Agency
IKI	International Climate Initiative
IMO	International Maritime Organization
IoT	Internet of Things
IRR	Internal Rate of Return
ITF	International Transport Forum
ITS	Intelligent Transportation Systems
UITP	International Association of Public Transport
LEZs	Low-Emission Zones
LNG	Liquefied Natural Gas
MaaS	Mobility-as-a-Service
MRV	Monitoring, Reporting, and Verification
MTP	Medium Term Program



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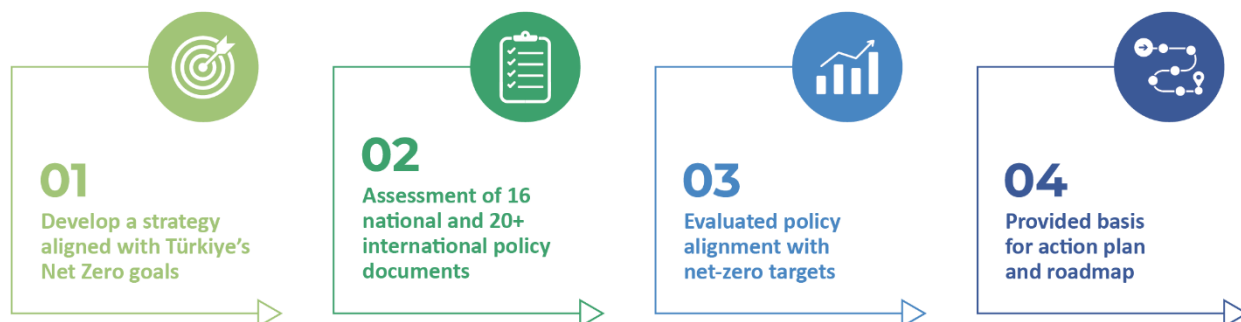
NDCs	Nationally Determined Contributions
NPV	Net Present Value
OIZ	Organized Industrial Zones
RDE	Real Driving Emissions
RED III	Renewable Energy Directive III
RFNBO	Renewable Fuels of Non-Biological Origin
RRF	Recovery and Resilience Facility
R&D	Research and Development
SAF	Sustainable Aviation Fuel
SDGs	Sustainable Development Goals
SMEs	Small and Medium-Sized Enterprises
SIs	Specific Indicators
SUMPs	Sustainable Urban Mobility Plans
TCDD	General Directorate of Turkish State Railways
TEN-T	Trans-European Transport Network
UNFCCC	United Nations Framework Convention on Climate Change
UNSDGs	United Nations Sustainable Development Goals
WLTP	Worldwide Harmonised Light-Duty Vehicles Test Procedure
ZEV	Zero-Emission Vehicle

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POLICY REVIEW AND PRIORITISATION REPORT INFOGRAPHIC

PURPOSE, SCOPE AND FINDINGS

PURPOSE AND METHODOLOGY



SCOPE: REVIEWED DOCUMENTS

National Documents (Türkiye)



Policy and Strategy Documents

- Türkiye Transportation Policy Document
- Türkiye 2053 Long-Term Climate Change Strategy



Strategies and Action Plans

- Climate Change Adaptation Strategy and Action Plan (2024–2030)
- Climate Change Mitigation Strategy and Action Plan (2024–2030)
- National Smart Cities Strategy and Action Plan (Draft)
- Circular Economy Strategy and Action Plan (Draft)



Development Plans and Programs

- Türkiye Transport and Logistics Master Plan (2053 Vision) Development Plan (2024–2028)
- Medium-Term Program (2025–2027)



Sectoral and Technical Action Plans

- TCDD Energy Management and Climate Change Action Plan (2023–2025)
- Roadmap for Mobility Vehicles and Technologies (2022)
- Green Deal Action Plan
- 2030 Energy Strategy and 2nd National Energy Efficiency Action Plan

International Policy Documents



Overarching Strategies

- European Green Deal (2019)
- Sustainable and Smart Mobility Strategy (2020)
- EU Fit for 55 Package (2021)
- Paris Agreement under UNFCCC
- 2030 Climate Target Plan
- REPowerEU Plan
- European Climate Law



Sectoral Legislation and Regulations

- Renewable Energy Directive III (RED III)
- Alternative Fuels Infrastructure Regulation (AFIR)
- RefuelEU Aviation / FuelEU Maritime
- CO₂ Standards for New Vehicles
- Energy Taxation Directive (Revised)
- TEN-T Regulation (2023 update)



Emissions Trading & Carbon Mechanisms

- EU ETS and new ETS2 (road and buildings)
- Carbon Border Adjustment Mechanism (CBAM)



MRV (Monitoring, Reporting, Verification) Legislation

- Maritime Transport MRV Regulation
- Energy Union Governance Regulation



International Aviation and Maritime

- ICAO CORSIA Program
- ICAO Environmental Standards
- Clean Aviation Joint Undertaking



Funding and Support Instruments

- Horizon Europe, LIFE Program
- InvestEU, CEF – Transport
- Innovation Fund, Modernisation Fund
- Green Climate Fund (GCF), IKI



Relevant Reports and Initiatives

- Global EV Outlook 2024 (IEA)
- ITF – Global Transport Outlook 2024
- European Mobility Week, CIVITAS, ELTIS
- SUMP Platform, Clean Bus Europe etc.



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KEY FINDINGS

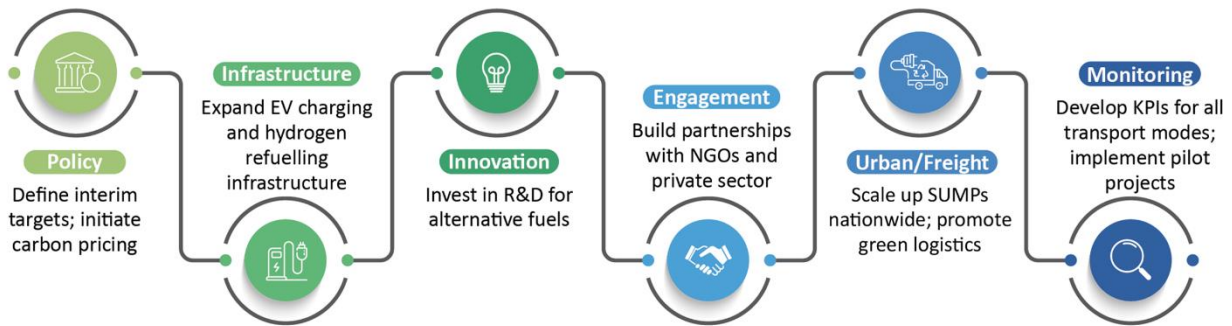
Summary Points

- ✓ Partial alignment of policies
- ✓ Underuse of rail/maritime transport
- ✓ Slow pace of electrification
- ✓ Weak MRV system
- ✓ Limited coordination
- ✓ Early stage digitalisation
- ✓ Fragmented urban mobility
- ✓ Misalignment with global frameworks
- ✓ Capacity & finance gaps



RECOMMENDATIONS AND STRATEGIC DIRECTIONS

THEMATIC RECOMMENDATIONS



STRATEGIC ENABLERS TOWARD 2053



POLICY REVIEW AND PRIORITISATION REPORT

EXECUTIVE SUMMARY

The aim of this report is to examine and interpret national and international policy documents to provide a framework for developing the “Strategy, Action Plan and Pathways” section of the "Türkiye's Net Zero Emission Target: Road Map for Transport" project.

The report also considers international agreements related to net-zero transport policy, as well as internal decisions, highlighting potential conflicts and critical elements that must be addressed within a finely tuned net-zero policy framework for Türkiye’s transport sector through 2053. To achieve this, a wide range of policy documents, strategic plans, programs and studies - both directly and indirectly related to Net Zero Emissions- have been examined.

The methodology employed involves first the evaluation of the relevant document, summarizing key objectives, visions, strategic components and expected outputs, and then assessing its alignment with the overarching Net Zero Targets.

This approach ensures that the development of the Strategy and Action Plan is grounded in both global and local policy contexts, providing a well-informed and effective roadmap for Türkiye’s transport sector to reach its Net Zero emission goals.

In the report, national and international documents were examined respectively in terms of both transportation and logistics issues, and evaluations were made in terms of Türkiye’s and EU’s Net Zero Goals.

The National documents examined in this report are classified in the Table 1.

Table 1: National Documents Examined in this report

Policy and Strategy Documents	• Turkish Transport Policy Document • Türkiye National Energy Plan (2023–2035) • National Climate Change Strategy Document (2023–2030) • Türkiye’s 2053 Long Term Climate Change Strategy
Plan and Program	• Türkiye Transportation and Logistics Master Plan (Vision 2053) • Presidency of Strategy and Budget - Twelfth Development Plan (2024-2028) • Presidency of Strategy and Budget – The Medium-Term Program (2025-2027)
Strategy and Action Plan	• Ministry of Environment, Urbanization and Climate Change - Türkiye's Climate Change Adaptation Strategy and Action Plan (2024-2030) • Ministry of Environment, Urbanization and Climate Change - Türkiye's Climate Change Mitigation Strategy and Action Plan (2024-2030)

	- Ministry of Environment, Urbanization, and Climate Change - 2020-2023 National Smart Cities Strategy and Action Plan - Ministry of Industry and Technology – Strategic Plan (2024–2028) - Ministry of Transport and Infrastructure – Strategic Plan (2024–2028) - Ministry of Energy and Natural Resources – Strategic Plan (2024–2028) - Ministry of Environment, Urbanization and Climate Change - National Circular Economy Strategy and Action Plan (DRAFT) - Ministry of Transport and Infrastructure - National Intelligent Transport Systems Strategy Document and the 2020–2023 Action Plan
Action Plan	- Ministry of Trade - Green Deal Action Plan (2021) - Türkiye’s Energy Efficiency 2030 Strategy and II. National Energy Efficiency Action Plan - General Directorate of Turkish State Railways (TCDD) - TCDD Energy Management and Climate Change Action Plan 2023-2025 - TCDD Transportation Inc. - Energy Management and Climate Change Action Plan 2025-2026 - Ministry of Industry and Technology - Mobility vehicles and technology roadmap (2022)

The international documents examined in this report are classified in Table 2.

Table 2: International Documents Examined in this report

Overarching Strategies and Policies	- The European Green Deal (2019) - Sustainable and Smart Mobility Strategy (2020) - EU Fit for 55 Package (2021) - United Nations Sustainable Development Goals (UN SDGs) (Transforming our World: The 2030 Agenda for Sustainable Development (2015); The Sustainable Development Goals Report 2024) - Paris Agreement, United Nations Framework Convention on Climate Change - REPowerEU Plan (2022) - European Climate Law (2021) 2030 Climate Target Plan (2020)
Sector-Specific Policies and Regulations	- Renewable Energy Directive III (RED III) (2023) - Alternative Fuels Infrastructure Regulation (AFIR) (2023) - ReFuelEU Aviation Regulation (2023) - FuelEU Maritime Regulation (2023) - CO2 Emission Standards for New Vehicles Regulation (2023) - Energy Taxation Directive (ETD) Revision (Proposed) - Eurovignette Directive (2022 Revision) - Combined Transport Directive (Under Revision) - TEN-T Regulation (Revised in 2023) - EU Intelligent Transport Systems (ITS) Directive (2023/2661)

Emissions Trading System (ETS)	• EU ETS Revision and Extension (2023) • New ETS for Road Transport and Buildings (ETS 2) (2023) • IMO GHG Emission Reduction Strategy (2023) • Carbon Border Adjustment Mechanism (CBAM) (2023) • Global Emissions Trading Systems Status Report (ICAP Status Report 2024)
Monitoring, Reporting, and Verification (MRV)	• Regulation (EU) 2015/757 on MRV for Maritime Transport • Implementing Regulation (EU) 2016/1927 • Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action • ISO 14064 Series – Greenhouse Gas Quantification and Reporting Standards
ICAO Air Transport Policy and Regulations	• Long-Term Global Aspirational Goal for International Aviation (LTAG) • ICAO Environmental Protection Standards
Aviation	• Clean Aviation Joint Undertaking • CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation)
Additional Policies, Directives, and Regulations	• Air Quality Directives (e.g., Directive 2008/50/EC) • Euro Standards (Euro 5/6 for light vehicles, Euro VI for heavy duty) • Worldwide Harmonised Light-Duty Vehicles Test Procedure (WLTP) & Real Driving Emissions (RDE) • Clean Power for Transport: A European Alternative Fuels Strategy (COM/2013/017) • Clean and Energy-Efficient Road Transport Vehicles Directive (Directive 2009/33/EC, amended by (EU) 2019/1161) • Protecting the Sea and the Food Chain from the Effects of Organotin Compounds (Regulation (EC) No 782/2003)
Funding Instruments and Programs	• Connecting Europe Facility (CEF) – Transport • Recovery and Resilience Facility (RRF) • Horizon Europe • Innovation Fund • Modernisation Fund • LIFE Programme • InvestEU Programme • Just Transition Mechanism • European Regional Development Fund (ERDF) • Cohesion Fund • European Investment Bank (EIB) Climate Action • International Climate Initiative (IKI) • UN Clean Technology Fund • Mitigation Action Facility • ICAO ACT-SAF Programme • World Bank Green Transport Investment Program
Related Reports	• European Environment Agency's "Sustainability of Europe's Mobility Systems" Report

	• 29th United Nations Climate Change Conference (COP29) • Global Transport Outlook 2024 (International Transport Forum – ITF) • International Energy Agency (IEA): "Global EV Outlook 2024" • Climate Finance for Sustainable Transport (Green Climate Fund – GCF, 2024) • UNESCAP: "Sustainable Transport Connectivity for the 2030 Agenda" (2024)
Key Awareness-Raising and Implementation Initiatives	• European Mobility Week • CIVITAS • Eltis – Urban Mobility Observatory • European Platform on Sustainable Urban Mobility Plans (SUMPs) • Clean Bus Europe Platform • Green Driving Tool • DiscoverEU • The Green Trip • European Year of Rail (2021) • Marco Polo II Programme • UNEP – Electric Mobility Initiative

At the end of each document, critiques were made in terms of net zero goals. Then, the key principles of net zero in transport in thirteen headings were examined and interpreted in terms of policies.

At the end of the report, recommendations for policy alignment were made and explanations were given on how the objectives and goals would be determined in the following sections.

What We Found

The findings highlight Türkiye's progress and challenges in aligning transport policies with Net Zero goals:

- **Partial Policy Alignment with Net Zero Objectives:** While Türkiye's national transport and climate policy framework acknowledges the 2053 Net Zero Emission Target, current strategies and action plans exhibit only partial alignment. In particular, the absence of detailed interim targets and sector-specific decarbonization pathways for 2030 hampers effective alignment with international climate mitigation benchmarks.
- **Underexploited Potential of Rail and Maritime Transport:** Despite repeated emphasis on modal shift towards rail and maritime transport in national and international strategies, the actual share of these modes in freight and passenger transport remains significantly below potential. The prevailing reliance on road transport continues to undermine decarbonization efforts.
- **Limited Progress on Transport Electrification:** Electrification emerges as a cornerstone of Türkiye's transport decarbonization agenda; however, the pace of implementation lags behind the level required to achieve net zero targets. Critical gaps

persist in the deployment of electric vehicle infrastructure and the electrification of the national railway network.

- **Insufficient Cross-Sectoral Coordination:** Existing policy documents recognize the need for integrating transport decarbonization with energy, industrial, and urban development strategies. Nevertheless, institutional mechanisms for ensuring effective cross-sectoral governance and policy coherence remain underdeveloped.
- **Freight Transport as a Persistent Emission Source:** The freight sector constitutes one of the most challenging domains in achieving emission reductions. While green logistics, multimodal transport systems, and energy-efficient freight corridors are referenced, implementation mechanisms and economic incentives are either weak or fragmented.
- **Fragmented Approach to Sustainable Urban Mobility:** Sustainable Urban Mobility Plans (SUMPs) and low-carbon urban mobility strategies are introduced in various policy frameworks; however, their deployment is limited in scope and mostly confined to major metropolitan areas, impeding nationwide transformation.
- **Underutilization of Digitalization and Innovation:** The integration of Intelligent Transport Systems (ITS), Mobility-as-a-Service (MaaS), and other smart mobility solutions is still at an early stage. The absence of a comprehensive digitalization strategy limits the potential efficiency and emission reduction benefits of transport system modernization.
- **Deficiencies in Monitoring, Reporting, and Verification (MRV):** The current policy landscape lacks robust MRV mechanisms tailored to transport-related emissions. The absence of standardized Specific Indicators (SIs) and reliable data frameworks constrains progress monitoring and policy evaluation.
- **Limited Consistency with Emerging International Frameworks:** Although Türkiye expresses its commitment to align with the European Green Deal, the Paris Agreement, and other multilateral obligations, noticeable gaps persist. In particular, the timing and stringency of decarbonization targets in the transport sector require strengthening to avoid potential regulatory misalignment.
- **Capacity and Financing Constraints:** Achieving net zero transport objectives necessitates substantial financial resources, human capital, and institutional capacities, which currently appear inadequate. Without dedicated financing instruments and capacity-building programs, the implementation of the envisaged actions may face severe challenges.

Top Recommendations

- **Policy Development:**
 - Introduce interim milestones to monitor long-term strategies.
 - Strengthen carbon pricing and green finance initiatives to drive sustainable practices.
 - Develop a Decarbonized Transport Roadmap.
 - Establish a coordination mechanism to integrate sectors such as transport, energy, and industry, with the process led by the Ministry of Environment, Urbanization and Climate Change.
- **Infrastructure and Technology Investments:**
 - Expand EV charging and hydrogen refueling infrastructure nationwide.
 - Electrify rail lines and modernize logistics hubs for multimodal freight transport.
 - Develop and standardize green corridors.
- **Innovation and Digitalization:**
 - Invest in R&D for alternative fuels, including biofuels and hydrogen.
 - Implement ITS for real-time traffic management and optimization.
 - Develop software for energy-efficient driving.
 - Establish an open data platform covering all transport modes (including real-time traffic data).
- **Stakeholder Engagement:**
 - Foster collaboration between public authorities, private companies, and NGOs.
 - Enhance public awareness campaigns on the benefits of sustainable mobility.
- **Sector-Specific Strategies:**
 - Freight Transport: Encourage private sector adoption of green logistics technologies.
 - Urban Transport: Scale SUMPs across all municipalities and integrate intermodal systems.
 - Develop modal shift plans to promote a transition toward the rail sector
 - Introduce carbon-based tax incentives to encourage modal shift.
 - Provide long-term incentives, taking into account private sector participation.
- **Monitoring and Evaluation:**
 - Develop robust Specific Indicators (SIs) for all transport modes.
 - Pilot projects to showcase the feasibility and scalability of innovations.
 - Monitor emissions in real time through digital systems rather than on an annual basis.

Türkiye's dedication to achieving Net Zero Emission targets is clearly demonstrated in its strategic policies, which align strongly with international frameworks such as the Paris Agreement, European Green Deal and the Sustainable Development Goals.

However, reaching the ambitious targets set for 2053 requires the following key actions:



- Accelerating digital transformation and technological integration, including smart transportation solutions, IoT applications, and advanced data analytics to optimize emissions management.
- Scaling up targeted investments in sustainable transport infrastructure, particularly focusing on electrified public transport, high-speed rail networks, integrated cycling and pedestrian paths, and extensive EV charging infrastructure.
- Strengthening collaboration and strategic partnerships between the public and private sectors, along with proactive engagement of stakeholders including local communities, NGOs, academia, and industry leaders to ensure inclusive, coordinated, and effective climate actions.
- Promoting renewable energy integration across the transport sector, ensuring that electric mobility and infrastructure are powered by clean and sustainable energy sources.
- Implementing policy and regulatory reforms to incentivize low-carbon mobility, including carbon pricing, tax benefits, and subsidies for sustainable transport technologies.
- Advancing capacity-building and workforce development, equipping professionals and institutions with the knowledge and skills necessary to implement and manage net-zero transport systems.
- Enhancing monitoring, reporting, and verification (MRV) mechanisms to track progress towards emission reduction targets effectively and ensure transparency and accountability.
- Encouraging behavioural change and raising public awareness, fostering a cultural shift towards sustainable mobility through education, outreach, and community engagement.

By focusing on these areas, Türkiye's transportation sector can become a sustainable and efficient model by both ensuring economic growth and fulfilling its environmental responsibilities. This report serves as a solid foundation for defining the strategic objectives, goals, and actions necessary for Türkiye's journey toward net zero emissions.

1. REVIEW OF NATIONAL POLICIES

1.1 Turkish Transport Policy Document

In the Turkish Transport Policy Document of the Ministry of Transport and Infrastructure, which was published in 2020, under the heading of "Energy Efficiency, Environmental and Social Sustainability", the policies for freight and passengers are stated as follows (Republic of Türkiye Ministry of Transport and Infrastructure):

1.1.1 Passenger

- Mobility strategies including sustainable, environmentally friendly, efficient, low-emission and emission-free transportation systems (electric transportation vehicles, bicycles, Pedestrians, etc.) are determined and encouraged at national, regional, and local levels.
- Urban mobility indices are determined based on city-specific factors (e.g., geography, population, economy, income, travel types, and transport infrastructure), guiding development efforts. Investments focus on expanding micromobility (especially bicycle infrastructure) and supporting electric and autonomous vehicle use through infrastructure and R&D.
- Congestion pricing, which will ensure the spread of public transportation by reducing the use of individual vehicles, and the spread of practices such as park and continue, public transportation corridors at the national level are encouraged.
- Increasing the share of the rail system in passenger transport is encouraged.
- Accessibility for individuals with reduced mobility is considered an essential element of all transportation projects. (Establishing an accessible transport infrastructure for all)
- In cities, infrastructure works are encouraged to make short-distance journeys with walking, bicycles, e-bikes, scooters, etc., and long-distance journeys with rail systems and other environmentally friendly road solutions.
- In all types of road passenger transport services, the transition to the fleet is gradually provided, which will ensure that the new vehicles to be purchased are electric or other alternative fuel.

Evaluation in Terms of Net Zero Goals: The passenger transport policies aim to achieve net zero emissions by promoting electric and hybrid vehicles and improving public transit. These measures seek to reduce emissions, enhance air quality, and ease urban congestion. Accessibility and integration of sustainable options are key, with success relying on broad adoption, technological advances, and public engagement.

1.1.2 Freight

- By considering the requirements of social, environmental, and economic dimensions in the establishment and activities of logistics facilities, value is created for all stakeholders, social sensitivity is increased, and green logistics is supported.
- To reduce oil dependence and address environmental concerns, energy efficiency in transport is improved, and consensus on mobility and efficiency principles is established. Vibration prevention systems are installed at crossings in residential areas, with incentives



to support domestic production. Noise-cancelling barriers are expanded in noisy urban areas and main roads. Logistics vehicles and equipment are modernized to meet global standards in age and emissions.

- Transportation corridors are created that are optimized in terms of Türkiye's energy use and emissions and minimize negative environmental impacts.
- Specially developed green transport corridors, which are attractive in terms of their reliability, limited congestion and low operating and administrative costs, sensitive to ecological conditions and ensuring efficient energy use, are identified, and implemented.
- The "Polluter Pays" principle is applied to ensure that the negative effects on the environment arising from logistics activities are covered by those who create this negativity based on fair and transparent criteria.
- Energy taxation, emission trading and other systems are used to reduce greenhouse gas emissions and air pollution caused by logistics activities and to keep greenhouse gas emissions at desired levels.
- To increase environmental quality, the use of railways and seas instead of roads is increased as much as possible on appropriate routes and distances.
- Starting from large and priority cities, it is ensured that the level of CO2 emissions from logistics activities is continuously reduced.
- Eco-innovation practices are encouraged to develop products, services, processes, and systems that use the least natural resources and create the least waste in logistics activities.

Evaluation in Terms of Net Zero Goals: The policy directives for freight transport in Türkiye are aligned with global net zero emission goals. By reducing dependency on traditional fuels and promoting green logistics, these initiatives contribute significantly to decreasing the carbon footprint of the freight sector. Moreover, the adoption of energy-efficient technologies and the shift towards renewable energy sources in logistics are crucial for Türkiye to progress towards its net zero ambitions. However, the successful realization of these goals will depend on robust implementation, continuous monitoring, and the integration of emerging technologies to keep pace with evolving environmental standards.

1.2 Türkiye Transportation and Logistics Master Plan (Vision 2053)

Türkiye Transportation and Logistics Master Plan, which was published in 2022, outlines a comprehensive strategy to transform the nation's transportation infrastructure and logistics capabilities by 2053.

This visionary plan aims to enhance Türkiye's strategic position as a critical logistics hub connecting Europe and Asia, integrating advanced technologies with robust infrastructure improvements (Republic of Turkey Ministry of Transport and Infrastructure).

Strategic Objectives and Vision: The primary objective of the Master Plan is to elevate Türkiye as a major global logistics hub, linking Europe and Asia.



The plan aims to develop an integrated, efficient, and sustainable transportation system that not only supports economic growth but also improves the quality of life across the country.

Strategic Components:

- **Infrastructure Development:**

- **Roads and Highways:** The plan includes significant expansion and upgrading of roads and highways to improve connectivity between cities and regions.
- **Railways:** Upgrading the railway system with a focus on high-speed trains aims to enhance passenger and freight transport services.
- **Air Transport:** Expansion of airport facilities to increase both passenger and cargo handling capacities is a priority.
- **Maritime Infrastructure:** Enhancing the efficiency of ports through modernization efforts is designed to boost maritime trade capacities.

- **Passenger Transport:**

- The Master Plan includes comprehensive measures to improve passenger transportation, focusing on sustainable and efficient mobility options. Public transportation systems will be upgraded, and alternative modes such as cycling and walking will be promoted in urban areas.

- **Freight Transport:**

- The plan emphasizes the critical role of freight transport in achieving Türkiye's economic and environmental goals. Dedicated freight corridors optimized for energy efficiency and emissions reductions are proposed, incorporating rail and maritime systems to reduce dependency on road transport.
- Strategic logistics centres will be developed to facilitate seamless intermodal transfers, ensuring efficient and sustainable freight movements.
- Policies aim to modernize the fleet of freight vehicles, prioritizing the adoption of low-emission and zero-emission vehicles.

The adoption of advanced technologies for logistics management, including digitalization and AI-powered systems, is emphasized to streamline operations and reduce environmental impact.

- **Environmental Sustainability:**

- Policies are in place to encourage the adoption of environmentally friendly transport technologies and reduce the sector's carbon footprint.
- Urban mobility initiatives will promote public transport and non-motorized transportation options such as biking and walking.



- **Technological Integration:**

- The integration of Intelligent Transportation Systems (ITS) will improve traffic management and enhance transport safety.
- Advanced logistic systems will be developed to streamline operations in warehousing and distribution.

- **Enhanced Intermodal Connections:**

- The plan emphasizes the development of multimodal transport facilities to facilitate the efficient movement of goods across different transport modes.
- Strategic logistics centres will act as key nodes in the national and international logistics network.

- **Research and Education:**

- Investment in research initiatives will drive innovation in transportation technologies.
- Educational programs will be developed to equip the workforce with skills in modern logistics and transport management.

Implementation Strategy: The implementation of the Master Plan is structured into phased activities:

- **Initial Phase:** Focuses on the modernization of existing infrastructure and the introduction of pilot projects for new technologies.
- **Mid-term Phase:** Expands on the initial projects with broader implementation across regions, including major infrastructural projects like new railway lines and highways.
- **Long-term Phase:** Aims for full-scale execution of all planned projects with ongoing upgrades and innovations based on emerging technologies and global trends.

Alternative Scenarios: The Master Plan incorporates several alternative scenarios to address potential future challenges.

Each scenario is designed to solve identified bottlenecks and problems through tailored strategies, ensuring the transport system's resilience against future socio-economic and environmental changes.

- **Digital Scenario:** Emphasizes digitalization and smart technologies across all modes of transport.
- **Green (Sustainable) Scenario:** Focuses on green technologies and practices to dramatically reduce the environmental impact of the transport sector. Sector specific targets are given below.



Railway Sector:

- Increase railway freight transport share from 5.08% to 22% by 2053
- Constructing 8,554 km of new railway lines, including 6,425 km high-speed train lines
- Increase railway line electrification significantly
- These targets directly support emission reduction by shifting freight from carbon-intensive road transport to more efficient rail systems

Road Transport:

- While specific electrification targets are not clearly defined in the Master Plan, there is emphasis on:
- Upgrading road infrastructure for improved efficiency
- Supporting transition to cleaner vehicle technologies

Aviation Sector:

- Establishing emission monitoring, reporting, and verification infrastructure
- Strategic management of carbon emissions

Export and Mobility Oriented Scenario:

- Prepares for increased global trade, emphasizing export-oriented infrastructure development.
- The Green (Sustainable) Scenario is the scenario with the highest NPV (net present value), IRR (internal rate of return) and BCR (benefit/cost ratio) values and was selected as the final scenario of the Transport and Logistics Master Plan.

Anticipated Benefits: By 2053, the Master Plan is expected to:

- Significantly cut down transportation times and costs.
- Enhance Türkiye's capabilities in international trade through improved logistics services.
- Substantially decrease the carbon footprint of the transport sector.
- Create extensive employment opportunities in new transport infrastructure projects.

Governmental Support and Policy Framework: The plan is supported by various governmental bodies and includes policy frameworks that ensure the alignment of local and national development goals. Endorsements from high-level officials, including the President, underscore the strategic importance of this initiative.

Evaluation in Terms of Net Zero Goals: Türkiye Transportation and Logistics Master Plan provides a solid foundation for the transformation of the country's transportation sector toward net zero emissions and aligns with Türkiye's broader environmental goals. The plan focuses on enhancing fuel efficiency, modal shift, long term planning, promoting electric and hybrid vehicles, and improving both passenger and freight transportation infrastructure are

crucial steps towards reducing the transportation sector's carbon footprint. However, success in achieving net zero emissions will depend on the stringent implementation of these strategies, adequate funding, ongoing technological innovations, and effective policy frameworks that support sustainable practices.

1.3 Ministry of Environment, Urbanization and Climate Change - Türkiye's Climate Change Adaptation Strategy and Action Plan (2024-2030)

Climate Change Adaptation Strategy and Action Plan (2024-2030) for Türkiye, which was published in 2024, outlines key initiatives to enhance resilience and adaptability of infrastructure and systems against climate variability, with a substantial focus on the transportation sector. This sector is crucial due to its significant contribution to greenhouse gas emissions and its vulnerability to climate impacts such as extreme weather events (Republic of Türkiye Ministry of Environment, Urbanization and Climate Change).

Transportation Sector Challenges and Adaptations: The plan acknowledges the transportation sector's critical role in economic stability and societal mobility, highlighting the necessity for adaptive measures to maintain functionality and safety under changing climate conditions.

Key aspects include:

- **Infrastructure Resilience:**
 - Strengthening infrastructure to withstand extreme weather conditions such as floods, storms, and heatwaves.
 - Upgrading road, rail, and port facilities to cope with anticipated increases in temperature and precipitation variability.
- **Passenger Transport:**
 - Expansion of public transport networks to reduce transport-related emissions.
 - Promoting electric and alternative fuel vehicles through incentives and supporting infrastructure like charging stations.
- **Freight Transport:**
 - The plan includes measures to enhance the resilience of freight transport systems to climate impacts, ensuring the continuity of supply chains during extreme weather events.
 - Investments are directed towards developing climate-resilient logistics hubs and freight corridors, with a focus on energy efficiency and minimizing emissions.
 - Encouraging modal shifts from road to rail and maritime transport to reduce the environmental impact and enhance sustainability.
 - Integration of advanced monitoring and forecasting systems to optimize freight movement and mitigate potential disruptions caused by climate variability.



- **Sustainable Transportation Initiatives:**

- Expanding public transport networks to reduce transport-related emissions.
- Promoting electric and alternative fuel vehicles through incentives and supporting infrastructure like charging stations.

- **Policy and Planning:**

- Integrating climate adaptation into transportation planning and policy-making.
- Implementing land-use strategies that consider future climate scenarios to avoid high-risk areas.

- **Emergency Preparedness and Response:**

- Enhancing systems for emergency response and recovery in transportation networks to ensure quick restoration of services after climate-induced disruptions.

- **Public Awareness and Capacity Building:**

- Conduct awareness campaigns to educate the public and stakeholders about the impacts of climate change on transportation.
- Training programs for transportation sector employees to manage and respond to climate risks effectively.

Evaluation in Terms of Net Zero Goals: The strategies and actions proposed in Climate Change Adaptation Strategy and Action Plan are aligned with Türkiye’s broader climate objectives, including the move towards net zero emissions.

The document outlines adaptation measures across various sectors, including transportation, which faces significant vulnerabilities from extreme weather events, rising temperatures, and other climate-related stressors. By focusing on enhancing the resilience of the transportation sector and promoting sustainable practices, the plan contributes indirectly to reducing carbon footprints through improved efficiency and alternative energy use.

Additionally, freight transport is explicitly addressed through investments in climate-resilient logistics hubs and freight corridors, aimed at reducing emissions and enhancing operational efficiency. Encouraging modal shifts from road to rail and maritime freight, along with the adoption of low-emission and zero-emission vehicles, ensures that freight transport plays a pivotal role in achieving net zero goals.

However, for Türkiye to achieve its net-zero targets, ongoing investment in green technologies and continuous improvement in operational practices will be essential. The plan’s success will depend heavily on the effective implementation of these strategies, alongside robust monitoring and feedback mechanisms to ensure adaptability and responsiveness to emerging climate challenges.

1.4 Ministry of Environment, Urbanization and Climate Change - Türkiye's Climate Change Mitigation Strategy and Action Plan (2024-2030)

The Climate Change Mitigation Strategy and Action Plan (CCMSAP) for 2024-2030, which was published in 2024, outlines comprehensive strategies to address climate change impacts across various sectors in Türkiye, with a special emphasis on the transportation sector. The document articulates a strategic vision to transform the transportation landscape to reduce greenhouse gas (GHG) emissions significantly by 2030, aligning with Türkiye's broader climate commitments and international obligations (Republic of Türkiye Ministry of Environment, Urbanization and Climate Change).

Current Status of the Transportation Sector: The transportation sector in Türkiye is a significant contributor to national GHG emissions, making it a critical focus for climate mitigation efforts. As urbanization and industrialization have progressed, there has been a substantial increase in transportation demand across the country.

The sector's GHG emissions have risen in tandem with this growth, driven by an increase in fossil fuel consumption within road, air, and maritime transport.

Strategic Objectives and Actions: The CCMSAP lays out specific strategies and actions to address the sustainability challenges within the transportation sector. Key components of the strategy include:

- **Enhancing Fuel Efficiency:** The plan prioritizes improvements in fuel efficiency across all modes of transportation. This includes transitioning to more efficient vehicles, promoting electric and hybrid vehicles, and implementing stricter fuel consumption standards.
- **Infrastructure Development for Alternative Fuels:** Significant investments are planned to develop infrastructure supporting alternative fuel vehicles, particularly electric vehicles (EVs). This involves expanding the network of charging stations and encouraging the adoption of EVs through incentives and subsidies.
- **Modal Shift in Transportation:** A strategic shift is encouraged from road to rail and maritime transport. This modal shift aims to reduce the congestion and emissions associated with road transport by leveraging the relatively lower emission profiles of rail and maritime transport.
- **Urban Transportation Planning:** The plan supports developing of comprehensive urban transportation strategies that promote public transport and non-motorized transport options such as cycling and walking. This includes the enhancement of public transport systems and the integration of transport planning with urban development policies.
- **Technological Innovations:** Emphasis is placed on adopting advanced technologies to improve transportation efficiency and reduce emissions. This covers the integration of Intelligent Transportation Systems (ITS), vehicle telematics, and other digital solutions to optimize traffic management and vehicle operations.
- **Regulatory and Policy Frameworks:** The action plan includes the development of robust regulatory and policy frameworks to support the adoption of sustainable transport practices. This involves revising existing legislation and introducing new regulations that



enforce emission reductions and encourage private sector investment in green transport technologies.

- **Freight Transport Initiatives:**

- Promoting modal shifts to rail and maritime freight systems to reduce reliance on road transport, which is a major source of emissions.
- Investments in the development of climate-resilient logistics hubs and corridors to ensure efficient and low-emission freight transport.
- Encouraging the adoption of low-emission and zero-emission freight vehicles through incentives and regulatory frameworks.
- Implementing advanced digital monitoring systems to optimize freight logistics and minimize environmental impacts.

Expected Outcomes: The successful implementation of the strategies and actions outlined in the CCMSAP is expected to lead to a substantial reduction in GHG emissions from the transportation sector. This will support Türkiye in meeting its Nationally Determined Contributions (NDCs) under the Paris Agreement and its long-term goal of achieving net-zero emissions by 2053.

The plan also aims to enhance the overall efficiency and sustainability of the transportation sector, improve air quality, reduce energy consumption, and support economic growth through innovative and sustainable transport solutions.

Evaluation in Terms of Net Zero Goals: The CCMSAP outlines a clear pathway for achieving low and zero-emission transport, aligned with Türkiye's 2053 Net Zero target.

The plan acknowledges transportation as one of the fastest-growing sources of greenhouse gas emissions in Türkiye, with rising demand for road freight and private vehicles posing a significant challenge. To address this, the strategy outlines a range of measures aimed at increasing transport efficiency, electrifying the vehicle fleet, and expanding low-emission public transportation infrastructure.

One of the key enablers for this transformation is the development of electric vehicle (EV) infrastructure and promotion of domestically produced EVs. The plan also highlights modal shifts—encouraging greater use of rail and maritime transport over road—and promotes smart mobility systems to reduce congestion and emissions in urban areas. However, the successful implementation of the transportation strategy is deeply dependent on parallel progress in the energy and industry sectors.

The energy sector actions focus on the rapid deployment of renewable energy, improving grid flexibility.

These steps are crucial for enabling a clean power supply that supports the electrification of transport. Without decarbonizing electricity, EV adoption could risk shifting emissions rather than eliminating them. Moreover, the strategy includes demand-side energy efficiency measures, such as smart grids and digitalization, which indirectly benefit transportation by integrating charging infrastructure into a more intelligent, responsive energy system.

In parallel, the industry sector’s decarbonization efforts—such as promoting energy efficiency in manufacturing, green hydrogen use, and circular economy approaches—create additional synergies with transport. For instance, green hydrogen production is not only critical for hard-to-abate industrial processes but could also be a solution for decarbonizing heavy-duty transport and freight logistics.

The strategy also supports the localization and innovation of clean technologies, encouraging domestic production of EV batteries, charging systems, and lightweight materials, which strengthens the domestic value chain and lowers the carbon footprint of transport solutions.

1.5 Türkiye’s First Updated Nationally Determined Contribution (NDC)

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 CO₂-eq by 2030). As of 9 November 2025, Türkiye has submitted its Second Nationally Determined Contribution (NDC). Under the Second NDC, Türkiye has committed to limiting its national greenhouse gas emissions to 643 Mt CO₂-equivalent by 2035, corresponding to a reduction of 466 Mt CO₂-equivalent compared to the business-as-usual scenario. 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 short-term mitigation target is a step towards its long-term target to reach net zero by 2053.

The NDC outlines several transportation-focused strategies for emissions reduction:

1. **Modal Shift Objectives:**
 - Rebalancing transport modes by reducing road transport’s share
 - Increasing railway and maritime transport for both freight and passengers
 - No specific quantitative targets for modal share changes by 2030
2. **Vehicle Technology Transition:**
 - Promoting low and zero-emission vehicles
 - Building a national fast charging station network for electric vehicles
 - Increasing electrification of the rail network
3. **Sustainable Urban Transport:**
 - Implementing sustainable transport approaches in urban areas
 - No detailed quantitative targets for urban mobility transformations
4. **Sector-Specific Measures:**
 - Aviation: Promoting sustainable aviation fuel production and use
 - Maritime: Expanding green port implementations
 - Freight: Enhancing combined transport systems

Evaluation in Terms of Net Zero Goals: Türkiye's Updated First NDC sets an ambitious target of a 41% reduction in greenhouse gas emissions by 2030 compared to the BAU scenario, aligning with its 2053 net-zero commitment.

The NDC incorporates comprehensive mitigation strategies across key sectors, with a particular focus on energy, transport, industry, and agriculture, all reinforced by strong cross-sectoral policies such as the recently enacted Climate Law and the creation of a national Emissions Trading System.

Transport sector actions emphasize modal shift, electrification, and clean fuel adoption, while energy strategies focus on scaling up renewables and efficiency. The NDC also recognizes the importance of adaptation and the interlinkages with water, agriculture, and urban resilience.

Binding mechanisms like carbon pricing and sectoral roadmaps ensure coordinated action across sectors, making Türkiye's climate policy framework both integrative and enforceable for the net-zero transition.

1.6 Presidency of Strategy and Budget – The Medium-Term Program (2025-2027)

The Medium-Term Program (MTP) for 2025-2027 in Türkiye, which was published in 2024, is strategically aligned with the Twelfth Development Plan, focusing on sustainable growth, macroeconomic stability, and technological advancement within the transportation sector.

MTP emphasizes green and digital transformations, aiming to enhance the transportation infrastructure to support economic and social objectives (Presidency of The Republic of Türkiye Presidency of Strategy and Budget, 2024).

Some macroeconomic targets from the Medium-Term Program:

a) Growth:

- **Public Infrastructure Investment:** The effectiveness of public infrastructure investment expenditures that are complementary to private sector investments, will be ensured through review programs during the Medium-Term Program period, with special emphasis on strengthening renewable energy, irrigation, and sustainable transportation infrastructure.
- **Structural transformation in industry:** Considering criteria such as logistics, proximity to the market, access to qualified human resources, and protection of agricultural areas, industrial growth basins will be determined on a country scale and planned industrial areas with ready infrastructure will be expanded.
- **R&D and Innovation Ecosystem:** R&D-based investments and entrepreneurship will be supported, and the innovation ecosystem will be strengthened.
- **High-Tech Production and Innovation:** Large-scale investments, project-based customized mechanisms, and attractive support packages will be prepared to make Türkiye a high-tech production centre in the region. Companies will be supported with the HIT-30 program, covering emerging priority technology areas such as semiconductors, e-

mobility, green energy, advanced manufacturing, healthy living, communication and space technologies, and innovative digital technologies.

■ **Technological Advancement:**

- 5G Roadmap: Implementation of a comprehensive 5G rollout plan to enhance digital connectivity and support the integration of IoT and smart technologies across various sectors.
- Satellite Development and Marketing Operations: Expansion of Türkiye's capabilities in satellite technology, focusing on both development and commercialization to bolster communication infrastructure and data acquisition capabilities.
- Data and Network Infrastructure: Strengthening the data infrastructure to support SDGs and improve national data handling capabilities. This includes enhancing network security, data processing capabilities, and ensuring reliable access across the country.

■ **Accelerating green transformation:**

- By implementing policies to accelerate the green transformation process for sustainable growth, compliance with international regulations will be strengthened, and the use of renewable energy resources and energy efficiency will be increased.
- Preparations for legislation addressing climate change-related practices in a holistic manner will be finalized and put into practice.
- The Net Zero Emission Strategy and Action Plan in the transportation sector will be prepared and put into practice.
- Preparatory work for the Second Nationally Determined Contribution (NDC), which includes greenhouse gas emission mitigation and climate change adaptation targets and commitments, and the 2053 Long Term Climate Change Strategy will be finalized.
- A carbon pricing mechanism, that aims to reduce greenhouse gas emissions, will be established to maintain competitiveness during the green transformation process, minimize the impacts of Carbon Border Adjustment Mechanism (CBAM), and support the transition to a low-carbon economy. -The impacts of the European Green Deal (EGD) and CBAM on various sectors will be assessed, and low-carbon sectoral roadmaps will be finalized for sectors that will be affected by EU regulations. -The economic and social impacts of carbon pricing instruments, including a complementary carbon tax, on the development and investment environment will be analysed.
- Green Finance Strategy and Action Plan, which will contribute to green transformation, will be put into practice.
- Legislative work will be completed for the establishment of a national green taxonomy that takes Türkiye's priorities into account and aligns with international taxonomy examples, particularly the EU taxonomy.
- In order to ensure a financial market environment that provides accurate and need-based information in the transformation towards a sustainable economy, standards and an expert pool will be developed to enable businesses to prepare corporate sustainability reports.
- Within the scope of the Green Deal Action Plan, projects will be implemented to reduce emissions in transportation, ensure sustainability, and increase connectivity.

- Investments compatible with the circular economy approach and aiming for low-carbon production will be supported as part of the Green Transformation Support Program.
 - The increase in electricity production from renewable energy sources will reduce dependence on imported energy, with the Renewable Energy Resource Area (YEKA) projects developed requiring the use of domestic products, alongside studies to evaluate offshore wind energy potential.
 - Projects that enhance energy efficiency will be supported, considering competitiveness and domestic production, with a focus on energy-intensive sectors.
 - Sustainable forest management will be prioritized, preserving and expanding forest assets, creating new sink areas, and continuing industrial plantation activities on suitable lands.
 - A national plan for high power charging stations will be developed in the logistics sector.
 - To promote electric vehicles, charging station networks will be improved and the use of domestic electric vehicles will be encouraged.
 - Training and consultancy services for green transformation will be supported.
- b) Balance of Payments:** The position of Overseas Logistics Distribution Networks in the supply chain will be strengthened. With Overseas Logistics Distribution Networks support, efforts will be made to include more companies in the distribution networks, ensure an efficient and comprehensive flow of exports, and provide infrastructure that maintains continuous export activity in key markets by enabling end-of-end deliveries to be completed in shorter times and at lower costs.

Key Transportation Initiatives: MTP outlines several specific transportation goals:

- **Enhancement of Rail and Public Transit Networks:** Significant investment is directed towards expanding rail transport for both freight and passengers, promoting a shift from road to rail, which is less carbon intensive.
- **Development of Urban and Regional Connectivity:** MTP supports enhancing connectivity through infrastructure projects, including the completion of major road networks and the development of regional airports, aiming for balanced regional development.
- **Net Zero Emission Strategy and Action Plan in the transportation sector** will be prepared and put into practice.
- **A national plan for high power charging stations** will be developed in the logistics sector.
- **To promote electric vehicles, charging station networks** will be improved and the use of domestic electric vehicles will be encouraged.

Freight Transport Initiatives:

- MTP emphasizes modal shifts to rail and maritime freight to reduce emissions associated with road transport.
- Investments in logistics hubs and freight corridors are prioritized to ensure operational efficiency and environmental sustainability.



- Policies to encourage the use of low-emission and zero-emission vehicles in freight transport are aligned with international standards.

Green and Digital Transformation: The program integrates environmental considerations with technological advancements:

- **Promotion of Electric and Hybrid Vehicles:** MTP includes incentives for the adoption of green vehicles to reduce dependency on fossil fuels.
- **Sustainable Urban Mobility Plans:** Emphasis on the development of pedestrian-friendly and cycling infrastructures in urban areas to reduce vehicular traffic.

Evaluation in Terms of Net Zero Goals: The transportation strategies within the MTP contribute to Türkiye's ambitions towards achieving net zero emissions. The MTP emphasizes Türkiye's dedication to green economic growth through carbon pricing and a national green taxonomy. These strategies aim to reduce emissions, align with international standards, and guide sustainable investments, ensuring a balance between discouraging high-emission activities and promoting green transformation.

Freight transport is a critical focus within the MTP, with initiatives aimed at promoting modal shifts to rail and maritime systems, reducing dependency on road transport.

Adopting digital solutions for logistics optimization and supporting low-emission vehicles further align these strategies with net zero targets. The focus on expanding rail networks, enhancing public transit, and promoting electric vehicles aligns with global standards for reducing transportation emissions.

However, the success of these initiatives will heavily depend on the consistent implementation and integration of new technologies, along with public acceptance and usage of these greener transportation alternatives.

1.7 Ministry of Trade - Green Deal Action Plan (2021)

The Green Deal Action Plan, which was published in 2021, aims to position Türkiye as a leader in sustainable and green economy practices in alignment with global standards and European Union (EU) regulations.

The plan outlines comprehensive strategies across multiple sectors, with a particular emphasis on transforming the transportation sector to reduce its environmental impact and enhance efficiency (Republic of Türkiye Ministry of Trade, 2021).

Transportation Sector Initiatives: Türkiye's transportation sector is crucial in its economic landscape, serving as a major contributor to both greenhouse gas emissions and economic activities. The Green Deal Action Plan proposes several key initiatives:

a) Freight Transport Initiatives:

- Promoting modal shifts to rail and maritime freight systems to reduce reliance on road freight, which is a significant source of emissions.
- Investments in the development of climate-resilient freight corridors and logistics hubs to ensure efficient and sustainable freight transport.
- Encouraging the adoption of low-emission and zero-emission freight vehicles through incentives and regulatory alignment with EU standards.
- Integration of advanced digital monitoring systems to optimize freight logistics and minimize environmental impacts.
- The link between *“clean, affordable, and secure energy supply”* and transport modes highlights the transition to clean energy and reduced energy consumption. In the aviation sector, this applies to fuel supply and the advancement of alternative energy sources, such as sustainable aviation fuels and emerging technologies for freight transport efficiency.

b) Development of Sustainable and Smart Transportation Systems:

- The plan supports the creation of advanced, sustainable transportation infrastructures, including the expansion of electric vehicle (EV) use and the enhancement of public transport systems.
- Investments are directed towards upgrading urban and inter-city mobility solutions to reduce emissions and promote energy efficiency.
- The Action Plan, under the heading of *“Sustainable Smart Transportation”*, foresees measures to reduce emissions across all transport modes, including aviation.

c) Promotion of Green Public Transportation:

- There is a focus on increasing the accessibility and attractiveness of public transport by integrating digital technologies and renewable energy sources.
- Initiatives include modernizing bus fleets, expanding metro and tram networks, promoting walking and cycling through improved urban planning.

d) Support for Alternative Fuel Technologies:

- The action plan encourages the adoption of hybrid and electric vehicles through incentives such as tax breaks, subsidies for EV purchases, and the development of charging infrastructure.
- Efforts are made to align with EU standards on emissions, pushing for a transition to low-emission vehicles across public and private sectors.

e) Investment in Infrastructure:

- Significant funding is allocated to develop and maintain sustainable transport infrastructure that supports cycling, walking, and other non-motorized forms of transport.
- Plans include the development of green corridors and parks that facilitate environmentally friendly transportation options.

Evaluation in Terms of Net Zero Goals: The Ministry of Commerce's Green Deal Action Plan outlines concrete steps for decarbonizing Türkiye's transportation sector, with a strong emphasis on digitalization and sustainability.

Key actions include preparing for the Mediterranean Sea’s Sulphur Emission Control Area, launching a Green Port Certification Program, and enhancing rail connections with the EU to enable a low-carbon logistics network.

The plan also prioritizes urban mobility through expanded EV charging infrastructure, electrification of public transport fleets, and development of bike and e-scooter lanes. These initiatives support a system-wide transition toward integrated, low-emission transport solutions, backed by supportive regulations and international funding mechanisms.

In this process, companies will need to reduce their carbon footprints, turn to more electric and alternative fuel vehicles, increase rail and maritime transportation, and adapt to smart logistics solutions. This transformation will be inevitable, especially for companies trading with the EU.

Green Deal Action Plan's transportation strategies are closely aligned with Türkiye’s ambition to achieve net zero emissions.

By focusing on reducing the carbon footprint of the transportation sector through sustainable practices and technologies, the plan supports the broader national and international goals of climate action.

Freight transport is a critical focus within the plan, with initiatives aimed at promoting modal shifts to rail and maritime transport, integrating advanced logistics technologies, and encouraging the adoption of low-emission and zero-emission freight vehicles.

However, achieving these ambitious targets will require:

- **Continuous Investment:** Sustained financial and political commitment to new technologies and infrastructure.
- **Policy and Regulatory Support:** Comprehensive legislation that mandates and incentivizes green practices.
- **Stakeholder Engagement:** Active participation from all sectors of society, including businesses, local governments, and citizens, to foster a culture of sustainability.

The effects of the Green Deal Action Plan on the transportation modes are summarized in Table 3.

Table 3: The Effects of Green Deal Action Plan on the Transportation Modes

Transport Mode	The Green Deal Impact	Probable Changes
Road	Medium-High	Transition to electric/hydrogen vehicles, carbon pricing, digital logistics solutions
Railway	High	Electrification, incentives, integration with logistics centres
Maritime	Medium-High	Green ports, low-carbon fuels, IMO regulations
Airline	High	Use of SAF, carbon taxes, electric/hydrogen aircraft

1.8 Presidency of Strategy and Budget - Twelfth Development Plan (2024-2028)

The Twelfth Development Plan (2024-2028) of Türkiye, approved on October 31, 2023, and published on November 1, 2023, emphasizes sustainable growth through innovative infrastructural development in the transportation sector.

This plan integrates advancements in green and digital technologies, aiming to elevate Türkiye's position in global logistics and transportation (Presidency of The Republic of Türkiye Presidency of Strategy and Budget, 2023).

Balance of Payments: Logistics capabilities will be strengthened to increase Türkiye's participation in the global supply chain.

- **363.1:** Within the Logistics Master Plan, logistics infrastructures will be strengthened, and transportation networks will be expanded in line with Türkiye's objective of becoming an effective logistics base in its neighbouring geography and region.
- **363.2:** Logistics, railway and port connections for foreign trade of industrial zones, organized industrial zones (OIZ), free zones and special investment areas will be strengthened in accordance with the supply chain, environmentally sensitive and sustainable manner.
- **363.3:** Türkiye's national and regional logistics capabilities will be improved by making the best use of international corridors, and new corridors will be established in line with Türkiye's priorities.
- **363.4:** Required steps will be taken to take measures to facilitate exports to neighbouring countries and to improve railway transportation infrastructure.
- **363.5:** Support will be provided for the expansion and effective operation of overseas logistics distribution networks in regions and countries with favourable logistics conditions.

Sectoral Policies - Logistics and Transportation: Logistics capabilities will be strengthened to increase Türkiye's participation in the global supply chain.

- **Objective:** The main objective is to develop inter-modal and multimodal transportation practices; to establish a safe, accessible, holistic, environment-friendly, and cost-effective transportation system; and to maximize the utilization of our potential to become a regional hub in transportation and logistics by creating infrastructure that supports competitive production and exports.
- **Policies and Measures:**
 - **27 (Digital Transformation):** Comprehensive digital transformation initiatives will be implemented to enhance operational efficiency, promote innovation, and strengthen Türkiye's competitive position in the global economy.
 - **363 (Increasing Logistic Capability):** Türkiye's logistics infrastructure will be enhanced with investments in integrated, efficient, and sustainable systems to meet global standards and strengthen connectivity across key trade routes.

- **363.1:** New transportation corridors and logistics centres will be developed to improve the efficiency and capacity of freight and passenger movements.
- **363.2:** Investments in rail and maritime logistics will prioritize reducing costs, increasing reliability, and minimizing environmental impacts.
- **363.3:** Advanced Intelligent Transportation Systems (ITS) will be integrated into logistics operations to ensure seamless communication and optimize supply chain management.
- **540.3 (Business and Investment):** Türkiye will prioritize green and digital transformation in business and investment strategies to position itself as a sustainable and technologically advanced logistics hub.
- **604:** Legislative arrangements and infrastructure work for the establishment of disaster-resilient transportation infrastructure will be completed.
- **605:** Research and Development activities will be encouraged for dissemination of environmentally friendly, new generation naval and air vehicles.
- **606.4:** Public, university and industry cooperation activities will be carried out to improve the quality of human resources in the transportation and logistics sector, and efforts will be made to increase Türkiye's representation power at medium and high level in relevant international organizations.
- **607:** The effectiveness of the existing infrastructure will be increased by reviewing ongoing investments in the transportation sector with a focus on feasibility, sustainability, effectiveness, accessibility, safety, and efficiency.
- **608:** The effectiveness of the existing infrastructure will be increased by reviewing ongoing investments in the transportation sector with a focus on feasibility, sustainability, effectiveness, accessibility, safety, and efficiency.
- **609:** In the transportation and logistics sector, the use of digital applications and new technologies, especially information and communication technologies, will be widespread, and more effective and efficient use of the existing infrastructure in transportation systems will be ensured.
- **610:** To increase the share of railways in freight and passenger transportation and to improve combined transportation opportunities, ongoing railway projects will be completed, and railway connections will be provided to important freight centres such as OIZs, ports and mines.
- **611:** To ensure that Türkiye becomes a regional and continental maritime transshipment hub, coastal facilities will be developed, and the Turkish maritime trade fleet will be improved.
- **612.2:** Cargo capacity will be utilized more effectively and efficiently to ensure that Istanbul becomes an international air cargo and transshipment centre.
- **613.3:** Intelligent Transportation Systems (ITS), which aim to reduce travel times on highways, increase traffic safety and ensure efficient use of existing road capacities, will be made widespread.

Key Transportation Initiatives: The plan identifies several strategic initiatives aimed at enhancing the transportation infrastructure:

- **Expanding Smart Transportation Systems:** Implementation of Intelligent Transportation Systems (ITS) will be broadened to enhance efficiency in road traffic management, reducing energy consumption and optimizing travel times.
- **Development of Rail and Public Transit:** Significant investments in rail transport aim to increase the railway's share in both freight and passenger transport. This aligns with global trends towards sustainable and less carbon-intensive transport modes.
- **Upgrading Urban and Regional Connectivity:** Projects like the completion of the Şile-Agva-Kandıra-Kaynarca State Road will improve regional accessibility, supporting economic growth and better integration of peripheral regions with main economic hubs.

Green and Digital Transformation: A focal point of the plan is the integration of green and digital transformations into the transportation sector:

- **Eco-friendly Vehicle Adoption:** Policies will encourage the adoption of environmentally friendly, new-generation marine and aerial vehicles, alongside promoting electric and hybrid vehicles within the country.

Logistics Optimization: Enhancements in logistics centres and their management models will be pursued to ensure efficient, sustainable, and resilient supply chains. This includes better integration of small and medium-sized enterprises (SMEs) into global supply networks.

Key Policies and Measures for Freight Transport:

- **Intermodal and Multimodal Transportation:** Policies emphasize shifting freight transport from road to rail and maritime modes, which are less carbon intensive. Specific measures include:
 - Development of dedicated freight corridors to optimize energy use and reduce emissions.
 - Increasing rail freight capacity and expanding logistics hubs to facilitate intermodal transfers.
- **Green Logistics Centers:** The plan calls for investments in eco-friendly logistics facilities that integrate renewable energy sources and adopt energy-efficient technologies to minimize environmental impact.
- **Modernization of Freight Vehicles:** Encouraging the adoption of low-emission and zero-emission vehicles in the freight sector through incentives and regulatory frameworks. This includes promoting electric and hydrogen-fueled trucks.
- **Advanced Logistics Technologies:** Integration of digital tools such as Intelligent Transport Systems (ITS) and Artificial Intelligence (AI) to optimize freight management, reduce fuel consumption, and minimize emissions.
- **Reducing Emissions in Industrial Zones:** Improving rail and port connections for Organized Industrial Zones (OIZs) and logistics centres to ensure efficient, low-carbon freight transportation.

The Targets for Logistics and Transportation Sector of Türkiye are given in Table 4. The bold written lines are directly or indirectly affects the Net Zero Emission in Transport Targets of Türkiye.

The targets that are related to the railway and maritime sectors like Railway Line Efficiency, Freight Transported by Railways, Electric Line Ratio and Cargo Handled on Cabotage Line are affecting net zero emission in the transport sector.

Table 4: Targets for Logistics and Transportation Sector

Indicator	2022	2023 ¹	2028 ²
High Speed Train Line Length (Km, Cumulative)	1,460	2,251	5,343
Share of Railways in Land Passenger Transportation (%)	5.37	5.76	7.60
Cargo Handled on Cabotage Line (Million Tones)	67.5	63.1	76.4
Airport Total Passengers (Including Direct Transit) (Million)	182	210	246
Length of Divided Road (Including Motorway) (km, Cumulative)	28,986	29,378	31,250
Motorway Length (km, Cumulative)	3,633	3,726	4,330
HMA Pavement Road Network (km, Cumulative)	30,026	30,861	35,500
The Number of People Died in Traffic Accidents	5,229	5,200 ³	3,500
Türkiye's Ranking in Logistics Performance Index	38	38	25
The Share of Railways in Land Freight Transportation (%)	4.77	5.43	9.0
Railway Line Efficiency (Passenger-Km+Ton-Km)/ (Outline Length)	2.41	2.77	7.0
Freight Transported by Railways (Billion Net Tons-Km)	16.6	19.4	40.0
Electric Line Ratio (%)	48	52	72
Signalized Line Ratio (%)	55	58	80
Length of Railway Branch Line (Km, Cumulative)	439	439	608
Total Container Handling (Million TEUs)	12.4	12.3	17.4
Maritime Transit Cargo Handling (Million Tones)	81.0	70.4	89.5
1000 GRT and Above Turkish Owned Merchant Fleet (Million DWT)	39.1	41.7	57.5
Airline International Cargo Traffic (Thousand Tons)	1,573	1,325	3,800

Evaluation in Terms of Net Zero Goals: The Twelfth Development Plan's transportation strategies contribute significantly towards Türkiye's net zero targets.

By fostering the development of smart, interconnected, and low-carbon transport systems, the plan supports a reduction in overall transportation emissions during the implementation period (2024-2028) without giving a specific emission reduction target.

Freight transport is a critical area within the plan, with initiatives aimed at promoting modal shifts to rail and maritime systems, reducing dependency on road transport. The adoption of digital solutions for supply chain optimization and investments in low-emission vehicles further support these goals.

¹ The data for 2023 are realization estimates of from the Ministry of Transportation and Infrastructure and the General Directorate of Security.

² The data for the year 2028 are Twelfth Development Plan targets.

³ Estimates of the Presidency of Strategy and Budget.

The focus on rail and public transit development, alongside the push for digitalization and green vehicles, aligns with global best practices for achieving sustainable and inclusive growth in line with climate action goals. However, the success in reaching net zero emissions will critically depend on the implementation pace, public-private partnerships, and continued investment in technology and infrastructure upgrades.

1.9 Ministry of Energy and Natural Resources- 2030 Strategy and II. National Energy Efficiency Action Plan

Türkiye's Ministry of Energy and Natural Resources has developed the "Energy Efficiency 2030 Strategy" and the "Second National Energy Efficiency Action Plan (NEEAP) 2024-2030" to advance the nation's goal of achieving net-zero emissions by 2053. These strategic documents emphasize the critical role of energy efficiency in reducing energy demand and ensuring supply security through effective cost management. They highlight the necessity of accelerating investments in sectors directly related to energy efficiency, including sustainable transportation (Republic of Türkiye Ministry of Energy and Natural Resources).

While the Energy Market Regulatory Authority (EMRA) plays a critical role in shaping energy policies and promoting clean energy transitions, specific information on climate change initiatives and emission reductions directly within the transportation and logistics sectors via EMRA-led projects is limited. Within the framework of Additional Article 5 added to the Electricity Market Law No. 6446 and the Charging Service Regulation that entered into force in 2022, the Energy Market Regulatory Authority (EMRA) continues to carry out regulatory and supervisory activities regarding the establishment and operation of electric vehicle charging infrastructure in Türkiye. However, the Ministry of Energy and Natural Resources, through its "2030 Strategy and II. National Energy Efficiency Action Plan," outlines comprehensive strategies impacting these sectors.

The "2030 Strategy and II. National Energy Efficiency Action Plan" highlights key initiatives aimed at enhancing energy efficiency and reducing emissions across all sectors, including transportation and logistics. EMRA's role, while not directly documented in these initiatives, is integral in supporting these broader policy frameworks through regulatory measures and oversight.

Strategic Initiatives

Transportation Fleet Modernization:

- Gradual transition to energy-efficient vehicles in public and private fleets
- Emphasis on fuel efficiency improvements in existing vehicles
- Projected energy savings through vehicle optimization

Public Transportation Enhancement:

- Expanding rail systems in urban areas
- Improving the energy efficiency of public transit vehicles



- Promoting modal shifts to reduce energy consumption per passenger-kilometre

Rail Transport Development:

- Expanding rail freight capacity
- Increasing the electrification rate of railways
- Modernizing rail systems to improve energy efficiency

Alternative Fuels and Technologies:

- Supporting the transition to electric vehicles
- Promoting biofuels and other alternative energy sources
- Developing the necessary infrastructure for alternative fuel vehicles

Green Freight Corridors:

- Establishing energy-efficient freight corridors
- Optimizing logistics operations to reduce fuel consumption
- Promoting intermodal solutions for freight transport

Investment and Funding

The plan outlines an investment of approximately \$20.2 billion in energy efficiency measures, with a significant portion allocated to the transportation sector. These investments aim to support:

- Infrastructure development for sustainable transport modes
- Technology adoption for energy-efficient vehicles
- Research and development in transport energy efficiency

Evaluation in Terms of Net Zero Goals: The 2030 Strategy and II. National Energy Efficiency Action Plan (NEEAP) provides a solid foundation for improving energy efficiency in Türkiye's transportation sector. Its strengths in promoting public transportation, rail development, and overall energy efficiency create positive momentum toward reducing emissions.

Based on the plan's measures are energy consumption reduction of approximately 16% by 2030 and cumulative savings of approximately 100 million tons of CO₂ emissions by 2030.

Strategy outlines Türkiye's commitment to improving energy efficiency across various sectors, including transportation. It emphasizes the importance of reducing energy consumption and greenhouse gas emissions to progress toward the 2053 net-zero goal.

The strategy highlights that achieving the targets set for 2030 will significantly contribute to the 2053 objective. Specifically, it projects that of the anticipated investment of 20.2 billion USD, 5 billion USD will be provided by the public sector through tax and incentive programs, with the remaining amount expected from other sources.

The NEEAP also serves as a comprehensive framework to implement energy efficiency measures across multiple sectors, including transportation. It sets specific targets and actions to reduce energy intensity and emissions. The plan acknowledges that meeting the outlined targets by 2030 is crucial for making substantial progress toward the 2053 net-zero emissions target. The projected investments and policy measures within the NEEAP are designed to align with this long-term climate strategy.

The EMRA's influence in the transportation and logistics sectors, contributes to Türkiye's net zero goals by fostering a regulatory environment that supports energy efficiency and the adoption of clean technologies.

The plan provides strategies for reducing emissions in freight transport by modernizing infrastructure, promoting energy-efficient technologies, and integrating alternative fuels. Specific measures include enhancing the energy efficiency of freight corridors, increasing the use of electrified rail systems for freight, and supporting the adoption of low-emission vehicles in logistics operations.

Continual assessment and adaptation of policies will be crucial to ensure these sectors align with national and international climate commitments, emphasizing the need for enhanced regulatory measures and increased collaboration between the EMRA and other governmental bodies.

1.10 Ministry of Environment, Urbanization, and Climate Change - 2024-2030 National Smart Cities Strategy and Action Plan (DRAFT)

The 2024–2030 National Smart Cities Strategy and Action Plan, prepared under the vision of "Advanced Society, Advanced Technology, Sustainable and Resilient World", serves as a comprehensive roadmap for fostering sustainable urban development in Türkiye.

The strategy aims to integrate advanced technologies with sustainability principles to address urban challenges and enhance the quality of life (Republic of Türkiye Ministry of Environment, Urbanization and Climate Change, 2019).

Key Objectives and Strategic Directions:

- **Vision and Goals:**
 - Achieving smart, sustainable, and resilient cities by leveraging cutting-edge technologies and innovative practices.
 - Encouraging stakeholder collaboration to create an integrated and effective ecosystem.
- **Strategic Components:**
 - **Smart Infrastructure Development:** Emphasis on ICT integration across transportation, energy, and utilities to increase efficiency and minimize environmental impact.

- **Urban Resilience and Adaptation:** Prioritizing sustainable urban planning that incorporates climate resilience and disaster risk reduction.
- **Human-Centric Design:** Ensuring citizen participation and equitable access to services through digital platforms and inclusive policies.
- **Implementation of Framework:**
 - **Actionable Goals:** 12 mission areas, 4 strategic objectives, and 30 actions have been outlined to achieve measurable progress.
 - **Monitoring and Evaluation:** Establishing a robust system to track implementation and adapt strategies as needed.
- **Sustainability Integration:**
 - Aligning urban development projects with global sustainability standards, including renewable energy adoption and carbon emission reductions.
 - Promoting circular economy practices in waste management and resource utilization.
- **Innovation and National Prioritization:**
 - Supporting locally developed technologies in line with the National Technology Initiative.
 - Strengthening Türkiye's position in producing independent, advanced technologies for urban development.

The Strategic Objective 2.3 within the 2024–2030 National Smart Cities Strategy and Action Plan reflect Türkiye's commitment to leveraging advanced technologies and innovative approaches to transform urban services.

By focusing on sustainable transportation, enhanced planning capacities, and citizen-centric solutions, this objective aims to create smarter, greener, and more efficient cities.

Strategic Objective 2.3: Ensuring Smart City Transformation in Urban Services

- **Actions:**
 - 19. Urban smart transportation applications will be expanded.
 - 20. Urban transportation analysis platforms will be developed to reduce accidents and traffic congestion, and the capacity of municipalities for transportation planning will be enhanced.
 - 21. Applications for technological transformations facilitating the transition to low-carbon and sustainable urban transportation systems will be implemented, and micro-mobility vehicles will be promoted.
- **Sub-Actions**
 - 177. Long-term bicycle-sharing systems will be expanded, and a membership system will be developed to ensure the easy, accessible, and affordable use of electric bicycles and scooters for urban mobility.

- 178. Efforts will be made to reduce vehicle ownership and encourage residents to adopt environmentally friendly transportation modes to mitigate urban traffic issues.
- 179. Access to alternative transportation information through the National Urban Guide will be provided to promote the use of multimodal transportation systems.

Evaluation in Terms of Net Zero Goals: The outlined actions and sub-actions serve as a roadmap to address urban mobility challenges, reduce carbon emissions, and promote eco-friendly transportation alternatives. By fostering collaboration among municipalities, private sector players, and citizens, this initiative is set to redefine urban living, ensuring a seamless, sustainable, and inclusive future for all.

1.11 Ministry of Environment, Urbanization and Climate Change - National Circular Economy Strategy and Action Plan (DRAFT)

As part of the Green Deal Action Plan, one of the pivotal actions is the transition to a green and circular economy, culminating in the development of the "National Circular Economy Action Plan." Planned to be published through a Presidential Circular, this action plan serves as a national strategy document. It aims to facilitate Türkiye's transition to a sustainable and resource-efficient circular economy.

Based on the status and needs analysis conducted for the transition to a circular economy, the action plan prioritizes seven sectors that have high resource usage and significant environmental impacts: Electronics and Information and Communication Technologies (ICT), Batteries and Vehicles, Packaging, Plastics, Textiles, Construction and Building, and Food and Biomass (Akpulat & Dağdeviren Hill, 2024).

The draft of the National Circular Economy Strategy and Action Plan, which is in the final stages of preparation, focuses on the entire lifecycle of products. It includes strategic objectives targeting product design and production processes, product consumption, waste management, and the use of secondary raw materials. The plan outlines six strategic goals:

- Circular Products
- Priority Sectors
- Waste Reduction and Prevention
- Proliferation of Circular Economy Practices
- Horizontal Actions
- Monitoring of the Circular Economy

Under these six strategic goals, there are 24 key objectives and 56 actions, with 21 of these actions being legislative and 35 non-legislative (focusing on infrastructure, technology and innovation, institutional structure, and cooperation, as well as financing and economic instruments).

Evaluation in Terms of Net Zero Goals: The National Circular Economy Strategy and Action Plan is a critical enabler for Türkiye's net zero emissions target by 2053. By addressing

resource efficiency, sustainable production, and waste minimization, the strategy directly contributes to reducing lifecycle greenhouse gas emissions across key sectors. The emphasis on circular product design, secondary raw materials, and sector-specific interventions supports emission reductions in both direct and indirect ways. Particularly, the integration of legislative and non-legislative actions targeting infrastructure, innovation, and financing mechanisms lays the groundwork for systemic decarbonization.

1.12 General Directorate of TCDD - TCDD Energy Management and Climate Change Action Plan 2023-2025

The "TCDD Energy Management and Climate Change Action Plan 2023-2025", which was published in 2022, has been developed with the aim of combating climate change and adapting to its impacts through detailed, scientific research focusing on energy efficiency and environmental sensitivity. The plan contains a comprehensive suite of actions designed to reduce greenhouse gas emissions and improve energy usage efficiency over the short, medium, and long term (Turkish State Railways, 2022).

The plan is structured under three thematic areas, consisting of 9 objectives, 20 goals, and 82 actions:

- **Green Transportation in Railways: Aims** to ensure sustainable energy management and establish an integrated eco-friendly railway transportation network.
- **Zero Carbon Future:** Focuses on widespread adoption of eco-friendly fuel technologies, enhancing waste management efficiency, contributing to the conservation of natural habitats, popularizing green building practices, and establishing a greenhouse gas emission management system to reduce emissions.
- **Reliable Energy Supply:** Dedicated to creating a robust and reliable energy infrastructure and enhancing energy demand management.

Each of these themes emphasizes the reduction of greenhouse gas emissions, with specific initiatives including the implementation of renewable energy investments. The goal of the "TCDD Energy Management and Climate Change Action Plan" is to achieve its targets by significantly lowering emissions and fostering a sustainable and energy-efficient railway sector.

Evaluation in Terms of Net Zero Goals: The TCDD Energy Management and Climate Change Action Plan plays a pivotal role in Türkiye's journey towards net zero emissions. By focusing on renewable energy projects and enhancing energy efficiency across its operations, TCDD is taking active steps to mitigate its environmental impact.

The plan's comprehensive approach to establishing sustainable practices in railway transportation not only aligns with Türkiye's environmental objectives but also contributes significantly to the global effort to reduce carbon footprints.

Achieving the outlined goals will require continuous monitoring, updates to technological practices, and engagement with environmental policies to ensure the railway system's alignment with net zero emissions standards.



1.13 TCDD Transportation Inc. - Energy Management and Climate Change Action Plan 2025-2026

This action plan has been developed based on scientific research with the primary goal of combating climate change and adapting to its impacts through a focus on energy efficiency and environmental sensitivity. It provides a strategic roadmap containing short, medium, and long-term actions designed to reduce greenhouse gas emissions and optimize the use of energy resources in railway freight and passenger transportation. The plan is structured around 2 themes, 5 strategic objectives, 14 goals, and 52 actions.

- **Journey to Blue and Green on Railways:** This theme focuses on ensuring sustainable energy management, increasing the effectiveness of environmental management, and expanding the use of eco-friendly fuel technologies.

- **Next Generation Railway Transportation:** This aims to enhance greenhouse gas emission management and ensure compliance with international climate policies, reporting platforms (such as CDP), and standards (ISO 50001).

Both themes serve to build a sustainable railway sector by reducing emissions, specifically through renewable energy investments and electrification.

The plan's contribution to net-zero goals is operationalized through the following Specific Indicators (SIs):

- **Electrification:** The goal is to increase the ratio of electric railway vehicles within the total fleet to 35%.
- **Renewable Energy:** It is planned to meet 3% of electricity consumption from renewable sources, particularly through Solar Power Plant (GES) investments.
- **Energy Savings:** The plan targets a 5% energy reduction in train operations and a 15% energy saving in stationary facilities compared to 2023 levels.
- **Corporate Carbon Footprint:** Reducing the company's carbon footprint by 5% relative to 2023 is set as a strategic target.

The action plan supports the railway sector in gaining a competitive advantage against international regulations like the EU Green Deal and the Paris Agreement. This strategic approach ensures that TCDD Transport Inc. optimizes its operational efficiency while fulfilling its future environmental responsibilities.

Evaluation in Terms of Net Zero Goals: This action plan is directly aligned with Türkiye's "2053 Net Zero Emission" and "Green Development" visions. By increasing the share of renewable energy in its portfolio and raising the electrification rate of its fleet, the company provides a critical contribution to national decarbonization targets.

1.14 Türkiye's 2053 Long Term Climate Strategy

Türkiye's 2053 Long Term Climate Strategy, which was published in 2024, is a forward-thinking framework designed to address the urgent need for climate action and to align with global commitments under the Paris Agreement ratified by Türkiye in 2021. Türkiye announced its target of achieving net-zero emissions by 2053 on September 27, 2021.

The Long-Term Climate Strategy has been developed to establish a comprehensive roadmap for climate change mitigation and adaptation, and it was approved by the Climate change and Adaptation Coordination Board (CCAB), on November 4, 2024 (Republic of Türkiye Ministry of Environment, Urbanization and Climate Change Directorate of Climate Change).

This strategy aims for Net Zero Emissions by 2053, setting a robust pathway for the country's transition to a sustainable and resilient economy. The strategy is a culmination of multi-sectoral collaboration coordinated by the Ministry of Environment, Urbanization, and Climate Change, Department of Climate Change alongside the Presidency of Strategy and Budget.

It reflects a holistic approach to tackling climate change through mitigation and adaptation measures spread across critical economic sectors.

The strategy includes several key targets relevant to the transportation sector:

Strategic Focus and Initiatives in terms of transport:

Electrification of Road Transport

- **Expansion of Electric Vehicles (EVs):** The strategy aims for a significant increase in the adoption of **battery electric vehicles (BEVs)** and **plug-in hybrid electric vehicles (PHEVs)** by **2053**. Target is 4.2 mil EVs and 348,000 charging stations by 2035. Supporting domestic EV manufacturing, increasing use of alternative fuels like hydrogen and biofuels, progressive electrification of vehicle fleets and development of supporting infrastructure for alternative fuel vehicles are also planned.
Incentives are planned for **EV manufacturing, purchasing, and infrastructure** expansion. EV charging infrastructure is targeted for nationwide deployment, ensuring the availability of fast-charging networks.
- **Integration with Renewable Energy:** It is aimed that the additional electricity demand arising from electrification in the transport sector will be met through clean and renewable energy sources, in line with Türkiye's ambitious renewable energy expansion targets, such as wind and solar power.
Smart grid technologies will support the **integration of EVs** into the energy system, enabling vehicle-to-grid (V2G) operations.
- **Efficiency and Digitalization:** Enhance fuel efficiency across all modes. Implement intelligent transport systems, eco-driving, and logistics optimization.

Digital infrastructure: the strategy aims to develop emissions database, electronic freight system, EV charging interface, use data to optimize networks and support smart mobility.



- **Urban mobility:** Integrating public transport, active mobility, shared mobility and promoting transit-oriented development and low-emission zones are also important measures for the emission reduction.

Rail and Public Transportation/modal shift

- **Increase in Rail Transport Share:** The plan calls for a **shift from road-based to rail-based freight and passenger transport** to reduce emissions.
Investments are directed toward **electrification of railway lines**, reducing reliance on diesel-powered locomotives. Expansion of **high-speed rail (HSR) networks** to promote intercity travel as a low-carbon alternative to short-haul flights.
Expand high-speed and conventional train lines. Increase rail's share in logistics from 5% to 22% by 2053.
 - **Railway Expansion:**
 - Construction of 8,554 km of new railway lines by 2053, including:
 - 6,425 km of high-speed train lines
 - 1,474 km of conventional train lines
 - 393 km of high-speed train lines
 - 262 km of very high-speed train lines
 - Implementation timeline:
 - 3,703 km between 2024-2029
 - 2,992 km between 2030-2035
 - 750 km between 2036-2053
- **Metro and Light Rail Expansion:** A key focus is **reducing urban transport emissions** by expanding metro, tram, and bus rapid transit (BRT) networks in major cities.
Cities are encouraged to **integrate electric and hydrogen-powered buses** into public transit fleets.

Decarbonization of Aviation and Maritime Transport

- **Sustainable Aviation Fuel (SAF):** Türkiye aims to **replace fossil-based aviation fuels** with **biofuels and synthetic e-fuels**. Research and development (R&D) initiatives will support domestic SAF production using **waste biomass and renewable energy**.
- **Green Ports and Low-Emission Ships:** Maritime transport will transition toward **LNG, ammonia, and hydrogen-powered vessels**. **Electrification of port operations** is a priority to eliminate emissions from auxiliary ship engines at docks.

Policy and Regulatory Framework for Net Zero Transport

To achieve net zero in transport, the strategy integrates **policy measures** aimed at structural transformation:

Carbon Pricing and Emissions Trading for Transport: The transport sector will be integrated into **Türkiye's planned emissions trading system (ETS)** to encourage decarbonization.



Tax incentives will be introduced to promote **EV adoption, charging infrastructure, and renewable fuels.**

Sustainable Mobility Plans for Cities: Local governments are required to develop **low-emission urban mobility strategies** focusing on **public transit, cycling, and pedestrian-friendly infrastructure.**

Fuel Efficiency and Emission Standards: Stricter **CO₂ emission limits** will be imposed on new vehicles to phase out internal combustion engine (ICE) cars. For heavy-duty vehicles, the use of biofuels and synthetic fuels may be promoted in a phased and technology-neutral manner, taking into account vehicle compatibility, the need for potential technical modifications, and associated investment and R&D requirements. In this context, the design and implementation of such measures should be developed through close consultation with industrial stakeholders, in order to ensure coherence with electrification pathways and to avoid fragmented investment signals.

- **Public Awareness and Education:** Efforts to increase public awareness about the impacts of climate change and the importance of individual actions in reducing carbon footprints are also integral to this long-term strategy.

Adaptation Measures:

- **Transportation sector:** the strategy includes enhancing the resilience of critical infrastructures, reducing vulnerability levels to ensure transportation and passenger safety and improving accessibility and evacuation options in disasters and emergencies, and enhancing response capacity
- Adaptation strategies focus on enhancing the resilience of infrastructure and communities, particularly in coastal areas prone to the effects of rising sea levels and extreme weather events.
- The health sector will be equipped to deal with the increasing risks associated with climate-related diseases and emergencies.

Evaluation in Terms of Net Zero Goals: The 2053 Long Term Climate Strategy is instrumental in positioning Türkiye on a sustainable trajectory towards achieving net zero emissions by 2053 and provides an important foundation for the decarbonization of the country's transportation sector. By implementing comprehensive mitigation strategies across key sectors and adapting to unavoidable climate impacts, Türkiye aims to not only meet its international obligations but also ensure long-term economic stability and environmental health.

This proactive approach will require ongoing adjustments based on emerging technologies, financial models, and global climate dynamics, ensuring that Türkiye remains aligned with the best practices for climate resilience.

Strategy strengths in addressing infrastructure development, recognizing the importance of modal shifts, addressing multiple transport modes including road, rail, maritime, and aviation and recognizing the need for integrated multimodal approaches and outlining a long-term vision create a basis for progress toward net zero emissions.

In terms of infrastructure, strategy gives significant attention to railway expansion with specific targets and recognizes the importance of charging infrastructure for EVs.

Clear emphasis on shifting transport from road to rail and maritime reduces emissions in the long run. Long Term Climate Change strategy introduces the framework for transport sector in terms of 2053 net zero target both for mitigation and adaptation.

1.15 Climate Law

Türkiye's Climate Law marks a crucial advancement in the country's climate policy framework by establishing the legal basis for its commitment to achieving net zero emissions by 2053.

The law introduces important enabling mechanisms for transport decarbonization, such as carbon pricing frameworks and designated institutional structures, and requires responsible entities to develop sector-specific targets and detailed implementation pathways.

This law supports a coordinated approach by mandating public institutions to prepare and monitor climate action plans, enhance clean technology deployment, and promote sustainable transport solutions, thus laying the groundwork for the sector's transition to lower emissions.

Climate Targets: Legal anchoring of Türkiye's commitment to reach net zero emissions by 2053

Governance Framework: Creation of Boards

Emissions Trading System (ETS): Establishment of a legal basis for a national carbon market

Carbon Pricing: Framework for emissions pricing mechanisms

Climate Finance: Provisions for financial instruments to support climate action

Monitoring and Verification: Requirements for emissions monitoring and reporting

International Cooperation: Mechanisms for engagement in international climate initiatives

While transport is not explicitly addressed in dedicated articles, it is implicitly included through:

- Article 5(1) and 5(2): Sectoral emissions reduction approaches that would encompass transport as a major emissions source
- Article 5(4): References to expansion of electrification, which applies to transport
- Article 8(1)(ç): Provisions for potential carbon border adjustment mechanisms that would affect vehicle and parts imports
- Article 9: Emissions Trading System framework that could eventually include transport fuels



- Article 13: Green transition supports mechanisms that could fund transport decarbonization

Governance Mechanisms Affecting Transport

Several governance structures established in the draft law have implications for transport:

- **Department of Climate Change (DCC):** Article 4 authorizes DCC with authority to coordinate cross-sectoral climate actions, while Article 10(1)(c) specifically authorizes it to manage emissions monitoring and carbon market mechanisms
- **Carbon Market Board:** Article 10(1)(a) establishes this inter-institutional board including representatives of the Ministry of Transport and Infrastructure, the Energy Market Regulatory Authority (EMRA), and the Capital Markets Board (CMB), with the secretariat function to be carried out by the Climate Change Presidency
- **Provincial Climate Change and Adaptation Coordination Board:** Article 7(3) establishes provincial coordination mechanisms
- **Local Climate Change Action Plans:** Article 7(4) requires development of local climate action plans by 2026 (per Temporary Article 3), which would necessarily include transport measures

Carbon Pricing and Market Mechanisms

The draft law establishes frameworks for carbon pricing that may affect transport, specifically through:

- **Emissions Trading System (ETS):** Articles 9 and 10 establish the framework for an ETS system initially focused on energy-intensive industries, with Article 10(2) providing provisions through which transport fuels could eventually be included. It would be the baseline for including aviation and maritime.
- **Offsetting Mechanisms:** Article 11 provides for offsetting measures and establishes a national offsetting system that could include transport-related carbon credits
- **Carbon Border Mechanism:** Article 8(1)(ç) establishes a "Carbon Border Adjustment Mechanism" that could affect imported vehicles and transport equipment

Financial and Incentive Mechanisms

The draft includes several financial mechanisms established in Articles 12 and 13 that are relevant to transport decarbonization:

- **ETS Revenue Allocation:** Article 12(2) establishes that revenues from emissions trading would be dedicated to climate action through special allocations in the central budget
- **Green Transition Support:** Article 13(1) specifically identifies climate-friendly investments and sectoral technological transformation as funding priorities
- **Financial Instruments:** Article 13(3) provides for developing guarantees, grants, and development of financial instruments that could support transport projects



- **Strategic Sector Support:** Article 13(2) prioritizes support for strategic sectors, which could include automobile manufacturing and other transport sectors

Evaluation in Terms of Net Zero Goals: Türkiye's Climate Law represents an important first step in establishing the legal and institutional foundation for decarbonizing the country's transport sector. To provide specific targets, detailed implementation pathways, and accountability mechanisms that would drive the transformation needed to achieve net zero transport emissions by 2053, Law invites responsible parties to make necessary arrangements.

The primary strength of the Law lies in creating an enabling framework for the transport sector. This enhanced framework would not only support climate goals but also position Türkiye's transport sector to become more competitive, innovative, and resilient. However, to maximize the effectiveness of the Climate Law in driving transport decarbonization, it will be essential to complement the core legislation with detailed implementing regulations, sector-specific strategies, and appropriate economic incentives.

1.16 Ministry of Industry and Technology - Mobility Vehicles and Technology Roadmap (2022)

Türkiye's **Mobility Vehicles and Technologies Roadmap** define a comprehensive strategy to transform the national mobility ecosystem in line with the 2053 Net Zero Emission Target and the evolving global climate agenda, notably the European Green Deal. The roadmap covers all major transport modes — road, rail, maritime, and aviation — while addressing both technological transitions and systemic transformations required for sustainable mobility.

The strategy focuses on the electrification of the transport sector, with specific emphasis on the development and deployment of electric vehicles (EVs), electric rail systems, and low-emission maritime and aviation technologies. Battery production, electrification infrastructure (including widespread charging networks), and smart mobility solutions such as autonomous, connected, and shared transport are identified as key enablers. Additionally, the roadmap prioritizes a modal shift from carbon-intensive transport to rail and maritime modes to reduce freight and passenger transport emissions.

Cross-cutting actions include fostering domestic capabilities in battery value chain development, reducing dependency on imported components, and promoting advanced manufacturing technologies. The roadmap also strengthens the integration between transport, energy, digitalization, and urban development policies, ensuring a systemic approach to emission reductions. It actively supports the expansion of R&D capacity, skilled workforce development, and the mobilization of Türkiye's entrepreneurial ecosystem to drive innovation.

By addressing both sector-specific and economy-wide linkages, the roadmap aims to position Türkiye as a regional hub for sustainable mobility technologies and services, ensuring both economic competitiveness and environmental resilience.



Evaluation in Terms of Net Zero Goals: The Mobility Vehicles and Technologies Roadmap play a critical role in Türkiye's pathway to net-zero. The electrification of vehicles across all transport modes directly reduces GHG emissions while also enabling the integration of renewable energy into the mobility system. The promotion of battery production and charging infrastructure facilitates the widespread adoption of electric vehicles, reducing reliance on fossil fuels and lowering lifecycle emissions.

The planned modal shift to rail and maritime transport offers substantial emission savings, given the lower carbon intensity of these modes compared to road and air transport.

Smart mobility solutions, including autonomous, connected, and shared vehicle technologies, are expected to enhance energy efficiency, reduce vehicle ownership needs, and optimize transport systems.

Furthermore, the roadmap aligns with international developments such as the EU Carbon Border Adjustment Mechanism (CBAM) and European mobility regulations, enabling Türkiye to mitigate trade and competitiveness risks while unlocking access to international climate finance.

Its cross-sectoral integration will ensure that transport decarbonization contributes meaningfully to Türkiye's broader climate, energy, and industrial transformation, paving the way for achieving both interim 2030 targets and the 2053 Net Zero commitment.

1.17 Financial Opportunities for Achieving Green Transformation Goals

This document, which was published on November 4, 2024, provides a comprehensive overview of financial opportunities and mechanisms available for supporting the green transformation in Türkiye.

The information aims to assist stakeholders in understanding and accessing various funding sources that can facilitate the transition towards greener practices and technologies across multiple sectors (Republic of Türkiye Ministry of Trade, 2025).

Green Logistics Certificate:

- **Objective:** Establish principles for integrated, balanced, and environmentally friendly logistics.
- **Support Details:**
 - 50% discount on transportation authorization certificates and renewal fees.
 - 95% discount on vehicle card fees for specific carriers.
 - Extra 5 points for UBAK Permit applications.

Renewal of Maritime Trade Fleet:

- **Objective:** Renew and modernize the Turkish maritime fleet, emphasizing innovation and employment in Turkish shipyards.



- **Support Details:**

- Turkish flagged vessels of 50GT and above can apply
- The amount of support to be given for newly built conventional ships to replace the scrapped ship will be given an incentive of 1.5 times the scrap price per ton.
- If an alternative environmentally friendly energy source is used in the newly built ship, including LNG and hybrid systems, instead of the scrapped ship, the support amount will be 2.5 times the scrap price per ton.
- In addition, ship owners who will convert the main engines of existing ships from fossil fuels to an alternative environmentally friendly energy source will be provided with a grant of 25 percent of the conversion cost.

Green Port Certificate:

- **Objective:** Reduce environmental damage from port operations and increase energy efficiency.
- **Support Details:**
 - Various incentives will be applied to those who have a green port certificate
 - Thirty ships arriving at the green ports within a year will be given priority to pass through the Turkish Straits.

Evaluation in Terms of Net Zero Goals: The financial incentives and certification programs outlined—such as the Green Logistics Certificate, Green Port Certificate, and maritime fleet renewal support—represent strategic tools that align with Türkiye’s net zero emissions target by 2053.

By encouraging cleaner fuels, energy efficiency improvements, and modernization of the transport and logistics infrastructure, these mechanisms facilitate emissions reduction in hard-to-abate sectors like maritime and freight transport.

The differentiated incentive levels for alternative fuel use, especially the higher support for environmentally friendly ships, demonstrate a performance-based approach to decarbonization.

1.18 National Intelligent Transport Systems Strategy Document and the 2020–2023 Action Plan

Türkiye’s National Intelligent Transport Systems (ITS) Strategy Document constitutes a comprehensive roadmap aimed at creating a human- and environment-centred transport ecosystem by integrating transportation and communications infrastructure with advanced information technologies. The document represents an updated version of the initial strategy published in 2014, reflecting technological developments and evolving societal needs.



- **Vision and Mission**

In line with the vision of “*a human- and environment-oriented transport system in Türkiye enabled by advanced information technologies,*” the strategy aims to establish a safe, environmentally friendly, and sustainable intelligent transport network **that makes use of** domestic and national resources.

- **Strategic Objectives**

A total of **31 actions** are defined under **five main strategic pillars**:

- **Development of ITS Infrastructure:** Addressing regulatory needs and establishing a national ITS architecture.
- **Sustainable Intelligent Mobility:** Expanding ITS solutions for persons with disabilities and promoting single-card payment systems such as the *Türkiye Card*.
- **Road and Driving Safety:** Establishing a traffic accident database and enhancing in-vehicle information systems.
- **Liveable Environment and an Informed Society:** Promoting electric vehicles, expanding bicycle use, and developing qualified human resources.
- **Data Sharing and Security:** Establishing an ITS Data Management Centre (DMC) and ensuring integration among relevant centres.

- **Monitoring and Evaluation**

The implementation and performance of the actions will be systematically monitored through SEPSİS (Strategy and Action Plan Monitoring and Evaluation System).

Evaluation in Terms of Net Zero Goals: The Strategy Document identifies fuel savings and reductions in carbon emissions in the transport sector as key benefits. Supporting the deployment of electric vehicles in public transport fleets, expanding bicycle infrastructure, and optimizing travel times through intelligent traffic management systems constitute **critical** building blocks for the decarbonization of the transport sector on Türkiye’s pathway toward its 2053 net-zero emissions target.

1.19 EU Intelligent Transport Systems (ITS) Directive (2023/2661)

This Directive updates Directive 2010/40/EU, which provides a general framework for the deployment of Intelligent Transport Systems (ITS) in the field of road transport and their integration with other transport modes. The primary objective of the Directive is to ensure the seamless and interoperable deployment of ITS services across Europe in line with the goals of efficient, safe, sustainable, and resilient mobility.



Priority Areas

The Directive groups ITS services into four main priority areas:

- **Area I:** Information and mobility services (including multimodal travel information).
- **Area II:** Travel, transport, and traffic management services.
- **Area III:** ITS services related to road safety and security (such as eCall and parking information).
- **Area IV:** Cooperative, connected, and automated mobility (**CCAM**) services.

Governance and Data Mechanisms

- **National Access Points (NAPs):** Member States are required to establish digital interfaces through which transport-related data will be made available in machine-readable formats.
- **Interoperability:** The ability of systems to exchange data and share information in standardized formats is a core principle of the Directive.
- **C-ITS Trust Model:** A common EU-wide framework for certificate management and trust lists will be established to ensure secure message exchange between vehicles and infrastructure.

Legal Powers and Implementation

The European Commission is empowered to adopt delegated acts to define data types and establish work programmes. Member States are expected to bring into force the necessary national measures to comply with this Directive by 21 December 2025.

Evaluation in Terms of Net Zero Goals: In alignment with the objectives of the European Green Deal, the Directive aims to reduce traffic congestion and pollution through digitalization. In particular, by promoting multimodal transport, it facilitates a shift towards cleaner modes of transport, thereby making a direct contribution to the EU's targets of reducing transport-related fatalities to zero and achieving significant emission reductions by 2050.

1.20 National Policy and Document Analysis with Stakeholder Impacts



Table **5** outlines the identified gaps in each reviewed policy document, focusing on areas that require attention or improvement. This analysis serves as a framework for addressing challenges and ensuring alignment with strategic objectives and project goals. By bridging these gaps, the implementation process can achieve greater efficiency and effectiveness.

Table 5: Policy/Document Analysis with Stakeholder Impacts

Policy/ Document Name	Impact on Stakeholders			Identified Gaps	Recommendations
	Government Bodies	Private Sector	General Public		
Turkish Transport Policy Document	Improves public health outcomes through stricter air quality standards.	Encourages cleaner industrial practices.	Reduces public health risks from pollution.	Limited emphasis on sustainable transport solutions such as electrification. Insufficient integration of urban and rural transport systems.	Strengthen policies for green and digital transportation infrastructure. Promote multimodal transport systems to bridge urban-rural divides.
Türkiye Transportation and Logistics Master Plan (Vision 2053)	Provides a long-term roadmap for sustainable and efficient logistics networks.	Creates investment opportunities in logistics hubs and corridors.	Improves supply chain efficiency, reducing product costs.	Inadequate focus on last-mile logistics and digital transformation. Limited incorporation of renewable energy in logistics hubs.	Develop last-mile delivery solutions and integrate renewable energy into logistics operations.
Türkiye's Climate Change Adaptation Strategy and Action Plan (2024-2030)	Focuses on strengthening the resilience of transportation systems to climate risks through infrastructure investments, early warning systems, emergency preparedness, collaboration with local governments,	Presents both opportunities and challenges for climate-resilient transport, including rising demand for resilient solutions, public-private collaboration in adaptation efforts, the need for capacity	Emphasizes the benefits of enhancing transportation systems to withstand climate-related risks, including improved safety, reduced service disruptions, and greater preparedness, while also	Limited discussion of the role of nature-based solutions in enhancing transportation resilience	Strengthen public-private collaboration and establish performance metrics for adaptation projects. Incorporate green infrastructure and ecosystem-based approaches into transportation adaptation strategies to provide co-benefits such as flood control and urban cooling



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Policy/ Document Name	Impact on Stakeholders			Identified Gaps	Recommendations
	Government Bodies	Private Sector	General Public		
	integration of climate risk assessments into planning, and support for R&D on adaptive transport technologies.	building, and potential costs linked to climate adaptation and regulatory compliance.	noting possible short-term inconveniences and shifts in travel behaviour during the adaptation process.		
Türkiye's Climate Change Mitigation Strategy and Action Plan (2024-2030)	Emphasizes shifting to sustainable transport through rail and maritime investment, public transit expansion, EV fleet adoption, and supportive local policies.	Highlights growth opportunities in EV and charging sectors, rising demand for clean transport technologies, public-private collaboration, transition costs, and the need to adapt business models and supply chains for sustainability.	Emphasizes better access to sustainable transport, improved urban air quality and health, evolving travel behaviours, greater public awareness, and some short-term disruptions during the transition.	Limited discussion of the role of behaviour changes and public engagement in promoting sustainable transportation. Insufficient consideration of the potential impacts on low-income and vulnerable populations	To drive sustainable transportation, introduce carbon credit schemes, expand clean tech subsidies, and run public awareness campaigns. Ensure the transition is inclusive by giving targeted support to low-income and vulnerable communities.
Green Deal Action Plan (2021)	Aligns national strategies with EU Green Deal objectives.	Facilitates access to international markets through compliance with green standards.	Encourages sustainable consumption patterns.	Slow implementation of green standards across sectors. Limited support for SMEs to adapt to green regulations.	Accelerate policy implementation and provide financial support for SMEs.
Twelfth Development	Outlines strategies for	Incentivizes investments in	Promotes equitable	Limited integration of	Establish clear sectoral roadmaps



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Policy/ Document Name	Impact on Stakeholders			Identified Gaps	Recommendations
	Government Bodies	Private Sector	General Public		
Plan (2024-2028)	economic growth aligned with sustainability	green infrastructure and technologies.	access to sustainable services.	net-zero targets in sectoral strategies. Inadequate focus on public awareness campaigns.	and launch nationwide sustainability education programs.
Medium Term Program (2025-2027)	Provides a short-term economic and sustainability framework.	Encourages projects aligned with green transformation and carbon reduction.	Focuses on improving energy efficiency and reducing emissions.	Lack of detailed implementation plans for carbon pricing and taxonomy strategies. Insufficient integration of clean energy initiatives in the program.	Provide sector-specific guidelines for carbon pricing and prioritize clean energy projects
2030 Strategy and II. National Energy Efficiency Action Plan	Focuses on reducing energy intensity and increasing efficiency.	Encourages energy-saving technologies and practices.	Reduces energy costs and promotes sustainable energy use.	Limited awareness about energy efficiency programs. Gaps in funding mechanisms for energy-efficient technologies.	Expand awareness campaigns and provide financial incentives for energy-saving projects.
2020-2023 National Smart Cities Strategy and Action Plan	Promotes urban digital transformation for efficiency and sustainability.	Private Sector: Encourages innovation in smart technologies and urban solutions.	Enhances urban living through technology-driven services. Identified	Limited scalability of smart city projects to smaller municipalities. Weak integration of environmental sustainability in smart city initiatives.	Scale solutions for smaller cities and integrate green technologies into smart infrastructure.



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Policy/ Document Name	Impact on Stakeholders			Identified Gaps	Recommendations
	Government Bodies	Private Sector	General Public		
National Circular Economy Strategy and Action Plan	Promote waste reduction and resource efficiency.	Drives innovation in recycling and sustainable production.	Reduces environmental impact and promotes eco-friendly lifestyles.	Absence of clear metrics for circular economic performance. Limited incentives for circular economy projects.	Develop measurable targets and provide tax breaks for circular economy businesses.
TCDD Energy Management and Climate Change Action Plan 2023-2025	Enhances energy efficiency in railway operations.	Encourages partnerships in green railway technologies.	Reduces the carbon footprint of railway transportation.	Limited focus on renewable energy integration in railways. Gaps in infrastructure upgrades for older rail networks.	Expand renewable energy use and modernize rail infrastructure.
Financial Opportunities for Achieving Green Transformation Goals	Supports Türkiye's alignment with the European Green Deal.	Facilitates access to strategic funding for sustainability projects.	Provides opportunities for societal advancement through sustainable development.	Complexity in accessing and utilizing financial resources effectively. Need for enhanced coordination among different ministries and stakeholders.	Simplify access to financial mechanisms. Improve coordination between stakeholders to ensure effective use of resources.
National ITS Strategy Document and the 2020–2023 Action Plan	Provides a comprehensive roadmap for the national ITS architecture and standards. Enhances	Provides incentives for the development of domestic technologies such as	Improves traffic safety by reducing accidents and fatalities. Enhances accessibility	The need to update the initial 2014 strategy document due to rapid technological	Rapid completion of ITS-related legal and institutional arrangements is recommended. Nationwide deployment of the



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Policy/ Document Name	Impact on Stakeholders			Identified Gaps	Recommendations
	Government Bodies	Private Sector	General Public		
	coordination among ministries and local authorities. Ensures systematic monitoring of actions through SEPSIS.	autonomous systems, artificial intelligence, and IoT. Creates new business opportunities for smart mobility and MaaS solutions.	and comfort in transport for persons with reduced mobility.	transformation. Shortcomings in inter-institutional data integration and coordination.	national ITS architecture and standards is critical. Qualified human resources should be developed in the ITS field.
EU Intelligent Transport Systems Directive (2023/2661)	Requires Member States to share transport-related data via National Access Points (NAPs). Provides a legal framework for cross-border interoperability.	Creates cross-border market opportunities for digital mobility service providers. Supports technological neutrality and security through the C-ITS trust model (PKI).	Directly contributes to the target of zero road fatalities by 2050. Facilitates a shift towards cleaner transport modes through multimodal travel information.	Lack of geographical continuity of ITS services across the EU and fragmented implementation. Many data types are not available in machine-readable formats.	Activation of the common European mobility data space and its components is necessary. Backward compatibility with existing systems should be maintained during the transition to new technologies. Common standards for CCAM and C-ITS should be applied.

2. REVIEW OF INTERNATIONAL POLICIES

2.1 The European Green Deal (2019)

The European Green Deal, which was published in 2019, is a comprehensive growth strategy introduced by the European Commission to address climate change and environmental degradation while ensuring economic growth and improving citizens' well-being.

Recognizing the urgent need for action, the plan sets ambitious objectives to make Europe climate-neutral by 2050, and transportation plays a pivotal role in achieving these targets (European Commission, 2019).

Significance of Transportation in the Green Deal: Transportation accounts for 25% of the EU's greenhouse gas emissions. The Green Deal aims for a significant reduction by 2050 through a systemic transformation in transportation, involving various initiatives to decarbonize mobility and promote sustainable transport practices.

Key Transportation Initiatives:

- **Cleaner Mobility Solutions:** The plan advocates a shift towards cleaner, cheaper, and healthier modes of transportation, both private and public. This includes expanding the use of electric vehicles, improving public transport networks, and supporting modal shifts from road to rail and waterborne transport.
- **Infrastructure Renovation:** A major focus is on renovating existing transport infrastructure to support new technologies and more sustainable transport patterns, including significant investments in EV charging stations and the development of smart traffic management systems.
- **Decarbonization of the Energy Sector:** Essential to transportation reforms is the decarbonization of the energy sector, ensuring that the energy used in transportation is derived from renewable sources, thereby reducing the overall carbon footprint of the mobility sector.
- **Innovation and Industry Support:** The Green Deal plans to help industries innovate and lead globally in producing clean products and technologies. This includes fostering advancements in sustainable fuels, vehicle technologies, and other green transport solutions.

Legislative and Financial Frameworks:

- The European Climate Law is proposed to turn the 2050 climate-neutrality goal into a binding legal obligation, creating a stable environment for investment in green technologies and infrastructure.
- Financial incentives and revised tax policies will support the transition, aiming to phase out subsidies for fossil fuels and realign financial flows to support sustainable practices across the transportation sector.



Challenges and Opportunities:

- Implementing these ambitious plans requires overcoming significant challenges, including technological advancements, consumer acceptance, and coordinated actions at both EU and member state levels.
- However, these changes also present opportunities for economic growth, job creation in new green industries, and improved public health and environmental quality.

Evaluation in Terms of Net Zero Goals:

- The transportation initiatives under the Green Deal are crucial for Europe to reach its net-zero emissions target by 2050. Success in this sector can significantly influence the overall effectiveness of Europe's climate strategy.
- Achieving net-zero in transportation will require continuous innovation, supportive policy frameworks, and substantial investment in green technologies and infrastructures.

2.2 Sustainable and Smart Mobility Strategy (2020)

The Sustainable and Smart Mobility Strategy, introduced by the European Commission on December 9, 2020, outlines a comprehensive plan to transform the European Union's transport system into alignment with the European Green Deal and the EU's Digital Strategy (European Commission, 2025).

Key Objectives:

- **Sustainability:** Achieve a 90% reduction in transport-related greenhouse gas emissions by 2050.
- **Smart Mobility:** Leverage digitalization and innovation to enhance the efficiency and connectivity of transport systems.
- **Resilience:** Strengthen the transport sector's capacity to withstand and adapt to future challenges and crises.

Strategic Milestones:

- **By 2030:**
 - At least 30 million zero-emission cars will be operational on European roads.
 - 100 European cities will achieve climate neutrality.
 - High-speed rail traffic will double across Europe.
 - Scheduled collective travel for journeys under 500 km will be carbon neutral.
 - Automated mobility will be deployed at a large scale.
 - Zero-emission marine vessels will be market-ready.



- **By 2035:**
 - Zero-emission; large aircraft will be market-ready.
- **By 2050:**
 - Nearly all cars, vans, buses, and new heavy-duty vehicles will be zero-emission.
 - Rail freight traffic will double.
 - A fully operational, multimodal Trans-European Transport Network (TEN-T) which is updated in 18 July 2024 will be established for sustainable and smart transport with high-speed connectivity.

To realize these goals, the strategy identifies 82 initiatives across 10 key areas (flagships), each encompassing specific measures to be implemented over the subsequent four years.

Evaluation in Terms of Net Zero Goals: The European Commission's "Sustainable and Smart Mobility Strategy" aims to reduce transport-related emissions by 90% by 2050, promoting both green and digital transformation.

In line with Türkiye's 2053 Net Zero Emission target, key elements of this strategy — such as the expansion of high-speed rail networks, the adoption of sustainable urban mobility solutions, and the widespread deployment of zero-emission vehicles — are highly relevant. Türkiye needs to further accelerate its efforts to reduce carbon emissions and promote sustainable mobility by developing transport policies aligned with this EU strategy.

2.3 EU Fit for 55 Package (2021)

The EU Fit for 55 Package, adopted on 14 July 2021, constitutes a comprehensive legislative framework designed to align EU policies with the ambitious target of reducing greenhouse gas (GHG) emissions by at least 55% by 2030 compared to 1990 levels. As a key component of the European Green Deal, the package plays a crucial role in the EU's pathway towards achieving climate neutrality by 2050.

It includes revisions and updates to multiple directives and regulations to accelerate the transition to a low-carbon economy across all sectors, including transport (Fit for 55, 2025).

Key objectives:

- Decarbonization of key sectors (transport, energy, buildings, and industry).
- Promotion of renewable energy sources (RES) to reduce reliance on fossil fuels.
- Strengthening EU climate leadership globally.

Legislative Revisions and Targets:

- **Renewable Energy Directive (RED III):**
 - The initial renewable energy source (RES) target for 2030 was raised from 32% (under RED II) to 40%. Subsequently, this target was further increased to 42.5%, with the possibility of reaching 45% under the REPowerEU Plan announced in May 2022.

- Sub-targets introduced for specific sectors:
 - **Transport:** Minimum **29% renewable energy share** or **14.5% GHG intensity reduction** by 2030.
 - **Heating and Cooling:** Annual increases in RES use (**0.8% until 2025, 1.1% from 2026 to 2030**).
 - **Industry:** Annual **1.6% increase** in RES usage, with **42% hydrogen** from renewables by 2030, increasing to **60% by 2035**.
- **Energy System Integration:**
 - Promotion of cross-sectoral use of renewable fuels and green hydrogen.
 - Establishment of a single EU database for tracking renewable fuels of non-biological origin (RFNBOs) and recycled carbon fuels.
 - Enhanced energy grid integration and system flexibility.
- **Sustainability Standards:**
 - Strengthened criteria for biofuels, bio liquids, and biomass fuels to ensure compatibility with biodiversity goals and reduce environmental harm.
 - Prohibition of financial support for biomass from certain forest sources starting in 2026.
- **Permitting Acceleration:**
 - Designation of “renewables go-to areas” with reduced administrative barriers for renewable energy projects.
 - RES projects prioritized as "overriding public interest" to limit legal objections.
- **Innovation and Technology:**
 - Increased promotion of hydrogen and advanced biofuels for hard-to-abate sectors (e.g., maritime and aviation).
 - Research and development incentives for renewable energy technologies.

Sector-Specific Changes

- **Transport:**
 - A combined sub-target of **5.5% advanced biofuels and RFNBOs**, with **1% RFNBOs** specifically for hard-to-decarbonize sectors like aviation and shipping.
 - Credit mechanisms for electro mobility, rewarding suppliers of renewable electricity to EVs.
 - Phasing out of multipliers for certain renewable fuels to avoid double counting.
- **Energy Production and Distribution:**
 - Increased emphasis on offshore wind energy projects and hydrogen corridors.
 - Specific targets for RFNBOs in total energy consumption.



Negotiations and Final Agreement

- The **European Parliament** and **Council of the EU** concluded negotiations on 30 March 2023.
- Agreed to:
 - Raise the EU RES target to **42.5% by 2030**, with an optional **2.5% additional top-up**.
 - Define sectoral sub-targets, including innovative renewable energy technologies.

Stakeholder Perspectives

- **Environmental Groups:**
 - Advocacy for higher RES targets (50% by 2030) and stricter protection of biodiversity.
 - Criticism of continued reliance on bioenergy, particularly forest biomass.
- **Industry and Energy Producers:**
 - Support for clear targets to drive investments in wind, solar, and hydrogen projects.
 - Call for stronger financial incentives and streamlined permitting processes.
- **EU Institutions:**
 - Parliament emphasized stricter sustainability criteria for biomass and accelerated transitions in transport and energy.
 - The council prioritized flexibility for member states in implementing RES targets.

Alignment with Türkiye's Policies

The EU Fit for 55 package serves as a model for Türkiye's climate and energy strategies, particularly the:

- **Türkiye Transportation and Logistics Master Plan (Vision 2053)**, which emphasizes green corridors, renewable energy integration, and decarbonization of transport.
- **Green Deal Action Plan**, which aligns with the EU Green Deal on transitioning to renewable energy and electrification.
- **Climate Change Mitigation Strategy**, which mirrors Fit for 55's focus on modal shifts, hydrogen adoption, and sustainable transport infrastructure.
- **Türkiye's Long-Term Climate Strategy** broadly aligns with the EU Fit for 55 Package in its commitment to net-zero by 2053 and its focus on key sectors such as energy, transport, and industry. Both frameworks promote renewable energy, electrification, energy efficiency, and carbon pricing. However, Türkiye's 2030 target of a 41% reduction below BAU is less ambitious than the EU's binding 55% reduction from 1990 levels. Furthermore, while Fit for 55 sets specific and binding interim targets for sectors like transport and buildings, Türkiye's plan remains more indicative, with flexible sectoral pathways. Still, the

strategy provides a solid foundation for convergence with EU climate policies, especially through the upcoming ETS and strengthened sectoral actions.

- Türkiye's Energy Efficiency Action Plan is a core component of its broader climate and energy transition agenda, aiming to reduce energy intensity, improve industrial competitiveness, and contribute to the country's 2053 net-zero target. When evaluated against the EU's Fit for 55 packages, several key alignments and divergences emerge, offering insight into how Türkiye's strategy positions itself in relation to EU climate policy architecture. At its core, the EU Fit for 55 package aims to reduce greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels.

Energy efficiency is a cornerstone of this effort, enshrined through revised targets under the Energy Efficiency Directive (EED) and related legislation. Türkiye's plan shows strong alignment in terms of intent. It focuses on reducing energy consumption across key sectors — particularly industry, buildings, and transportation.

Evaluation in Terms of Net Zero Goals: The EU Fit for 55 package provides a robust framework for achieving climate goals, setting an example for Türkiye's adaptation and alignment with global climate commitments. Its ambitious targets and sectoral strategies underline the importance of renewable energy and innovative technologies in meeting net-zero objectives.

Close collaboration and alignment between Türkiye and the EU can strengthen efforts to achieve shared sustainability goals. Some key takeaways for Türkiye are:

- The EU Fit for 55 Package sets legally binding targets for a 55% emissions reduction by 2030 and a net-zero trajectory by 2050, emphasizing carbon pricing (ETS & ETS-2), accelerated sectoral targets, and renewable energy deployment.
- Türkiye, aiming for net-zero by 2053, will need to enhance its interim (2030) targets, particularly for transport, energy, and industry, to align with EU climate standards and safeguard trade competitiveness under mechanisms like the Carbon Border Adjustment Mechanism (CBAM).
- Electrification, modal shift, and smart mobility are essential for Türkiye to remain integrated into European value chains and logistics systems.
- The inclusion of maritime transport in the EU ETS directly affects Turkish shipping, especially for voyages involving EU ports.
- Turkish maritime companies will face rising carbon costs unless Türkiye establishes compatible carbon pricing and clean shipping incentives.
- Compliance with EU fuel standards and port sustainability requirements will become increasingly important for Türkiye's logistics competitiveness.

2.4 United Nations Sustainable Development Goals (UN SDGs) (Transforming our World: The 2030 Agenda for Sustainable Development (2015); The Sustainable Development Goals Report 2024)

United Nations Sustainable Development Goals (SDGs) were established in 2015 as a universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity by 2030. These goals are interconnected and designed to balance social, economic, and environmental sustainability. From a transportation perspective, several SDGs directly influence or are influenced by transportation systems globally (United Nations, 2024).

Relevant SDGs to Transportation:

- **Goal 7: Affordable and Clean Energy** ensures access to affordable, reliable, sustainable, and modern energy for all. In the transportation sector, the focus is on promoting the adoption of cleaner fuels and electric vehicles to reduce greenhouse gas emissions and improve energy efficiency.
- **Goal 9: Industry, Innovation, and Infrastructure** aim to build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. Under this goal, developing quality, reliable, sustainable, and resilient infrastructure, including regional and trans-border infrastructure, is crucial to support economic development and human well-being.
- **Goal 11: Sustainable Cities and Communities** makes cities and human settlements inclusive, safe, resilient, and sustainable. A significant focus is on providing access to safe, affordable, accessible, and sustainable transport systems for all, improving road safety, and expanding public transport.
- **Goal 13: Climate Action** calls for urgent action to combat climate change and its impacts. The transportation sector, being a major contributor to greenhouse gas emissions, has a critical role in implementing measures to address climate change through innovations in sustainable transport.

Results from The Sustainable Development Goals Report 2024: According to "The Sustainable Development Goals Report 2024":

- **Goal 7:** Renewable energy sources and electrification in transportation are expanding, with investments in infrastructure for electric vehicles and cleaner fuels. However, the pace must accelerate to meet 2030 targets.
- **Goal 9:** Progress has been made in expanding and upgrading infrastructure for sustainable transport, particularly in developing regions where access to public transit remains a key challenge. However, investments in public transport are still not meeting the necessary levels required to foster broad economic growth and sustainability.
- **Goal 11:** There has been an increase in cities adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, and resilience to disasters. Enhanced focus on public and non-motorized transport has contributed to this progress, although much remains to be done to achieve universal access.

- **Goal 13:** Efforts to reduce carbon emissions from transportation are gaining traction with an increase in the adoption of electric vehicles and enhancements in fuel efficiency. Yet, the pace of transformation needs to accelerate significantly to meet the emissions reductions required by 2030.

Strategies and Actions: The SDGs advocate for several key strategies within the transportation sector:

- Enhancing public transportation systems to reduce reliance on private vehicles, thereby decreasing traffic congestion and pollutant emissions.
- Promoting the adoption of electric and low-emission vehicles to make transportation cleaner.
- Improving infrastructure to support cycling and walking, reducing the carbon footprint associated with short-distance travel.
- Integrating modern technology such as smart traffic management systems to optimize route planning and reduce idle times.

Challenges and Opportunities: Achieving the SDGs in transportation faces challenges such as high financial costs, the need for innovation, and gaining public support for sustainable practices. However, there are significant opportunities to drive economic growth, reduce environmental impacts, and enhance social well-being by aligning transportation systems with these global goals.

Evaluation in Terms of Net Zero Goals: The SDGs provide a framework that supports the transition towards net-zero emissions in the transportation sector. Achieving these goals would not only help mitigate climate change but also promote technological advancements, economic growth, and energy efficiency. However, success heavily depends on global collaboration, technological breakthroughs, consistent policy support, and substantial investments. The transportation sector's move towards net zero requires a significant shift in both infrastructure, energy systems, and human behaviour, emphasizing renewable energy sources and sustainable practices.

2.5 Paris Agreement, United Nations Framework Convention on Climate Change (2015)

Paris Agreement, adopted under the United Nations Framework Convention on Climate Change in 2015, and entered into force on 4 November 2016, represents a global commitment to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low-carbon future. The agreement emphasizes the critical role of Nationally Determined Contributions (NDCs), as outlined in Article 4, in achieving its overarching goal of limiting global temperature rise to well below 2°C, while pursuing efforts to limit it to 1.5°C. Each Party to the Agreement is required to prepare, communicate, and maintain successive NDCs, reflecting their highest possible ambition in mitigating greenhouse gas emissions, in alignment with their national circumstances and development priorities (United Nations, 2015).

NDCs are dynamic and must evolve over time to demonstrate progression. Developed countries are expected to lead with economy-wide absolute emission reduction targets, while developing nations are encouraged to enhance their mitigation efforts progressively. Moreover, the NDC framework includes a mechanism for periodic updates every five years, ensuring that contributions remain aligned with the outcomes of the global stock take process.

Nationally Determined Contributions (NDCs) outline a country's vision and strategic direction in alignment with its long-term planning and development priorities. Long-term climate strategies serve as a roadmap to achieving these NDCs by providing a forward-looking approach. Article 4, paragraph 1 of the Paris Agreement underscores the necessity for all parties to reach net-zero emissions in the latter half of this century to fulfil the Agreement's temperature objectives. Furthermore, paragraph 19 of the same article encourages parties to submit "long-term low greenhouse gas emission development strategies," considering the principle of common but differentiated responsibilities and respective capabilities. The First Global Stock take has urged countries that have yet to submit their Long-Term Low Greenhouse Gas Emission Development Strategies to do so promptly and to update them as needed.

In the context of Türkiye, its NDCs play a pivotal role in setting clear, actionable targets for emissions reductions and adaptation measures. These contributions are instrumental in integrating climate goals into national policies, fostering alignment with international commitments, and supporting the transition toward a low-carbon economy.

Türkiye announced its goal of achieving net-zero emissions by 2053 on September 27, 2021. To support this commitment, the Long-Term Climate Strategy was developed as a comprehensive roadmap for climate change mitigation and adaptation. The strategy was approved by the Climate Change and Adaptation Coordination Board (CCAB) on November 4, 2024.

Transportation's Role in the Paris Agreement: The transportation sector is crucial in the context of the Paris Agreement due to its significant contribution to global greenhouse gas emissions. Sustainable transportation strategies are integral to achieving the overall objectives of the agreement, which include:

- Strengthening the global response to the threat of climate change.
- Enhancing the ability to adapt to adverse impacts.
- Making finance flows consistent with low greenhouse gas emissions and climate-resilient development.

Key Articles and Themes Relevant to Net Zero Transportation Goals:

- **Article 2:** Sets the agreement's long-term temperature goals which direct transportation policies towards significant emissions reductions.
- **Article 4:** Calls for a global peak in greenhouse gas emissions as soon as possible and rapid reductions thereafter, which implies a substantial transformation of the transportation sector to achieve a balance between emissions and sinks.

- **Article 5:** Highlights the importance of policies aimed at reducing emissions, such as carbon pricing and emission trading systems, which are instrumental in incentivizing low-emission transportation solutions.
- **Article 6:** Article 6 of the Paris Agreement emerges as a pivotal mechanism for international cooperation in reducing greenhouse gas emissions, with transportation standing at the critical intersection of technological innovation and collaborative transformation.
- **Article 7:** Emphasizes the need for climate-resilient transportation infrastructure to withstand challenges like flooding, extreme heat, and other climate-induced stresses, ensuring the continuity and safety of mobility systems.
- **Capacity Building:** Stresses the importance of providing support, training, and resources to enable the transition to sustainable transportation systems, particularly in developing nations.
- **Finance:** Encourages promoting low-carbon transport solutions, such as electric buses, sustainable rail systems, and clean energy for transportation, through climate finance mechanisms.
- **Technology:** Advocates for sharing advanced technologies like electric vehicles, innovative fuel systems, and improved traffic management systems to enhance efficiency and reduce emissions.
- **Cooperation:** Underlines the value of international partnerships on projects that reduce transportation emissions, enabling the exchange of knowledge and best practices globally.

Progress and Challenges:

- **Mitigation Measures:** The transportation sector has seen initiatives such as the electrification of transport, enhancement of fuel efficiency, and shifts from road to rail and other less carbon-intensive modes.
- **Adaptation Strategies:** Developing resilient infrastructure to withstand climate-related extremes affects transportation systems directly, urging updates to design standards and operational practices.

Recent Developments: According to the "Message to Parties and Observers" from Q2 2024:

- **Technical Progress:** Significant advancements have been made in defining the technical aspects of emissions reductions, including methodologies for calculating and reporting emissions specific to transportation.
- **Political Engagement:** Increased political engagement is urged to ensure that ambitious, actionable transportation policies are formulated, particularly as nations prepare for upcoming conferences.
- **Financial Frameworks:** Discussions have continued optimizing financial support for developing nations, which includes funding for sustainable transportation projects to reduce emissions and enhance adaptation measures.

Global Stocktake and Commitments: The global stocktake in Article 14 of the Paris Agreement reviews collective progress towards its goals every five years, including transportation sector

performance. This encourages countries to report updates and challenges, enhancing their national contributions to better target transportation emission reductions.

Evaluation in Terms of Net Zero Goals: Achieving net-zero emissions in the transportation sector by the mid-century, as aimed at by many countries, requires accelerated action and significant policy shifts, including:

- **Innovation in Low-Emission Technologies:** Increasing the adoption of electric vehicles, alternative fuels, and advanced propulsion technologies.
- **Investment in Infrastructure:** Scaling up infrastructure for sustainable transport options such as mass transit, cycling, and walking.
- **Regulatory Frameworks:** Implementing stringent emission standards and policies that promote low-carbon transport solutions.
- **International Collaboration/Cooperation:** Countries must align their Net Zero targets with international initiatives, programs, regulations, and agreements to ensure cohesive and effective global action.

2.6 REPowerEU Plan (2022)

The REPowerEU Plan, launched by the European Commission in May 2022, aims to reduce dependency on Russian fossil fuels, diversify energy supplies, and accelerate the transition to clean energy. It was developed in response to Russia's invasion of Ukraine and the subsequent energy crisis caused by the weaponization of energy resources (European Commission, 2022).

Key Objectives:

- **Energy Savings:**
 - Promote energy efficiency and encourage reduced energy consumption across all sectors.
 - Introduce energy-saving campaigns and financial incentives for improvements in efficiency.
- **Diversification of Energy Supplies:**
 - Reduce reliance on Russian gas by sourcing liquefied natural gas (LNG) and pipeline gas from alternative suppliers.
 - Increase the production and import of renewable energy sources like biomethane and green hydrogen.
- **Accelerating Clean Energy:**
 - Boost the deployment of renewable energy projects, targeting 45% renewable energy consumption by 2030.
 - Focus on expanding solar, wind, and renewable hydrogen infrastructure.



Progress and Achievements:

- **Reduction in Russian Dependency:**
 - The EU's reliance on Russian gas imports dropped from 45% in 2021 to approximately 15% by 2023.
- **Renewable Energy Growth:**
 - 56 GW of new solar capacity was installed in 2023, increasing the EU's total capacity to 260 GW, with a goal of reaching 700 GW by 2030.
- **Energy Savings:**
 - Final energy consumption decreased by 2.8% in 2022, reflecting the success of conservation efforts.

Challenges:

- **Policy and Regulation:**
 - Complex permitting processes and a lack of streamlined policies slow down renewable energy investments.
- **Supply Chain Issues:**
 - Dependence on imported raw materials and technology increases costs and delays in project implementation.
- **Financial Barriers:**
 - While significant funding is allocated, securing these funds can be slow and administratively burdensome.

Funding and Support:

The REPowerEU Plan integrates €300 billion in funding from the EU budget, including:

- €225 billion in loans under the Recovery and Resilience Facility (RRF).
- €75 billion in grants for member states to implement energy projects.

Evaluation in Terms of Net Zero Goals: REPowerEU plan includes many directions for many industries, but also some directions may affect the Transportation Sector. For example, higher consumption of hydrogen in hard-to-abate transport sectors, especially in heavy duty trucks and through the production of sustainable fuels for aviation and waterborne sectors provides another opportunity to replace Russian fossil fuels.

Additionally, another target is 10 million tons of domestic renewable hydrogen production and 10 million tons of imports by 2030 to replace natural gas, coal and oil in hard-to-decarbonize industries and transport sectors.

2.7 European Climate Law (2021)

The European Climate Law, enacted in June 2021, legally commits the European Union to achieving climate neutrality by 2050. This legislation mandates a collective, net reduction in greenhouse gas emissions of at least 55% by 2030 compared to 1990 levels (European Union, 2021).

Key Provisions:

- **2050 Climate Neutrality Goal:** The EU is obligated to attain net-zero greenhouse gas emissions by 2050, effectively balancing emissions with removals.
- **2030 Emission Reduction Target:** An interim target has been set to reduce net greenhouse gas emissions by a minimum of 55% by 2030, relative to 1990 levels.
- **Progress Monitoring:** The European Commission is tasked with evaluating progress towards these targets every five years, ensuring alignment with the objectives of the Paris Agreement.
- **European Scientific Advisory Board on Climate Change:** This independent body has been established to provide scientific advice and report on the EU's progress in meeting its climate goals.

The European Climate Law serves as a cornerstone of the European Green Deal, aiming to make Europe the first climate-neutral continent. It provides a clear and legally binding framework for the EU and its Member States to collectively address climate change and transition towards a sustainable future.

Evaluation in Terms of Net Zero Goals: Although greenhouse gas emissions continue to fall and there are encouraging signs of action on the ground, the Commission's assessment is that current progress towards the EU's climate neutrality objective appears to be insufficient. Action is most needed in areas which still require significant reductions in emissions (e.g. buildings, transport), where progress is too slow (e.g. agriculture), or where, in recent years, there has been a deteriorating trend, as is the case for the carbon sink (e.g. land use, land-use change, and forestry) (European Climate Law, 2025) .

2.8 2030 Climate Target Plan (2020)

The 2030 Climate Target Plan, introduced by the European Commission in September 2020, aims to enhance the European Union's climate ambition by proposing a net reduction in greenhouse gas emissions of at least 55% by 2030, compared to 1990 levels (European Climate Law, 2025).

Key Objectives:

- **Increased Ambition:** Elevate the previous 2030 emissions reduction target from 40% to 55%, setting a more ambitious and cost-effective path towards achieving climate neutrality by 2050.

- **Economic Growth and Job Creation:** Stimulate the creation of green jobs and continue the EU's track record of reducing greenhouse gas emissions while growing its economy.
- **Global Leadership:** Encourage international partners to increase their ambition to limit the rise in global temperature to 1.5°C and avoid the most severe consequences of climate change.

Implementation Strategy:

To achieve these objectives, the plan outlines sector-specific targets and approaches, as well as the necessary regulatory revisions and new initiatives within the climate and energy policy framework.

This comprehensive strategy is designed to guide the European Union towards a sustainable and resilient future, aligning with the goals of the European Green Deal.

Evaluation in Terms of Net Zero Goals: The EU's 2030 Climate Target Plan, with its binding 55% emission reduction target by 2030, sets a more ambitious pathway than Türkiye's current 41% reduction below BAU. For Türkiye to effectively align with EU expectations and avoid competitiveness risks, especially under CBAM, it will be essential to strengthen interim targets, accelerate transport electrification, promote modal shift, and operationalize its planned Emissions Trading System in line with EU practices.

2.9 Sector-Specific Policies and Regulations

2.9.1 Renewable Energy Directive III (RED III)

The Renewable Energy Directive III (RED III), part of the European Union's "Fit for 55" package, is a crucial framework for achieving the EU's climate neutrality target by 2050. RED III builds on its predecessor, RED II, increasing ambition and introducing stricter mandates, particularly targeting the transport sector to achieve a 55% reduction in greenhouse gas (GHG) emissions by 2030 (European Union, 2023), (Now, 2023).

Key Provisions for the Transport Sector

- **Renewable Energy Targets:** Member States must achieve either:
 - A **29% share** of renewable energy in the transport sector's final consumption, or **14.5% reduction** in the GHG intensity of fuels by 2030.
- **Sub-Targets for Biofuels and RFNBOs:**
 - A **5.5% combined sub-target** for advanced biofuels and renewable fuels of non-biological origin (RFNBOs), with at least 1% RFNBOs by 2030.
- **Electromobility Incentives:**
 - Renewable electricity supplied to electric vehicles (EVs) via public charging stations will be rewarded through a credit mechanism. These credits can be sold to fuel suppliers, encouraging further EV adoption.



- **Marine and Aviation Fuels:**
 - Specific provisions aim to decarbonize maritime and aviation sectors, such as a 1.2% renewable fuel share for maritime transport energy by 2030. These sectors are otherwise difficult to electrify.
- **Biofuels Sustainability Criteria:**
 - Enhanced sustainability and GHG savings criteria for biofuels and biomass ensure only environmentally responsible sources are included in achieving targets.

Challenges and Opportunities

- **Challenges:**
 - Transitioning to advanced biofuels and hydrogen-based RFNBOs requires overcoming technological and economic hurdles.
 - Infrastructure for EV charging and alternative fuels is unevenly distributed across Member States.
- **Opportunities:**
 - Significant potential for innovation and job creation in green technologies.
 - Strengthening energy security through reduced reliance on fossil fuels.

Evaluation in Terms of Net Zero Goals: RED III provides a comprehensive strategy to align the transport sector with EU climate goals. While ambitious, its success will depend on robust Member State implementation, technological advancements, and consistent financial support for renewable energy infrastructure.

2.9.2 Alternative Fuels Infrastructure Regulation (AFIR) (2023)

The Alternative Fuels Infrastructure Regulation (AFIR), adopted as part of the European Union's Fit for 55 packages, focuses on establishing a coherent and integrated network of infrastructure for alternative fuels across Europe. This regulation is critical to achieving the EU's climate neutrality target by 2050 while aligning with the European Green Deal and the Paris Agreement goals (European Commission, 2025) (European Union, 2014).

Key Objectives

- **Harmonization of Infrastructure Development:** Set mandatory targets for charging stations and hydrogen refueling stations along major transport corridors (TEN-T network) to ensure consistency across Member States.
- **Promotion of Zero-Emission Transport:** Support the deployment of infrastructure for electric, hydrogen, and biofuel-powered vehicles to reduce reliance on fossil fuels.
- **Consumer Accessibility:** Ensure charging stations are user-friendly, interoperable, and compatible with real-time pricing and availability information.
- **Funding and Support Mechanisms:** Leverage public-private partnerships and EU funding schemes to accelerate infrastructure development.



Implementation Highlights

- **Charging Infrastructure:** Ensure charging points every 60 km for electric vehicles on main TEN-T corridors by 2025 and additional urban charging solutions by 2030.
- **Hydrogen Refueling Stations:** Deploy refueling stations every 200 km along the core TEN-T network by 2030.
- **Data Transparency:** Require digital platforms to provide users with real-time information on station locations, availability, and costs.
- **Integration with Smart Grids:** Support renewable energy integration and energy storage capabilities through connected systems.

Evaluation in Terms of Net Zero Goals: AFIR plays a pivotal role in the EU's transition to net zero emissions by:

- **Reducing Transport Emissions:** Transport accounts for 25% of EU greenhouse gas emissions; AFIR addresses this by promoting clean energy solutions.
- **Facilitating Decarbonization:** Ensures adequate infrastructure to support the growing demand for zero-emission vehicles, accelerating the shift from internal combustion engines to electric and hydrogen technologies.
- **Encouraging Technological Innovation:** Promotes advancements in energy efficiency, storage, and renewable energy use in the transport sector.
- **Enhancing Resilience:** Aligns with the broader goals of sustainable urban mobility and the circular economy, creating a robust framework for long-term climate resilience.

2.9.3 ReFuelEU Aviation Regulation (2023)

The ReFuelEU Aviation Regulation (2023) is a key part of the European Union's "Fit for 55" package, aiming to decarbonize aviation by mandating the gradual increase of sustainable aviation fuels (SAF) in the fuel mix at EU airports. Starting in 2025, at least 2% of aviation fuel supplied must be SAF, rising incrementally to 70% by 2050. SAF includes synthetic fuels, advanced biofuels from waste and residues, and recycled carbon fuels, all meeting strict sustainability criteria.

The regulation applies to fuel suppliers, airlines, and airports, requiring infrastructure upgrades, detailed reporting, and anti-tankering measures to prevent airlines from refueling outside the EU.

By harmonizing rules across member states, ReFuelEU Aviation aims to reduce CO₂ emissions, foster innovation and investment in SAF, create new jobs, and ensure a level playing field for air transport across Europe.

Share of SAF used at EU airports from 2025:

- 2025: 2% SAF
- 2030: 6% SAF, 2030-2031: 1.2 and 2032-2034: 2% synthetic fuels
- 2035: 20% SAF, 2035 5% synthetic fuels



- 2040: 34% SAF, 2040 10% synthetic fuels
- 2045: 42% SAF, 2045 15% synthetic fuels
- 2050: 70% SAF, 2050 35% synthetic fuels

2.9.4 FuelEU Maritime Regulation (2023)

The FuelEU Maritime Regulation (Regulation (EU) 2023/1805), part of the EU's "Fit for 55" package, aims to decarbonize maritime transport by requiring ships over 5,000 gross tonnage calling at EU ports to progressively reduce the greenhouse gas (GHG) intensity (CO₂e including CH₄, N₂O) of the energy they use. Starting in 2025, ships must achieve a 2% reduction in GHG intensity compared to 2020 levels, with targets increasing every five years to reach an 80% reduction by 2050.

The regulation encourages the use of renewable and low-carbon fuels, with special incentives for renewable fuels of non-biological origin (RFNBOs) and excludes fossil fuels from certification.

The Regulation requires the use of onshore power supply (OPS) or other zero-emission technologies starting from 1 January 2030 in EU ports falling under the Alternative Fuels Infrastructure Regulation (AFIR), and from 1 January 2035 in all EU ports equipped with OPS infrastructure.

It also mandates that passenger and container ships use onshore power supply while docked at major EU ports from 2030 to reduce air pollution in port areas. Ship operators must submit monitoring plans, report detailed fuel and emissions data, and must pay penalties for non-compliance. Revenue from penalties will support further decarbonization projects in the maritime sector. The regulation is technology-neutral, allowing flexibility in how ship owners meet the targets, and includes exceptions for certain regions and a pooling mechanism for compliance.

GHG Intensity Reduction Targets for Maritime Fuels (relative to 2020 baseline):

- 2025: 2%
- 2030: 6%
- 2035: 14,5%
- 2040: 31%
- 2045: 62%
- 2050: 80%

2.9.5 CO₂ Emission Standards for New Light-Duty Vehicles Regulation (2023)

- **Target: 100% reduction** in CO₂ emissions for new cars and vans by 2035.
- **Interim Targets (vs. 2021 levels):** 2030: -55% for new cars, -50% for new vans.

2.9.6 CO₂ Emission Standards for New Heavy-Duty Vehicles Regulation (2024)

The average CO₂ emissions of the Union fleet of new heavy-duty motor vehicles, other than special purpose vehicles, off-road vehicles and off-road special purpose vehicles shall be reduced by the following percentages compared to the average CO₂ emissions of the reporting period of the year 2019:

- 15 % for vehicle sub-groups 4-UD, 4-RD, 4-LH, 5-RD, 5-LH, 9-RD, 9-LH, 10-RD and 10-LH for the reporting periods of the years 2025 to 2029;
- 45 % for all vehicle sub-groups other than vocational vehicles for the reporting periods of the years 2030 to 2034;
- 65 % for all vehicle sub-groups for the reporting periods of the years 2035 to 2039;
- 90 % for all vehicle sub-groups for the reporting periods of the year 2040 onwards.

2.9.7 EU Automotive Package (2025)

The European Commission presented on 16 December 2025 the Automotive Package to support the sector's efforts in the transition to clean mobility. It sets an ambitious yet pragmatic policy framework to ensure 2050 climate neutrality and strategic independence while providing more flexibility to manufacturers. It also responds to calls by EU industry to simplify rules.

The CO₂ standards now provide further flexibilities to support the industry and **enhance technological neutrality**, while providing predictability to manufacturers and maintaining clear market signal towards electrification. From 2035 onwards, carmakers will need to comply with a **90% tailpipe emissions reduction target**, while the remaining 10% emissions will need to be compensated through the use of low-carbon steel Made in the Union, or from e-fuels and biofuels.

2.9.8 Energy Taxation Directive (ETD) Revision (Proposed)

- **Aim:** Align taxation of energy products with EU climate objectives.
- **Proposal:** Establish minimum tax rates based on energy content and environmental performance (favoring sustainable fuels and electricity).
- **One of the main changes:** Fossil fuels used as fuel for intra-EU air transport, maritime transport and fishing should no longer be fully exempt from energy taxation in the EU. This is a crucial measure given the role of these sectors in energy consumption and pollution.

2.9.9 Eurovignette Directive (2022 Revision)

- **Overview:** Revises road-charging frameworks for heavy-duty vehicles across the EU.
- **Key Point:** Requires Member States to vary charges based on CO2 emissions from 2023 onward.

2.9.10 Combined Transport Directive (Under Revision)

- **Objective:** Encourage multimodal freight transport.
- **Proposed Updates:** New support measures for transshipment terminals and simplification of administrative procedures.

The initiative aims to:

- Re-establish the conditions for support and proof of compliance.
- Strengthen the support framework for intermodal transport.
- Improve market transparency.
- Introduce common transparency requirements for terminals ensuring that all terminals make data publicly available on terminal facilities and services, complementary to the proposed revision of the TEN-T Regulation.

2.9.11 TEN-T Regulation (Revised in 2023)

- **Scope:** Sets standards for the development of the Trans-European Transport Network (TEN-T).
- **Timing:**
 - **Core Network** to be completed by 2030.
 - **Comprehensive Network** to be completed by 2050.

The revised TEN-T will set mandatory targets:

- Passenger railway lines on the TEN-T core and extended core network shall allow **trains to travel at 160 km/h or faster by 2040**.
- The **European Rail Traffic Management System (ERTMS) must be rolled out on the entire TEN-T network as the single European signalling system in Europe** to make rail safer and more efficient. Consequently, national legacy 'class B' systems must be decommissioned progressively; this will incentivize European industry to invest in ERTMS.
- **Safe and secure parking areas** shall be developed on the core and extended core road network of the TEN-T by 2040, **on average every 150 km**. This is key to assuring safety and appropriate working conditions for professional drivers.
- **Major airports**, dealing with more than 12 million passengers annually, will have **to be connected by long-distance rail**, a major step towards improving connectivity and accessibility for passengers and strengthening the competitiveness of rail vis-a-vis domestic flights.



- **The number of transshipment terminals must develop in line with the current and expected traffic flows and the needs of the sector. Equally handling capacity at freight terminals must improve.** This, as well as allowing the circulation of 740 mil trains across the network, will help shift more freight onto more sustainable modes and give a push to Europe's combined transport sector (the use of combinations such as railroad to move freight).
- All **430 major cities** along the TEN-T network will have to develop **Sustainable Urban Mobility Plans** to promote zero and low emission mobility.
- The European Maritime Space aims to integrate the maritime space with other transport modes efficiently, viably and sustainably. For this purpose, short-sea shipping routes will be upgraded, and new ones will be created, while maritime ports will be further developed as well as their hinterland connections.

2.10 Emissions Trading System (ETS)

The EU Emissions Trading System (EU ETS) is the world's largest and longest-running carbon market, launched in 2005 to help the EU cost-effectively reduce greenhouse gas emissions and combat climate change.

It operates on a cap-and-trade principle, setting a limit on total emissions from key sectors such as power generation, industry, aviation, and, since 2024, maritime transport. Companies receive or purchase emission allowances, which they must surrender for their actual emissions; unused allowances can be traded.

The system is now in its fourth phase (2021–2030) and has undergone major reforms to align with the EU's Green Deal and climate targets, including a 62% emission reduction from covered sectors by 2030 compared to 2005 levels.

Recent changes expanded the ETS to cover maritime transport, tightened the emissions cap, reduced free allocation of allowances, and created a new parallel system (ETS2) for buildings, road transport, and small industry, starting in 2027.

Revenues from the ETS are now dedicated to climate action, supporting innovation, modernization, and a Social Climate Fund to help vulnerable groups manage the impact of carbon pricing. The Carbon Border Adjustment Mechanism (CBAM) is also being introduced to prevent carbon leakage and ensure fair competition as free allowances are phased out.

- Requires polluters to contribute to reducing overall EU emissions while generating revenues to finance the green transition; a covers emission from the electricity and heat generation, industrial manufacturing and aviation sectors - which account for roughly 40% of total GHG emissions in the EU.
- It started covering emissions from maritime transport in 2024.
- Operates in all EU countries plus Iceland, Liechtenstein and Norway, and is linked to the Swiss ETS (since 2020) (European Commission, 2025).
- As of 2024, in line with the regulations prepared by the European Commission (DG CLIMA) and adopted by the European Parliament and the Council, the scope of the EU Emissions Trading System (EU ETS) for the maritime sector has been expanded to

include not only carbon dioxide (CO₂) emissions but also methane (CH₄) and nitrous oxide (N₂O) emissions (European Commission, 2024).

- Revision and expansion of the EU Emissions Trading System (Directive (EU) 2023/959).

2.10.1 EU ETS Revision and Extension (2023)

- **New Target: 62% reduction** of emissions in ETS sectors by 2030 (compared to 2005).
- **Inclusion of Maritime Transport:**
 - From 2024: 40% of emissions covered.
 - From 2025: 70% of emissions covered.
 - From 2026: 100% of emissions covered.
- **Aviation:** Gradual **phase-out of free ETS allowances** for airlines by 2026.

2.10.2 New ETS for Road Transport and Buildings (ETS 2) (2023)

- **Implementation:** From 2027 onward.
- **Target:** 43% reduction in emissions by 2030 (compared to 2005).

Evaluation in Terms of Net Zero Goals: The inclusion of transport sectors is a critical evolution of the EU ETS, directly addressing one of the most challenging areas for decarbonization.

This expansion has significant implications for countries like Türkiye that have economic and policy ties to the EU.

Türkiye has begun developing its carbon pricing framework: on sectors covered by the EU Carbon Border Adjustment Mechanism, such as.

The Climate Law has entered into force and has established the legal basis for carbon pricing; the Regulation on the Operation of the Emissions Trading System Market has been opened for public consultation by the Energy Market Regulatory Authority (EMRA) and is expected to enter into force by the end of 2025; and the launch of a pilot emissions trading system is planned from 2026, with an initial focus on sectors such as iron and steel, cement, fertilizers, and electricity; the Medium Term Program (2025-2027) indicates the establishment of a carbon pricing mechanism to maintain competitiveness and minimize CBAM impacts. However, Türkiye has not yet fully integrated the transport sector into these initial carbon pricing frameworks (European Commission, 2025).

EU ETS expansion to transport sectors creates several direct and indirect effects for Türkiye:

Direct Effects:

- **Maritime Transport:** Turkish shipping companies operating to/from EU ports have been subject to EU ETS requirements from 2024 onward
- **Aviation:** Turkish airlines operating intra-EU flights are already subject to the EU ETS, with increasing costs as free allowances phase out
- **Cross-Border Road Transport:** The ETS-2 will indirectly affect Turkish trucking companies operating in the EU through fuel price increases

Indirect Effects:

- **Competitive Pressure:** EU transport operators subject to carbon pricing may gain competitive advantages if they accelerate decarbonization faster than Turkish counterparts
- **Supply Chain Impacts:** EU companies may increasingly prefer lower-carbon logistics options to reduce their Scope 3 emissions
- **Regulatory Spillover:** EU standards often influence Turkish regulations due to economic integration

2.10.3 Carbon Border Adjustment Mechanism (CBAM) (2023)

The EU's Carbon Border Adjustment Mechanism (CBAM) is the EU's tool to put a **fair price on the carbon emitted** during the production of intensive goods that are entering the EU, and to encourage cleaner industrial production in non-EU countries.

The CBAM will **initially apply to imports of certain goods and selected precursors** whose production is carbon intensive and at most significant risk of carbon leakage: **cement, iron and steel, aluminium, fertilizers, electricity and hydrogen**. It requires importers to purchase CBAM certificates matching embedded carbon emissions and prices aligned with EU Emissions Trading System (ETS):

- **Purpose:** Address carbon leakage for certain ETS sectors.
- **Phase-In:** From 2026 to 2034.

Evaluation in Terms of Net Zero Goals: The introduction of the EU's CBAM has significant implications for Türkiye. CBAM is designed to prevent carbon leakage by applying a carbon price to imports of certain goods. Türkiye, as a major trading partner with the EU, will be directly affected.

While initially focused on emissions-intensive industries (cement, iron and steel, aluminium, fertilizers, electricity, and hydrogen), CBAM's scope could expand to indirectly affect transport-related emissions. Without a comparable carbon pricing system, Turkish exports face increasing costs under CBAM.

The pressure from CBAM creates strong incentives for Türkiye to develop its own robust carbon pricing mechanisms, potentially including transport emissions.

CBAM represents a significant external driver that could accelerate Türkiye's transport sector decarbonization if properly leveraged. While presenting short-term economic challenges, it creates a clear business case for transforming both industrial production and the transport sector toward lower-carbon alternatives.

The unique position of Türkiye—with strong EU trade links but also connections to Middle Eastern and Asian markets—provides an opportunity to develop a competitive advantage as a clean manufacturing hub during the global net zero transition.

Success will depend on coordinated policy action across industrial, energy, and transport domains, along with strategic investments in infrastructure and technology.

Direct Impacts:

Supply Chain Integration:

- Turkish automotive manufacturers exporting to EU will face increasing pressure to decarbonize production
- CBAM will indirectly price emissions in vehicle manufacturing supply chains
- May accelerate shift toward EV production for both domestic use and export

Industrial Decarbonization Spillovers:

- Steel, aluminium, and other CBAM-covered sectors are key inputs for transport manufacturing

As these sectors decarbonize to remain competitive under CBAM, lower-carbon materials become available for domestic transport industry.

2.11 Monitoring, Reporting, and Verification (MRV)

Monitoring, Reporting, and Verification (MRV) is a systematic process used to track and ensure the accuracy of greenhouse gas (GHG) emissions data and the effectiveness of climate mitigation actions. The MRV process involves three main steps:

- **Monitoring** (or Measurement): Collecting data on emissions, mitigation actions, or support, often through direct measurement, estimates based on activity data, or calculation using emission factors.
- **Reporting**: Compiling and presenting this information in standardized formats, such as inventories or annual reports, to make it accessible and transparent for stakeholders and the public.
- **Verification**: Independently reviewing or assessing the reported information to confirm its accuracy, completeness, and compliance with established procedures, often by accredited third parties or authorities.

MRV is crucial for ensuring transparency, accountability, and credibility in climate policy, supporting the design and evaluation of mitigation strategies, and building trust among stakeholders. It is a core component of international climate agreements like the Paris Agreement, and is required for mechanisms such as carbon markets and emissions trading systems to function effectively.

2.11.1 Regulation (EU) 2015/757 on MRV for Maritime Transport

- **Scope**: Ships over 5,000 gross tons calling at EU ports must monitor and report annual CO₂ emissions, fuel consumption, and other relevant data.
- **Link to ETS**: Paves the way for maritime emissions to be included under the EU ETS.

2.11.2 Implementing Regulation (EU) 2016/1927

- **Details:** Specifies templates and rules for monitoring plans, emissions reports, and documents of compliance in the maritime sector.

2.11.3 Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action

- **Framework:** Establishes an integrated system for planning, reporting, and monitoring progress on GHG reductions, renewables, and energy efficiency across all sectors.

Evaluation in Terms of Net Zero Goals: Monitoring, Reporting, and Verification (MRV) systems form the backbone of effective climate policy by providing transparent, accurate emissions data necessary for meaningful decarbonization. While the EU has developed a comprehensive and mature MRV ecosystem across multiple transport modes, Türkiye has made initial progress but faces significant gaps that must be addressed to support its transport decarbonization goals. The EU has established a comprehensive MRV ecosystem for transport emissions through several interconnected regulations.

2.12 ICAO Air Transport Policy and Regulations

The objectives of the air transport policy and regulation program are to:

- reduce costs in performing its economic regulatory functions
 - increase consumer's benefits and choices.
 - improve air connectivity; and
 - create more competitive business opportunities in the marketplace
- there by contributing to sustainable economic development and to the expansion of trade and tourism (ICAO, 2025).

2.12.1 CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation)

CORSIA is the first global market-based measure for any sector and represents a cooperative approach that moves away from a “patchwork” of national or regional regulatory initiatives. It offers a harmonized way to reduce emissions from international aviation, minimizing market distortion, while respecting the special circumstances and respective capabilities of ICAO Member States.

CORSIA complements the other elements of the basket of measures by offsetting the amount of CO₂ emissions that cannot be reduced using technological improvements, operational improvements, and sustainable aviation fuels with emissions units from the carbon market (ICAO, 2025).

- Phase 1 (2024-2026): Voluntary participation
- Phase 2 (2027-2035): Mandatory for countries with >0.5% aviation activity
- Baseline: Average of 2019 CO₂ emissions



- Requirements for MRV (Monitoring, Reporting, Verification)
- At its 41st Assembly in October 2022, ICAO decided that, from 2024 until the scheme's conclusion in 2035, CORSIA's baseline would be set at 85% of 2019 emissions—a target far more ambitious than initially foreseen and one that received industry backing (IATA, 2025)

Participation of States in the pilot phase (2021 to 2023) and first phase (2024 to 2026) is voluntary.

For the second phase from 2027, all States with an individual share of international aviation activity in year 2018 above 0.5% of total activity or whose cumulative share reaches 90% of total activity, are included. Least Developed Countries, Small Island Developing States and Landlocked Developing Countries are exempt unless they volunteer to participate.

ICAO has agreed on three aspirational goals for the international aviation sector:

- 2% annual fuel efficiency improvement through 2050
- Carbon neutral growth from 2020 onwards (CNG 2020)
- Long-term global aspirational goal of net-zero carbon emissions by 2050

Evaluation in Terms of Net Zero Goals: CORSIA provides a global, harmonized mechanism to manage and reduce emissions from international aviation, which is highly relevant for Türkiye given its growing role as an international aviation hub. Türkiye's active participation in CORSIA requires a structured approach to align its aviation decarbonisation policies with international standards and ensure consistency with its 2053 Net Zero target. In this context, the draft directive on Sustainable Aviation Fuels (SAF-TR) introduced by Türkiye's Directorate General of Civil Aviation marks a significant national step.

The SAF-TR aims to promote the production and use of sustainable aviation fuels, incentivize sectoral innovation, and establish a regulatory framework to facilitate emission reductions in line with both CORSIA and EU Fit for 55 objectives.

Together, these efforts reflect Türkiye's commitment to aligning with global best practices while fostering a domestic regulatory base to support its long-term decarbonisation strategy in aviation.

2.12.2 ICAO Environmental Protection Standards

ICAO serves as a multilateral platform for cooperation on international aviation and environmental protection. Over the years, the national governments who participate together under the Chicago Convention, also commonly referred to as 'ICAO Member States', have agreed to concentrate their aviation environmental collaboration on three core areas:

- Climate change and aviation emissions
- Aircraft noise
- Local air quality



Countries are pursuing these objectives through ICAO primarily via their development of new global aviation standards. They have also agreed to aspirational goals for international aviation, and have prioritized ICAO's Environmental Protection resources on:

- Airframe, propulsion, and other aeronautical and technological innovations
- Optimizing flight procedures to reduce fuel burn
- Increasing the production and deployment of sustainable aviation fuels and clean energy
- Implementing the Carbon Offsetting Reduction Scheme for International Aviation (CORSIA).
- Aircraft CO₂ Emissions Standard (Annex 16, Volume III)
- Non-volatile Particulate Matter Standard
- CAEP (Committee on Aviation Environmental Protection) requirements
- Noise and Local Air Quality Standards

2.13 Clean Aviation Joint Undertaking

The Clean Aviation Joint Undertaking (CAJU) is a successful public-private partnership between the European Commission and the European aeronautics industry that is on the way to achieving its environmental performance targets (Clean Aviation Joint Undertaking, 2025).

It follows from its predecessor program, the Clean Sky 2 Joint Undertaking (Regulation (EU) 2021/2085).

The clean aviation technologies that this program is developing will enable future aircraft to:

- Cut fuel burn & related CO₂ emissions by 20-30%
- Cut noise levels.

Benefits:

- The public – thanks to less noise pollution and lower emissions, better travel options and improved industrial competitiveness in Europe.
- The economy - aeronautics is among the EU's most successful industries. Clean Aviation will help shape a European labour force able to develop the cutting-edge technology necessary to remain on top of the market.
- Small & medium-sized businesses - growing numbers of such firms are getting involved through calls for project proposals offered under Clean Aviation. This opens new opportunities for them and new potential supply chains for established industry players.
- Scientific community & academia - Clean Aviation offers ways of speeding up the application of novel technologies. It gives industry and science a chance to jointly address challenges and priorities.

2.14 Additional Policies, Directives, and Regulations

- Air Quality Directives (e.g., Directive 2008/50/EC): Set air pollution limits for NO_x, PM, etc.
- Euro Standards (Euro 5/6 for light vehicles, Euro VI for heavy-duty): Limit permissible emissions (NO_x, PM).
- Worldwide Harmonized Light-Duty Vehicles Test Procedure (WLTP) & Real Driving Emissions (RDE): Modernize emissions testing to reflect real-world conditions.
- Clean Power for Transport: A European Alternative Fuels Strategy (COM/2013/017): Lays out comprehensive objectives for alternative fuels.
- Clean and Energy-Efficient Road Transport Vehicles Directive (Directive 2009/33/EC, amended by (EU) 2019/1161): Encourages public procurement of low- and zero-emission vehicles.
- Protecting the Sea and the Food Chain from the Effects of Organotin Compounds (Regulation (EC) No 782/2003): Environmental protection in maritime contexts.

2.15 Funding Instruments and Programs

Table 6 below shows the main funding mechanisms and programs supporting the green transition in transport:

Table 6: The Main Funding Mechanisms and Programs Supporting the Green Transition in Transport

Funding mechanism and program	Budget	Scope
Connecting Europe Facility (CEF) – Transport	Budget: ~€25.8 billion (2021–2027) https://transport.ec.europa.eu/transport-themes/infrastructure-and-investment/connecting-europe-facility_en	Alternative Fuels Infrastructure Facility (AFIF): ~€1.5 billion to co-fund EV charging, hydrogen refueling, etc.
Recovery and Resilience Facility (RRF)	Budget: ~€723.8 billion (2021–2026) https://single-market-economy.ec.europa.eu/industry/strategy/hydrogen/funding-guide/eu-programmes-funds/recovery-and-resilience-facility_en	Green Spending Threshold: Minimum 37% of each national plan must contribute to climate objectives
Horizon Europe	Overall Budget: €95.5 billion (2021–2027) https://www.forskningsradet.no/en/horizon-europe/	Climate, Energy, and Mobility Cluster: ~€15 billion allocated to R&D in sustainable transport, clean energy, etc.
Innovation Fund	Estimated Revenue: ~€38 billion from EU ETS (2020–2030) https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/innovation-fund/what-innovation-fund_en	Scope: Supports highly innovative technologies and big flagship projects for emissions reduction in energy-intensive industries, including transport



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Funding mechanism and program	Budget	Scope
Modernization Fund	Estimated ~€51 billion (2021–2030) https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/modernisation-fund_en	Focus: Assists 10 lower-income EU Member States to modernize their energy systems and transport for climate neutrality
LIFE Programme	Budget: €5.4 billion (2021–2027) https://www.euro-access.eu/_media/file/818_call-fiche_life-2025-ta-r_en.pdf	Clean Energy Transition Sub-Programme: €1.9 billion dedicated to supporting green energy projects, including mobility
InvestEU Programme	Budget: €26.2 billion (2021–2027) https://investeu.europa.eu/investeu-programme_en	Sustainable Infrastructure Window: ~38% of InvestEU funding targets climate-friendly infrastructure, including transport
Just Transition Mechanism	Funding Pool: ~ €65–75 billion (2021–2027)	Just Transition Fund: €17.5 billion to mitigate socio-economic impacts in regions most affected by the energy and transport transition
European Regional Development Fund (ERDF)	Budget: ~€226 billion (2021–2027)	Requirement: At least 30% to be spent on climate objectives (including clean transport)
Cohesion Fund	Budget: ~€48 billion (2021–2027)	Transport Focus: Financing sustainable mobility (e.g., rail, public transport) in eligible Member States
European Investment Bank (EIB) Climate Action	Aim: Mobilize €1 trillion for climate and environmental sustainability investments (2021–2030)	Transport Relevance: Financing zero-emission transport projects, alternative fuels infrastructure, etc.
International Climate Initiative (IKI)	Budget: at least EUR 1.5 billion private capital * https://www.international-climate-initiative.com/en/iki-media/publication/the-strategy-of-the-international-climate-initiative-up-to-2030-1812/	Objectives: Raising the ambitions of NDCs, NAPs and/or NBSAPs, Improving the enabling environment, Implementation of climate change mitigation, biodiversity and/or climate change adaptation measure, Mobilizing private investment

Funding mechanism and program	Budget	Scope
UN Clean Technology Fund	Budget: 5.2 billion USD * https://www.cif.org/topics/clean-technologies	Objective: Climate Investment Funds comprise two funds, the Clean Technology Fund and the Strategic Climate Fund. The Clean Technology Fund provides new large-scale financial resources to invest in clean technology projects in developing countries, which contributes to the demonstration, deployment, and transfer of low-carbon technologies with a significant potential for long-term greenhouse gas emissions savings.
Mitigation Action Facility	Budget: Since 2012, the Mitigation Action Facility has supported 60 projects across 37 countries, with a total funding volume of EUR 826 million (as of March 2024)	Objective: Their focus spans three key sectors: energy, transport, and industry. The Mitigation Action Facility is a go-to platform driving climate action across sectors.

2.16 Related Reports

In addition to the international policies reviewed earlier in the report, this section presents a selection of other relevant reports that provide complementary insights into sustainable mobility, transport decarbonisation, and climate-aligned infrastructure planning.

These reports offer valuable data, strategic frameworks, and best practices that can support Türkiye's efforts to align its transportation system with its 2053 Net Zero vision.

2.16.1 European Environment Agency: Sustainability of Europe's Mobility Systems

The European Environment Agency (EEA) report, titled "Sustainability of Europe's Mobility Systems" dated October 10, 2024, provides a comprehensive analysis of the current state and prospects of sustainable mobility across Europe. The report emphasizes the critical role of sustainable transport systems in achieving broader environmental goals and outlines several key areas where action is needed (European Environment Agency, 2025).

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Enhancing Urban Mobility: The report identifies urban mobility as a pivotal area for sustainability efforts. It stresses the importance of integrating public transport solutions with other forms of green transportation, such as cycling and walking, to reduce carbon emissions and enhance urban liveability. Innovative approaches to urban planning and policymaking are recommended to foster more sustainable cityscapes.

Electrification of Transport: Electrification of the transport sector is highlighted as a crucial strategy for reducing reliance on fossil fuels. The EEA report outlines the progress in electric vehicle (EV) adoption and the expansion of EV charging infrastructure. It calls for continued investment and policy support to accelerate the shift towards electrified public and private transport.

Policy and Governance: Effective policy and governance structures are deemed essential for steering the transition to sustainable mobility. The report advocates robust legislative frameworks that incentivize green transport solutions and ensure adequate funding and implementation of sustainable transport policies.

Evaluation in Terms of Net Zero Goals: The EEA report concludes that while significant strides have been made in advancing sustainable mobility, there is still much work to be done to meet net zero goals. Enhanced cooperation between governments, industry, and civil society is crucial to scale up efforts. Strengthening the regulatory environment, increasing financial investment in green infrastructure, and fostering public-private partnerships are key strategies recommended to push forward the agenda of sustainable transport and achieve net zero emissions.

2.16.2 29th United Nations Climate Change Conference (COP29)

The 29th United Nations Climate Change Conference (COP29), held in Baku, Azerbaijan, from November 11 to 22, 2024, has been a pivotal event in addressing global climate challenges. Several key decisions and developments from the conference are particularly relevant to the transportation and energy sectors:

Adoption of International Carbon Market Standards: COP29 delegates agreed on standards for international carbon credit trading under Article 6.4 of the Paris Agreement. This framework aims to facilitate the trading of carbon credits between countries, potentially unlocking significant climate finance and promoting investments in low-carbon technologies, including sustainable transportation initiatives (Furness & Abnett, 2025).

In the intricate landscape of global climate action, Article 6 of the Paris Agreement emerges as a pivotal mechanism for international cooperation in reducing greenhouse gas emissions, with transportation standing at the critical intersection of technological innovation and collaborative transformation.

Article 6 fundamentally reimagines how nations can collaborate to achieve their climate goals, creating a sophisticated framework of market and non-market mechanisms that allow countries to trade carbon credits and collaborate on emissions reduction strategies. For the



transportation sector, this represents an unprecedented opportunity to transcend national boundaries and develop integrated, low-carbon mobility solutions.

The article introduces three primary approaches: cooperative approaches through bilateral agreements, a centralized mechanism for global emissions reduction, and non-market mechanisms that support sustainable development. In the transportation context, these mechanisms open pathways for technology transfer, joint infrastructure projects, and innovative financing models that can accelerate decarbonization.

The integrated development of international corridors for the seamless exchange of electric vehicle technologies, cross-border rail networks aligned with shared climate objectives, and maritime transport routes optimized for minimal emissions constitutes a coherent framework for low-carbon global mobility, enabled by the diplomatic and economic architecture established under Article 6.

Developing countries can particularly benefit by attracting investments into sustainable transportation infrastructure. A country may establish an advanced electric bus system, generate verified emissions reductions, and trade these credits internationally creating both environmental impact and economic opportunity.

The core strength of the mechanism lies in its flexibility. Rather than imposing rigid, one-size-fits-all regulations, Article 6 allows countries to develop strategies tailored to their specific geographic, economic, and technological conditions.

From a transport perspective, this does not merely mean replacing fossil fuel vehicles with new ones but redesigning entire mobility ecosystems. It's about creating intelligent transportation networks that prioritize efficiency, accessibility, and environmental sustainability.

However, the path is not without challenges. Robust monitoring, reporting, and verification mechanisms are crucial to prevent double counting of emissions reductions and ensure the integrity of these international carbon trading systems.

Climate Finance Commitments: A draft proposal at COP29 suggested that developed nations contribute \$250 billion annually by 2035 to assist developing countries in combating climate change. However, this figure has been met with criticism from developing nations, who argue that it falls short of the estimated \$1.3 trillion needed. The final agreement on climate finance remains under negotiation, highlighting the ongoing debate over funding levels necessary to support global climate initiatives (Mooney & Bryan, 2025).

Emphasis on Fossil Fuel Transition: Discussions at COP29 have revisited the commitment to transition away from fossil fuels, a topic prominently addressed at COP28 in Dubai. While some progress has been made, the pace of transition and the specific commitments required from nations remain contentious issues, impacting strategies for reducing emissions in sectors like transportation (Arasu et al., 2025).

Focus on Sustainable Transportation: The conference has underscored the importance of sustainable transportation in achieving climate goals. Strategies discussed include enhancing

public transportation systems, promoting electric and low-emission vehicles, and developing infrastructure to support non-motorized transport. These measures are crucial for reducing the transportation sector's carbon footprint and aligning with the Sustainable Development Goals (SDGs).

Integration of Renewable Energy in Transportation: Aligning with Goal 7: Affordable and Clean Energy, COP29 has highlighted the need for integrating renewable energy sources into transportation systems. This includes the adoption of electric vehicles powered by renewable energy and the development of supporting infrastructure, which are essential steps toward reducing greenhouse gas emissions from the transportation sector.

Evaluation in Terms of Net Zero Goals: These developments from COP29 are integral to shaping future policies and projects aimed at sustainable transportation and energy systems. Staying informed about the outcomes of COP29 will be beneficial for aligning ongoing and future projects with global climate objectives.

2.16.3 Global Transport Outlook 2023 (International Transport Forum - ITF)

The ITF Transport Outlook 2023, published by the International Transport Forum, offers policy-relevant projections on global transport activity, CO₂ emissions, and infrastructure investment needs through 2050. It models multiple scenarios to show how policy action can steer the transport sector toward sustainability while maintaining access and economic growth (International Transport Forum, 2023).

Key Findings on Passenger Transport:

- **Electrification and Innovation:** Electrification of passenger vehicles is necessary but not sufficient on its own. Emission reductions are most effective when combined with demand management and a shift toward shared and active modes
- **Active Mobility:** Promoting walking and cycling, supported by compact urban design, leads to reduced trip lengths and greater sustainability.
- **Public Transit Integration:** Investment in high-capacity, low-emission mass transit systems is vital, particularly in rapidly urbanizing regions, to offset private vehicle growth.

Key Findings on Freight Transport:

- **Modal Shifts:** Moving freight from road to more energy-efficient modes such as rail and inland waterways is one of the most effective strategies to reduce emissions in the freight sector.
- **Low-Carbon Technologies:** The deployment of electric and hydrogen trucks is essential for long-distance, heavy-duty decarbonization.
- **Digitalization and Optimization:** Using AI-powered logistics platforms improves load factors and minimizes emissions by reducing empty runs and streamlining delivery operations.

Strategies and Recommendations:

- Adopting integrated policy scenarios that combine electrification, modal shift, demand reduction, and sustainable fuels.
- Increasing investment in multimodal infrastructure, including clean public transport, freight rail corridors, and active mobility networks.
- Supporting technology innovation through R&D and demonstration projects in zero-emission transport and smart mobility.
- Applying carbon pricing, low-emission zones, and vehicle regulations to incentivize emissions reduction.
- Ensuring just transition mechanisms that improve access, affordability, and resilience for all communities, especially in developing and emerging regions.

Evaluation in Terms of Net Zero Goals:

The ITF Transport Outlook 2023 concludes that meeting net-zero targets by 2050 is technically feasible but requires decisive and early action. Electrification alone will not be sufficient without systemic shifts in transport behaviour, infrastructure investment, and governance. Türkiye's Vision 2053 and its Climate Change Mitigation Strategy reflect many of the report's key principles, including public transit electrification, freight rail expansion, and urban mobility reforms. The report underscores that combining these efforts with digitalization and international collaboration is critical to accelerate the transition to a low-carbon transport system.

2.16.4 International Energy Agency (IEA): "Global EV Outlook 2025"

The Global EV Outlook 2025 by the International Energy Agency (IEA) provides an in-depth analysis of the global electric vehicle (EV) market, highlighting its role in achieving net-zero transport emissions.

Key Findings on Passenger Transport:

- **Global EV Growth:** In 2024, electric car sales exceeded 17 million units globally, marking a 25% increase from the previous year. Projections indicate that in 2025, EV sales will surpass 20 million, accounting for over 25% of total car sales worldwide.
- **Public Transit Electrification:** China continues to lead, with EVs comprising nearly 50% of its new car sales in 2024. Europe maintained a 20% market share, while the United States saw a modest growth to around 10%. Emerging markets in Asia and Latin America are experiencing rapid adoption, driven by policy support and affordable EV models.
- **Charging Infrastructure:** The global stock of public charging points doubled since 2022, reaching over 5 million in 2024. Europe and China are leading this expansion, with significant investments in fast-charging networks to support the growing EV fleet.

Key Findings on Freight Transport:

- **Electric Trucks and Logistics:** Advancements in battery technology have led to increased adoption of electric heavy-duty vehicles. The total cost of ownership for electric trucks is becoming more competitive, especially in urban and regional applications.

- **Hydrogen Integration:** For long-distance freight, hydrogen fuel cell trucks are emerging as a viable solution, addressing range limitations of battery-electric vehicles. Several pilot projects and investments are underway to develop hydrogen refueling infrastructure.

Strategies and Recommendations:

- **Policy Support:**
 - Introduce financial incentives, such as subsidies and tax breaks, to accelerate EV adoption.
 - Implement stringent emission standards to encourage the transition to EVs.
- **Infrastructure Development:**
 - Investing in expanding charging infrastructure, including fast-charging stations along major corridors.
 - Developing hydrogen refueling stations to support fuel cell vehicle deployment.
- **Technological Innovation:**
 - Supporting research and development in battery technologies to improve energy density and reduce costs.
 - Promoting smart charging solutions and grid integration to manage increased electricity demand.

Evaluation in Terms of Net Zero Goals: The IEA's Global EV Outlook 2025 aligns with Türkiye's Transportation and Logistics Master Plan (Vision 2053), emphasizing the critical role of electrification in decarbonizing the transport sector. The report's insights on infrastructure development, policy frameworks, and technological advancements provide a roadmap for Türkiye to enhance its EV ecosystem. By adopting these strategies, Türkiye can accelerate its transition to sustainable mobility, reduce greenhouse gas emissions, and achieve its net-zero objectives.

2.16.5 Climate Finance for Sustainable Transport (Green Climate Fund – GCF, 2024)

The *Green Climate Fund's 2024 report, Climate Finance for Sustainable Transport*, emphasizes the critical role of **climate finance** in enabling the transition to low-carbon transportation systems, particularly in emerging economies. The report outlines mechanisms to overcome financial barriers to achieve **net-zero transport emissions by 2050**.

Key Findings on Passenger Transport:

- **Public Transport Infrastructure:** Climate finance has supported large-scale projects such as electric bus fleets and metro systems, reducing emissions and improving air quality.
- **Electrification and Innovation:** Financial incentives for EV adoption, coupled with investments in charging infrastructure, accelerate the transition to clean passenger transport.
- **Equity and Affordability:** Ensuring access to affordable, sustainable transportation for vulnerable populations addresses *social inequalities in urban mobility*.



Key Findings on Freight Transport:

- **Green Logistics Corridors:** Climate finance supports modal shifts from road to **rail** and **maritime transport**, reducing freight emissions.
- **Alternative Fuels and Technologies:** Investments in green hydrogen, biofuels, and electric freight vehicles are essential to decarbonizing heavy-duty transport.
- **Digitalization:** Funding enables the adoption of smart logistics systems, improving efficiency and minimizing fuel consumption across supply chains.

Strategies and Recommendations:

- **Financial Mechanisms:**
 - Implement **blended finance models** to combine public and private funds, de-risking investments in sustainable transport infrastructure.
 - Develop **carbon pricing frameworks** to generate funding for green mobility projects.
- **Targeted Investments:**
 - Prioritize large-scale investments in electric public transport, green freight systems, and clean infrastructure.
 - Support emerging economies in *capacity building* and *technology transfer* for sustainable transport solutions.
- **Access to Finance:**
 - Facilitate access to concessional loans and grants for cities and regions to implement sustainable mobility projects.
- **Monitoring and Evaluation:**
 - Establish frameworks to measure the impact of climate finance on emission reductions and sector transformation.

Evaluation in Terms of Net Zero Goals: The *GCF report* highlights climate finance as a cornerstone for achieving net-zero transport targets, particularly in emerging economies like Türkiye. By addressing financial barriers such as high upfront costs, the report aligns with Türkiye Transportation and Logistics Master Plan (Vision 2053) and Green Deal Action Plan. Its emphasis on *public transport electrification*, *green logistics infrastructure*, and *alternative fuels* provides practical pathways to scale up sustainable solutions, ensuring Türkiye meets its net-zero ambitions.

2.16.6 UNESCAP: Advancing Sustainable Transport Connectivity in Asia-Pacific (Based on the Regional Action Programme 2022–2026)

The United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) continues to implement its Regional Action Programme for Sustainable Transport Development in Asia and the Pacific (2022–2026). This program outlines regional strategies for promoting environmentally sustainable, socially inclusive, and economically efficient



transport systems, supporting the achievement of the UN Sustainable Development Goals (SDGs) (Economic and Social Commission for Asia and the Pacific, 2024).

Key Findings on Passenger Transport:

- **Regional Integration:** UNESCAP advocates for the expansion of cross-border rail and bus networks to promote seamless mobility, particularly under the Intergovernmental Agreement on International Railway Transport in Asia and the Pacific (2019).
- **Urban Mobility:** Member States are encouraged to adopt Sustainable Urban Mobility Plans (SUMP) and integrate Bus Rapid Transit (BRT) and metro systems to alleviate congestion and reduce emissions.
- **Sustainable Transport Indicators:** UNESCAP is developing common indicators to monitor progress on low-carbon and accessible passenger transport solutions.

Key Findings on Freight Transport:

- **Multimodal Corridors:** Shifting freight transport to rail, inland waterways, and maritime routes is a core strategy to cut logistics-related emissions and support trade efficiency.
- **Dry Ports and Logistics Hubs:** The program promotes the development of green logistics hubs and dry ports under the Intergovernmental Agreement on Dry Ports (2013) to improve last-mile freight connectivity.
- **Digital Freight Platforms:** The digitalization of freight systems, including IoT-enabled platforms, is being advanced to improve data sharing, traceability, and real-time efficiency.

Strategies and Recommendations:

- **Policy Integration:**
 - Align national transport policies with the SDGs, Paris Agreement, and regional frameworks such as APTA and Asian Highway/Trans-Asian Railway networks.
 - Foster regional agreements that standardize border-crossing procedures and emissions benchmarks.
- **Infrastructure and Innovation:**
 - Prioritize public investment in rail electrification, clean ports, and low-emission vehicle fleets.
 - Support R&D for hydrogen mobility, smart transport platforms, and AI-driven traffic management.
- **Financing and Inclusion:**
 - Enhance access to climate finance for sustainable transport initiatives.
 - Promote affordable, inclusive mobility—especially for rural areas and vulnerable populations.

Evaluation in Terms of Net Zero Goals: The UNESCAP action plan strongly complements Türkiye's ambitions under its 2053 Vision for Carbon Neutrality and Transport and Logistics Master Plan. The emphasis on multimodal transport corridors, smart logistics, and regional integration aligns with Türkiye's goals of becoming a key Eurasian logistics hub. Furthermore,

the promotion of digitalization and rail infrastructure resonates with national strategies aimed at reducing freight emissions and enhancing urban transit resilience.

2.17 Key Awareness-Raising and Implementation Initiatives

The following initiatives play a crucial role in raising public awareness and supporting the implementation of sustainable urban mobility across Europe.

1. **European Mobility Week:** Annual campaign every September, promoting sustainable urban mobility.
2. **CIVITAS:** Supports cities with knowledge exchange on ambitious urban transport measures.
3. **Eltis – Urban Mobility Observatory:** Offers resources and best practices on sustainable urban mobility.
4. **European Platform on Sustainable Urban Mobility Plans (SUMPs):** Encourages city-level emissions reduction targets and integrated planning.
5. **Clean Bus Europe Platform:** Accelerates the deployment of clean bus fleets.
6. **Green Driving Tool:** Provides guidance on eco-driving and calculates potential emissions savings.
7. **DiscoverEU:** Encourages rail travel for young Europeans.
8. **The Green Trip:** Highlights local influencers' experiences with green initiatives across Europe.
9. **European Year of Rail (2021):** Raised awareness of rail as a sustainable transport mode.
10. **Marco Polo II Programme:** Funded freight transport projects to shift traffic off roads onto more sustainable modes.

2.18 Selected Quantitative Targets and Timelines (Consolidated)

The following consolidated targets and timelines outline the EU's key quantitative goals for achieving climate neutrality and transforming the transport sector.

1. **Climate Neutrality:**
 - Net-zero GHG emissions by **2050** (European Climate Law, European Green Deal).
2. **2030 GHG Reduction:** -55% (Fit for 55) vs. 1990, and -62% in ETS sectors vs. 2005.
3. **Transport Sector:**
 - 90% emissions reduction by **2050** (European Green Deal).
 - 30 million zero-emission vehicles by **2030** (Sustainable and Smart Mobility Strategy).
 - CO2 **100% reduction** for new cars/vans by **2035** (CO2 Emission Standards for New Vehicles Regulation 2023).
 - Maritime fuels: up to **-80% GHG intensity** by 2050 (FuelEU Maritime).
 - Aviation: up to **70% SAF** mandate by 2050 (ReFuelEU Aviation).
4. **Renewable Energy in Transport:**
 - **29%** share of renewables in transport by 2030 (RED III).
 - **14.5%** GHG intensity reduction by 2030 in transport fuels (RED III).
5. **Infrastructure:**

- AFIR requires EV chargers **every 60 km** and hydrogen station **every 200 km** on main highways by 2025; 3.5 million public charging points by 2030.
6. **Road Charging:**
- Eurovignette Directive: CO₂-based charging for heavy-duty vehicles from **2023** onward.

2.19 Analytical Overview and Observations

This section offers a high-level analytical synthesis of the key themes, trends, and implementation challenges emerging from the reviewed EU and international policy frameworks. It highlights strategic observations related to policy design, funding mechanisms, technological direction, and urban mobility priorities. The aim is to distill cross-cutting insights that are particularly relevant for aligning Türkiye's transport and climate strategies with global and European best practices.

- **Policy Convergence:** The Fit for 55 Package aligns multiple regulations—on vehicles, fuels, and infrastructure—towards the overarching 2030 climate target. The EU's focus on cross-sectoral decarbonization is evident in extending emissions trading to maritime and road transport/buildings.
- **Substantial Public Funding:** The combined budgets of the Recovery and Resilience Facility (RRF), InvestEU, CEF, Horizon Europe, and others underscore the EU's commitment to financing large-scale transitions. Many funding streams require or prioritize alignment with climate and sustainability goals.
- **Technological Neutrality vs. Specific Mandates:** While some directives (RED III, AFIR) remain technology-neutral to a degree (e.g., advanced biofuels, hydrogen, electrification), other regulations (CO₂ emission standards, ReFuelEU Aviation, FuelEU Maritime) establish clear numeric targets for adoption of zero- or low-carbon technologies.
- **Urban Focus:** The Commission emphasizes urban mobility decarbonization (e.g., SUMP, Clean Bus Europe Platform, CIVITAS), recognizing that urban transport contributes significantly to congestion and emissions.
- **Implementation Challenges:** Achieving these goals requires strong Member State implementation, effective public-private coordination (e.g., building extensive charging/refueling infrastructure), and the adoption of ambitious local measures.

3. KEY PRINCIPLES IN NET ZERO IN TRANSPORT

3.1 Green mobility

Green mobility encompasses a range of sustainable transportation strategies aimed at reducing environmental impacts, enhancing efficiency, and improving the overall quality of urban life. For instance, the İzmir Sustainable Urban Mobility Plan has expanded metro networks and integrated them with bus and ferry services to encourage public transport use.

Similarly, Antalya has focused on improving cycling infrastructure and pedestrian pathways, significantly reducing car dependency in its tourist areas. These strategies include promoting the use of public transit, cycling, walking, and the deployment of cleaner and smarter vehicles.

National Context: Türkiye's Initiatives

- **Türkiye Transportation and Logistics Master Plan (Vision 2053):** This comprehensive plan outlines Türkiye's long-term goals for transforming its transportation infrastructure. It emphasizes the development of environmentally friendly public transit systems such as electrified railways and enhanced cycling pathways, and the integration of advanced technologies like intelligent transportation systems to create more sustainable and efficient urban mobility solutions.
- **Climate Change Mitigation Strategy and Action Plan (CCMSAP) for Türkiye:** This action plan sets specific targets for reducing greenhouse gas emissions within the transportation sector. It includes measures to increase the use of renewable energy sources and to enhance vehicle efficiency across the country.
- **Green Deal Action Plan for Türkiye:** Aligned with the broader European Green Deal, this plan includes initiatives specifically designed to support sustainable transportation, such as incentives for electric vehicles and investments in green infrastructure like charging stations and bike lanes.

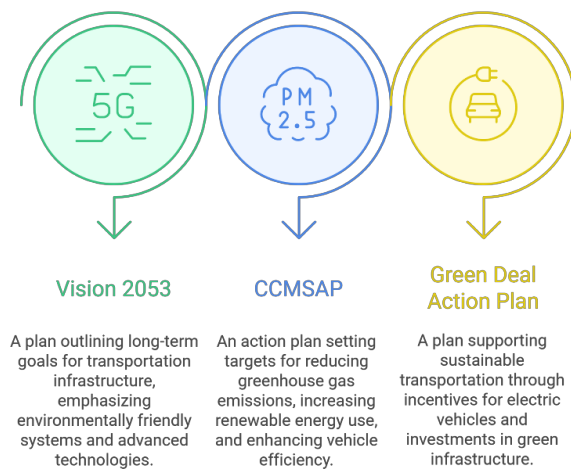


Figure 1: National Context: Türkiye's Initiatives for Green Mobility

International Context

- **United Nations Sustainable Development Goals (SDGs):** Particularly relevant is SDG 11, which aims to make cities inclusive, safe, resilient, and sustainable. It calls for expanding public transport, upgrading road safety, and providing access to green public spaces.
- **Paris Agreement and the United Nations Framework Convention on Climate Change (UNFCCC):** These agreements emphasize the importance of reducing carbon emissions in the transportation sector as part of broader efforts to combat climate change. Countries, including Türkiye, have committed to creating more sustainable transport systems as part of their nationally determined contributions (NDCs).
- **European Green Deal:** This deal sets benchmarks for reducing greenhouse gas emissions across EU member states and provides a model for associated countries like Türkiye. It promotes a significant shift towards sustainable mobility, advocating for a 90% reduction in transport emissions by 2050.
- **International Energy Agency (IEA) Reports:** These reports often provide insights and recommendations on how to transition to sustainable mobility, highlighting successful case studies and emerging trends in green transportation technologies.
- **Global Fuel Economy Initiative (GFEI):** This initiative aims to promote and facilitate greater fuel economy in vehicles around the world, reducing fuel consumption and lowering emissions from the transport sector.

Sustainable Urban Mobility Plans (SUMP): SUMP are designed to meet the mobility demands of urban settings in a sustainable manner. These strategic plans aim to improve accessibility, decrease road congestion, and reduce environmental impact through a modal shift from private vehicle use to more sustainable alternatives such as public transportation, cycling, and walking. SUMP effectively align transportation policy and urban development to foster communities that are economically vibrant, environmentally sustainable, and socially inclusive. To effectively develop, execute, and assess Sustainable Urban Mobility Plans, municipalities can refer to the European Commission's guidelines. These provide a robust framework that ensures urban mobility strategies are well-integrated with broader economic and environmental policies (Consult, 2019).

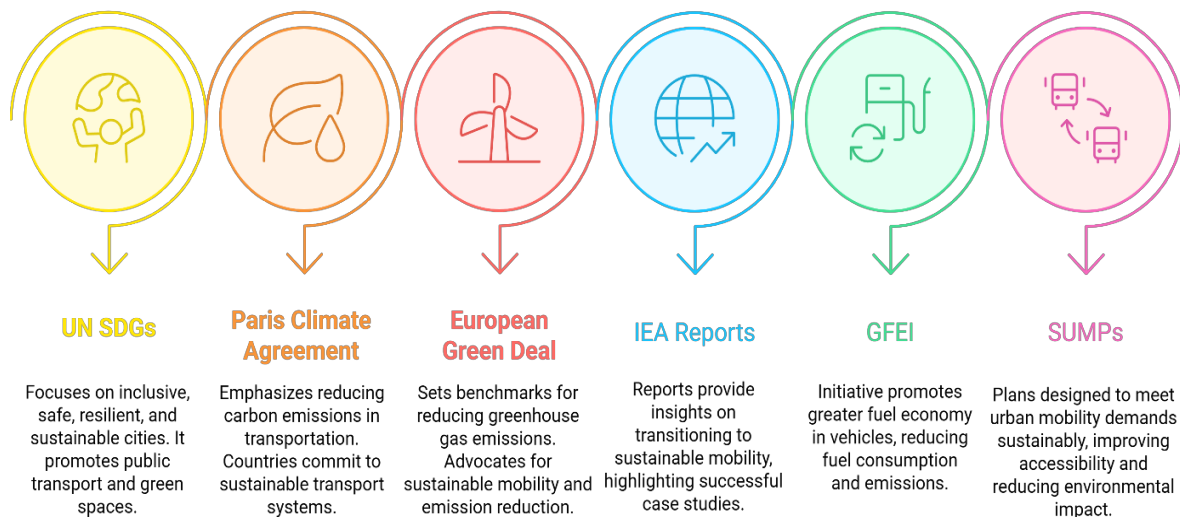


Figure 2: International Context for Green Mobility



Evaluation and Future Directions: Green mobility is crucial for achieving net-zero emissions in the transportation sector, a key goal in both national and global climate strategies. Its success depends on investments in sustainable infrastructure, supportive policies, and cooperation from public and private sectors. Sustainable Urban Mobility Plans (SUMPs) have shown effective outcomes in Turkish cities, demonstrating significant potential for scalability and further enhancement.

As technology evolves and more data becomes available, initiatives like Türkiye Transportation and Logistics Master Plan (Vision 2053) and the Green Deal must continue to adapt and innovate. Regular reviews and improvements to these plans are necessary to address upcoming transportation challenges.

It is also important for municipalities to work together, using international guidelines and proven methods, to ensure these efforts are successful and aligned with broader sustainability objectives.

3.2 Digitalization

Digitalization in the transportation sector involves the integration of digital technologies to improve the efficiency, safety, and sustainability of transport systems. The ITS (Intelligent Transport Systems) Action Plan includes initiatives such as dynamic traffic management systems, smart intersections, and vehicle-to-infrastructure communication systems to enhance overall transportation efficiency and reduce emissions.

National Context: Türkiye's Initiatives

- **Türkiye Transportation and Logistics Master Plan (Vision 2053):** This plan emphasizes developing smart cities and modernizing transport infrastructures to enhance efficiency and sustainability. Key projects from the ITS Action Plan, such as the deployment of cooperative ITS corridors and adaptive traffic management solutions, are central to this vision.
- **Climate Change Mitigation Strategy and Action Plan (CCMSAP) for Türkiye:** This strategy focuses on using digital technologies to monitor and reduce the carbon footprint of transportation, including smart traffic and advanced fuel monitoring systems, and the implementation of the ITS (Intelligent Transport Systems) action plan to optimize traffic flow and enhance system efficiency.

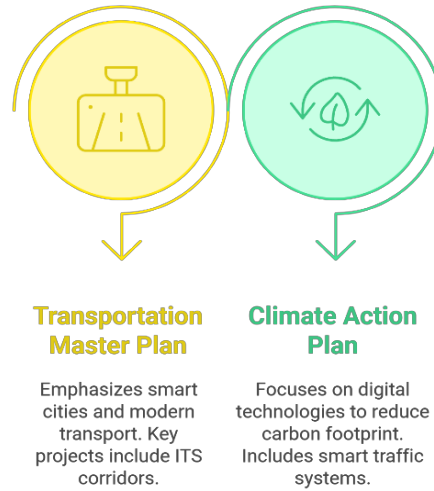


Figure 3: National Context: Türkiye's Initiatives for Digitalization

International Context

- **United Nations Sustainable Development Goals (SDGs):** SDG 9 specifically targets building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation. Digitalization in transportation directly contributes to achieving these objectives by modernizing infrastructure and making transport systems more sustainable.
- **Paris Agreement and United Nations Framework Convention on Climate Change (UNFCCC):** These agreements underscore the importance of technology in tackling climate change. Digital solutions in transportation, such as emission tracking systems and optimization algorithms, are vital for countries to meet their Nationally Determined Contributions (NDCs).
- **European Green Deal:** The deal places a strong emphasis on digitalization as a means to achieve the 'green transition'. It includes funding and support for innovation in digital technologies that can lead to a reduction in transport emissions, such as mobility-as-a-service (MaaS) and digital logistics platforms.
- **International Transport Forum (ITF):** The ITF advocates digital innovations in transportation, providing guidelines and policy advice on how digital technologies can be used to improve transport efficiency and sustainability.
- **Smart Mobility Initiatives by the International Energy Agency (IEA):** The IEA supports the implementation of smart mobility solutions, such as advanced real-time traffic management and integrated multimodal transport systems, which are essential for reducing urban congestion and lowering emissions.

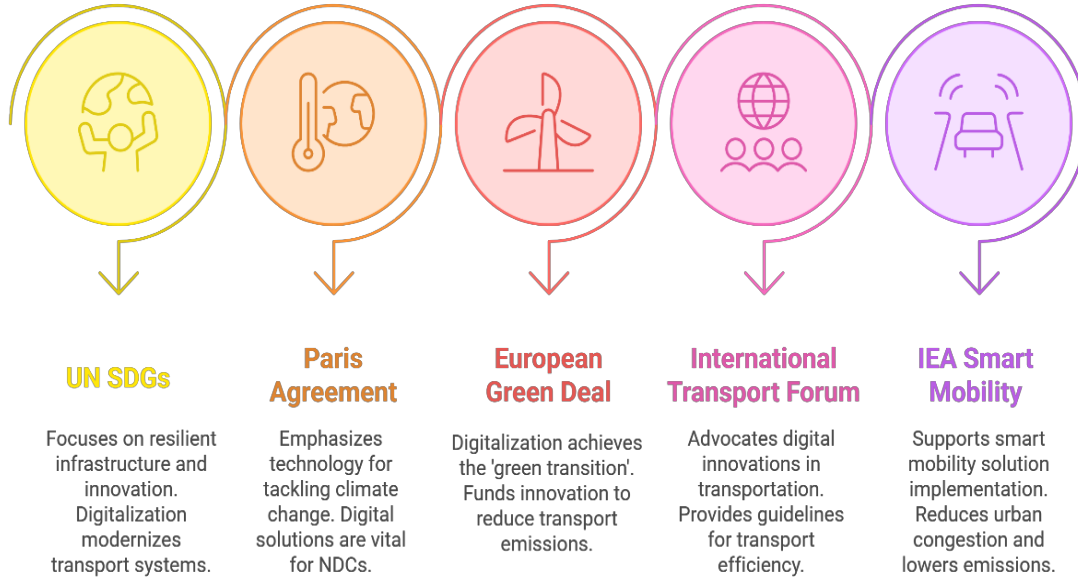


Figure 4: International Context for Digitalization

Challenges and Opportunities: The path to fully digitalized transportation faces several challenges, including cybersecurity risks, privacy concerns, and the need for substantial investments in infrastructure and skills training. However, the opportunities digitalization presents, such as enhanced operational efficiency, reduced environmental impact, and creation of new value streams in the economy, far outweigh these challenges.

Evaluation and Future Directions: The successful integration of digital technologies in transportation is pivotal for reaching net-zero emissions. Ongoing advancements in AI, IoT, and big data analytics offer promising prospects for making transportation systems more sustainable. National plans like Türkiye Transportation and Logistics Master Plan (Vision 2053), aligned with international commitments under the Paris Agreement and frameworks like the European Green Deal, set the foundation for a comprehensive digital transformation in the transportation sector.

3.3 Sustainable transport

Sustainable transport involves the adoption of transportation methods and the development of infrastructures that are environmentally friendly, economically viable, and socially inclusive. This concept is crucial for reducing global carbon emissions and is integral to achieving net-zero emissions across the transportation sector.

National Context: Türkiye's Initiatives

- **Türkiye Transportation and Logistics Master Plan (Vision 2053):** This plan outlines Türkiye's long-term strategy to enhance its transport infrastructure with sustainability at its core. It includes expanding electric rail networks, increasing the efficiency of logistics systems, and promoting the use of renewable energy within the transport sector.

- **Climate Change Mitigation Strategy and Action Plan (CCMSAP) for Türkiye:** This action plan details measures specific to reducing emissions from transport, such as improving vehicle fuel efficiency and increasing the use of public transportation. These measures are designed to help Türkiye meet its climate targets while enhancing the sustainability of its transport systems.

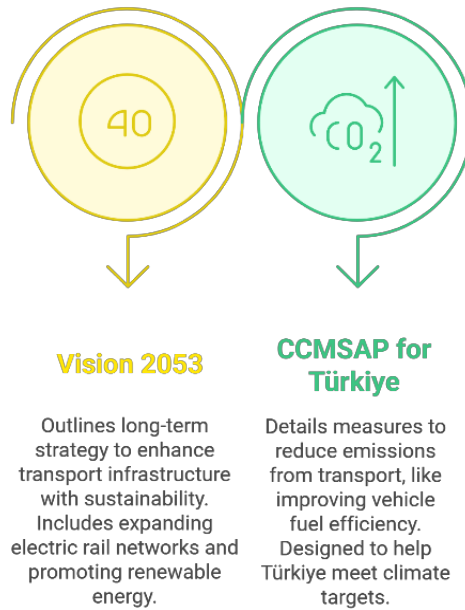


Figure 5: National Context: Türkiye's Initiatives for Sustainable Transport

International Context

- **United Nations Sustainable Development Goals (SDGs):** Sustainable transport directly contributes to several SDGs, particularly SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate Action). These goals promote the development of quality, reliable, sustainable, and resilient infrastructure, including transport systems that provide access to all.
- **Paris Agreement and the United Nations Framework Convention on Climate Change (UNFCCC):** These global agreements underscore the need for significant reductions in GHG emissions, with sustainable transport being a key area of focus. Participating countries, including Türkiye, are encouraged to develop transport solutions that contribute to their nationally determined contributions (NDCs) to limit global warming.
- **The European Green Deal:** The European Green Deal provides a roadmap for EU member states to transition towards a sustainable economy by 2050, which includes transforming the transportation sector through innovations in mobility, supporting a shift towards more sustainable modes of transport, and reducing transport emissions.

- **International Energy Agency (IEA) Reports:** These reports often highlight the importance of transitioning to sustainable transport systems as part of global energy policy to reduce dependence on fossil fuels.
- **Global Fuel Economy Initiative (GFEI):** This initiative aims to promote and facilitate improvements in automotive fuel economy and the adoption of electric vehicles worldwide, directly supporting the shift to more sustainable transport solutions.
- **International Transport Forum (ITF):** The ITF explores policies that improve the sustainability of transport systems globally, providing guidelines and best practices that can be adapted by countries like Türkiye.
- **International Association of Public Transport (UITP):** As an umbrella organization, UITP plays a critical role in fostering international cooperation and innovation within the public transport sector. It brings together a diverse network of transport professionals and industry leaders to promote environmentally sound, economically viable, and accessible public transportation solutions. UITP's strategic initiatives, as detailed in their declaration on scaling up climate ambition, emphasize the essential role of public transport in reducing urban greenhouse gas emissions and achieving sustainability goals. This declaration shows successful case studies and advocates for a comprehensive approach that enhances the accessibility and integration of public transport with other sustainable modes such as cycling and walking (Advancing Public Transport)

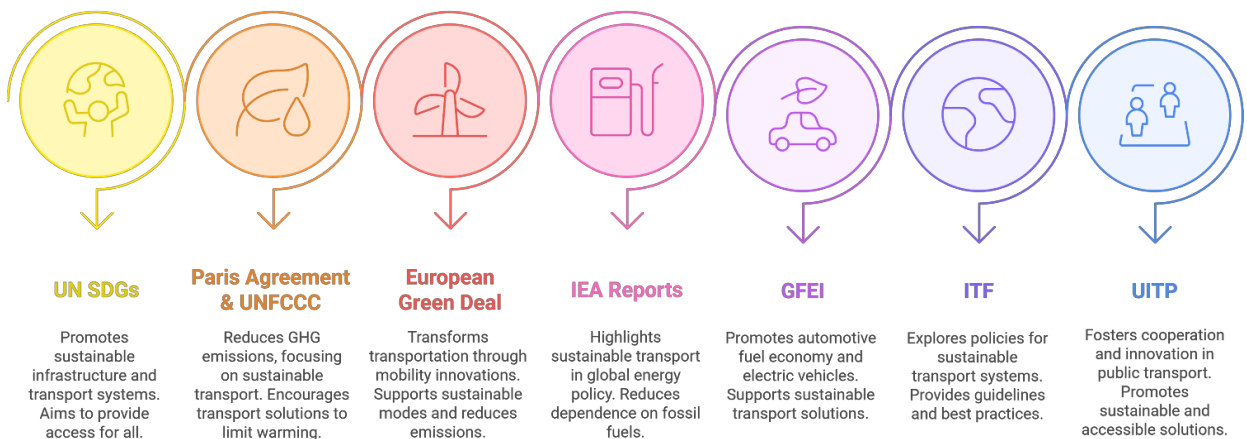


Figure 6: International Context for Sustainable Transport

Challenges and Opportunities: While there are significant challenges in fully implementing sustainable transport—such as technological limitations, financial constraints, and the need for behavioural changes among the populace—the opportunities for environmental, economic, and social benefits are immense. Sustainable transport can lead to reduced urban air pollution, lower greenhouse gas emissions, and enhanced accessibility of transportation services, contributing to overall better quality of life.

3.4 Shift to zero-emission vehicles

The shift to zero-emission vehicles (ZEV) is central to the global strategy for reducing greenhouse gas emissions in the transportation sector, which is pivotal for achieving net-zero emissions. Zero-emission vehicles, including electric vehicles (EVs), hydrogen fuel cell vehicles, and other alternative fuel vehicles that emit no tailpipe pollutants, are critical in this transition.

National Context: Türkiye's Initiatives

- **Türkiye Transportation and Logistics Master Plan (Vision 2053):** This strategic framework includes ambitious goals for integrating zero-emission vehicles into Türkiye's transportation network. The plan outlines initiatives to increase the number of EVs on the roads, supported by the development of necessary infrastructure such as charging stations.
- **Climate Change Mitigation Strategy and Action Plan (CCMSAP) for Türkiye:** This action plan specifically targets a reduction in emissions through the promotion of ZEVs. It supports the adoption of electric and hydrogen fuel vehicles through incentives for consumers and manufacturers, aligning with global reduction targets.
- **Green Deal Action Plan for Türkiye:** Mirroring the European Green Deal's initiatives, this plan emphasizes the acceleration of ZEV adoption, focusing on upgrading the electric grid to support charging needs and incentivizing businesses to transition their fleets to electric vehicles.

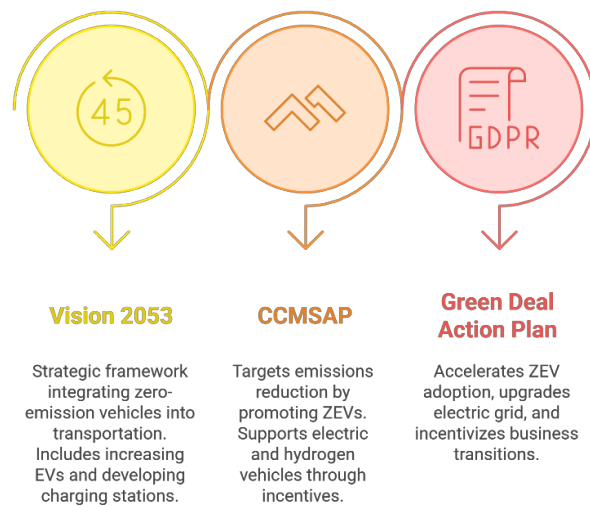


Figure 7: National Context: Türkiye's Initiatives for Shifting to Zero-emission Vehicle

International Context

- **United Nations Sustainable Development Goals (SDGs):** Specifically, SDG 13 (Climate Action) calls for urgent action to combat climate change and its impacts, with the shift to ZEVs playing a significant role in these efforts.
- **Paris Agreement:** Under the United Nations Framework Convention on Climate Change (UNFCCC), the Paris Agreement sets forth commitments by nations to reduce their carbon

footprints. The widespread adoption of ZEVs is critical to meeting the determined contributions set by countries, including Türkiye.

- **European Green Deal:** The deal provides a comprehensive plan to make Europe climate-neutral by 2050, which includes significant support for transitioning to ZEVs. This includes regulatory frameworks to phase out combustion-engine vehicles and funding for ZEV technology development.
- **International Energy Agency (IEA) Reports:** These often provide insights into the progress and challenges in the adoption of electric vehicles globally and recommend policies to accelerate the shift to ZEVs.
- **Global EV Outlook:** An annual publication by the IEA that tracks the EV market, infrastructure development, and policy measures worldwide, offering valuable benchmarks for countries like Türkiye.

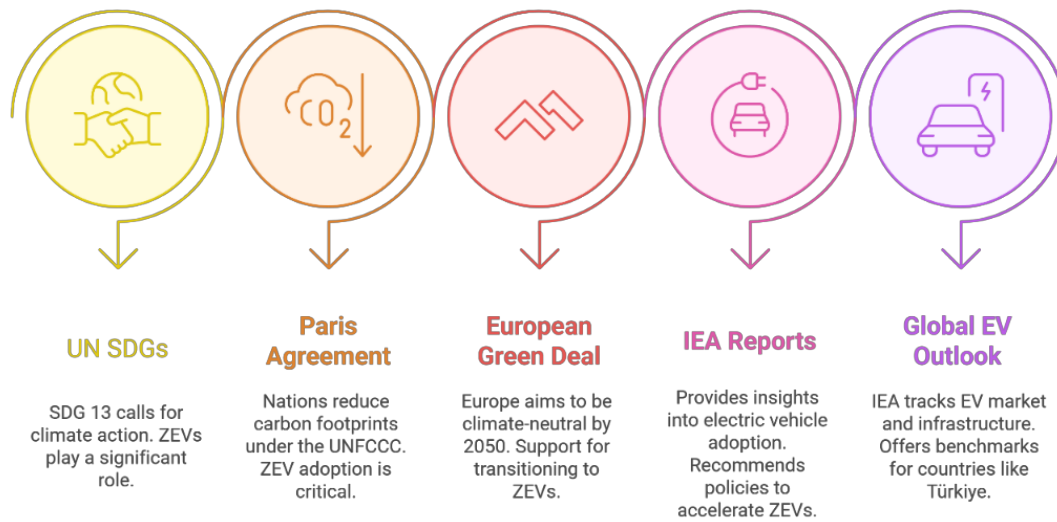


Figure 8: International Context for Shifting to Zero-emission Vehicle

Challenges and Opportunities: The transition to zero-emission vehicles presents several challenges, including the initial high costs of ZEVs, the need for widespread charging infrastructure, and the technological development of batteries and hydrogen fuel cells. However, studies, including those from the Global EV Outlook and the International Energy Agency, indicate that ZEVs offer substantial opportunities for environmental benefits, reduced operational costs, primarily due to lower energy expenses compared to fossil fuels and reduced maintenance requirements owing to simpler mechanical structures (Global EV Outlook, Section 3.2). National strategies, such as Türkiye Transportation and Logistics Master Plan (Vision 2053) and CCMSAP, further align with these findings by emphasizing cost efficiency in fleet operations and energy savings (Türkiye Transportation and Logistics Master Plan (Vision 2053), Chapter 5).

3.5 Renewable and low-carbon fuels

Renewable and low-carbon fuels, including biofuels, hydrogen, and synthetic fuels, are essential for decarbonizing the transportation sector, which is crucial for achieving net-zero emissions. These fuels provide viable alternatives to fossil fuels, reducing greenhouse gas emissions and dependency on oil.

National Context: Türkiye's Initiatives

- **Türkiye Transportation and Logistics Master Plan (Vision 2053):** This plan aims to diversify Türkiye's energy sources in transportation by integrating renewable and low-carbon fuels. It outlines the development of infrastructure necessary for the distribution and utilization of these fuels, such as hydrogen refueling stations and expanded biofuel production capabilities.
- **Climate Change Mitigation Strategy and Action Plan (CCMSAP) for Türkiye:** This action plan emphasizes reducing carbon emissions through the adoption of alternative fuels. It includes strategies to support the production of domestic biofuels and the exploration of hydrogen technologies, reflecting Türkiye's commitment to cleaner transport options.
- **Green Deal Action Plan for Türkiye:** Inspired by the European Green Deal, this plan includes measures to increase the use of renewable energy in the transportation sector, aligning with broader goals to cut emissions and enhance energy security.

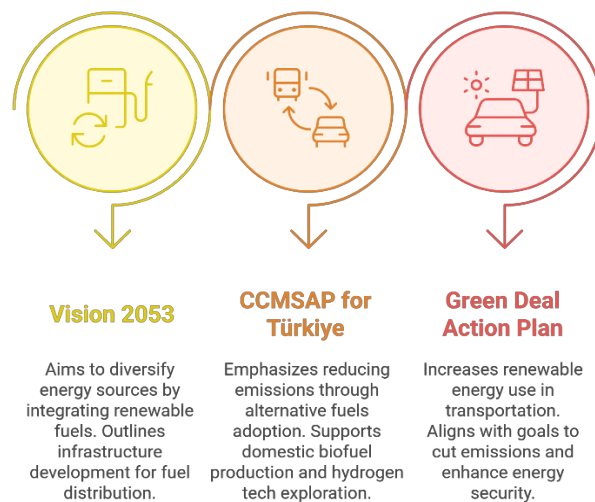


Figure 9: National Context: Türkiye's Initiatives for Renewable and Low-carbon Fuels

International Context

- **United Nations Sustainable Development Goals (SDGs):** Specifically, SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action) support the transition to sustainable energy, which encompasses the adoption of renewable and low-carbon fuels in transportation.
- **Paris Agreement and the United Nations Framework Convention on Climate Change (UNFCCC):** These global agreements stress the importance of reducing greenhouse gas

emissions. The widespread adoption of renewable and low-carbon fuels in transportation is vital for signatories, including Türkiye, to meet their Nationally Determined Contributions (NDCs).

- **European Green Deal:** This comprehensive strategy aims to make the EU climate-neutral by 2050 and includes significant incentives for the development and adoption of renewable energy sources within the transportation sector. The Green Deal also encourages investment in research and innovation related to sustainable fuels.
- **International Energy Agency (IEA) Reports:** These reports address the role of renewable fuels in achieving energy transitions, providing policy guidance and statistical analysis on the adoption trends and impacts of these fuels.
- **Global Bioenergy Partnership:** An initiative that facilitates the sustainable development of bioenergy and includes guidelines and sustainability indicators, influencing policies and projects worldwide, including those in Türkiye.

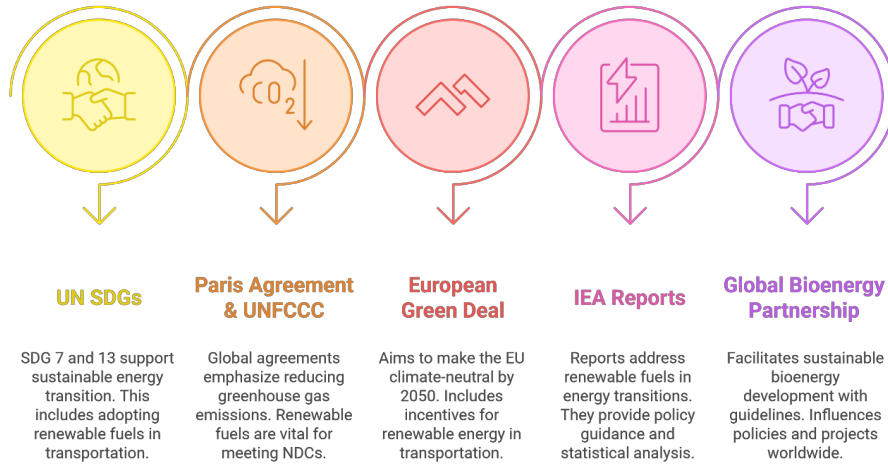


Figure 10: International Context for Renewable and Low-Carbon Fuels

Challenges and Opportunities: While renewable and low-carbon fuels promise reducing emissions, challenges such as technological limitations, high production costs, and the need for extensive infrastructure development persist. However, the potential for significant environmental benefits, energy security, and alignment with global climate commitments provides substantial motivation for overcoming these hurdles.

3.6 Research and innovation

Research and innovation in transportation are pivotal for advancing technologies and strategies that support the shift to net-zero emissions. This focus area encapsulates efforts to develop new materials, energy sources, and digital technologies that can significantly reduce the environmental footprint of the transportation sector.

National Context: Türkiye's Initiatives

- **Türkiye Transportation and Logistics Master Plan (Vision 2053):** This plan emphasizes innovation in transportation infrastructure and systems, aiming to establish Türkiye as a hub for technological advancements in logistics and mobility solutions. The plan supports research into autonomous vehicles, alternative fuels, and smart infrastructure to enhance the efficiency and sustainability of transport networks.
- **Climate Change Mitigation Strategy and Action Plan (CCMSAP) for Türkiye:** The CCMSAP outlines specific initiatives to foster research and development (R&D) in low-carbon technologies. This includes enhancing the capabilities of Turkish research institutions and promoting collaborations between the government, academic institutions, and the private sector to pilot and scale innovative transportation solutions.
- **Green Deal Action Plan for Türkiye:** Mirroring the European initiative, this plan advocates for significant investments in research and innovation to support the decarbonization of the transport sector. This includes developing and implementing cutting-edge technologies that align with global environmental goals.

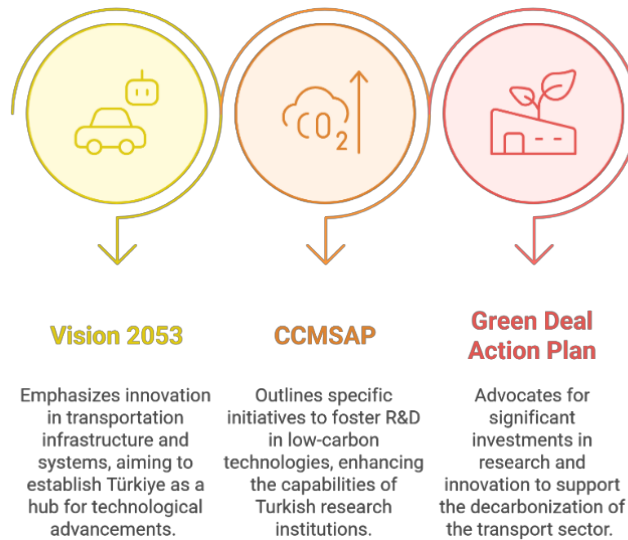


Figure 11: National Context: Türkiye's Initiatives for Researching and Innovation

International Context

- **United Nations Sustainable Development Goals (SDGs):** SDG 9 specifically targets building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation. The goal underscores the importance of advancing research and technology to build sustainable transport systems.
- **Paris Agreement and the United Nations Framework Convention on Climate Change (UNFCCC):** These agreements emphasize the role of technological innovation in achieving global climate targets. They encourage signatory countries to invest in scientific research and new technologies as part of their commitment to reducing greenhouse gas emissions.

- **European Green Deal:** This deal places a strong emphasis on innovation as a means to achieve the 'green transition' across the EU. It includes funding and support for R&D in new mobility technologies and sustainable transport systems, providing a blueprint for Türkiye and other nations looking to enhance their transport sector's sustainability.
- **Horizon Europe:** As the EU's key funding program for research and innovation, it supports projects that include developing sustainable transport solutions that can be adopted globally.
- **International Transport Forum (ITF):** The ITF at the OECD conducts research that helps shape transport policies around the world. It explores issues such as electrification of transport, urban mobility planning, and the impact of innovation on reducing emissions.

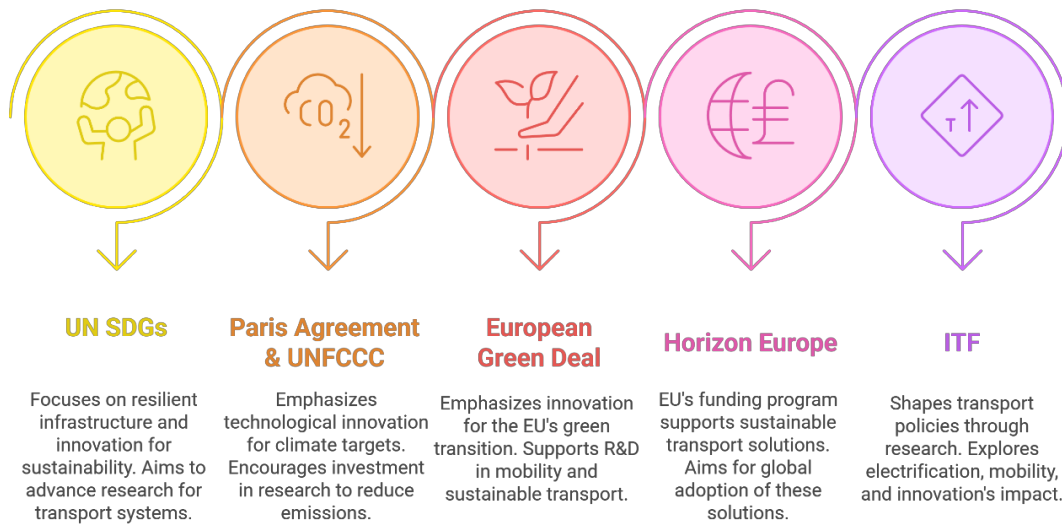


Figure 12: International Context for Researching and Innovation

Challenges and Opportunities: Research and innovation in transportation face challenges such as securing adequate funding, bridging the gap between research and market implementation, and ensuring that innovations are scalable and economically viable. However, the opportunities are vast, including the potential to significantly reduce emissions, create new industries and jobs, and improve the overall quality of life by reducing pollution.

3.7 Recharging and re-fueling infrastructure

Developing robust recharging and refueling infrastructure is critical to facilitating the transition to zero-emission vehicles (ZEVs), which include electric vehicles (EVs), hydrogen fuel cell vehicles, and other alternative fuel vehicles. This infrastructure is fundamental to the widespread adoption of cleaner transport technologies, which is essential for reducing global greenhouse gas emissions in line with net-zero targets.

National Context: Türkiye's Initiatives

- **Türkiye Transportation and Logistics Master Plan (Vision 2053):** This strategic plan underscores the importance of establishing extensive recharging and refueling networks across Türkiye to support the adoption of electric and hydrogen vehicles. It includes provisions for enhancing the electric grid to handle increased demand from EVs and creating incentives for building private and public charging and hydrogen refueling stations.
- **Climate Change Mitigation Strategy and Action Plan (CCMSAP) for Türkiye:** The CCMSAP focuses on reducing emissions from the transport sector by supporting the infrastructure required for alternative fuels. This includes government-backed initiatives to expand the number of EV charging stations and to pilot hydrogen refueling stations in key urban and industrial areas.
- **Green Deal Action Plan for Türkiye:** Inspired by the European Green Deal, this plan addresses the necessity of scaling up infrastructure to reduce emissions from transport. It emphasizes investments in both electric charging and hydrogen refueling capabilities, aligning with broader efforts to decarbonize energy sources.

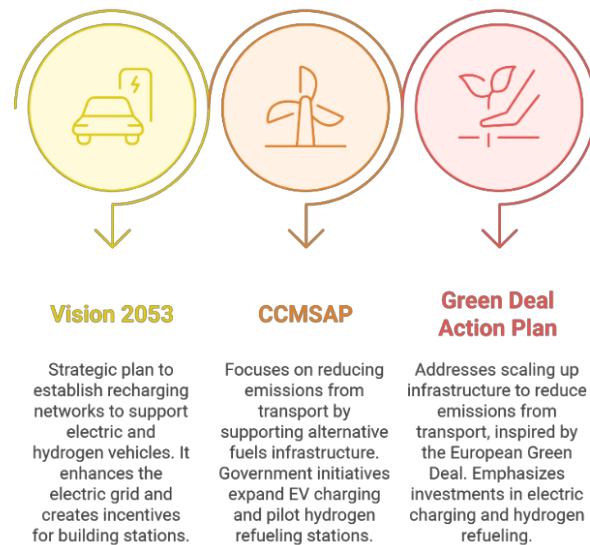


Figure 13: National Context: Türkiye's Initiatives for Recharging and Re-Fueling Infrastructure

International Context

- **United Nations Sustainable Development Goals (SDGs):** Specifically, SDG 7 (Affordable and Clean Energy) and SDG 11 (Sustainable Cities and Communities) support the development of infrastructure that facilitates clean and sustainable energy sources, including transportation fuels.
- **Paris Agreement and the United Nations Framework Convention on Climate Change (UNFCCC):** Commitments under these agreements include enhancing the capacity to

support low-carbon technologies and infrastructure, crucial for the widespread adoption of ZEVs.

- **The European Green Deal:** The deal lays out specific objectives to increase the deployment of alternative fuel infrastructure across EU member states. This initiative serves as a model for countries like Türkiye, providing a blueprint for creating a comprehensive network of EV charging stations and hydrogen refueling points.
- **International Energy Agency (IEA) Global EV Outlook:** This report provides insights into the global status of electric mobility, emphasizing the critical role of charging infrastructure in enabling the transition to electric transport.
- **Hydrogen Council Reports:** These reports highlight the growing importance of hydrogen as a clean energy carrier and outline strategies for developing hydrogen infrastructure globally, offering guidance that Türkiye could adopt.

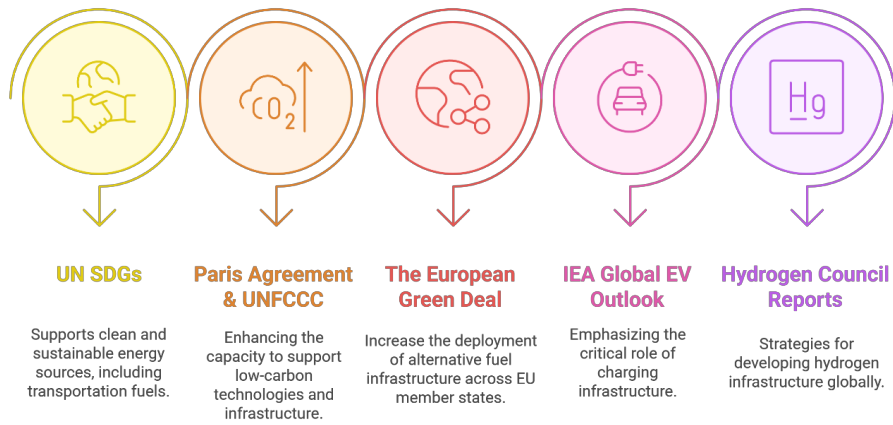


Figure 14: International Context for Recharging and Re-Fueling

Challenges and Opportunities: Building an extensive network of recharging and refueling stations presents challenges such as significant capital investment, technological integration with existing transport and energy systems, and ensuring geographical coverage that supports rural and urban needs equally. However, the opportunities are vast, promising reduced emissions, enhanced energy security, and the fostering of new industries around renewable energy and technology.

3.8 Creating zero emission ports and airports

The transformation of ports and airports into zero-emission facilities is a crucial step towards reducing the transportation sector's carbon footprint. This involves the implementation of various technologies and practices aimed at eliminating greenhouse gas emissions from operations traditionally dependent on fossil fuels.

National Context: Türkiye's Initiatives

- **Türkiye Transportation and Logistics Master Plan (Vision 2053):** This plan specifically targets the reduction of emissions in the transportation sector, including significant improvements to infrastructure at ports and airports. The strategy includes electrification of ground service equipment, installation of solar panels, and the use of alternative fuels for vehicles and auxiliary equipment.
- **Climate Change Mitigation Strategy and Action Plan (CCMSAP) for Türkiye:** This comprehensive plan outlines measures to reduce emissions across various sectors, with specific initiatives for ports and airports to adopt cleaner energy sources and more efficient operational practices.
- **Green Deal Action Plan for Türkiye:** Reflecting the ambitions of the European Green Deal, this national version includes policies to enhance the sustainability of transportation hubs. The plan supports the transition to zero-emission technologies at ports and airports through funding, incentives, and regulatory support.
- **UAB's Green Port Certificate Program:** This initiative by Türkiye's Ministry of Transport and Infrastructure promotes the adoption of renewable energy sources, energy efficiency measures, and electrification at ports. The program aims to reduce emissions through the use of shore power systems, advanced waste management, and periodic sustainability audits.

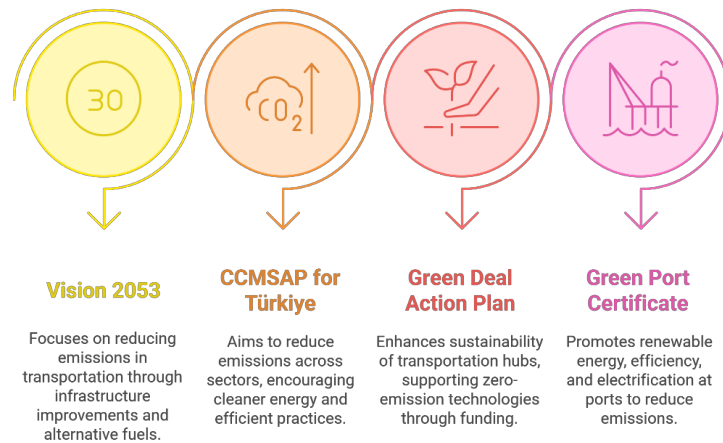


Figure 15: National Context: Türkiye's Initiatives for Creating Zero Emission Ports and Airports

International Context

- **United Nations Sustainable Development Goals (SDGs):** SDG 9 (Industry, Innovation, and Infrastructure) and SDG 13 (Climate Action) are particularly relevant as they encourage the development of resilient infrastructure and call for urgent action to combat climate change, which directly pertains to modernizing ports and airports.
- **Paris Agreement:** Under the UNFCCC, this landmark agreement compels countries to lessen their carbon output, with a focus on sectors like transportation that are high

emitters of greenhouse gases. Zero-emission ports and airports are integral to achieving the emissions reductions pledged by countries, including Türkiye.

- **The European Green Deal:** This EU policy framework sets ambitious targets for reducing emissions across all member states, promoting sustainable and smart mobility solutions that include significant upgrades to transport infrastructure to eliminate emissions.
- **International Civil Aviation Organization (ICAO):** ICAO promotes initiatives to reduce emissions in aviation, which extend to airport operations. These include optimizing flight routes and ground operations to minimize fuel use.
- **International Maritime Organization (IMO):** IMO's strategy for reducing greenhouse gases by at least 50% by 2050 includes enhancing the efficiency of port operations and supporting the electrification of ships while docked. With the adoption of the 2023 IMO GHG Strategy, the International Maritime Organization revised its previous target and now aims to achieve net-zero greenhouse gas emissions from international shipping by or around 2050, with interim reduction checkpoints for 2030 and 2040.

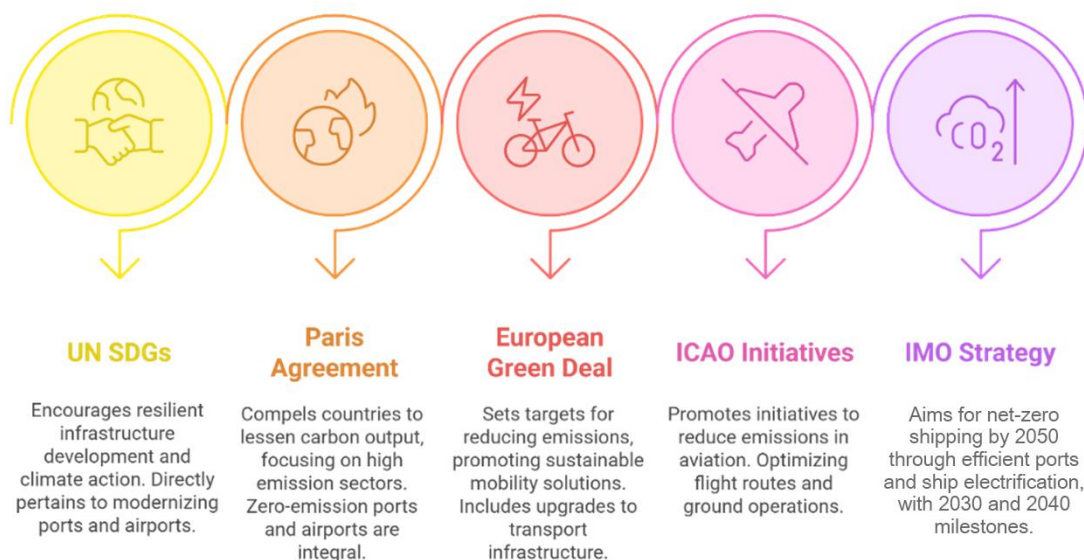


Figure 16: International Context for Creating Zero Emission Ports and Airports

Challenges and Opportunities: Developing zero-emission ports and airports present several challenges, including the high costs associated with deploying new technologies and the need for substantial changes in infrastructure design and operations. However, these initiatives also offer significant opportunities for energy savings, reduced operational costs over time, and the potential for technological leadership in green transport solutions.

3.9 Decarbonize aviation and maritime transport

Decarbonizing aviation and maritime transport are essential for reducing global greenhouse gas emissions within the transportation sector, which is pivotal in the global strategy to achieve net-zero emissions by mid-century. Both sectors are among the more challenging to

decarbonize due to their heavy reliance on fossil fuels and the technical limitations of current alternatives.

National Context: Türkiye's Initiatives

- **Türkiye Transportation and Logistics Master Plan (Vision 2053):** This plan emphasizes enhancing the sustainability of Türkiye's transport sectors, including aviation and maritime. It includes the adoption of cleaner fuel technologies, improvements in operational efficiency, and the development of infrastructure capable of supporting new, low-emission technologies.
- **Climate Change Mitigation Strategy and Action Plan (CCMSAP) for Türkiye:** The CCMSAP outlines specific targets for reducing emissions from the aviation and maritime sectors, such as increasing the use of biofuels, implementing energy efficiency measures, and exploring new technologies like electrification where feasible.
- **Green Deal Action Plan for Türkiye:** Aligned with the European Green Deal, this action plan supports significant reductions in transport emissions through innovation, subsidies for cleaner energy transitions, and stricter emissions regulations for ships and aircraft operating within and from Türkiye.

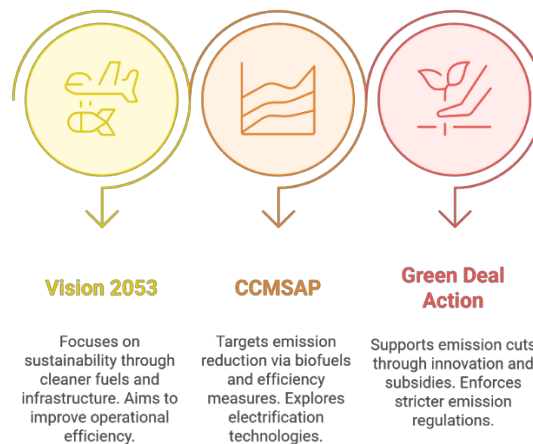


Figure 17: National Context: Türkiye's Initiatives for Decarbonizing Aviation and Maritime Transport

International Context

- **United Nations Sustainable Development Goals (SDGs):** Specifically, SDG 13 (Climate Action) calls for comprehensive measures to combat climate change, with a focus on large-scale infrastructure and transport systems, including those in aviation and maritime.
- **Paris Agreement:** Under this Agreement, countries are expected to contribute to global efforts to minimize carbon output, with specific implications for international transport sectors like aviation and maritime, which require international cooperation to effectively manage emissions.

- **The European Green Deal:** The Deal sets out ambitions for the EU to become climate-neutral by 2050 and includes initiatives to significantly cut emissions from all modes of transport through operational changes, fuel transitions, and infrastructural adaptations.
- **International Civil Aviation Organization (ICAO):** ICAO has established a global scheme for aviation emissions reductions, promoting carbon-neutral growth through CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation).
- **International Maritime Organization (IMO):** With the adoption of the 2023 IMO GHG Strategy, the International Maritime Organization aims to achieve net-zero greenhouse gas emissions from international shipping by or around 2050, through measures including enhanced energy efficiency, the use of cleaner fuels, and the deployment of zero- and near-zero emission technologies.
- **International Energy Agency (IEA)** reports often provide insights into the transitions required within aviation and maritime transport to achieve global energy and climate goals.
- **Global Maritime Forum** and **Clean Skies for Tomorrow:** These initiatives foster collaborations that develop and deploy new technologies to decarbonize these challenging sectors.

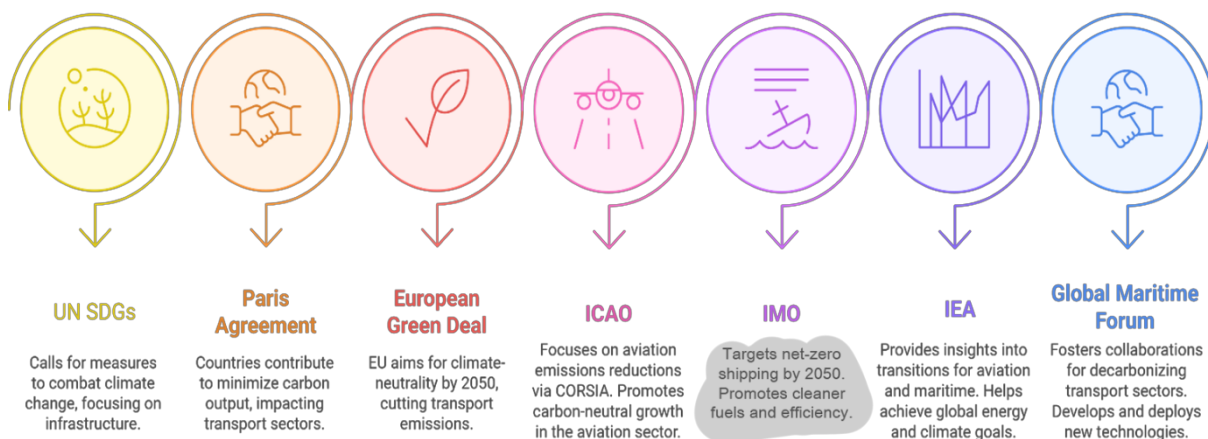


Figure 18: International Context for Decarbonizing Aviation and Maritime Transport

Challenges and Opportunities: Decarbonizing aviation and maritime transport involves overcoming substantial technical and economic challenges, particularly around the development and deployment of sustainable alternative fuels and propulsion technologies. However, these efforts present significant opportunities for innovation, leading to potential breakthroughs in green technology and the creation of sustainable supply chains.

3.10 Electrification of rail transport

Electrification of rail transport is a critical strategy in reducing greenhouse gas emissions from the transportation sector, playing a significant role in global efforts to achieve net-zero

emissions. By switching from diesel-powered to electric trains, this initiative not only curtails direct emissions but also enhances the overall energy efficiency of rail systems.

National Context: Türkiye's Initiatives

- **Türkiye Transportation and Logistics Master Plan (Vision 2053):** This comprehensive plan advocates for a broad expansion of Türkiye's electric rail infrastructure as part of its objective to modernize transportation and reduce carbon emissions. The vision includes increasing the share of electrically powered trains in the national fleet and extending the electrified rail network to cover more regions.
- **Climate Change Mitigation Strategy and Action Plan (CCMSAP) for Türkiye:** Aligning with broader environmental targets, the CCMSAP emphasizes upgrading existing rail lines to electric and building new electric lines to support a shift towards more sustainable transport modes.
- **Green Deal Action Plan for Türkiye:** Reflecting the aims of the European Green Deal, this action plan prioritizes investments in electric rail transport, recognizing its potential to significantly reduce transport-related emissions.

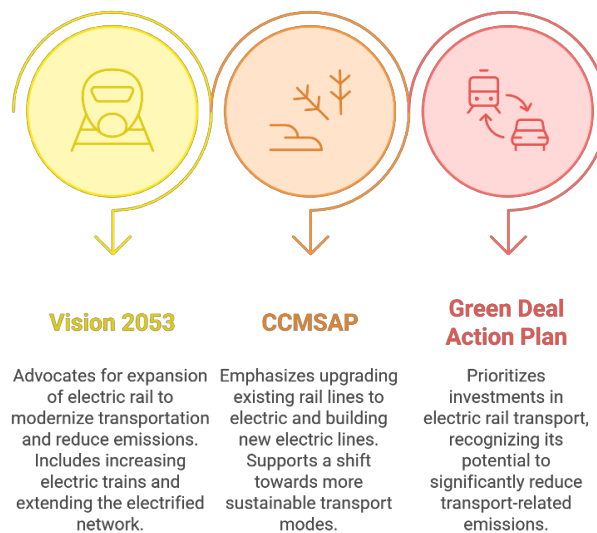


Figure 19: National Context: Türkiye's Initiatives for Electrification of Rail Transport

International Context

- **United Nations Sustainable Development Goals (SDGs):** Specifically, SDG 9 (Industry, Innovation, and Infrastructure) and SDG 11 (Sustainable Cities and Communities) promote the development of reliable, sustainable, and resilient infrastructure, including electrification of public transport systems like rail.
- **Paris Agreement:** Under the framework of the United Nations Framework Convention on Climate Change (UNFCCC), the Paris Agreement includes commitments to reduce carbon emissions. Electrification of rail transport is acknowledged as a key measure

for nations, including Türkiye, to meet their nationally determined contributions (NDCs).

- **European Green Deal:** This deal sets forth aggressive targets for reducing emissions across Europe, with rail electrification identified as a primary means to decarbonize transport. The EU aims to cut transport emissions by 90% by 2050, heavily relying on electrified public transport systems.
- **International Energy Agency (IEA) Reports:** These often highlight the benefits of rail electrification in terms of energy efficiency and emissions reduction, providing guidance and statistical analysis on global trends.
- **European Union's Shift2Rail Initiative:** This public-private partnership aims to drive innovation in rail transport, including projects focused on enhancing and expanding electrified rail networks.

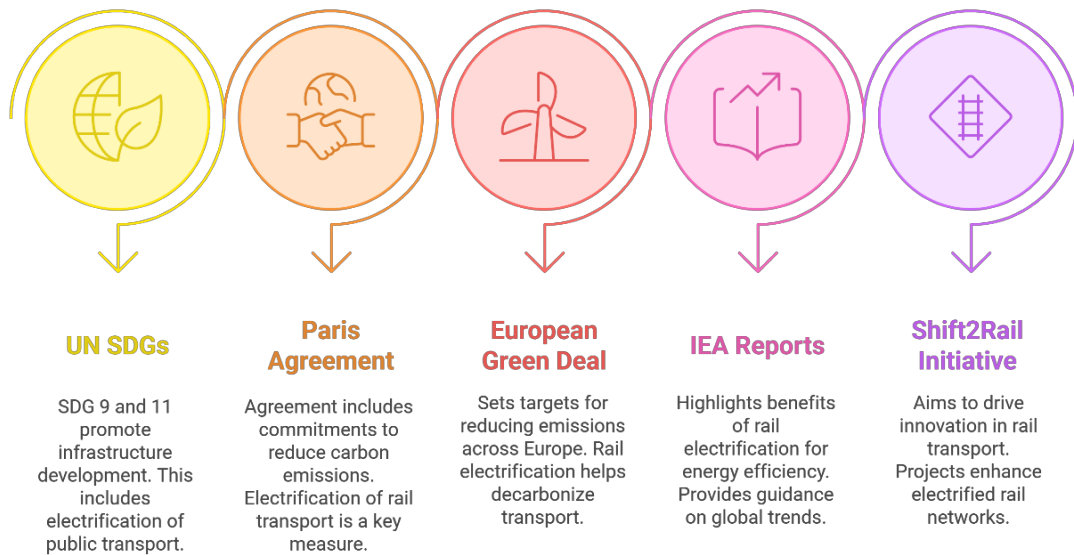


Figure 20: International Context for Electrification of Rail Transport

Challenges and Opportunities: The shift to electrified rail presents several challenges, such as the high upfront costs associated with infrastructure development and technology upgrades, and the need for continuous investment in grid capacity to support increased electrical loads. However, the long-term benefits include not only reduced operational costs and lower environmental impacts but also improved service reliability and increased passenger capacity.

3.11 Changes in mobility patterns and consumer behaviours

Changes in mobility patterns and consumer behaviours are essential to reducing transportation emissions and achieving net-zero goals. These changes include shifts from private vehicle use to public and non-motorized transport, increased acceptance of electric and alternative fuel vehicles, and adaptation of new mobility services like car-sharing and ride-hailing.

National Context: Türkiye's Initiatives

- **Türkiye Transportation and Logistics Master Plan (Vision 2053):** This plan acknowledges the need for a cultural shift towards sustainable mobility. It includes policies to promote public transport and non-motorized transport as preferable choices for the Turkish population, integrating these into urban planning and development.
- **Climate Change Mitigation Strategy and Action Plan (CCMSAP) for Türkiye:** The CCMSAP emphasizes education and public awareness campaigns to change consumer behaviours. It supports incentives for consumers to choose more sustainable transport options, such as subsidies for electric vehicle purchases and investments in reliable public transportation.
- **Green Deal Action Plan for Türkiye:** Aligned with the European Green Deal, this plan includes efforts to reform the transport sector by encouraging behavioural changes. This encompasses increasing the cost-efficiency and convenience of green transport options to make them more attractive to consumers.

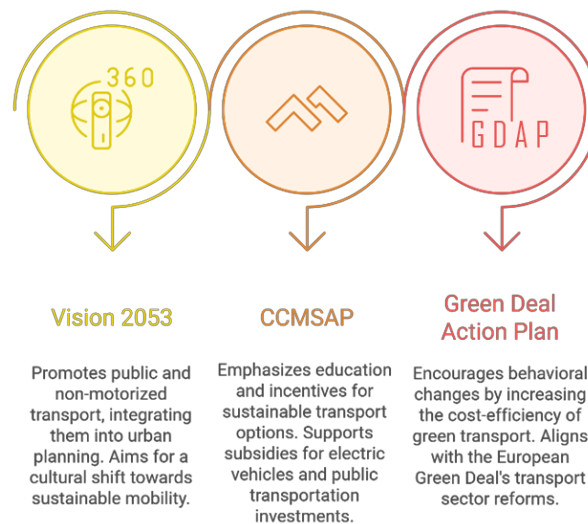


Figure 21: National Context: Türkiye's Initiatives for Changes in Mobility Patterns and Consumer Behaviours

International Context

- **United Nations Sustainable Development Goals (SDGs):** Specifically, SDG 11 (Sustainable Cities and Communities) promotes a significant increase in public transit usage and improvements in road safety, which necessitate shifts in how individuals commute and interact with urban environments.
- **Paris Agreement:** Under the UNFCCC, this agreement drives the global agenda on reducing carbon emissions, with an implicit focus on transforming how people travel. Encouraging changes in mobility patterns is integral to achieving the national commitments made by countries, including Türkiye.
- **European Green Deal:** This comprehensive strategy aims to transform the EU into a fair and prosperous society, with no net emissions of greenhouse gases by 2050. It includes significant measures to shift consumer behaviour towards sustainable transport options through policy, infrastructure investment, and public awareness efforts.
- **International Energy Agency (IEA):** The IEA provides guidance on how changes in consumer behaviour can dramatically reduce energy consumption and emissions in the transport sector.
- **Global Mobility Reports:** These reports often analyse trends in how shifts in mobility patterns can lead to significant reductions in urban congestion and pollution.
- **EU's New Mobility Patterns Study:** The European Commission's study reveals that urban mobility is undergoing transformative changes, driven by:
 - Increased use of electric vehicles, especially in urban delivery systems, signalling a move towards low-emission logistics solutions.
 - Growing popularity of bicycles and electric scooters in city settings, which align with the push for micro-mobility solutions to reduce urban congestion.
 - The study also discusses the integration of these new transport modes into existing urban infrastructures, which is essential for creating efficient, sustainable urban transport ecosystems.

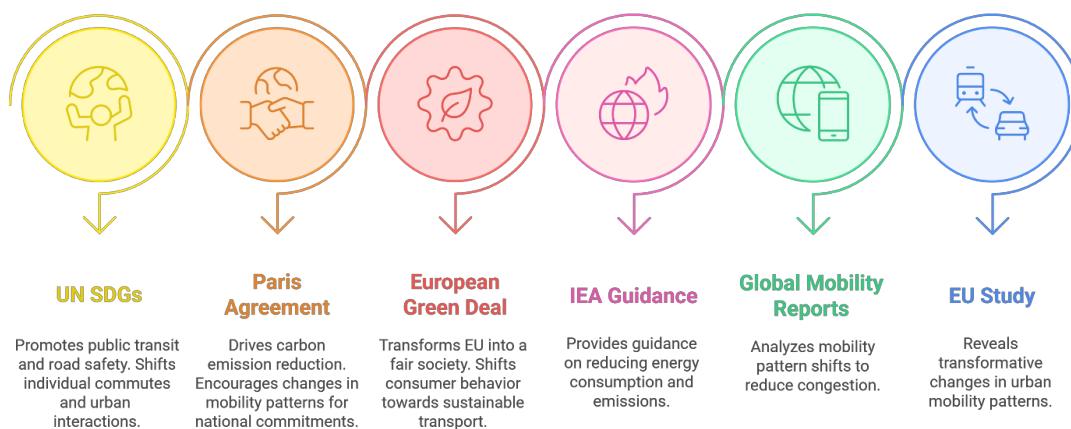


Figure 22: International Context for Changes in Mobility Patterns and Consumer Behaviours

Challenges and Opportunities: Encouraging changes in mobility patterns and consumer behaviours presents challenges such as overcoming entrenched habits and preferences, the availability and reliability of alternative transport options, and the need for substantial investment in public transport infrastructure. However, the opportunities for creating more liveable, low-carbon cities are immense. These changes can lead to reduced urban congestion, lower emissions, improved air quality, and enhanced public health.

3.12 Affordability

Affordability is a critical component of sustainable transportation, ensuring that all segments of society can benefit from clean, efficient, and modern mobility solutions. This principle is key to achieving net-zero emissions in transportation, as widespread adoption of sustainable transport technologies depends heavily on their economic accessibility.

National Context: Türkiye's Initiatives

- **Türkiye Transportation and Logistics Master Plan (Vision 2053):** This plan emphasizes the development of affordable transportation solutions as part of Türkiye's broader goals to enhance mobility and reduce environmental impact. The plan includes subsidies for electric vehicles, investments in cost-effective public transport systems, and support for alternative fuel technologies that can lower overall transportation costs.
- **Climate Change Mitigation Strategy and Action Plan (CCMSAP) for Türkiye:** The CCMSAP addresses affordability by promoting energy-efficient transportation technologies that are not only cleaner but also more economical for consumers in the long run. The plan advocates financial incentives that lower the upfront costs of clean vehicles.
- **Green Deal Action Plan for Türkiye:** Inspired by the European Green Deal, this plan supports the creation of financial mechanisms to make sustainable transportation options more affordable for both individuals and businesses, thereby facilitating a broader transition to low-emission transport modes.

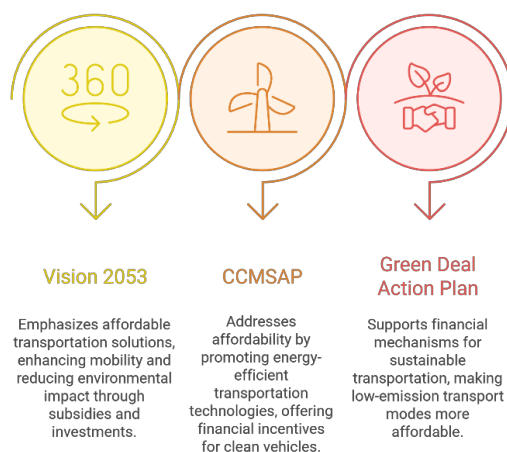


Figure 23: National Context: Türkiye's Initiatives for Affordability

International Context

- **United Nations Sustainable Development Goals (SDGs):** SDG 11 targets the provision of access to safe, affordable, accessible, and sustainable transport systems for all by 2030, emphasizing the enhancement of inclusive and sustainable urbanization.
- **Paris Agreement:** The global move towards reducing carbon emissions through the UNFCCC framework indirectly supports affordability by encouraging countries to develop and implement cost-effective, sustainable transport solutions as part of their nationally determined contributions (NDCs).
- **European Green Deal:** This deal includes specific provisions to support member states in making the transition to green transport economically feasible. It encourages the use of pricing mechanisms like carbon pricing, which can help fund the subsidies needed to make green technologies more accessible.
- **International Energy Agency (IEA):** The IEA provides analyses and recommendations on how to improve the affordability of clean transport technologies through policy, technology improvements, and economies of scale.
- **Global Environment Facility (GEF):** The GEF offers funding for projects in developing countries that reduce emissions and enhance affordability in transportation, such as through the introduction of clean public transport solutions.

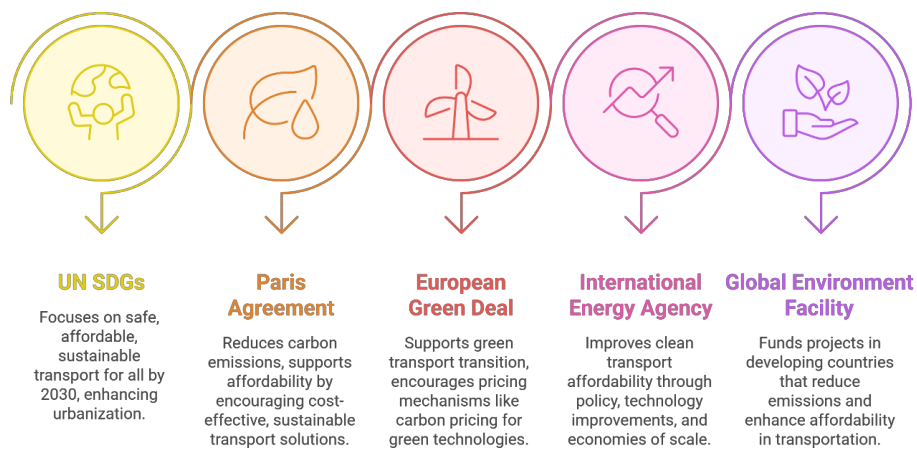


Figure 24: International Context for Affordability

Challenges and Opportunities: Affordability challenges include the high initial costs of transitioning to sustainable transport systems and the need for ongoing financial support to make these options viable for lower-income populations. However, there are significant opportunities to drive down costs through technological advancements, increased production scale, and innovative financing models that can expand access to these critical technologies.

3.13 Sustainable urban mobility

Sustainable urban mobility encompasses strategies and practices designed to make transportation within cities more environmentally friendly, efficient, and inclusive. Emphasizing the shift from private car use to public transit, cycling, and walking, sustainable urban mobility is essential for reducing urban congestion, lowering greenhouse gas emissions, and improving air quality.

Türkiye has made notable strides in this area. As of 2023, eight Turkish cities have implemented SUMP, spearheaded by the Union of Municipalities of Türkiye (TBB) under the SUMP (Sustainable Urban Mobility Plan) program. These cities include major metropolitan areas such as Ankara, İzmir, and Antalya, as well as emerging urban centres like Eskişehir, Kayseri, Konya, Sakarya, and Trabzon.

Each SUMP addresses specific local needs while contributing to national goals of reducing traffic congestion, enhancing air quality, and promoting modal shifts towards more sustainable transport options such as public transit, cycling, and walking. For example, in İzmir, the SUMP has focused on expanding the metro network and integrating it with bus and ferry services to provide a seamless public transportation experience.

In Antalya, the emphasis has been on improving cycling infrastructure and pedestrian pathways to reduce car dependency in tourist-heavy areas. The SUMP initiative not only supports the implementation of these plans but also facilitates knowledge sharing across cities, enabling them to learn from each other's experiences. The program's approach includes workshops, training sessions, and an annual conference that discusses progress, challenges, and future steps in urban mobility planning (SKUP Türkiye, 2025).

National Context: Türkiye's Initiatives

- **Türkiye Transportation and Logistics Master Plan (Vision 2053):** This plan establishes a framework for sustainable urban mobility in Türkiye, focusing on expanding public transportation networks, integrating cycling and pedestrian pathways, and promoting the use of clean energy vehicles.
- **Climate Change Mitigation Strategy and Action Plan (CCMSAP) for Türkiye:** The CCMSAP highlights initiatives aimed at reducing transportation emissions in urban areas, such as improving public transport systems and encouraging the shift to electric vehicles (EVs) through incentives and supportive policies.
- **Green Deal Action Plan for Türkiye:** Reflecting the objectives of the European Green Deal, this plan includes measures to boost the sustainability of urban transportation. These measures involve enhancing the efficiency and coverage of public transit and advancing the integration of mobility-as-a-service (MaaS) solutions.

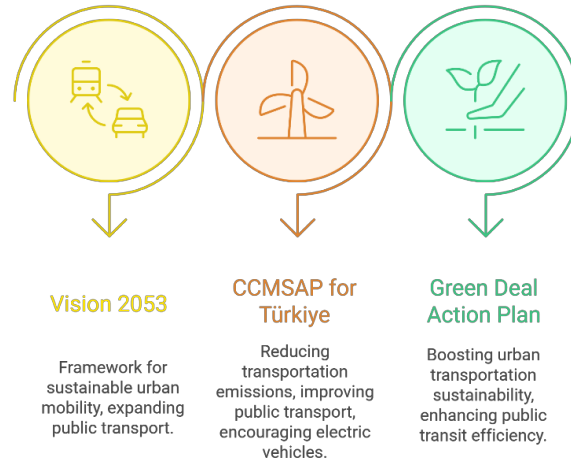


Figure 25: National Context: Türkiye's Initiatives for Sustainable Urban Mobility

International Context

- **United Nations Sustainable Development Goals (SDGs):** SDG 11 targets sustainable cities and communities and underscores the importance of providing access to safe, affordable, accessible, and sustainable transport systems for all, enhancing inclusive and sustainable urbanization.
- **Paris Agreement:** As part of the broader UNFCCC goals, the Paris Agreement encourages countries to undertake ambitious efforts to combat climate change and adapt to its effects, with a specific emphasis on sustainable urban planning and mobility solutions that contribute to emission reductions.
- **European Green Deal:** This deal aims to transform the EU into a fair and competitive economy with a modern, resource-efficient, and competitive transport sector at its core by 2050, significantly reducing transport emissions through sustainable urban mobility initiatives.
- **The International Transport Forum (ITF)** at the OECD produces reports and policy recommendations on sustainable transport, focusing on urban areas. It provides data-driven insights into how cities can manage the transition to sustainable mobility.
- **Global Covenant of Mayors for Climate & Energy:** This international alliance commits city leaders to significant cuts in greenhouse gas emissions, with a strong focus on sustainable transportation and urban mobility as a critical area of action.

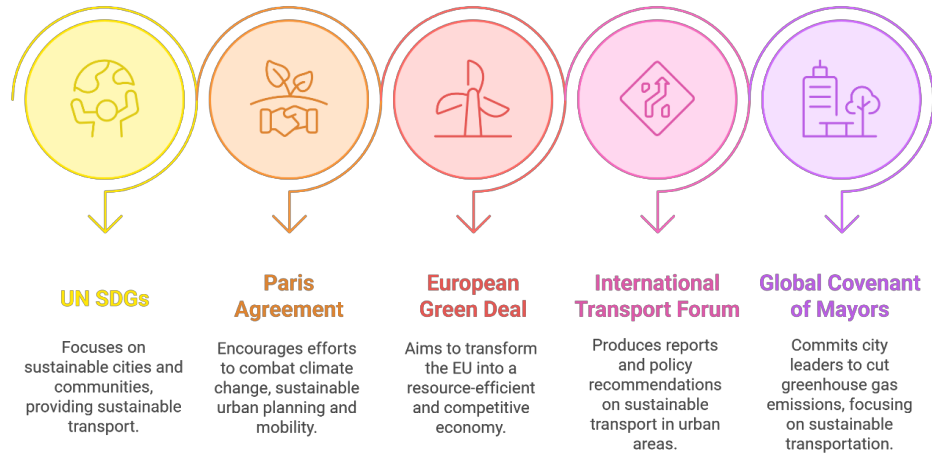


Figure 26: International Context for Sustainable Urban Mobility

Challenges and Opportunities: Implementing sustainable urban mobility presents various challenges, including financial constraints, the need for behavioural change among residents, and the integration of new technologies into existing urban frameworks. However, these challenges are met with significant opportunities: reducing urban emissions contributes to healthier cities, and integrating modern mobility solutions can lead to greater economic opportunities and improved quality of life for urban residents.

4. RECOMMENDATIONS FOR POLICY ALIGNMENT AND PRIORITIZATION

4.1 Comparative Analysis of Policies in Terms of International and National Documents

Major international and national documents related to Net Zero Emissions are available in the Annex section.

The table is given comparatively under the headings of Road, Rail, Maritime, Air, Intermodal, Logistics, Urban, Finance, Climate, Technology, Infrastructure and Energy.

Whether the regulations and measures contained in international documents in Europe are mandatory or binding are given in Table 7. Here, "Binding" means legally enforceable that parties are obligated under law. "Mandatory" means required or compulsory, but not always with legal force. Both imply obligation, but binding relates to legal authority, while mandatory refers to practical necessity. Binding and mandatory criteria refer exclusively to the applicable jurisdiction, which may not necessarily include Türkiye

Table 7: Binding or mandatory status of regulations

Document	Related Regulation / Measure	Type of Regulation	Description
Fit for 55 Package	Emission Trading System (ETS) Revision	Binding	Includes maritime transport in ETS. As of 2024, a significant share of maritime emissions (rather than the majority, due to the phased application whereby only 50% of certain voyages are covered and 40% of the corresponding allowances must be surrendered in 2024) is covered, with the scope progressively expanded until 2026.
	Effort Sharing Regulation (ESR)	Binding	Makes emissions reduction in road transport legally binding. Sets national emissions reduction targets for member states.
	Carbon Border Adjustment Mechanism (CBAM)	Binding	Does not directly cover transport but applies carbon pricing to imported materials used in transport, such as steel, aluminium, and cement.
	Vehicle Emission Performance Standards Regulation	Binding	Stricter CO ₂ emission standards for new cars and vans. Bans the sale of new internal combustion engine (ICE) vehicles from 2035.
	FuelEU Maritime	Mandatory	Encourages the use of renewable and low-carbon fuels in the maritime sector, but with flexibility in implementation.
	ReFuelEU Aviation	Mandatory	Increases the use of sustainable aviation fuels (SAF). Introduce specific SAF blending mandates for airlines.



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Document	Related Regulation / Measure	Type of Regulation	Description
	Alternative Fuels Infrastructure Regulation (AFIR)	Mandatory	Requires EU countries to develop infrastructure for electric and hydrogen-powered vehicles. Includes fast charging stations every 60 km, but with flexibility.
	Energy Taxation Directive Revision	Mandatory	Removes tax benefits for fossil fuels and incentivizes low-carbon fuels. Member states have flexibility in tax adjustments.
Sustainable and Smart Mobility Strategy (2020)			In summary, the strategy provides a visionary framework for sustainable mobility but does not currently include mandatory or binding measures to guarantee the implementation of its objectives.
REPowerEU Plan (2022)	Gas Storage Requirements	Mandatory	Mandates EU Member States to fill gas storage facilities to 80% capacity by November 2022 and to 90% in subsequent years to strengthen energy security.
	Solar Rooftop Initiative	Binding	Introduces a legally binding EU solar rooftop obligation for certain categories of buildings to promote the adoption of solar energy.
	Electricity Consumption Reduction	Binding	Implements a mandatory reduction in electricity consumption to manage demand and enhance energy efficiency.
The European Green Deal	EU Climate Law	Binding	Establishes legally binding targets to reduce greenhouse gas emissions by 55% by 2030 and achieve climate neutrality by 2050.
	Carbon Border Adjustment Mechanism (CBAM)	Binding	Imposes a carbon tariff on carbon-intensive imports to prevent carbon leakage and ensure fair competition.
	Fit for 55 Package	Binding	A comprehensive set of proposals to update EU legislation and implement new initiatives to meet the 55% emission reduction target by 2030.
2030 Climate Target Plan (2020)	Effort Sharing Regulation (ESR)	Binding	Sets binding national targets for EU Member States to reduce greenhouse gas emissions in sectors not covered by the Emissions Trading System (ETS), such as transport, buildings, agriculture, and waste.
	Revision of the Emissions Trading System (ETS)	Binding	Strengthens the existing ETS by reducing the overall emission cap and increasing the annual reduction rate. Extends the ETS to new sectors, including maritime transport and, in a separate system, road transport and buildings.
	Renewable Energy Directive (RED) Amendment	Binding	Increases the binding target for the share of renewable energy sources in the EU's energy mix to 40% by 2030.



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Document	Related Regulation / Measure	Type of Regulation	Description
	Energy Efficiency Directive (EED) Amendment	Binding	Sets an EU-level target to reduce energy consumption by 9% by 2030 compared to the 2020 reference scenario, with binding national contributions.
	Carbon Border Adjustment Mechanism (CBAM)	Binding	Introduces a carbon levy on imports of certain goods from countries with less stringent climate policies to prevent carbon leakage and ensure fair competition.
EU Climate Law	Climate Neutrality by 2050	Binding	Legally obligates the EU to achieve net-zero greenhouse gas emissions by 2050.
	2030 Emission Reduction Target	Binding	Sets a binding target to reduce net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels.
	Progress Monitoring and Reporting	Mandatory	Mandates regular assessment and reporting by the European Commission on the EU's progress toward climate targets, with authority to propose corrective actions if necessary.
Renewable Energy Directive III (RED III)	Overall Renewable Energy Target	Binding	Sets a binding EU-wide target of at least 42.5% renewable energy consumption by 2030, with an aspirational goal of 45%.
	Heating and Cooling	Mandatory	Mandates an annual increase of 0.8% in renewable energy usage for heating and cooling until 2026, followed by a 1.1% annual increase from 2026 to 2030.
	Transport Sector	Binding	Requires a binding target of at least a 14.5% reduction in greenhouse gas intensity in transport from the use of renewables by 2030, or a binding target of at least a 29% share of renewable energy within the transport sector by 2030.
	Advanced Biofuels and Biogas	Binding	Establishes a combined binding target of at least 1% in 2025 and 5.5% in 2030 for advanced biofuels and biogas within the transport sector.
Alternative Fuels Infrastructure Regulation (AFIR) (2023)	Binding National Targets	Mandatory	Mandates Member States to set and achieve binding national targets for the deployment of alternative fuels infrastructure, ensuring a minimum coverage across the EU.
	Electric Recharging Infrastructure	Mandatory	Sets mandatory deployment targets for publicly accessible electric recharging points for both light-duty and heavy-duty vehicles, ensuring availability along the Trans-European Transport Network (TEN-T) and urban areas.
	Hydrogen Refueling Infrastructure	Binding	Requires the establishment of publicly accessible hydrogen refueling stations along the TEN-T core network at regular intervals, facilitating the adoption of hydrogen-powered vehicles.



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Document	Related Regulation / Measure	Type of Regulation	Description
	Shore-Side Electricity Supply	Binding	Obliges maritime and inland waterway ports to provide shore-side electricity for vessels, reducing emissions from ships at berth.
	Electricity Supply to Stationary Aircraft	Mandatory	Mandates airports to supply electricity to stationary aircraft, decreasing reliance on auxiliary power units and reducing emissions.
ReFuelEU Aviation Regulation (2023)	Sustainable Aviation Fuel (SAF) Blend Requirements	Mandatory	Airlines must ensure a progressively increasing percentage of SAF in their fuel mix: 2% from 2025 until the end of 2026, 6% by 2030, and 70% by 2050 (Starting in 2025, ramping up to 70% by 2050).
	Reporting Obligations	Mandatory	Airlines are required to report on the fuel types used and the volume of SAF purchased annually (Annual reporting from 2025).
	Certification of SAF	Mandatory	SAF must meet specific sustainability criteria and be certified according to EU standards (Immediate implementation).
	Monitoring and Verification	Binding	A robust system for monitoring and verifying compliance with SAF obligations will be established (Continuous oversight).
	Incentives for SAF Production	Binding	Financial support and incentives for the production of SAF to ensure growth of the market (Ongoing initiative).
	Promotion of Innovation	Binding	Funding and support for research and innovation in alternative fuels and technologies (Ongoing initiative).
FuelEU Maritime Regulation (2023)	Greenhouse Gas (GHG) Reduction Targets	Mandatory	Shipping companies must reduce their GHG emissions by a specified percentage: 2% by 2025, 20% by 2030, and 80% by 2050 (Starting in 2025, ramping up to 80% by 2050).
	Sustainable Fuel Requirements	Mandatory	A minimum percentage of renewable and low-carbon fuels must be used: 2% by 2025, increasing to 75% by 2050 for certain vessels (Starting in 2025, ramping up to 75% by 2050).
	Reporting Obligations	Mandatory	Operators are required to report on fuel consumption and GHG emissions annually (Annual reporting from 2025).
	Fuel Quality Standards	Mandatory	Fuels used must meet specific sustainability and quality standards set by the EU (Immediate implementation).
	Monitoring and Verification	Binding	A system for monitoring and verifying compliance with fuel requirements and GHG targets will be established (Continuous oversight).
	Support for Innovation and R&D	Binding	Financial support for research and innovation in sustainable maritime fuels and technologies (Ongoing initiative).



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Document	Related Regulation / Measure	Type of Regulation	Description
EU ETS Revision and Extension (2023)	Market Stability Reserve (MSR)	Mandatory	Establishes a reserve to balance allowances to mitigate price volatility in the carbon market (Ongoing implementation).
	Emission Reduction Targets	Mandatory	New reduction targets of 43% by 2030 compared to 2005 levels for capped sectors (Enforcement starting in 2024).
	Coverage Expansion	Mandatory	Extends the ETS to include maritime emissions and additional industrial sectors (Implementation begins in 2024).
	Auctioning of Allowances	Mandatory	Phases in full auctioning of carbon allowances for maritime and aviation sectors (Gradual from 2024 onwards).
	Free Allowances Phase-Out	Mandatory	Gradually reduces free allowances for certain sectors to encourage emissions reductions (Phased out completely by 2030).
	Reporting Requirements	Mandatory	Operators must report emissions data annually and comply with monitoring and verification standards (Annual reporting from 2024).
	Compliance Obligations	Binding	Entities covered under the ETS must surrender an equivalent number of allowances for their emissions (Ongoing compliance from 2024).
Carbon Border Adjustment Mechanism (CBAM) (2023)	CBAM Certificates	Mandatory	Importers of certain goods must purchase CBAM certificates corresponding to the number of embedded emissions (To be implemented from 2026).
	Covered Sectors	Mandatory	CBAM applies to specific sectors, including steel, cement, aluminium, fertilizer, electricity, and hydrogen (Immediate listing of covered sectors).
	Emission Reporting	Mandatory	Importers must report the emissions associated with their imports, as assessed using EU standards (Annual reporting from 2026).
	Calculation of Embedded Emissions	Mandatory	A specific methodology will be established to calculate the embedded emissions in imported goods (To be developed ahead of 2026 implementation).
	Gradual Phase-In	Mandatory	CBAM will initially operate as a reporting system before fully implementing the adjustment in 2026 (Initial reporting in 2024, full implementation in 2026).
	Compliance Verification	Binding	A verification system to ensure that importers comply with reporting and certification requirements (Continuous oversight).
CORSIA (Carbon Offsetting and Reduction)	Carbon Offsetting Requirements	Mandatory	Airlines must offset the growth in their CO2 emissions from international flights above 2019 levels by purchasing carbon offsets (Starts in 2021, full implementation by 2027).



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Document	Related Regulation / Measure	Type of Regulation	Description
Scheme for International Aviation)	Emission Monitoring and Reporting	Mandatory	Airlines are required to monitor and report their CO ₂ emissions annually to ensure transparency and accountability (Annual reporting from 2021).
	Monitoring, Reporting, and Verification (MRV) Requirements	Binding	All ICAO member states with operators conducting international flights must monitor, report, and verify CO ₂ emissions from these flights annually, starting from 2019.
	Participation in CORSIA	Mandatory	Participation is mandatory for all countries that are part of the scheme; monitoring and reporting obligations apply to airlines (Ongoing initiative).
	Sustainability Criteria for Offsets	Binding	Carbon offset projects must meet specific sustainability criteria established by CORSIA to ensure environmental integrity (Immediate implementation).
	Review of the Scheme	Binding	A periodic review of CORSIA's effectiveness and emissions reduction outcomes is mandated to ensure ongoing compliance and improvements (Every three years starting in 2022).
ICAO Environmental Protection Standards	Aircraft Noise Standards	Binding	Limits the noise levels produced by aircraft to reduce noise pollution around airports.
	Engine Emissions Standards	Binding	Sets limits on emissions such as nitrogen oxides (NO _x) from aircraft engines to improve local air quality.
	CO ₂ Emissions Standards	Mandatory	Mandates improvements in fuel efficiency and reductions in carbon dioxide (CO ₂) emissions for new aircraft designs.
	Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)	Binding	A global market-based measure to offset CO ₂ emissions from international flights, aiming for carbon-neutral growth.
29th United Nations Climate Change Conference (COP29)	New Collective Quantified Goal (NCQG) on Climate Finance	Binding	Developed countries committed to mobilizing \$300 billion annually by 2035 to support developing nations in mitigating and adapting to climate change. This goal aims to enhance financial assistance beyond the previous \$100 billion annual target.
	Article 6 Implementation – Carbon Market Mechanisms	Binding	Finalized rules for international carbon trading under Article 6 of the Paris Agreement, establishing frameworks for both bilateral trading (Article 6.2) and a centralized carbon market mechanism (Article 6.4). These mechanisms are designed to facilitate global cooperation in reducing greenhouse gas emissions.

4.2 Evaluation for Türkiye

The meaning of some of the regulation, which has been evaluated above in terms of its obligatory feature, for Türkiye is presented in the Table 8. It has been interpreted according to the status of bringing an obligation to Türkiye or being voluntary.

As can be seen in the table, CBAM, MRV, and the Paris Agreement are directly binding (Obligatory) for Türkiye. Other regulations are not legally binding but are considered voluntary or mandatory, particularly for sectors involved in EU trade. Türkiye's climate and transport policies are expected to align with these frameworks over time.

Table 8: Effects of Regulations/Directives on Türkiye

Regulation/Directive	Effect on Türkiye	Comment for Türkiye
International Agreements		
Paris Agreement	Obligatory	Türkiye ratified the Paris Agreement in 2021 and is committed to reaching net zero by 2053, with obligations under its Nationally Determined Contributions (NDCs). Rail transport has been designated as one of the priority sectors for increasing the share of low-carbon transport modes.
Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)	Voluntary	In Türkiye, CORSIA has been mandatory for international flights covered under the scheme since 2019. Turkish aviation operators will be required to support the carbon-neutral growth objective and to develop mechanisms for the procurement of carbon credits.
EU Regulations (<i>directly applicable in all EU Member States without transposition</i>)		
EU Climate Law	Voluntary	Türkiye is not subject to the EU's net-zero emission targets.
Emission Trading System (EU ETS) Revision	Affected	Türkiye is not part of the EU ETS, but a national ETS is expected to become operational as of 2026. While alignment is not mandatory, it is of critical importance for trade with the European Union. Establishing a carbon pricing system aligned with the EU ETS would provide a competitive advantage for export-oriented sectors.
Carbon Border Adjustment Mechanism (CBAM)	Affected	In Türkiye's exports to the EU, sectors such as iron and steel, aluminium, cement, fertilizers, electricity, and hydrogen will be directly



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Regulation/Directive	Effect on Türkiye	Comment for Türkiye
		subject to carbon costs after 2026. Therefore, the timely implementation of a national ETS and the strengthening of verified emissions reporting are of critical importance for Türkiye. Failure to achieve alignment by 2026 would result in increased costs. Failure to comply by 2026 will lead to increased costs.
Alternative Fuels Infrastructure Regulation (AFIR)	Voluntary	Not binding but provides a reference framework for Türkiye's electric vehicle infrastructure development. It may also support the deployment of electric trucks and intermodal transport solutions in rail logistics.
FuelEU Maritime	Voluntary	Not binding for Türkiye, but it will affect Turkish shipping companies operating in the EU. Ships sailing from Turkish ports to EU ports are indirectly affected due to sustainable fuel usage requirements. Enhancing alternative fuel supply infrastructure at Turkish ports would strengthen their competitiveness.
ReFuelEU Aviation	Voluntary	It is not binding for Türkiye; however, compliance will be required in the medium term for Turkish airlines and fuel suppliers, as all flights in EU airspace will be subject to sustainable aviation fuel (SAF) blending requirements.
Vehicle Emission Performance Standards Regulation	Voluntary	Türkiye does not directly adopt EU CO ₂ emission limits, for the automotive industry exporting to the EU, these CO ₂ thresholds are de facto binding.
EU Directives (require national transposition into domestic law)		
Renewable Energy Directive (RED) Amendment	Voluntary	Not binding for Türkiye, but sustainability certifications may be required for energy trade with the EU.
Energy Efficiency Directive (EED) Amendment	Voluntary	Not directly binding, but important for Türkiye's energy efficiency policies. It serves as a technical alignment reference, particularly for energy efficiency strategies in the transport sector.
Energy Taxation Directive Revision	Voluntary	Not directly binding, but if Türkiye integrates into a carbon pricing system, alignment with EU criteria may be important in terms of tax competitiveness.

Regulation/Directive	Effect on Türkiye	Comment for Türkiye
Policy Packages / Strategies		
Fit for 55 Package	Voluntary	Not directly binding, but it serves as a reference point for Türkiye's carbon neutrality goals. For the industrial and transport sectors, alignment constitutes a de facto requirement in order to maintain competitiveness in EU markets.
Monitoring, Reporting, and Verification (MRV) Requirements	Obligatory for EU trade	Will be mandatory for Turkish companies exporting to the EU, particularly in the maritime and energy sectors.
Sustainable and Smart Mobility Strategy (2020)	Voluntary	Provides a framework for EU policy alignment but is not binding for Türkiye. Türkiye may adapt this strategy to its own mobility policies, particularly with regard to increasing rail and intermodal transport. Alignment with the EU approach can be observed in the policies of the Ministry of Transport and Infrastructure.
Sustainable Aviation Fuel (SAF) Blend Requirements	Voluntary	Not binding for Türkiye, but applicable to flights entering EU airspace.

4.2.1 Paris Agreement (Ratified 2021) and Türkiye's NDC

The Paris Agreement, adopted in 2015, is a legally binding international treaty that aims to limit global warming to well below 2°C, with efforts to stay within 1.5°C. Under this agreement, countries submit Nationally Determined Contributions (NDCs), outlining their plans to reduce greenhouse gas emissions.

While the Paris Agreement sets overarching goals, it does not prescribe specific mandatory measures for individual sectors, such as transportation, in any country.

Türkiye ratified the Paris Agreement in 2021 and submitted its Second Nationally Determined Contribution (NDC) to the Secretariat of the United Nations Framework Convention on Climate Change on 9 November 2025. According to this document, Türkiye has committed to limiting its greenhouse gas emissions to 643 million tonnes of CO₂-equivalent by 2035, corresponding to a reduction of 466 million tonnes of CO₂-equivalent compared to the business-as-usual (BAU) scenario. This commitment covers all greenhouse gases and all mitigation sectors identified by the IPCC.

However, the specific strategies and policies to achieve these reductions are determined by Türkiye's national plans and are not mandated by the Paris Agreement itself.

Key Obligations:

- Limiting emissions to 643 MtCO₂-eq by 2035, representing a reduction of 466 MtCO₂-eq compared to the BAU scenario (Republic of Türkiye Ministry of Environment, Urbanization and Climate Change).
- Under Türkiye's Twelfth Development Plan (2024-2028) (pp.218-219), sectoral roadmaps will be developed, and regulatory adjustments will be made considering the emission reduction targets for greenhouse gases.
- Sector-specific decarbonization strategies for transport.

In line with Türkiye's Long-Term Climate Strategy (p.36) and its 2053 Net Zero Emission Target, the transport sector will focus on intermodal freight integration, a transition to rail and maritime transport, and increased use of clean energy sources.

Transport-Specific Requirements:

As mentioned above parts of the report:

- Shift to rail/maritime transport modes (road transport currently dominates passenger-km). Under the Türkiye Transport and Logistics Master Plan (2053), transitioning to rail and maritime transport is a key priority. By 2053, an additional 8,554 km of new railway lines is planned to be constructed.
- Implement EU-compatible emission standards for vehicles (cars, lorries, motorcycles). The Climate Change Mitigation Strategy and Action Plan (2024-2030) includes measures to promote low and zero-emission vehicles in public and private sectors, establish low-emission zones in urban areas, and optimize traffic management to reduce emissions.
- Develop national electric vehicle charging infrastructure by 2030. The Türkiye Green Deal Action Plan and the Climate Change Mitigation Strategy outline plans for expanding national electric vehicle charging infrastructure, including high-powered charging stations in urban centres and logistics hubs between 2024-2030.
- Expand high-speed rail network which is currently 2,251 km. A total of 8,554 km of railway lines are planned for construction by 2053, including 6,425 km of high-speed train lines, 1,474 km of conventional train lines, 393 km of high-speed train lines, and 262 km of very high-speed train lines. Of these, 3,703 km are scheduled for completion between 2024–2029, 2,992 km between 2030–2035, and 750 km between 2036–2053. (Türkiye Long-Term Climate Strategy, p.36)

In national climate strategies, Türkiye has emphasized the importance of enhancing energy efficiency and prioritizing sustainable transportation modes. For instance, the country plans to prioritize railway and maritime transport to minimize environmental impacts and establish

a sustainable transportation network. Additionally, there is a focus on developing smart routes suitable for electric vehicles and implementing intelligent transportation systems.

In summary, while the Paris Agreement establishes binding commitments for countries to reduce emissions, it does not impose specific mandatory measures for the transportation sector in Türkiye. The development and implementation of such measures are within the purview of Türkiye's national policies and strategies.

The primary guiding policy documents and sectoral legislation for the transport sector in “Republic of Türkiye Updated First Nationally Determined Contribution” are listed below;

- Fuel Quality By-law (2017)
- By-law on Procedures and Principles Regarding the Improvement of Energy Efficiency in Transportation (2019)
- By-law on Bicycle Roads (2019)
- By-law on Combined Transport (2022)
- By-law on E-scooter (Trilateral By-law 2021)
- By-law on Monitoring of Greenhouse Gas Emissions from Aviation Activities
- National Transport and Logistics Master Plan (2022-2053)
- National Intelligent Transportation Systems (ITS) Strategy and 2020-2023 Action Plan
- Mobility Vehicles and Technologies Strategy Roadmap (2022)
- Inter-city Transport and Tourism Bicycle Routes Master Plan (2021)
- Directive on Sustainable Aviation Fuel (SAF) (2022) (being drafted)

Türkiye’s main mitigation policies in the transport sector are as follows:

- To ensure balanced utilization of transport modes in freight and passenger transport by reducing the share of road transport and increasing the share of maritime and rail transport,
- To develop low or zero emission, energy-efficient, and alternative clean fuel transportation options and expand urban passenger and freight transportation by rail for international and intercity.
- To increase the use of electricity and alternative energy resources instead of fossil fuels on highways,
- To promote electric vehicles by establishing a national fast charging station network,
- To increase the efficiency and coverage of the intercity rail network and its electrification,
- To implement sustainable transport approaches in urban areas,
- To promote sustainable aviation fuel production via national sources,
- To support and incentivize sustainable aviation fuels at international airports,
- To expand green port implementations,
- To implement Ship Scrap Regulation,
- To enhance combined transport,
- To promote alternative fuels and clean vehicles,



The National Transport and Logistics Master Plan (2022-2053) sets out substantial targets in the sector by 2035 namely:

- A sustainable, liberalized, economically profitable, high-technology railway sector will be developed.
- Between 2024 and 2035, a total of 6,699 km of railway lines are planned to be constructed, including 5,345 km of high-speed and very high-speed rail lines.
- Railway Passenger transportation share will increase from 0.96% to 5.31% and railway freight transportation share will increase from 5.08% to 20.12%.
- Annual railway passenger transport will increase from 19.5 million to 145.6 million.
- Annual railway freight transportation will reach 306 million tons from 55 million tons.
- Railway infrastructure will be developed in line with the changing mega trends in the sector and based on sector dynamics.
- Between 2024 and 2035, a total of 49 billion Dollars (with 2019 prices) of railway investment is foreseen.
- The share of highways in annual freight transportation will be reduced from 71% to 59%.
- Highly renewable energy resources will be used in ports.
- Emission monitoring, reporting, and verification infrastructure will be established, and carbon emissions will be strategically managed in air transportation.

Türkiye has set a national, economy-wide GHG emission reduction target that encompass the transportation sector as part of its broader climate commitments. Therefore, sector-specific mitigation targets for transport are not explicitly detailed in the NDC. Nevertheless, the transport sector remains a key focus of Türkiye's climate strategies. In 2023, emissions from the sector amounted to 99 million tonnes of CO₂-equivalent, accounting for 18% of the country's total emissions.

To address emissions from transportation, Türkiye has outlined several initiatives:

- **Promotion of Public Transportation:** Enhancing the efficiency and appeal of public transit systems to reduce reliance on private vehicles.
- **Development of Sustainable Transport Modes:** Investing in rail and maritime infrastructure to offer greener alternatives to road transport.
- **Advancement of Electric Vehicles (EVs):** Encouraging the adoption of EVs through incentives and expanding charging infrastructure.
- **Implementation of Intelligent Transportation Systems (ITS):** Utilizing technology to optimize traffic flow and reduce congestion-related emissions.

These measures align with Türkiye's commitment to achieving net-zero emissions by 2053, as announced in 2021. While specific GHG reduction targets for the transportation sector are not delineated, these initiatives reflect Türkiye's strategic approach to mitigating emissions within the sector as part of its national climate objectives.

4.2.2 IMO 2023 GHG Strategy

Binding Targets:

- ≥20% emissions reduction in international shipping by 2030 (2008 baseline).
- ≥70% reduction by 2040.

The strategy sets out indicative checkpoints for 2030 and 2040; to reduce the total annual GHG emissions from international shipping by at least 20%, striving for 30%, by 2030 and to reduce the total annual GHG emissions from international shipping by at least 70%, striving for 80%, by 2040 (Det Norske Veritas, 2025).

- Mandatory Carbon Intensity Indicator (CII) compliance for all Turkish-flagged vessels >5,000 GT.

The IMO's strategy mandates that all ships, regardless of flag, implement mandatory measures to reduce carbon intensity. This includes compliance with the Carbon Intensity Indicator (CII) regulations for vessels over 5,000 gross tonnages (GT) (2023 IMO Strategy on Reduction of GHG Emissions from Ships, 2025).

Operational Requirements:

- The strategy does highlight the importance of technical and operational measures to enhance energy efficiency.
- Establish "green shipping corridors" in Marmara/Aegean/Black Sea routes. The concept of "green shipping corridors" is gaining attention globally to decarbonize specific maritime routes.
- Phase out heavy fuel oil in coastal shipping. The IMO's strategy advocates for the reduction of GHG emissions through various measures, including the potential phase-out of heavy fuel oil, especially in sensitive regions.

4.2.3 EU Acquis Alignment (Transport Chapter)

Critical Obligations:

- Full adoption of Euro 7 emission standards for road vehicles.

The Euro 7 emission standards are planned for implementation in the EU from 2025 for cars and vans and 2027 for trucks and buses.

Türkiye is expected to align with EU vehicle emissions standards under the Customs Union and EU Accession process.

According to Article 21 of Regulation (EU) 2024/1257 of the European Parliament and of the Council, the Euro 7 emission limits shall apply to new types of cars and vans (M1, N1) from 29 November 2026 and to all new vehicles of these categories from 29 November 2027, while



for heavy-duty vehicles (M2, M3, N2, N3) the limits shall apply to new types from 29 May 2028 and to all new vehicles from 29 May 2029.

- Complete separation of rail infrastructure management from operations (contrary to TCDD's current integrated model).

The EU Regulation 3577/92 requires member states to open domestic maritime transport (cabotage) to competition.

Türkiye still maintains cabotage restrictions under the 1926 Cabotage Law, protecting national shipping companies.

There is no official timeline for phasing out these restrictions, though discussions are ongoing within the EU accession negotiations.

- Phase out coastal cabotage monopoly under EU Regulation 3577/92.

The EU Regulation 3577/92 requires member states to open domestic maritime transport (cabotage) to competition.

Türkiye still maintains cabotage restrictions under the 1926 Cabotage Law, protecting national shipping companies.

There is no official timeline for phasing out these restrictions, though discussions are ongoing within the EU accession negotiations.

- Implement EU ETS for aviation on all intra-Türkiye flights

The EU Emissions Trading System (EU ETS) currently applies to flights within the European Economic Area (EEA).

The EU plans to extend ETS to cover all intra-EU and extra-EU departing flights by 2027 under EU Directive 2003/87/EC.

While the current plans for the Turkish ETS do not specifically mention including intra-Türkiye flights by 2027, the system is still in development. As Türkiye aims to align with EU standards and mitigate the impact of the Carbon Border Adjustment Mechanism (CBAM), it's possible that the aviation sector could be included in future expansions of the Turkish ETS.

4.2.4 Mediterranean & Black Sea Sustainable Maritime Declarations

Regional Commitments:

- The International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention), which entered into force in 2017, aims to prevent the spread of harmful aquatic organisms by regulating ballast water discharge.

The Mediterranean Strategy for Prevention, Preparedness, and Response to Marine Pollution from Ships (2022-2031) acknowledges the significant role of ballast water in introducing



invasive species. It emphasizes the need for effective ballast water management (UN Environment Programme, 2022).

- LNG bunkering infrastructure at six major ports (Istanbul, Izmir, Mersin, etc.) by 2030.

The Motorways of the Sea Detailed Implementation Plan (2022) by the European Commission highlights the importance of developing alternative fuels infrastructure, including LNG, to reduce greenhouse gas emissions. A solution involving LNG bunkering vessels to/from Marmara (Türkiye) seems to be a more efficient solution.

- Mandatory shore power for cruise ships >5,000 GT by 2028.

The EU MRV Regulation (Regulation 2015/757) on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport and amending Directive 2009/16/EC applies to all ships above 5000 GT in respect to CO₂ emissions released in voyages to, from and between ports under the jurisdiction of EU Member States from the 1 January 2018.

The Motorways of the Sea Detailed Implementation Plan (2022) emphasizes the need for more widespread onshore power supply (OPS) in ports to reduce emissions. While it advocates for the adoption of OPS, it does not mandate its implementation for cruise ships over 5,000 GT by 2028.

4.2.5 Alignments and Conflicts of the Türkiye's Transportation Policies

Türkiye's commitment to achieving net-zero emissions by 2053 aligns with global and European climate goals. However, there are certain differences and potential conflicts in policies and implementation strategies:

Target Years and Reduction Rates:

- European Union (EU): The EU aims to achieve net-zero emissions by 2050 and has committed to reducing greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels.
- Türkiye: Türkiye has set a net-zero target for 2053 and plans to double its emission reduction targets by 2030.

Policies and Mechanisms:

- Emission Trading Systems (ETS): The EU actively implements carbon pricing mechanisms through the ETS, while Türkiye has not yet fully implemented a national carbon pricing system.
- Carbon Border Adjustment Mechanism (CBAM): The EU plans to apply a carbon tariff on certain imported goods through CBAM, which could impact Türkiye's exports and necessitate compliance with EU standards.

Structural and Economic Differences:

- **Energy Sources:** While EU countries have advanced further in the transition to renewable energy, fossil fuels still play a significant role in Türkiye's energy production. This leads to differences in emission reduction strategies.
- **Economic Capacity:** Türkiye's economic and technological capacity differs from EU countries, which may create challenges in implementing climate policies and meeting reduction targets.

Although Türkiye's net-zero target is aligned with global and European ambitions, differences in implementation, energy infrastructure, and economic capacity create potential challenges. To bridge these gaps, Türkiye needs to develop policies that consider its national conditions while ensuring alignment with international cooperation and support mechanisms.

In the transportation sector, Türkiye's net-zero policies present both alignment and conflicts with global and EU climate strategies. The key areas of divergence include:

1. Transport Emission Reduction Targets

- **EU:** The EU's *Fit for 55* package mandates a **90% reduction in transport-related emissions by 2050** and sets binding targets for road, aviation, and maritime sectors.
- **Türkiye:** While Türkiye has committed to net-zero by 2053, it **lacks a sector-specific binding emission target for transport** similar to the EU.
- **Conflict:**
 - Without clear emission reduction obligations for transport, Türkiye may face challenges in aligning with EU policies, especially in trade and regulatory compliance. In addressing this gap, it is important that Türkiye's legislative efforts focus not on a one-to-one replication of EU legislation and numerical CO₂ reduction targets, but rather on an approach that takes into account the country's economic and industrial dynamics, as well as the fact that such a regulatory framework would be implemented for the first time.
 - **Emission Monitoring:** No centralized GHG registry for transport exists vs. EU Regulation 2018/1999 requirement.
The EU Governance Regulation (2018/1999) mandates a centralized emissions monitoring and reporting system for all transport sectors.
Each EU Member State must submit detailed National Energy and Climate Plans (NECPs) with transport-related GHG emission data to the European Commission.
Türkiye does not have a centralized transport-specific GHG emissions registry similar to the EU system.
The Climate Change Mitigation Strategy and Action Plan (2024-2030) acknowledges the need for a more integrated transport emission monitoring system, but no full implementation exists yet.

2. Electrification and Alternative Fuels

- **EU:** The EU actively promotes electric vehicles (EVs) and alternative fuels (e.g., hydrogen, e-fuels) through strict mandates such as:
 - **2035 ban on new internal combustion engine (ICE) cars.**
 - **Renewable Energy Directive (RED III)** requiring a higher share of renewables in transport fuels.
- **Türkiye:**
 - No official **ICE phase-out target**.
 - **Lower EV adoption** rates and limited infrastructure development compared to EU standards.
 - Dependence on **imported technologies** for alternative fuel production.
- **Conflict:** Türkiye's delay in fully transitioning to EVs and alternative fuels may create a competitiveness gap in vehicle exports to the EU. To close this gap, the existing vehicle fleet needs to be renewed with electric and alternative-fuel vehicles, and the provision of appropriate incentives for this transition is of critical importance. Considering both the substantial emissions footprint of heavy-duty vehicles and Türkiye's industrial capabilities in their manufacturing, it is essential to place increased focus on heavy-duty vehicles, in addition to light-duty vehicles.

3. Aviation and Maritime Compliance with EU Standards

- **EU:**
 - Aviation is included in the **EU Emissions Trading System (ETS)**, and the **CORSIA** scheme applies to international flights.
 - The **FuelEU Maritime** initiative mandates **carbon intensity reductions in shipping fuels**.
- **Türkiye:**
 - No domestic **aviation ETS** or strict **maritime decarbonization rules**.
 - Heavily relies on **bunker fuels** and **fossil-based aviation fuels**.
- **Conflict:**
 - Türkiye's aviation and maritime sectors may face **higher carbon costs** when operating within the EU, affecting trade and logistics competitiveness.
 - Port Modernization Lag: Only 3 out of 26 commercial ports have shore power infrastructure (2024 data) vs. 2028 regional declaration targets.
 - EU ETS Incompatibility: Türkiye's draft ETS excludes small maritime operators (<10 vessels) and aviation's non-CO₂ emissions, conflicting with EU ETS III scope. In the EU ETS for shipping, the MRV system will include CH₄ and N₂O from 2024, the ETS will cover these gases from 2026, and the sector's compliance will be phased in at 40%, 70%, and 100% for the years 2025, 2026, and 2027, respectively (European Commission, 2025).



- Coastal Cabotage: Article 940 of Turkish Commercial Code reserves domestic maritime transport for Turkish-flagged vessels, conflicting with EU accession requirements.
- Fossil Fuel Subsidies: 2023 energy subsidies included \$2.1B for marine diesel oil vs. \$0.3B for green shipping tech.
- Alternative Fuels: No national standards for ammonia/methanol bunkering despite IMO 2023 strategy requirements.

4. Carbon Pricing and CBAM Impact on Logistics

- **EU:**
 - Implement **Emissions Trading System (ETS)** for road transport by 2027.
 - Expands the **Carbon Border Adjustment Mechanism (CBAM)**, impacting **freight transport and supply chains**.
- **Türkiye:**
 - No **road transport ETS**.
 - CBAM may increase **transportation costs** for exports to the EU, especially in **freight-intensive industries**.
- **Conflict:**
 - Turkish logistics companies will need to **adapt to carbon pricing models** for trade continuity, increasing operational costs.

5. Rail Electrification and Decarbonization Targets, Investments, Alignment with EU Rail Regulations and Funding

- **EU Approach:**
 - The EU aims for a **fully decarbonized rail sector by 2050**, with **100% electrification and increased use of renewable energy** in railway operations. The **EU Sustainable and Smart Mobility Strategy** promotes rail as the backbone of green mobility.
 - The EU prioritizes **high-speed rail for passenger transport and rail freight corridors** to reduce truck-based emissions. The **TEN-T network** (Trans-European Transport Network) aims to **shift 75% of inland freight to rail and inland waterways**.
 - The EU **mandates strict sustainability standards** for rail transport, including energy efficiency, alternative fuels, and cross-border railway integration.
 - The EU provides **significant financial support** for rail projects through programs like **CEF (Connecting Europe Facility)** and the **Green Deal Investment Plan**.



- **Türkiye's Approach:**

- While Türkiye has been expanding rail electrification, a **significant portion of the railway network is still diesel-powered**, and progress is slower compared to the EU.
- Türkiye **prioritizes high-speed rail projects for passengers** over freight rail development. Although Türkiye has **ambitious freight rail targets**, it still **heavily relies on road transport for logistics**. Investments in freight corridors and logistics hubs that facilitate integrated logistics centres are of great importance for supporting modal shift.
- Türkiye is **not fully integrated into the EU's rail regulations** and does not yet follow **all EU emission standards** for locomotives and rail transport.
- Türkiye **does not have the same level of access** to EU rail funding mechanisms, which **limits the pace of rail decarbonization projects**.
- Rail vs. Road Investment: As 2023 allocates 43,40% to road projects vs. 48,30% to rail, it confirms a policy match with the EU's modal shift goals, which prioritize rail and inland waterways. Türkiye Transportation and Logistics Master Plan (Vision 2053) provides guidance on this issue.

- **Conflict:**

- The EU is pushing for **full electrification**, while Türkiye **still relies on diesel locomotives** in freight and passenger transport.
- While **EU policies encourage freight rail** as a key decarbonization strategy, **Türkiye's investment focus on passenger rail** may slow the shift to **low-emission freight transport**.
- Lack of full regulatory alignment may **create barriers** for Türkiye's rail industry in trade and logistics cooperation with the EU.
- Türkiye faces **financing challenges** in expanding rail infrastructure to **match EU standards**, potentially slowing the shift to sustainable rail transport.

Türkiye's transport policies, while moving towards sustainability, lack binding commitments on emissions reduction, fuel standards, and carbon pricing seen in the EU. As a result, compliance with EU regulations, trade competitiveness, and logistics efficiency may be affected unless harmonization strategies are adopted.

Some of the strategic tensions are listed below:

- Growth vs. Green Transition: Türkiye's export-driven economy faces competitiveness risks from accelerated decarbonization timelines.
- Technological Leapfrogging: Simultaneous requirements for rail electrification (25% complete), EV adoption, and green ports strain technical capacity.
Türkiye faces technological capacity challenges in meeting decarbonization goals across transport sectors.

To eliminate the conflicts between international and national policies and to determine the appropriate policies for Türkiye more clearly, strategy, actions and pathways will be

determined after stages such as stakeholder interviews, workshops, and obtaining expert opinions within the scope of the project.

Also, more detailed information about the set of potential “net zero in transport” policies and conflicts with the international policies for Türkiye is given in Annex.

4.3 Prioritization of the Policies

The policies mentioned above were evaluated on an international and national basis, then scored and prioritized in terms of their impact, cost-effectiveness, feasibility and timeframe of net zero emissions.

Environmental Impact criterion evaluates the policy’s ability to reduce greenhouse gas emissions, promote sustainable transportation, and provide environmental benefits. While evaluating policies, the following questions are considered:

- **Carbon reduction potential:** How much can this policy reduce total transportation emissions?
- **Sectoral transformation impact:** What measurable impacts has the policy achieved in advancing sustainable transport for urban and intercity mobility, considering indicators such as electrification rates, modal shifts, integration of mobility systems, and emission reductions?
- **Social and economic benefits:** Does it help reduce traffic congestion, air pollution, or energy dependence?

The following scale and specified definitions in Table 9 can be used when scoring policies according to this criterion.

Table 9: Scale Definitions for Environmental Impact

Score	Definition
1–2	Negligible or no contribution to emission reduction; very limited or uncertain impact on sustainable transport; minimal or no social/environmental benefits.
3–4	Low contribution to reducing emissions; limited sectoral impact; small improvements in congestion, pollution, or energy dependence.
5–6	Moderate emission reduction potential; some contribution to sustainable transport in urban or intercity contexts; moderate improvements in congestion and air quality.
7–8	Significant emission reduction; strong support for sectoral transformation; clear social and environmental benefits, such as reduced congestion, improved air quality, and lower energy dependence.
9	Maximum potential for emission reduction; transformative impact across the entire transport sector; comprehensive and sustainable environmental, social, and economic benefits.

Feasibility criterion assesses how easily the policy can be integrated into existing infrastructure, its regulatory compatibility, and its practical applicability. While evaluating policies, the following questions are considered:

- **Compatibility with existing infrastructure:** How significantly can the policy be supported by Türkiye's current transportation infrastructure?
- **Regulatory framework:** To what degree have the essential legal and institutional arrangements been established?
- **Public-private cooperation:** Can the policy be effectively implemented with support from both sectors?

The following scale and specified definitions in Table 10 can be used when scoring policies according to this criterion.

Table 10: Scale Definitions for Feasibility

Score	Definition
1–2	Very low feasibility; major infrastructure gaps; no supporting regulations; weak or absent stakeholder cooperation.
3–4	Low feasibility; requires significant new infrastructure and major legal changes; limited stakeholder readiness.
5–6	Moderate feasibility; partial infrastructure support; regulatory adjustments needed; cooperation possible but not guaranteed.
7–8	High feasibility; existing infrastructure largely compatible; regulatory framework mostly aligned; strong potential for public–private cooperation.
9	Very high feasibility; fully compatible with current infrastructure; clear and supportive regulations; robust and established public–private cooperation.

Cost-Effectiveness criterion assesses the balance between the policy's implementation costs and the benefits it provides. Policies that have a high impact at a low cost receive higher scores. While evaluating policies, the following questions are considered:

- **Initial investment costs:** To what extent does the policy require significant infrastructure and equipment investments?
- **Operational and maintenance costs:** To what extent are the ongoing operational and maintenance expenses high?
- **Return on investment:** To what extent can the financial return or cost savings be realized quickly?
- **Funding opportunities:** To what extent can the policy be supported by public funds, private investments, or international grants?

The following scale and specified definitions in Table 11 can be used when scoring policies according to this criterion.

Table 11: Scale Definitions for Cost-Effectiveness

Score	Definition
1–2	Very high costs, very low benefits; single or uncertain funding sources; very long payback period (>15 years).
3–4	High costs, low benefits; limited diversity of funding; long payback period (10–15 years).
5–6	Moderate costs, medium-level benefits; partially secured funding; medium-term payback period (5–10 years).
7–8	Low costs, high benefits; reliable and diverse funding sources; short payback period (3–5 years).
9	Minimum costs, maximum benefits; sustainable and guaranteed funding; very short payback period (<3 years).

Timeframe criterion assesses how quickly the policy can be implemented and how soon it will produce results. Policies that can be implemented within 0-5 years receive higher scores. While evaluating policies, the following questions are considered:

- **Ease of implementation:** How quickly can the policy be introduced using existing regulations and infrastructure?
- **Short-term impact:** Will measurable results be achieved in a relatively short time (for example in 3-5 years)?
- **Scalability:** To what extent can the policy be piloted in a limited area and subsequently scaled up to nationwide implementation?

The following scale and specified definitions in Table 12 can be used when scoring policies according to this criterion.

Table 12: Scale Definitions for Timeframe

Score	Definition
1–2	Very long implementation period (>15 years); requires major regulatory/infrastructure changes; results highly uncertain.
3–4	Long implementation (10–15 years); significant regulatory/institutional adjustments needed; limited short-term results.
5–6	Medium-term implementation (5–10 years); some initial results visible; scalability possible but gradual.
7–8	Short implementation (3–5 years); measurable results achievable in the near term; scalable with moderate effort.
9	Very rapid implementation (0–3 years); immediate, visible impact; highly scalable and adaptable nationwide.

While selecting these criteria, academic literature was examined as well as existing documents in the world and in Türkiye. Out of many criteria considered by a panel of experts,

it was decided that the above four prioritization criteria would be the most inclusive and appropriate.

The Best Worst Method (BWM) was used to weigh the criteria. BWM is proposed to solve multi-criteria decision-making (MCDM) problems. In an MCDM problem, several alternatives are evaluated with respect to several criteria to select the best alternative(s). According to BWM, the best (e.g. most desirable, most important) and the worst (e.g. least desirable, least important) criteria are identified first by the decision-maker. Pairwise comparisons are then conducted between each of these two criteria (best and worst) and the other criteria. A maximin problem is then formulated and solved to determine the weights of different criteria.

In our case, the best and worst criteria to be selected according to the method were determined as Cost-Effectiveness and Timeframe, respectively. Afterwards, Best to Others (BO vector) and Others to Worst (OW vector) were created with the preferences of experts.

Finally, the formulated max min problem is solved, and the weights of the criteria are determined as follows in the Figure 27:

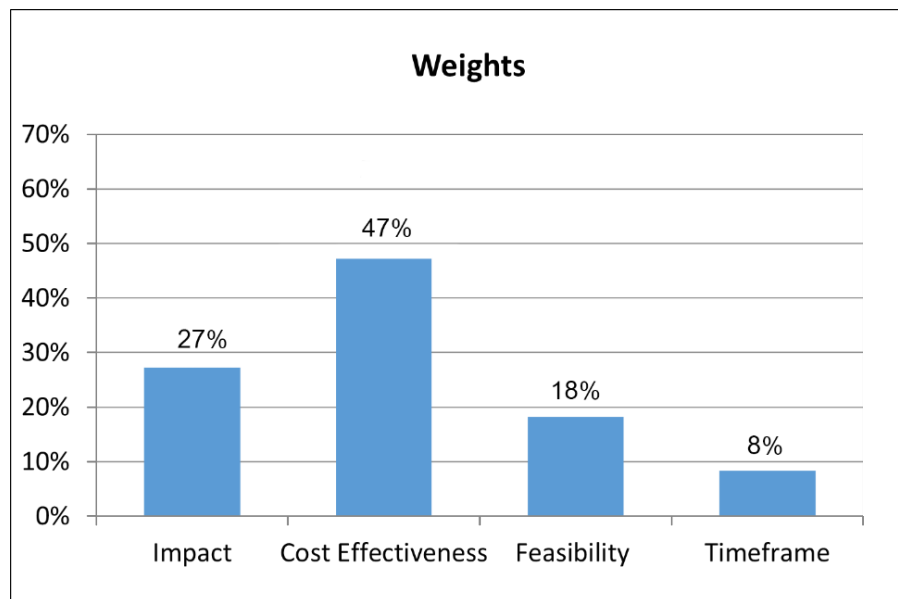


Figure 27: Weights of the Criteria

Criteria Number = 4	Criterion 1	Criterion 2	Criterion 3	Criterion 4
Names of Criteria	Environmental Impact	Cost Effectiveness	Feasibility	Timeframe

Select the Best	Cost Effectiveness
-----------------	--------------------

Select the Worst	Timeframe
------------------	-----------

Best to Others	Environmental Impact	Cost Effectiveness	Feasibility	Timeframe
Cost Effectiveness	2	1	3	5

Others to the Worst	Timeframe
Environmental Impact	4
Cost Effectiveness	5
Feasibility	2
Timeframe	1

Weights	Environmental Impact	Cost Effectiveness	Feasibility	Timeframe
	27%	47%	18%	8%

Input-Based CR	0,15
Associated Threshold	0,1994

The pairwise comparison consistency level is acceptable

Criteria Number = 4	Criterion 1	Criterion 2	Criterion 3	Criterion 4
Names of Criteria	Environmental Impact	Cost Effectiveness	Feasibility	Timeframe

Select the Best	Cost Effectiveness
-----------------	--------------------

Select the Worst	Timeframe
------------------	-----------

Best to Others	Environmental Impact	Cost Effectiveness	Feasibility	Timeframe
Cost Effectiveness	2	1	3	5

Others to the Worst	Timeframe
Environmental Impact	4
Cost Effectiveness	5
Feasibility	2
Timeframe	1

Weights	Environmental Impact	Cost Effectiveness	Feasibility	Timeframe
	27%	47%	18%	8%

Input-Based CR	0,15
Associated Threshold	0,1994

The pairwise comparison consistency level is acceptable

After the criteria and their respective weights were determined as described above, the process proceeded to the scoring and prioritization of policy recommendations. As a result of the policy evaluation conducted for Türkiye in the previous section, a total of 24 policy recommendations, listed in the Annex, were scored by different stakeholders.

internal evaluations was calculated first. Subsequently, the arithmetic averages of each criterion across the 22 surveys received from 22 different institutions were calculated and synthesized, leading to the results presented in Table 13: Policy Prioritization Matrix

The weighted scores shown in the final column of the table were obtained by multiplying each criterion score by its corresponding weight.

Accordingly, the overall policy scores ranged between 8.04 and 5.87 out of 10.

Table 13: Policy Prioritization Matrix

Area	Policy Framework	Evaluation	Weights Of The Criteria				Weighted Score
			27%	47%	18%	8%	
			Impact	Cost Effectiveness	Feasibility	Timeframe	
Finance	Incentives, taxes and pricing approaches for net zero emission	* In EU countries, incentives are provided through funds, credits, taxation and pricing in areas such as climate action, low carbon technologies and renewable energy. * Various incentives are given for green logistics certificate and green port in Türkiye. * The construction of new ships to replace the scrapped Turkish Flagged Ships is encouraged in various ways.	8,82	7,57	8,20	7,80	8,04



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Area	Policy Framework	Evaluation	Weights Of The Criteria				Weighted Score
			27%	47%	18%	8%	
			Impact	Cost Effectiveness	Feasibility	Timeframe	
Road	Promoting Electric and Alternative Fuel Vehicles	* In EU, it is targeted that vehicles with internal combustion engines will be phased out from traffic and only zero-emission vehicles will be used by 2035. It is predicted that at least 10% zero-emission technologies will be used in heavy freight vehicles. * On a national basis, recommendations for the development of electric vehicles and their infrastructure have been specified. * The number of EVs targeted for 2030 in our country corresponds to 10% of the total number of vehicles today. * Although the costs of EV vehicles are gradually decreasing thanks to technological advances, it can be considered to make existing government supports such as SCT reductions permanent in order to comply with the targets in the EU.	9,10	7,63	7,72	7,20	8,00
Urban	Strengthening the public transportation	* Detailed targets have been set for the use of public transport vehicles and environmentally friendly fuels in public transport. All the related documents have aligned targets. * It is envisaged to increase the length of rails and the use of rail systems in the cities of our country, to give importance to energy efficiency, to use smart technology applications and to reduce the use of private cars.	8,93	7,87	6,88	7,11	7,92
Urban	Developing bicycle, walking and micro-mobility infrastructure	* The use of micro mobility vehicles is supported in cities of the world.	7,98	7,71	8,17	7,76	7,87



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Area	Policy Framework	Evaluation	Weights Of The Criteria				Weighted Score
			27%	47%	18%	8%	
			Impact	Cost Effectiveness	Feasibility	Timeframe	
Energy	Energy Efficiency	* The European Commission has a directive on EU energy efficiency. In this directive, net targets for energy saving have been set. * In national documents for Türkiye, net percentage targets have been set related with reducing the number of emissions by decreasing energy consumption. * Within the national plans, investment budgets to increase energy efficiency in transportation are envisaged.	8,82	7,69	7,21	6,95	7,85



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Area	Policy Framework	Evaluation	Weights Of The Criteria				Weighted Score
			27%	47%	18%	8%	
			Impact	Cost Effectiveness	Feasibility	Timeframe	
Road	Enhancing the charging infrastructure across the country, especially in major cities	* In the EU documents, it is stated that the number of charging stations will reach 1 million in 2030, hydrogen refueling stations will be located every 150 km, and the TEN-T network will be especially emphasized in this regard, and it is ensured that these stations will be more user-friendly, interoperable, and compatible. * It is included in the Medium Term Program (2025-2027) of national charging station planning. It has been stated in the plans of different institutions that the number of charging stations will reach 100.000 in year 2028, 160,000 in year 2030 and approximately 350,000 in year 2035. * It is beneficial to establish a separate hydrogen market law for the establishment of a hydrogen ecosystem. * The number of hydrogen refuel stations is very low in Türkiye, and a target planning study for transport sector is needed in this regard.	8,82	7,49	7,03	6,94	7,72
Energy	Renewable Energy	* To increase the use of renewable energy for EU countries, compatible targets have been determined in different documents. * Within the national plans, investment budgets to increase energy efficiency in transportation are envisaged.	8,53	7,69	6,73	6,43	7,64



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Area	Policy Framework	Evaluation	Weights Of The Criteria				Weighted Score
			27%	47%	18%	8%	
			Impact	Cost Effectiveness	Feasibility	Timeframe	
Urban	Urban Transport Plans	* SUMP projects are becoming widespread in the world and in our country.	7,76	7,24	7,77	6,79	7,43
Leveraging technology	Intelligent Transportation Systems (ITS)	* Best practices are spreading in the world and EU countries and research studies on this subject are supported. * There is an intelligent transportation systems strategy document prepared for Türkiye to make maximum use of the infrastructure capacity and thus reduce environmental impacts. * In our country, urban-scale plans are being prepared for urban ITS systems, especially in metropolitan cities.	8,17	7,36	6,82	6,64	7,42
Transition among the modes and Intermodal Transportation	Shift to environmentally friendly modes	* In EU countries, the shifting of cargo transported by road to rail and inland waterways is important and supported. * Similarly, multimodal transportation is supported in our country. As an example, a project is being carried out to determine the main corridors of Türkiye's combined transport.	8,34	6,98	7,05	6,69	7,33



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Area	Policy Framework	Evaluation	Weights Of The Criteria				Weighted Score
			27%	47%	18%	8%	
			Impact	Cost Effectiveness	Feasibility	Timeframe	
Transition among the modes and Intermodal Transportation	Enhancing multimodal transportation facilities	* Efforts are being made to support transshipment terminals in EU countries and to facilitate operations at these terminals. * Within the scope of the combined transportation regulation in Türkiye, a green logistics certificate is issued. This certificate is given to companies that are engaged in railway transportation and attach importance to green packaging, waste management, water footprint and energy efficiency.	8,40	6,89	6,32	6,14	7,13
Logistics	Decreasing the emissions sourced by city logistics operations	* It is trying to increase the use of rail systems for freight transportation in cities in the countries of the world and in our country.	8,16	6,50	6,88	6,42	7,00
Rail	Electrification of Railways and usage of alternative energies in terms of net zero emissions	* Studies on the use of alternative fuels such as hydrogen in rail transport in the EU have intensified. * In Türkiye, targets are mainly set for the expansion of urban and intercity railway lines, making them double-track and increasing electrification.	8,47	6,62	6,26	5,56	6,96
Rail	Improving railway transportation system in terms of net zero emissions	* In EU, rail freight share is targeted at 30% in 2030 and 22% in 2053 in Türkiye. * The amount of freight transported by rail is targeted to be 40.0 billion Net Ton-Km in 2028 in Türkiye. * To achieve net zero emission targets, it would be appropriate to increase the share of rail freight transport volume.	7,87	7,05	6,02	5,31	6,94



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Area	Policy Framework	Evaluation	Weights Of The Criteria				Weighted Score
			27%	47%	18%	8%	
			Impact	Cost Effectiveness	Feasibility	Timeframe	
Finance	Emission Trading System (ETS) for Net Zero Emission	* In EU Countries, studies are being carried out for the Maritime and Aviation sectors to enter this system. Within the scope of these studies, targets are determined. * A carbon border adjustment mechanism will be enhanced to the transportation sector. * Efforts are underway to establish the necessary legal and institutional infrastructure for the implementation of ETS in Türkiye. From 2025, it is planned to launch a pilot ETS application in which certain sectors such as cement will be included. In the long run, the transportation sector (except aviation) should also be considered within this system.	7,73	6,21	7,53	7,02	6,92
Climate Goals	General Goals on Climate Change	* The target values mentioned in all documents for the reduction of GHG Emissions related to EU countries are collected here. There is harmony between these goals. * Monitoring and reporting emissions is also important. * In Türkiye, the trends from different institutions towards reducing net zero emissions are similar. In addition, a regulation on the monitoring and reporting of emissions is implemented in Türkiye.	7,40	6,64	6,89	6,70	6,89



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Area	Policy Framework	Evaluation	Weights Of The Criteria				Weighted Score
			27%	47%	18%	8%	
			Impact	Cost Effectiveness	Feasibility	Timeframe	
Logistics	Decreasing the emissions sourced by national and international logistics operations	* For EU countries, in all documents, there is a aligned target for the rate of freight transported by rail and it has been determined as 30%. * In our country, this rate is targeted as 21%. * In this context, it is envisaged to expand logistics centres and create freight corridors	8,25	6,38	6,35	5,65	6,81
Rail	Enhancing Railway Transportation Network	* When the EU documents are examined, it is seen that the focus is on the completion of the railway needs of the TEN-T corridors, electrification and modal shift rather than the railway network enhancing. * Investments in railway line continue. However, to achieve the desired targets, it is necessary to increase the transportation of cargo and passengers.	8,31	6,50	5,73	5,17	6,74
Infrastructure	Resilience of the transport network	* The EU has established the main transport corridors. It continues to invest in strengthening and making these corridors more resilient. * Efforts are being made to increase the resilience of the transportation network in Türkiye.	6,88	6,96	6,04	5,58	6,66
Maritime	Supporting the green seaports	* The number of ports with green port certificates in the world and in our country is increasing.	7,08	6,56	6,40	5,92	6,62



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Area	Policy Framework	Evaluation	Weights Of The Criteria				Weighted Score
			27%	47%	18%	8%	
			Impact	Cost Effectiveness	Feasibility	Timeframe	
Maritime	Improving maritime transportation system in terms of net zero emissions	* EU documents include targets that focus on reducing emissions using environmentally friendly fuels and monitoring and reporting emissions. * Reduction of Greenhouse Gas Emissions, Sustainable Fuel Use and Energy Efficiency are the main policies adopted by Türkiye in the maritime transport sector. * In this context, concrete numerical targets have not been set as much as in EU countries. However, studies on short-distance maritime transportation are carried out in our country.	6,94	6,67	5,92	5,28	6,49
Maritime	Supporting the green vessels/ships	* Emissions from maritime transport are monitored and reported at EU ports. * In Türkiye, incentives are given to scrap old ships and build new ships, new shipbuilding using environmentally friendly energy sources, and main engine conversion. * Research on ammonia as an environmentally friendly fuel is ongoing. Investments can be increased to produce this fuel, which is not widely used currently.	7,10	5,97	5,47	5,09	6,11



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Area	Policy Framework	Evaluation	Weights Of The Criteria				Weighted Score
			27%	47%	18%	8%	
			Impact	Cost Effectiveness	Feasibility	Timeframe	
Aviation	Improving airway transportation system in terms of net zero emissions	* In EU countries, a market-based measure for international aviation CO2 emissions is adopted by using Technological advances, operational improvements and alternative sustainable fuels. * Türkiye is also a member of CORSIA. In Türkiye, measures have been defined to support the implementation of operational and technological improvements, as well as the use of sustainable aviation fuels (SAF).	6,66	6,06	5,70	5,51	6,11
Aviation	Promoting environmentally friendly air fuel and aircrafts	* There are detailed and overlapping targets in EU documents for the use of sustainable aviation fuels and the gradual reduction of their emissions. * In Türkiye, similar tendencies are reflected in different policies. There are regulations in place that set clear targets for the use of sustainable aviation fuels and the gradual reduction of emissions. Emissions from air transport fuels are monitored and reported.	7,68	5,42	4,81	4,83	5,87

The analysis identified Cost-Effectiveness as the most critical criterion, carrying a weight of 47%, followed by Environmental Impact (27%), Feasibility (18%), and Timeframe (8%). Under this framework, the final weighted scores ranged from a high of 8.04 to a low of 5.87 out of 10.

The most prioritized policies, as determined by stakeholder consensus, are detailed below:

- **Financial Incentives and Pricing** (Score: 8.04): Ranked as the top priority, this policy framework emphasizes the use of funds, credits, and taxation to support climate action and low-carbon technologies. It specifically highlights the importance of green logistics certificates and incentives for fleet renewal (e.g., scrapping old Turkish-flagged ships) to align with international standards.
- **Promotion of Electric and Alternative Fuel Vehicles** (Score: 8.00): This policy focuses on phasing out internal combustion engines by 2035 and establishing a target where electric vehicles (EVs) constitute a significant portion of the national fleet. Stakeholders emphasized making existing government supports, such as Special Consumption Tax (SCT) reductions, permanent to ensure long-term market growth.
- **Strengthening Urban Public Transportation** (Score: 7.92): Priority is given to increasing the length of rail systems and integrating smart technology applications to reduce reliance on private vehicles in metropolitan areas.
- **Development of Non-Motorized and Micro-Mobility Infrastructure** (Score: 7.87): Stakeholders identified the expansion of bicycle, walking, and micro-mobility paths as a highly feasible and impactful method for reducing urban emissions.
- **Energy Efficiency in Transportation** (Score: 7.85): This involves setting net percentage targets for emission reduction through decreased energy consumption, supported by dedicated national investment budgets.
- **Expansion of Charging Infrastructure** (Score: 7.72): To support the EV transition, the analysis prioritizes reaching a target of 160,000 charging stations by 2030 and establishing a legal framework for a hydrogen refueling ecosystem.

The findings indicate that stakeholders prioritize policies that balance high environmental impact with cost-efficiency. While systemic shifts like the Electrification of Railways (6.96) and the Emission Trading System (6.92) are recognized as essential for long-term goals, they received lower immediate priority scores compared to financial incentives and urban mobility improvements due to higher perceived costs and longer implementation timeframes. Overall, the analysis underscores that financial mechanisms and road transport electrification are viewed as the most effective "levers" for Türkiye's immediate net-zero trajectory.

5. CONCLUSION

Türkiye's transportation sector stands at a pivotal moment in its transition toward net-zero emissions by 2053. This comprehensive policy review reveals both significant progress and persistent challenges that require urgent attention to achieve the country's ambitious climate goals. The analysis of national and international frameworks demonstrates Türkiye's commitment to sustainable transport transformation while highlighting critical gaps that must be addressed.

Progress and Strategic Foundation

Türkiye has established a robust policy foundation for transport decarbonization through comprehensive national strategies. The Transportation and Logistics Master Plan (Vision 2053) provides a long-term roadmap emphasizing modal shifts from road to rail and maritime transport, with specific targets to increase railway's freight share from 5% to 22% by 2053. The Climate Change Mitigation Strategy and Action Plan (2024-2030) outlines concrete measures for reducing transport emissions, including fleet modernization, infrastructure electrification, and alternative fuel adoption.

The 2053 Long-Term Climate Strategy establishes clear sectoral targets, including the construction of 8,554 km of new railway lines and significant expansion of electric vehicle infrastructure with targets of 4.2 million EVs and 348,000 charging stations by 2035.

Türkiye's Updated First Nationally Determined Contribution committed to reducing greenhouse gas emissions by 41% relative to the business-as-usual scenario by 2030, limiting emissions to approximately 695 Mt CO₂-equivalent. In contrast, Türkiye's Second Updated NDC (also referred to as NDC 3.0), submitted on 9 November 2025, commits to limiting emissions to 643 Mt CO₂-equivalent by 2035, corresponding to a reduction of about 466 Mt CO₂-equivalent compared to the business-as-usual scenario for that year. Initiatives in the transport sector are expected to play a critical role in achieving these targets.

International alignment has been strengthened through ratification of the Paris Agreement in 2021 and active engagement with EU policies through the Green Deal Action Plan. The development of national emissions trading system frameworks and preparation for carbon pricing mechanisms demonstrate Türkiye's commitment to international climate standards.

Key Findings and Challenges

- **Partial Policy Alignment with Net Zero Objectives**

While Türkiye's national transport and climate policy framework acknowledges the 2053 Net Zero Emission Target, current strategies exhibit only partial alignment with international climate mitigation benchmarks.

The absence of detailed interim targets and sector-specific decarbonization pathways for 2030 hampers effective coordination with global climate frameworks. Policy documents often

lack binding mechanisms and specific timelines for implementation, creating uncertainty for stakeholders and investors.

- **Modal Shift Challenges**

Despite repeated emphasis on modal shift toward rail and maritime transport in national strategies, the actual implementation remains significantly below potential. The prevailing reliance on road transport, particularly for freight, continues to undermine decarbonization efforts. Infrastructure investments have not adequately prioritized intermodal connections and integrated logistics systems necessary to facilitate this transition.

- **Electrification Progress Limitations**

Transport electrification emerges as a cornerstone of Türkiye's decarbonization agenda, yet implementation pace lags behind the level required to achieve net zero targets. Critical gaps persist in electric vehicle infrastructure deployment and railway network electrification. The current rail electrification rate requires substantial acceleration to meet long-term targets, while EV charging infrastructure development needs coordinated national planning.

- **Cross-Sectoral Coordination Deficiencies**

While policy documents recognize the need for integrating transport decarbonization with energy, industrial, and urban development strategies, institutional mechanisms for ensuring effective cross-sectoral governance remain underdeveloped. Fragmented approaches between different ministries and government levels limit the potential for coordinated climate action.

- **Freight Transport Complexities**

The freight sector represents one of the most challenging domains for emission reductions. Although green logistics, multimodal transport systems, and energy-efficient freight corridors are referenced in policy documents, implementation mechanisms and economic incentives remain either weak or fragmented. The heavy reliance on road freight continues to generate significant emissions.

- **Urban Mobility Fragmentation**

Sustainable Urban Mobility Plans (SUMPs) and low-carbon urban mobility strategies are introduced in various policy frameworks, but their deployment remains limited in scope and mostly confined to major metropolitan areas. As of 2026, Turkish cities such as İstanbul, Ankara, Konya, İzmir, Kocaeli, etc. have implemented SUMPs, impeding nationwide urban transport transformation.

- **Digital Innovation Underutilization**

Integration of Intelligent Transport Systems (ITS), Mobility-as-a-Service (MaaS), and other smart mobility solutions remains at an early stage. The absence of comprehensive digitalization strategies limits potential efficiency gains and emission reduction benefits from transport system modernization.

- **Monitoring and Verification Gaps**

The current policy landscape lacks robust Monitoring, Reporting, and Verification (MRV) mechanisms tailored to transport-related emissions. The absence of standardized Specific Indicators (SIs) and reliable data frameworks constrains progress monitoring and policy evaluation, making it difficult to assess actual decarbonization progress.

Strategic Recommendations

- **Policy and Governance Priorities**

- Establish binding interim targets for 2030 and 2040
- Create a centralized coordination mechanism for transport decarbonization
- Accelerate implementation of carbon pricing and emissions trading
- Strengthen alignment with international climate and trade frameworks
- Ensure alignment of the maritime sector with EU ETS requirements in accordance with Türkiye's recent amendments to the Ports Law

- **Infrastructure and Technology Priorities**

- Expand EV charging and alternative fuel infrastructure
- Accelerate railway electrification and multimodal logistics development
- Support innovation and domestic production of clean transport technologies

- **Sector-Specific Priorities**

- Strengthen emission standards and incentives in road transport
- Promote sustainable fuels and green port infrastructure in maritime and aviation
- Expand rail connections to industrial zones
- Scale sustainable urban mobility planning nationwide

- **Financing and Implementation**

- Mobilize green finance and international climate funding
- Strengthen public-private partnerships
- Invest in workforce skills and institutional capacity

Strategic Policy Prioritization

A critical element of this strategy is the prioritization of 24 policy recommendations using the Best Worst Method (BWM), which incorporated feedback from 31 evaluations across 22 distinct institutions. This analysis determined that Cost-Effectiveness (47% weight) is the most decisive factor for stakeholders, followed by Environmental Impact (27%) and Feasibility (18%).



Based on these weighted criteria, the following policies emerged as the highest priorities for immediate action:

- **Financial & Fiscal Reform** (Score: 8.04): Implementing incentives, taxes, and pricing approaches for net-zero emissions is ranked as the top priority due to its high cost-effectiveness and impact.
- **Road Transport Electrification** (Score: 8.00): Promoting EVs and making government supports (like SCT reductions) permanent is identified as the most impactful environmental lever.
- **Integrated Urban Mobility** (Score: 7.92): Strengthening public transportation and micro-mobility infrastructure (Score: 7.87) provides a highly feasible path for urban decarbonization.

Toward a Sustainable Transport Future

Türkiye's journey toward net-zero transport emissions by 2053 requires transformative action across policy, technology, and societal dimensions. The country possesses significant advantages including its strategic geographic position, growing renewable energy capacity, and strong industrial base that can support this transformation.

Success will depend on resolving policy contradictions, accelerating infrastructure investments, and ensuring that the transition is both environmentally effective and socially inclusive. The integration of transport decarbonization with broader economic development goals will be essential for maintaining political support and public acceptance.

The next critical phase involves translating strategic visions into concrete implementation plans with clear timelines, adequate financing, and robust monitoring mechanisms. By addressing the identified gaps and building on existing strengths as well as accelerating implementation efforts and maintaining focused governance will enable Türkiye not only to meet its 2053 commitments but also to emerge as a leader in sustainable and low-carbon transport systems in the region and beyond.

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ANNEX

• Comparative Analysis of Policies in Terms of International & National Documents

Major international and national documents related to Net Zero Emissions are available in Table 1. It is given comparatively under the headings of Road, Rail, Maritime, Aviation, Modal shift and Intermodal Transportation, Logistics, Urban, Finance, Climate Targets, Technology, Infrastructure and Energy. In the first column of the table, the expressions that can be accepted as policies for Türkiye are specified. In the side columns, the strategies, actions and legislations in the relevant international and national documents related to this field are given. International policy frameworks such as the European Green Deal and the Paris Agreement provide the overarching direction for transport decarbonisation (European Commission, 2019; United Nations, 2015). At the national level, Türkiye's Medium-Term Programme and climate strategy documents define the policy trajectory and implementation priorities (Presidency of the Republic of Türkiye Presidency of Strategy and Budget, 2024; Republic of Türkiye Ministry of Environment, Urbanization and Climate Change Directorate of Climate Change).

Table 1: Comparative Analysis of Policies in Terms of International & National Documents

Policy	International Document	International Policies (S/A/L)	National Document	National Policies (S/A/L)
Road				
Promoting electric and alternative fuel vehicles	EU Fit for 55 Package	Phasing out internal combustion engine vehicles in the EU market by 2035.	Medium Term Program (2025-2027)	Promoting the use of domestic electric vehicles through targeted subsidies and infrastructure improvements.
	EU Fit for 55 Package	RED III: Increasing advanced biofuels usage in transport to at least 5.7% by 2030.	Turkish Transport Policy Document	Reduction of greenhouse gas emissions by enhancing electric vehicles and charging infrastructure.
	The European Green Deal	Ensure all new vehicles sold by 2035 are zero-emission.	Turkish Transport Policy Document	Gradual transition to alternative fuel vehicles to reduce dependency on fossil fuels.
	ITF 2024	Deploy at least 10% of heavy freight vehicles with zero-emission technologies by 2030.	Green Deal Action Plan (2021)	Encouraging the transition to zero-emission vehicles in freight and logistics.
	ITF 2024	Ensure all new buses purchased for urban areas are electric or hydrogen-based by 2035.	Mobility Vehicles and Technologies Roadmap - Ministry of Industry and Technology	According to the report, more than 1.600.000 electric vehicles are expected to be on the road in Türkiye by 2030. The promotion of electric vehicle rental systems in intercity and urban areas, as

				well as the support of domestic electric vehicle manufacturing through tax incentives and low-interest credit programs, are necessary.
	CO2 Emission Standards for New Vehicles Regulation (2023)	* Target: 100% reduction in CO2 emissions for new cars and vans by 2035. * Interim Targets (vs. 2021 levels): 2030: - 55% for new cars, - 50% for new vans.		
Enhancing the charging infrastructure across the country, especially in major cities	Sustainability of Europe's Mobility Systems	Achieve 1 million public recharging stations by 2030 for electric vehicles.	Turkish Transport Policy Document	Reduction of greenhouse gas emissions by enhancing electric vehicles and charging infrastructure.
	EU Fit for 55 Package	Alternative Fuels Infrastructure Regulation (AFIR): Requires EV charging stations every 60 km along main roads.	Ministry of Energy and Natural Resources - 2024-2028 Strategic Plan Regulation on Charging Services (Official Gazette, 2022), (implemented by EMRA) governing the establishment, licensing, and operation of EV charging infrastructure	Increasing the number of electric vehicles charging sockets to 100.000 in 2028
	EU Fit for 55 Package	AFIR: Mandates hydrogen refueling stations every 150 km.	Medium Term Program (2025-2027)	The current national policy context, which primarily focuses on electric high-power charging infrastructure rather than hydrogen refueling, envisages implementing a national high-power charging station plan for logistics corridors and urban areas by 2027. .
	The European Green Deal	Deploy 1 million public recharging and refueling stations by 2025 for zero-emission vehicles.	Mobility Vehicles and Technologies Roadmap	According to the report, the number of public charging sockets in Türkiye is expected to reach 251,000 (35% DC socket) by 2030.
	Sustainability of Europe's Mobility Systems	Achieve 1 million public recharging	Regulation on Charging Services	According to the EMRA projections, the total number of charging sockets

		stations by 2030 for electric vehicles.		is expected to reach 273,076 by 2035, under the medium scenario.
	COP29	Deploy 1 million public charging stations for EVs by 2030.	Regulation on the Procedures and Principles for Increasing Energy Efficiency in Transportation - Ministry of Transport and Infrastructure (May 2019)	The Ministry of Transport and Infrastructure has included hydrogen among the clean energy fuels to be promoted as an alternative to fossil energy sources.
	Alternative Fuels Infrastructure Regulation (AFIR) (2023)	* Set mandatory targets for charging stations and hydrogen refueling stations along major transport corridors (TEN-T network) to ensure consistency across Member States. * Ensure charging points every 60 km for electric vehicles on main TEN-T corridors by 2025 and additional urban charging solutions by 2030. * Deploy hydrogen refueling stations every 150 km along the core TEN-T network by 2030.		
	Alternative Fuels Infrastructure Regulation (AFIR) (2023)	* Support the deployment of infrastructure for electric, hydrogen, and biofuel-powered vehicles to reduce reliance on fossil fuels.		
	Alternative Fuels Infrastructure Regulation (AFIR) (2023)	* Ensure charging stations are user-friendly, interoperable, and compatible with real-time pricing and availability information. * Require digital platforms to provide users with real-time		

		information on station locations, availability, and costs.		
Promotion of advanced biofuels (European Union)	Revised Renewable Energy Directive — “RED III”: Directive (EU) 2023/2413 (amends RED II) (Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652)	Imposes a transport obligation so Member States must choose either: (a) $\geq 14.5\%$ GHG-intensity reduction of transport energy by 2030, or (b) $\geq 29\%$ renewable share in transport by 2030 Introduces a binding, combined sub-target of 5.5% (by 2030) for advanced biofuels (Annex IX Part A) + RFNBOs, with a minimum 1% RFNBO share; still applies double counting to Annex IX/RFNBO contributions.	Umbrella documents: - Updated NDC & 2053 Net-Zero - Long-Term Climate Strategy (2053) - Climate Change Mitigation Strategy & Action Plan (2024–2030) - Türkiye Green Deal Action Plan (Presidential Circular 2021/15) EMRA regulations (changed 31.10.2025): - Bioethanol obligation at 1.5% (v/v) for a single period covering 2023–2026 (applies to both refiners and distributors) Biodiesel obligation at 0.5% rate but combined 2023–2026 as a single compliance period for biodiesel blending	The umbrella documents emphasize alternative clean fuel options frame the policy direction and project but do not impose advanced-biofuel or e-fuel quotas for road use. No specific road-fuel quotas for advanced biofuels/e-fuels is defined in the umbrella documents.
Low Carbon Fuel Standard (LCFS) — a California Air Resources Board (CARB) regulation in Title 17, California Code of	Cal. Code Regs. Tit. 17, § 95480 - Purpose State Regulations US Law LII / Legal Information Institute	Requires a declining carbon-intensity (CI) of transportation fuels sold in the state. CARB’s 2024 rulemaking (finalized in 2025) tightened the CI reduction schedule to 30% by 2030 and 90% by 2045 (relative to the 2010 baseline)		

Regulations, §§ 95480–95497				
Promotion of alternative fuels (green H2 and derivatives, i.e. e-fuels)	- Alternative Fuels Infrastructure Regulation (AFIR) — Regulation (EU) 2023/1804 - Renewable Energy Directive (RED III) — Directive (EU) 2023/2413	Sets mandatory H₂ refueling coverage—public HRS every 200 km on both TEN-T core and comprehensive road networks and at least one HRS in each urban node by specified milestones Sets sub-target of 5.5% for advanced biofuels + RFNBOs (renewable fuels of non-biological origin, i.e., renewable hydrogen & e-fuels), with a **minimum ≥1% RFNBO requirement by 2030. Also provides multipliers and sustainability rules.	Türkiye Hydrogen Technologies Strategy and Roadmap (2023) Announcement - Republic of Türkiye Ministry of Energy and Natural Resources	Following argets are set: 2 GW electrolysers by 2030 5 GW by 2035 70 GW by 2053 cost goals of : \$2.4/kg by 2035 < \$1.2/kg by 2053 Additional measures include - certification/traceability - domestic technology and infrastructure support - potential gas-grid blending, and cross-sector deployment (incl. transport).
Rail				
Enhancing railway transportation network			Green Deal Action Plan (2021)	Developing low-carbon transport corridors to facilitate sustainable trade.
			Twelfth Development Plan (2024-2028)	Increasing high-speed train lines to 5,343 km by 2028.
			2030 Strategy and II. National Energy Efficiency Action Plan (2024-2030)	Expanding rail freight capacity and urban rail systems to meet energy efficiency goals for sustainable mobility.

			TCDD Energy Management and Climate Change Action Plan 2023-2025	Constructing 5 ecological bridges along railway corridors by 2025.
			TCDD Transportation Inc. - Energy Management and Climate Change Action Plan 2025-2026	Logistics hubs and intermodal connections for freight transport should be expanded. Electrification of high-speed rail and suburban lines, along with the development of infrastructure compatible with battery and hydrogen technologies, should be prioritized. In addition, energy efficiency and the deployment of low-carbon propulsion technologies in rail vehicles should be promoted.
Electrification of railways and usage of alternative energies in terms of net zero emissions	Alternative Fuels Infrastructure Regulation (AFIR) (2023)	The regulation now includes railway transport, and this will encourage EU member states to consider the roll-out of alternative fuels infrastructure on the rail network, contributing to the achievement of the EU Green Deal objectives	TCDD Energy Management and Climate Change Action Plan 2023-2025	Increasing the share of electric railway lines to 54% by 2025.
	RED III (see above)	The RES-T target (in RED III) was set to 29% of energy consumed in road and rail transport to come from renewable sources		

	Alternative Fuels Infrastructure Regulation (AFIR) (2023)	*Different technologies are available to the rail sector to shift away from diesel trains, including direct electrification, battery powered trains and hydrogen applications. *The development of these technologies requires the deployment of suitable recharging and refueling infrastructure in member states.	Türkiye's Climate Change Mitigation Strategy and Action Plan (2024-2030)	Developing electrification systems for railway and urban transport systems to support decarbonization. The development of HVO technology should be advanced, accompanied by pilot projects to evaluate its feasibility, scalability, and emissions reduction potential.
			TCDD Energy Management and Climate Change Action Plan 2023-2025	To carry out project development and feasibility studies to ensure that 35% of railway energy consumption is supplied from renewable energy sources.
Improving railway transportation system in terms of net zero emissions	Sustainability of Europe’s Mobility Systems	Increase rail freight share to 30% of total inland freight transport by 2030.	Twelfth Development Plan (2024-2028)	To minimize environmental impacts and costs and increase energy efficiency in the transportation and logistics sector, priority will be given to rail and maritime transportation.
	COP29	Increase rail freight share to 30% by 2030 to cut emissions.	TCDD Energy Management and Climate Change Action Plan 2023-2025	Planting 200.000 trees near railway zones to protect natural life.
			TCDD Energy Management and Climate Change Action Plan 2023-2025	Reducing total carbon footprint by 10% compared to 2023 levels.
			Türkiye Transportation and Logistics Master Plan (Vision 2053)	It is aimed to increase the share of rail freight transport from 5,08% to 22%. In line with this goal, projects such as the development of railway infrastructure and the establishment of logistics centres are planned.
Maritime				

Improving maritime transportation system in terms of net zero emissions	Sustainability of Europe's Mobility Systems	Reduce maritime GHG intensity reduction by 80% by 2050 through alternative fuels and efficiency.	Green Deal Action Plan (2021)	Promoting the use of maritime transport for international trade to reduce carbon emissions.
	EU Fit for 55 Package	FuelEU Maritime Regulation sets a declining limit on the well-to-wake GHG intensity of the energy used on board ships calling at EU ports as well as sets On-shore power (OPS) obligations.	Twelfth Development Plan (2024-2028)	To minimize environmental impacts and costs and increase energy efficiency in the transportation and logistics sector, priority will be given to rail and maritime transportation.
	The European Green Deal	Reduce maritime transport emissions by at least 50% by 2050.		
	Paris Agreement	Reduce the carbon intensity of international shipping by at least 40% by 2030.		
	COP29	Reduce the impact of the shipping industry on marine biodiversity by 50% by 2050.		
	Implementing Regulation (EU) 2016/1927	Details: Specifies templates and rules for monitoring plans, emissions reports, and documents of compliance in the maritime sector.		
	TEN-T Regulation (Revised in 2023)	The European Maritime Space aims to integrate the maritime space with other transport modes efficiently, viably and sustainably. For this purpose, short-sea shipping routes will be upgraded, and new ones will be created, while maritime ports will be further developed as well as their hinterland connections.		

Supporting the green seaports	EU Fit for 55 Package	AFIR: Ensures shore-side electricity infrastructure at ports by 2030.	Regulation on the Issuance of Green Port Certificate to Coastal Facilities (MTI - November 2023)	The aim is to determine the procedures and principles regarding the dissemination and support of the efforts to increase energy efficiency by reducing the environmental damage of coastal facilities caused by ship and cargo operations.
Supporting the green vessels / ships	Regulation (EU) 2015/757 on MRV for Maritime Transport	• Scope: Ships above 5,000 gross tonnage calling at EU ports are required to monitor and report annual CO₂ emissions, fuel consumption, and other relevant data	Amendments to the Turkish Ports Law (Law No. 618) enabling the pricing of greenhouse gas emissions from vessels calling at Turkish ports and establishing the legal basis for monitoring, reporting, and verification (MRV) systems	Recent amendments to the Turkish Ports Law have enabled the pricing of greenhouse gas emissions from ships calling at Turkish ports and initiated the development of the technical and regulatory infrastructure for monitoring, reporting, and verification (MRV), providing a legal basis for supporting greener vessels and port operations.
			EMRA's Decision No. 9822 on the Amendment of the Decision on Crude Oil, Fuel Oil, Bunkering, Mineral Oil, Base Oil and Petroleum-Related Substances	Sustainable marine blending components can be used in the preparation of marine fuels up to 30 % (EMRA decision was published in the Official Gazette... Biodiesel can be used)
			Financial Opportunities for Achieving Green Transformation Goals - (Regulation on the Promotion of the Construction of New Ships to Replace Scrapped Turkish Flagged Ships)	If an alternative environmentally friendly energy source is used in the newly built ship, including LNG and hybrid systems, instead of the scrapped ship, the support amount will be 2.5 times the scrap price per ton (Turkish flagged vessels of 50GT and above can apply).
			Financial Opportunities for Achieving Green Transformation Goals - (Regulation on the Promotion of the Construction of New Ships to Replace	In addition, ship owners who will convert the main engines of existing ships from fossil fuel to an alternative environmentally friendly energy source will be provided with a grant of 25 percent of the conversion cost (Turkish

			Scrapped Turkish Flagged Ships)	flagged vessels of 50GT and above can apply).
Aviation				
Promoting environmentally friendly air fuel and aircrafts	EU Fit for 55 Package	2025: 2% SAF blend • 2030: 6% SAF (with 0.7% synthetic fuels) • 2040: 32% SAF (8% synthetic) • 2050: 63–70% SAF (28% synthetic).	Türkiye's Climate Change Mitigation Strategy and Action Plan (2024-2030) Sustainable Aviation Fuel Directive (SHT-SAF)	The principles governing the standards to be met by sustainable aviation fuels to be used for the reduction of greenhouse gas emissions from international aviation activities, as well as their mandatory use and incentivisation, have been established.
		ReFuelEU Aviation Regulation (EU) 2023/2405: Sets minimum escalating SAF blending by fuel suppliers, ensuring an RFNBO subtarget		
	The European Green Deal	Reduce aviation emissions by 40% by 2040 through sustainable aviation fuels.	Regulation On the Monitoring of Greenhouse Gas Emissions from Aviation Activities Sustainable Aviation Fuel Directive (SHT-SAF)	A 5% reduction in emissions from international flights has been targeted for 2030. The reduction target will be updated in the future.
	Sustainability of Europe's Mobility Systems	Reduce aviation emissions by: 2030: 5–8% CO ₂ reduction • 2050: 63–70% reduction	Carbon Offsetting and Reduction Scheme Implementation Instruction for International Aviation (SHT-CORSIA)	Procedures and principles governing the monitoring, reporting, verification, and offsetting of carbon dioxide emissions arising from international aviation activities have been established.
	COP29	The Aviation Impact Accelerator's 2030 Sustainable Aviation Goals aim for a 40% reduction in fuel burn per passenger-kilometre by 2040	Türkiye's Climate Change Mitigation Strategy and Action Plan (2024–2030)	The principles governing the standards to be complied with by sustainable aviation fuels to be used for the reduction of greenhouse gas emissions from international aviation

		through fleet modernization and operational optimizations	Sustainable Aviation Fuel Directive (SHT-SAF)	activities, as well as their mandatory use and incentivisation, have been established.
	CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation)	• 2% annual fuel efficiency improvement through 2050	Regulation on the Monitoring of Greenhouse Gas Emissions Arising from Aviation Activities (SHY-16.4)	Procedures and principles governing the monitoring, reporting, verification, and offsetting of carbon dioxide emissions arising from international aviation activities have been established.
	CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation)	• Carbon neutral growth from 2020 onwards (CNG 2020)	Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) Implementation Directive (SHT-CORSIA)	
	CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation)	• Long-term global aspirational goal of net-zero carbon emissions by 2050		
Improving airway transportation system in terms of net zero emissions	Paris Agreement	Implement carbon-neutral aviation fuels to reduce aviation emissions by 50% by 2050.	SHY 16.4 – SHT-CORSIA (Turkish Civil Aviation Regulation and Instruction on the Implementation of ICAO's Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA))	Green Airport Project: "Green Establishment Certificate" is given by SHGM to businesses that meet the specified requirements. If all businesses at an airport receive a "Green Establishment Certificate", that airport will be given a "Green Airport Certificate".
	ACI (Airports Council International) Net Zero 2050	Commitment of the European Airport Industry under ACI to Achieve Net Zero CO ₂ Emissions (Scope 1 & 2) by 2050	General Directorate of State Airports Authority (DHMI)	Within the scope of the "Carbon-Free Airport Project" launched by DHMI in 2020, approval has been granted for the European Airport Industry's commitment under ACI to achieve Net Zero CO ₂ emissions (Scope 1 & 2) by 2050. In addition, since 2020, airports have been certified at various levels under the Airport Carbon Accreditation (ACA) Programme conducted by ACI.

	Toulouse Declaration	The first public–private initiative supporting the objective of European aviation to achieve net zero CO ₂ emissions by 2050, approved by the Council of the European Union on 4 February 2022	General Directorate of State Airports Authority (DHMI)	Within the scope of the “Carbon-Free Airport Project” launched by DHMI in 2020, approval has also been granted to the Toulouse Declaration.
	CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation)	Airlines must offset the growth in their CO2 emissions from international flights above 2019 levels by purchasing carbon offsets (Starts in 2021, full implementation by 2027).		
	CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation)	Airlines are required to monitor and report their CO2 emissions annually to ensure transparency and accountability (Annual reporting from 2021).		
	ICAO Air Transport Policy and Regulations	One of the objectives of the air transport policy and regulation program is creating more competitive business opportunities in the marketplace thereby contributing to the sustainable economic development and to the expansion of trade and tourism		
Modal shift and Intermodal Transportation				
Shift to environmentally friendly modes	The European Green Deal	Shift 75% of inland freight currently carried by road to rail and inland waterways by 2030.	Türkiye Transportation and Logistics Master Plan (Vision 2053)	Shift to environmentally friendly transportation modes, reducing fossil fuel dependency.
			Türkiye's Climate Change Mitigation Strategy and Action Plan (2024-2030)	Enhancing modal shift to maritime transport to reduce emissions.

Enhancing multimodal transportation facilities	Combined Transport Directive (Under Revision)	Proposed Updates: New support measures for transshipment terminals and simplification of administrative procedures to encourage multimodal transportation	Turkish Transport Policy Document	Developing integrated multimodal transport systems including rail, sea, and air hubs
			2024-2030 National Smart Cities Strategy and Action Plan (DRAFT)	Access to alternative transportation information through the National Urban Guide will be provided to promote the use of multimodal transportation systems.
			Combined Transportation Regulation - MTI	The purpose of this Regulation is to establish, support and encourage the dissemination of an integrated, balanced and environmentally friendly transportation order by determining the principles, principles and conditions regarding combined freight transportation, intermodal transportation by rail and green logistics activities.
Logistics				
Decreasing the emissions sourced by city logistics operations	ITF 2024	Expand rail freight share to 20% of all freight by 2030.	2030 Strategy and II. National Energy Efficiency Action Plan (2024-2030)	Expanding rail freight capacity and urban rail systems to meet energy efficiency goals for sustainable mobility. To promote the use of e-cargo bikes and electric micromobility solutions, and to provide priority access and dedicated parking spaces for low-

				emission vehicles in urban logistics areas.
	ITF 2024	Increase urban freight efficiency with e-cargo bikes handling 25% of deliveries by 2030.		
Decreasing the emissions sourced by national and international logistics operations	EU Fit for 55 Package	Increasing rail freight usage to account for at least 30% of long-distance transport by 2030.	Twelfth Development Plan (2024-2028)	Increasing railway freight share to over 21% and passenger share to over 6% by 2028.
	Paris Agreement	Increase rail freight share to 30% of total freight transport by 2030.	Medium Term Program (2025-2027)	Expanding rail freight corridors to reduce dependency on road transport and improve connectivity.
	Sustainability of Europe's Mobility Systems	Increase rail freight share to 30% of total inland freight transport by 2030.	Green Deal Action Plan (2021)	Expanding rail freight capacity to align with EU Green Deal objectives.
	COP29	Increase rail freight share to 30% by 2030 to cut emissions.	Türkiye Transportation and Logistics Master Plan (Vision 2053)	Expansion of logistics centres integrated with rail and sea networks. To develop national strategies to increase the share of rail and maritime transport, and to implement green logistics certification schemes and carbon footprint reporting requirements.
Urban				
Strengthening the public transportation	ITF 2024	Ensure all new buses purchased for urban areas are electric or hydrogen-based by 2035.	Türkiye's Climate Change Adaptation Strategy and Action Plan (2024-2030)	Integration of adaptation measures into urban transport systems to enhance climate resilience.
	United Nations Sustainable Development Goals (UN SDGs)	Goal 11: Ensure at least 60% of urban residents globally have access to public transport by 2030.	Türkiye's Climate Change Mitigation Strategy and Action Plan (2024-2030)	Developing electrification systems for railway and urban transport systems to support decarbonization.
	The European Green Deal	Increase urban public transport usage by 60% by 2030 to reduce congestion and pollution.	Twelfth Development Plan (2024-2028)	Expanding urban rail systems to 880 km by 2028.

	Sustainability of Europe's Mobility Systems	Increase urban public transport usage by 50% by 2030 to mitigate congestion and pollution.	2030 Strategy and II. National Energy Efficiency Action Plan (2024-2030)	Expanding rail freight capacity and urban rail systems to meet the energy efficiency goals for sustainable mobility.
	ITF 2024	Double urban public transport ridership to reduce congestion and improve air quality by 2030.	2024-2030 National Smart Cities Strategy and Action Plan (DRAFT)	Urban smart transportation applications will be expanded.
	COP29	Double urban public transport usage by 2030 to mitigate congestion and emissions.	2024-2030 National Smart Cities Strategy and Action Plan (DRAFT)	Urban transportation analysis platforms will be developed to reduce accidents and traffic congestion, and the capacity of municipalities for transportation planning will be enhanced.
			2024-2030 National Smart Cities Strategy and Action Plan (DRAFT)	Efforts will be made to reduce vehicle ownership and encourage residents to adopt environmentally friendly transportation modes to mitigate urban traffic issues.
Developing bicycle, walking and micro mobility infrastructure	ITF 2024	Promote electric micro mobility to account for 15% of total urban trips by 2030.	2024-2030 National Smart Cities Strategy and Action Plan (DRAFT)	Long-term bicycle-sharing systems will be expanded, and a membership system will be developed to ensure the easy, accessible, and affordable use of electric bicycles and scooters for urban mobility.
Urban Transport Plans	United Nations Sustainable Development Goals (UN SDGs)	Goal 13: Promote sustainable transport systems to mitigate climate change impacts in urban areas.	Turkish Transport Policy Document	Integration of urban transport with national master plans.
	Paris Agreement	Promote sustainable transport systems to reduce emissions in urban areas.	Türkiye's Climate Change Adaptation Strategy and Action Plan (2024-2030)	Implementation of local climate action plans in 81 provinces with a focus on urban infrastructure adaptation.
	Paris Agreement	Increase public transport share in urban areas to 60% by 2030 to reduce emissions.	Türkiye's Climate Change Adaptation Strategy and Action Plan (2024-2030)	Development of urban mobility strategies to reduce heat island effects.

	TEN-T Regulation (Revised in 2023)	All 430 major cities along the TEN-T network will have to develop Sustainable Urban Mobility Plans to promote zero and low emission mobility.		
Finance				
Incentives, taxes and pricing approaches for net zero emission	EU Fit for 55 Package	Social Climate Fund: Provides financial support to mitigate the social impacts of carbon pricing in the transport sector, with a €72.2 billion budget (2025-2032).	Türkiye's Climate Change Mitigation Strategy and Action Plan (2024-2030)	Establish regulations to incentivize the use of alternative fuels in transport.
	Energy Efficiency Directive - EC	To address any potential negative impacts, the revenue generated from the extension of the EU Emissions Trading System (ETS) to buildings and transport will be used through the Social Climate Fund.	Medium Term Program (2025-2027)	Promoting the use of domestic electric vehicles through targeted subsidies and infrastructure improvements.
	Sustainability of Europe's Mobility Systems	Deploy EUR 40 billion through the Innovation Fund for low-carbon technologies in transport.	Financial Opportunities for Achieving Green Transformation Goals	50% discount on transportation authorization certificates and renewal fees for Green Logistics Certificate
	COP29	Developed countries committed to mobilizing USD 300 billion annually for developing nations by 2035.	Financial Opportunities for Achieving Green Transformation Goals	95% discount on vehicle card fees for specific carriers for Green Logistics Certificate
	COP29	Up to USD 1.3 trillion per year in public and private financing for climate action by 2035.	Financial Opportunities for Achieving Green Transformation Goals	Extra 5 points for UBAK Permit applications for Green Logistics Certificate
	EU Fit for 55 Package	Revised Energy Taxation Directive: Ends tax exemptions for fossil fuels in aviation and maritime sectors. Introduce lower taxes for low-	Financial Opportunities for Achieving Green Transformation Goals	Various incentives will be applied to those who have a green port certificate

		carbon and renewable fuels.		
	Renewable Energy Directive III (RED III)	Renewable electricity supplied to electric vehicles (EVs) via public charging stations will be rewarded through a credit mechanism. These credits can be sold to fuel suppliers, encouraging further EV adoption.	Financial Opportunities for Achieving Green Transformation Goals	Thirty ships arriving at the green ports within a year will be given priority to pass through the Turkish Straits.
	Alternative Fuels Infrastructure Regulation (AFIR) (2023)	Leverage public-private partnerships and EU funding schemes to accelerate infrastructure development.	Financial Opportunities for Achieving Green Transformation Goals	The IPA project titled "Maritime Decarbonization and Green Shipping Program" will support climate-based investments (energy efficiency, electrification, circular economy and other environmental benefits) that promote the green transformation of companies in the sector.
	Energy Taxation Directive (ETD) Revision (Proposed)	Proposal: Establish minimum tax rates based on energy content and environmental performance (favoring sustainable fuels and electricity)	Regulation on the Promotion of the Construction of New Ships to Replace Scrapped Turkish Flagged Ships	The purpose of this Regulation is to determine the procedures and principles of the incentives to be given to support the renewal of our country's maritime trade fleet and the establishment of an effective, safe and sustainable transportation system that is harmless to the marine environment in coastal waters and international waters.
	Energy Taxation Directive (ETD) Revision (Proposed)	One of the main changes: Fossil fuels used as fuel for intra-EU air transport, maritime transport and fishing should no longer be fully exempt from energy taxation in the EU. This is a		

		crucial measure given the role of these sectors in energy consumption and pollution.		
	Eurovignette Directive (2022 Revision)	Requires Member States to vary charges based on CO2 emissions from 2023 onward. The aim of the proposal was to move away from a time-based model of charging (vignettes) to a distance-based one – that better reflects the polluter-pays and user-pays principles – and to include other vehicles.		
Emission trading system (ETS) for net zero emission	EU Fit for 55 Package	Expanding the EU Emissions Trading System (ETS) to cover emissions from maritime transport and flights departing from the EU.	EPDK (EMRA)- Regulation On the Operation of the Emissions Trading System Market	This Regulation establishes the procedures and principles governing the Emissions Trading System market and the Transaction Registry System to be established and operated for the purpose of promoting the reduction of greenhouse gas emissions.
	The European Green Deal	Introduce a carbon border adjustment mechanism for selected sectors to reduce carbon leakage.		
	New ETS for Road Transport and Buildings (ETS 2) (2023)	• Target: 43% reduction in emissions by 2030 (compared to 2005).		
	EU ETS Revision and Extension (2023)	• Aviation: Gradual phase-out of free ETS allowances for airlines by 2026.		

	EU ETS Revision and Extension (2023)	• Inclusion of Maritime Transport: - o from 2024: 40% of emissions covered. - o from 2025: 70% of emissions covered. - o from 2026: 100% of emissions covered.		
Climate Targets				
General goals on climate change	EU Fit for 55 Package	Reducing EU greenhouse gas emissions by 55% by 2030 compared to 1990 levels.	Medium Term Program (2025-2027)	Establishing a net-zero emission strategy for the transportation sector to align with the green transformation goals.
	United Nations Sustainable Development Goals (UN SDGs)	Goal 13: Limit global warming to 1.5°C, requiring a 42% reduction in GHG emissions by 2030.	Medium Term Program (2025-2027)	Developing national and urban mobility systems focusing on electrification and sustainable practices.
	Paris Agreement	Achieve net-zero emissions by 2050 in order to limit global warming to 1.5°C.	Türkiye's 2053 Long Term Climate Strategy	Achieving net-zero emissions by 2053 through mitigation and adaptation strategies.
	Paris Agreement	Hold the increase in the global average temperature to well below 2°C above pre-industrial levels and limit to 1.5°C.	Türkiye's 2053 Long Term Climate Strategy	Reducing energy intensity by 35% by 2035 compared to 2020 levels.
	Paris Agreement	Reduce global greenhouse gas emissions to achieve a balance between emissions and sinks in the second half of the century.	Regulation on the Monitoring of Greenhouse Gas Emissions - (Directorate of Climate Change - MEUCC)	The purpose of this Regulation; to regulate the procedures and principles regarding the monitoring, reporting and verification of greenhouse gas emissions.
	Paris Agreement	Submit nationally determined contributions (NDCs) every 5 years with progressively higher ambition.		
	The European Green Deal	Achieve climate neutrality by 2050 across all sectors.		

	The European Green Deal	Reduce greenhouse gas emissions by 55% by 2030 compared to 1990 levels.		
	Sustainability of Europe’s Mobility Systems	Reduce transport GHG emissions by 90% by 2050 to achieve climate neutrality.		
	ITF 2024	Reduce transportation emissions by 50% from 2020 levels by 2030 across all modes.		
	Renewable Energy Directive III (RED III)	Enhanced sustainability and GHG savings criteria for biofuels and biomass ensure only environmentally responsible sources are included in achieving targets.		
	Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action	• Framework: Establishes an integrated system for planning, reporting, and monitoring progress on GHG reductions, renewables, and energy efficiency across all sectors.		
Technology				
Intelligent Transportation Systems (ITS)	Paris Agreement	Enhance international cooperation to support technology transfer for sustainable transport solutions.		
			Türkiye Transportation and Logistics Master Plan (Vision 2053)	Implementing intelligent transportation systems (ITS) for enhanced mobility and safety.
			Türkiye's Climate Change Mitigation Strategy and Action Plan (2024-2030)	Expanding urban transport systems to include low-emission technologies.

			2024-2030 National Smart Cities Strategy and Action Plan (DRAFT)	Applications for technological transformations facilitating the transition to low-carbon and sustainable urban transportation systems will be implemented, and micro-mobility vehicles will be promoted.
Infrastructure				
Resilience of the transport network	United Nations Sustainable Development Goals (UN SDGs)	Goal 9: Develop quality, reliability, sustainable, and resilient transport infrastructure to support economic development and human well-being.	Türkiye Transportation and Logistics Master Plan (Vision 2053)	Construction of 5,839 km new motorways by 2053, focusing on efficiency and connectivity.
			Türkiye's Climate Change Adaptation Strategy and Action Plan (2024-2030)	Strengthening transport infrastructure to handle extreme weather events like flooding and heatwaves.
			Türkiye's Climate Change Adaptation Strategy and Action Plan (2024-2030)	Monitoring and evaluation of transport networks for climate risk resilience.
			Green Deal Action Plan (2021)	Implementing eco-design standards for transport infrastructure to minimize environmental impact.

Energy				
Energy efficiency	Energy Efficiency Directive - EC	The directive more than doubles the annual energy savings obligation by 2028. This is one of the key policy instruments of the directive to meet the headline target and to drive energy savings in end-use sectors, such as buildings, industry and transport.	2030 Strategy and II. National Energy Efficiency Action Plan (2024-2030)	Reducing energy consumption by 16% and achieving a cumulative savings of 100 million tons of CO2 emissions by 2030.
			2030 Strategy and II. National Energy Efficiency Action Plan (2024-2030)	Investing \$20.2 billion in energy efficiency to support green energy transformation in the transport sector.
			2030 Strategy and II. National Energy Efficiency Action Plan (2024-2030)	Promoting energy-efficient urban transport systems and electrification strategies to reduce dependency on fossil fuels.
			Energy Efficiency Law	Regarding increasing energy efficiency in transportation; The procedures and principles regarding the reduction of the unit fuel consumption of domestically produced vehicles, the increase of efficiency standards in vehicles, the dissemination of public transportation, and the establishment of advanced traffic signaling systems are regulated by the regulation to be prepared jointly with the Ministry of Industry and Trade and put into effect by the Ministry of Transport.
			2030 Strategy and II. National Energy Efficiency Action Plan (2024-2030)	Increasing public awareness and implementing mandatory energy audits in transport sectors.
Renewable energy	EU Fit for 55 Package	Renewable Energy Directive (RED III) sets a target of 40% renewable energy in	Türkiye's 2053 Long Term Climate Strategy	Transforming the energy sector with 69.1% renewable energy share by 2053.

		the EU energy mix by 2030		
	EU Fit for 55 Package	RED III mandates 5% of newly installed renewable energy capacity to come from innovative technologies by 2030.	Türkiye's 2053 Long Term Climate Strategy	Investing \$59 billion in renewable energy, \$20.2 billion in energy efficiency by 2030.
	EU Fit for 55 Package	Deploying at least 30 GW of offshore wind energy annually to meet EU targets by 2030.	Renewable Energy Legislation - Electricity Market Law	Within the framework of this law, projections are prepared for the use, development and charging infrastructure needs of electric vehicles and necessary incentives are given.
	United Nations Sustainable Development Goals (UN SDGs)	Goal 7: Increase the global share of renewable energy to 42.5% of energy consumption by 2030.		
	The European Green Deal	Increase renewable energy share to 40% of total energy consumption by 2030.		
	Renewable Energy Directive III (RED III)	A 29% share of renewable energy in the transport sector's final consumption, or a 14.5% reduction in the GHG intensity of fuels by 2030		
	Renewable Energy Directive III (RED III)	Specific provisions aim to decarbonize maritime and aviation sectors, such as a 1.2% renewable fuel share for maritime transport energy by 2030. These sectors are otherwise difficult to electrify.		
	Alternative Fuels Infrastructure Regulation (AFIR) (2023)	* Support renewable energy integration and energy storage capabilities through connected systems.		

- **Conflicts between Türkiye’s international environmental commitments and domestic transport sector policies**

Structured analysis of conflicts between Türkiye’s international environmental commitments and domestic transport sector policies, based on the provided targets and timelines is shown in Table 2.

Table 2: Analysis of Conflicts

Conflict Area	International Agreement	Domestic Policy/Decision	Nature of Conflict
Fossil Fuel Subsidies	Paris Agreement (NDC): Requires phasing out fossil fuel subsidies to meet 2053 net-zero	Domestic: subsidies are reported on natural gas	Undermines emissions reduction targets by incentivizing fossil fuel use in road/rail freight
Maritime ETS Alignment	EU Green Deal (CBAM & ETS): By 2026, imports and shipping to the EU must face an equivalent carbon price	Climate Law of Türkiye: Delays domestic ETS to 2026, initial scope likely excludes certain sectors (e.g. small emitters, aviation/shipping)	The Turkish Climate Law does not explicitly cover the maritime sector, whereas the EU ETS includes 50% of emissions involving EU ports, leaving the remaining share open to carbon pricing under national or other international mechanisms. While this structure does not create a risk of double taxation, it increases compliance costs for maritime companies, which may subsequently lead to higher costs for exporters.
SAF Production	CAO CORSIA: Carbon-neutral growth for international aviation from 2027; EU ReFuelEU mandate 2% SAF by 2025, 6% by 2030.	Through the use of sustainable aviation fuels (SAF), a 5% reduction in emissions from international flights is targeted by 2030.	Annual emission reduction targets associated with the use of sustainable aviation fuels (SAF) will be defined for each year, thereby creating demand for SAF production.
Rail Electrification	EU TEN-T Standards: Core rail network to be 100% electrified by 2030	National Transport Plan: ~54% of rail lines electrified by 2024; full electrification only by 2035 (“90% in medium term”)	Slower rail electrification could exclude Türkiye from EU’s integrated rail corridors. Delayed modernization risks missed funding and continued diesel rail emissions. Advanced biofuels (HVO) can be used to cover part of the gap.

Conflict Area	International Agreement	Domestic Policy/Decision	Nature of Conflict
MARPOL Annex VI Compliance	IMO MARPOL Annex VI: Global 0.50% sulfur limit in marine fuels from 2020, enforced by member states.	Domestic Fuel Rule: Full heavy fuel oil (HFO) ban in Turkish coastal shipping delayed until 2025 (Black Sea/Mediterranean). <i>De facto</i> use of >0.5% sulfur fuel continued on some routes.	Continued use of high-sulfur fuels in coastal routes (Vessels transiting Turkish straits (Bosphorus, Dardanelles) or the Marmara Sea are exempt from the 0.10% sulfur limit unless anchored for >2 hours. This allows coastal shipping vessels on short-haul routes to use fuels with ≤1.50% sulfur during transit, provided they do not exceed anchoring time limits.)
Urban Air Quality	WHO Guidelines: PM2.5 limit of 5 µg/m ³	Euro VI Standards: Implemented	no official phase-out policy for pre-2010 vehicles exist in Türkiye as of 2025 45% of Türkiye's truck fleet remains non-compliant, worsening urban air pollution
Renewable Energy Integration	EU Green Deal: 55% renewable electricity by 2030	Grid Modernization: 51 GW solar/wind by 2035 (delayed vs. EU pace)	Insufficient grid upgrades risk stranded assets (e.g., EV charging stations)/ High Carbon Intensity of electricity mix
Carbon Pricing	OECD Recommendations: \$75–100/ton CO ₂ tax by 2030	Draft ETS: sets penalty but excludes aviation until 2026	Uneven sectoral coverage creates market distortions
Hydrogen Adoption	EU Hydrogen Strategy: 20 Mt renewable H ₂ by 2030	Hydrogen Valley Initiative: 3 pilot projects by 2026, no binding targets	Lack of clear hydrogen quotas for transport delays hard-to-abate sector transitions

- **Key Conflict Summary**

- Fossil Fuel Dependency vs. NDC Targets: Continued diesel subsidies (\$8.2B/year) contradict Türkiye's Paris Agreement pledges.
- Delayed ETS Implementation: Misalignment with EU CBAM risks trade penalties for maritime sector.
- Infrastructure Gaps: Slow EV charging and rail electrification jeopardize modal shift goals. (Advanced biofuels can cover a significant part of the gap)

Recommendations for Resolution is shown in the Table 3.

Table 3: Recommendations for Resolution

Conflict	Potential Resolution
Fossil Fuel Subsidies	Gradually redirect 20–30% of fossil fuel subsidies into clean transport (EV charging, e-buses)
Maritime ETS Misalignment	Fast-track adoption of a national ETS by 2025 (ahead of EU’s 2026 CBAM start) covering major sectors, including maritime and aviation. Link with EU carbon market mechanisms where feasible to exempt Turkish exporters from CBAM charges. Carbon pricing for maritime emissions should be implemented under the Turkish Ports Law (Law No. 618), within the authority of the Ministry of Transport and Infrastructure, rather than through inclusion in the national Emissions Trading System, which is not currently envisaged for the maritime sector. On-shore power (OPS) infrastructure in major ports must be planned. Advanced biofuels (biodiesel blends) and bioLNG need be considered.
SAF Production Gaps	Scale up the supply of sustainable aviation fuel (SAF) through cooperation with the EU and industry stakeholders. For example, participate in or co-finance a €500 million SAF investment programme focused on local feedstocks (such as agricultural residues and used cooking oils).
Rail Electrification Delays	Secure international financing to accelerate rail electrification. This could include collaboration with the EU (EFSD+) or alternative investors (e.g. China’s Belt and Road Initiative) to upgrade critical corridors by 2030 instead of 2035. This would better integrate Turkish rail with EU standards. To cover the delays on electrification advanced biofuels (such as HVO) can be considered in the non-electrified diesel sections of the railway network.
Urban Air Quality	Strengthen and accelerate the vehicle scrappage program for old diesel trucks and buses. Use a portion of ETS revenue or other green funds to incentivize retiring pre-2010 vehicles by 2027–2028 (instead of 2030). Tighten low-emission zone regulations in big cities to restrict high-emitting vehicles, improving compliance with WHO air quality guidelines. Increase quotas of advanced biofuels such as bioethanol, biodiesel and bioCNG/biogas.

Türkiye’s policy contradictions highlight tensions between economic priorities and climate commitments. Bridging these gaps requires harmonizing domestic regulations with international benchmarks while securing green financing mechanisms.

- **Road Transport Prioritisation (Decarbonization Targets and Timelines)**

In 2021, Türkiye ratified the Paris Agreement and concurrently established a national goal to achieve economy-wide net-zero emissions by 2053. This target applies across all sectors, including road transport, and has been confirmed by Türkiye’s cabinet and President Erdoğan.

Although it is not a legally binding, sector-specific policy, it is firmly embedded within the country’s official climate strategy. Achieving net-zero emissions in the road transport sector by 2053 appears plausible due to this high-level commitment, though detailed sector-specific roadmaps remain under development.

Türkiye’s updated Second Nationally Determined Contribution, submitted in 2025, commits to limiting greenhouse gas emissions to 643 MtCO₂-equivalent by 2035 compared to the business-as-usual scenario. This ambitious target aligns with Türkiye’s commitments under the Paris Agreement; however, meeting this goal will require substantial and aggressive policy measures, particularly in the energy and transportation sectors.

The previous National Energy Efficiency Action Plan (NEEAP), covering the period 2017–2023, targeted a reduction in primary energy consumption of about 14% below the BAU scenario across multiple sectors, including transport. However, this target was set for 2023 and is now outdated. Türkiye announced a new Energy Efficiency Action Plan for 2024–2030, setting an updated goal of a 16% reduction in energy use by 2030 across all sectors.

This revised target is realistic given Türkiye's planned investments of approximately USD 20 billion in energy efficiency by 2030. While a specific target for the transport sector energy intensity is not explicitly stated, improvements in this sector remain encouraged within the broader economy-wide efficiency goals.

Regarding technology adoption, Türkiye's Energy Market Regulatory Authority (EMRA) released projections under a high-growth scenario, estimating that approximately 4.2 million electric vehicles (EVs) will be on the roads by 2035. This projection corresponds to around 17% of the total vehicle fleet and has been publicly endorsed by senior government officials. The target is ambitious but achievable, considering rapid market expansion—from roughly 15,000 EVs in 2022 to over 93,000 by early 2024—supported significantly by Türkiye's domestic EV manufacturer, Togg. The government's ongoing efforts to accelerate EV charging infrastructure further support this goal.

Türkiye has also aligned its heavy-duty vehicle emissions standards with the European Union's Euro VI regulations. Implementation of Euro VI standards began in the mid-2010s, and by 2016, compliance became mandatory for all new heavy-duty trucks and buses nationwide.

Additionally, Türkiye requires gasoline to include a bioethanol blend, a mandate first introduced at 2% in 2013 and increased to 3% in 2014 by the Energy Market Regulatory Authority (EMRA). This obligation was temporarily suspended in 2020 to divert ethanol to sanitizer and disinfectant production during the COVID-19 pandemic, after which the 3% mandate was reinstated. Law No. 7333 (2021) subsequently introduced tax incentives for biofuels but did not itself establish the blending requirement. As of 31 October 2025, however, the effective blending quota for gasoline has been reduced to 0.5%, necessitating its restoration to at least 3% and the introduction of provisions that would allow further increases where domestic biofuel supply can cover fuel demand, with equivalent minimum quotas applied to biodiesel. This biofuel blending framework supports domestic agriculture and modestly reduces fossil fuel dependence, although biofuels currently account for less than 1% of Türkiye's total transport energy use. In parallel, biomethane produced via anaerobic digestion and subsequent upgrading of organic wastes, as well as green hydrogen, should be granted non-discriminatory access to the natural gas grid through enabling legislation by the Ministry of Energy and Natural Resources (MENR) and corresponding regulation by EMRA, building on ongoing efforts to prepare for hydrogen blending into gas networks.

For infrastructure development, EMRA projects under a high scenario that Türkiye will install approximately 347,934 public EV charging sockets nationwide by 2035. EMRA's infrastructure projections has reported similar figures, with medium scenarios ranging from 181,000 to 273,000 chargers. Significant progress has been achieved; the number of publicly accessible charging points increased from approximately 3,000 in early 2023 to 36,280 as of October 2025.

According to projections by the Ministry of Transport and Infrastructure, Türkiye is expected to have approximately 1.8 to 2.1 million electric vehicles on its roads by 2030 under medium to high growth scenarios. By 2035, this number is projected to increase significantly, reaching

approximately 5.1 to 6.3 million electric vehicles under medium to ambitious scenarios aligned with the country's net-zero targets.

Türkiye's Climate Law establishes a domestic Emissions Trading System (ETS) to be implemented by 2026-2027. This system aims to cover major emitters across various sectors. Carbon Market Board and Advisory Board are established under Climate Law and responsible for overseeing the implementation and decision-making processes of the national cap-and-trade system. However, specific implementation details for road freight emissions remain under discussion.

The phase-out of pre-2010 diesel vehicles through scrappage incentives between 2025 and 2030 is currently under policy development. The Climate Council, in its 2022 declaration, recommended accelerated retirement of pre-Euro 5 diesel cars and trucks (vehicles generally produced before 2011). This measure aligns with national air quality improvement goals, given that older diesel vehicles significantly contribute to black carbon and nitrogen oxide (NOx) emissions. Although formal legislation has not yet been enacted, Türkiye has previously implemented similar vehicle scrappage programs. While official endorsement and expert recommendations support this initiative, nationwide implementation has not commenced as of 2025. Nonetheless, the measure remains plausible, especially in urban areas, complementing Euro VI standards and broader air quality objectives.

Lastly, establishing Low-Emission Zones (LEZ) in Istanbul and Ankara city centres by 2026 has been recommended but not yet implemented. The Climate Council in 2022 proposed the creation of LEZs to improve urban air quality. Istanbul's municipal Climate Action Plan also includes proposals to restrict older, higher-polluting vehicles within its historic core. Despite these plans, as of early 2025, neither city has officially implemented LEZs, indicating ongoing planning and future potential rather than immediate policy realization.

Structured summary of Türkiye's road transport decarbonization targets and timelines across intercity and urban sectors, synthesized from international agreements and domestic policies is shown in Figure 1.

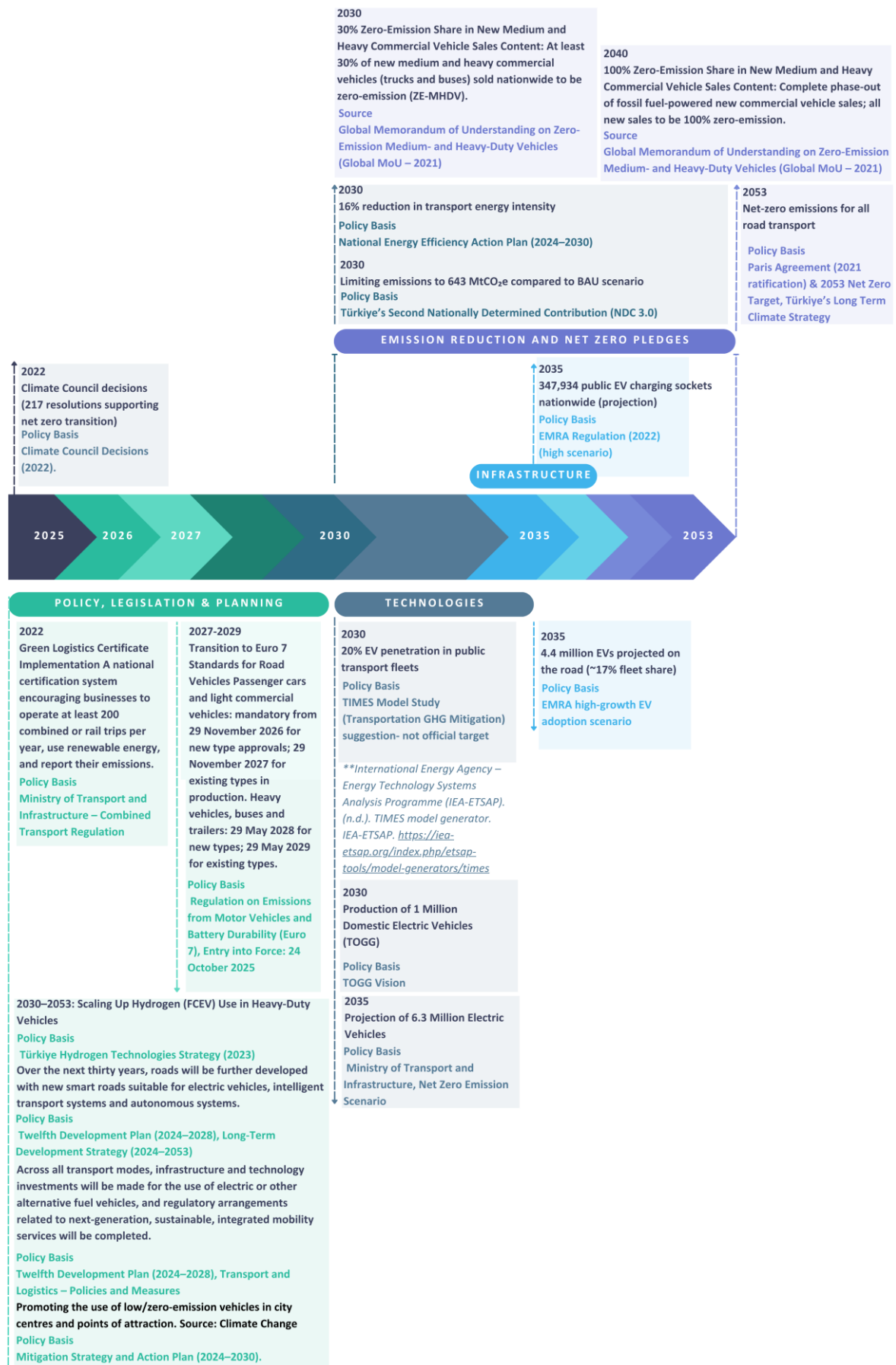


Figure 1: Road Prioritization for Türkiye

- **Modal Shift & Multimodal Transport**

- 2053: Reduce road freight transport share from 71.39% to 57.47%. *Policy basis:* Transport and Logistics Master Plan.
- 2053: Reduce road passenger transport share from 70.59% to 42.28%. *Policy basis:* Transport and Logistics Master Plan.
- 2035: Reduce the share of highways in annual freight transportation from 71% to 59%. *Policy basis:* Transport and Logistics Master Plan (2035 targets).

- **Maritime Transport Prioritisation (Decarbonization Targets and Timelines)**

Structured analysis of conflicts between Türkiye's international environmental commitments and domestic transport sector policies, based on the provided targets and timelines:

Net-zero emissions for maritime sector by 2053: This target aligns with Türkiye's economy-wide net-zero 2053 commitment announced after Paris Agreement ratification. While not a standalone IMO requirement, Turkish officials have indeed stated that the maritime sector is expected to reach net-zero by 2053 in line with national policy. The timeline (2053) is accurate, as it mirrors the national net-zero deadline. This target's ambition is high but generally plausible since it follows the overall decarbonization pathway of Türkiye (which includes all sectors). It is also broadly consistent with the IMO's revised strategy calling for net-zero GHG emissions "by or around 2050" for global shipping (Türkiye chose 2053, slightly later).

Policy basis: Türkiye's 2053 Net Zero Target (national climate strategy).

"40% reduction in CO₂ intensity of maritime transport (vs. 2008) by 2030": This matches the IMO Initial GHG Strategy's 2030 goal for international shipping – 40% reduction in carbon intensity by 2030 relative to 2008. Türkiye, as an IMO member, supports this objective, and it is reflected indirectly in policy (e.g. Türkiye's updated NDC 3.0 mentions aligning sectoral actions with Paris goals, though it doesn't explicitly quantify a maritime intensity target). The 2030 timeline and 2008 baseline are accurate per IMO. Achieving 40% intensity reduction by 2030 is plausible globally – in fact, some of this has been met through slower steaming after 2008 – but it demands continued efficiency gains and cleaner fuels. For Türkiye's fleet and ports, it means driving energy efficiency (e.g. IMO's EEDI/EEXI and CII measures) and logistics improvements this decade. Clear distinctions between Turkish-flagged and Turkish-owned vessels, as well as between cabotage and international shipping activities, are required before setting targets for the Turkish maritime fleet, as these categories are subject to different regulatory and compliance regimes.

Policy basis: IMO Initial GHG Strategy (2018); IMO 2023 GHG Strategy; Paris Agreement commitments (though Türkiye's current NDC 3.0 is economy-wide and not very stringent).

LNG bunkering infrastructure at major ports (Mersin, İzmir, Çeşme) by 2027: In September 2021, Türkiye's state gas company BOTAŞ, shipping firm Arkas Petrol, and Japan's Sumitomo Corp signed a tripartite agreement to establish the country's first LNG bunkering hub. This initiative aims to develop LNG bunkering services in Turkish ports (notably in the eastern Mediterranean) to fuel LNG-powered ships.

50% on-shore-power usage for port calls by 2030: Türkiye's "Green Port" (Yeşil Liman) **certification standards** encourage port operators to adopt measures to reduce emissions within which onshore power (cold ironing) is highlighted as a key measure. While Turkish legislation does not establish a fixed quota requiring shore power use in 50% of port calls, this target is consistent with broader policy trends. The EU's Alternative Fuels Infrastructure Regulation now **mandates** that main ports provide shore-side electricity by 2030 for container and passenger ships. Additionally, from 2030 the EU FuelEU Maritime Regulation will require many ships (containers, cruises) to use shore power or equivalent zero-emission measures while at berth. Although Türkiye is not in the EU, its biggest ports may adopt similar timelines to stay competitive and reduce pollution. Notably, in **October 2024, Asyaport (Tekirdağ) became the first Turkish port to offer high-voltage on-shore power for containerships**, allowing a 20,000 TEU ship (MSC *Oscar*) to shut down engines and plug into the grid

Methane slips reduction systems for LNG carriers by 2026: There is **no Turkish regulation explicitly requiring methane slip abatement tech by 2026**, but this target is derived from *EU alignment requirements*. The EU has recognized methane emissions ("methane slip") from LNG-fuelled ships as a climate issue. Notably, the EU Emissions Trading System (ETS) expansion will **include methane from shipping starting in 2026** (ships must pay for CH₄ emissions in addition to CO₂). This will economically pressure LNG carriers and dual-fuel ships to reduce methane slip or face higher costs. Also, the IMO is working on Lifecycle GHG guidelines and mid-term measures that account for methane (likely to be finalized by 2025). So, while Türkiye hasn't imposed a direct mandate for equipment, **any Turkish-flagged or Türkiye-operating LNG vessels trading to the EU will need to cut methane slip by 2026** to avoid ETS fees. Technologies to do so (engine modifications, oxidizers, fuel containment improvements) are expected to be adopted as best practices. The timeline 2026 corresponds to the EU ETS phase-in (70% of shipping emissions costs in 2025, 100% in 2026) which indeed *covers methane*

CO₂-based emission fees (ETS) by 2026: Türkiye is in the process of establishing a domestic Emissions Trading System. The **Climate Change Mitigation Strategy and Action Plan (2024–2030)** released in 2024 outlines the creation of a national ETS aligned with the EU ETS and Carbon Border Adjustment Mechanism. The national ETS is expected to primarily cover the power and industrial sectors, with full operationalization envisaged by 2026 following a pilot phase in 2025. Under the Turkish Ports Law (Law No. 618), the pricing of greenhouse gas emissions from maritime activities falls exclusively within the authority of the Ministry of Transport and Infrastructure, and at this stage, the inclusion of the maritime sector in the national ETS is not envisaged.

Within Türkiye's areas of jurisdiction, sulphur content limits of 0.10% and 0.50% are applied in line with the provisions of Annex VI of the MARPOL Convention. Compliance with MARPOL Annex VI is monitored through inspections, and the necessary enforcement measures are taken. Türkiye became a Party to Annex VI of the MARPOL Convention in 2014, and accordingly, compliance with all requirements of MARPOL Annex VI is inspected for both Turkish-flagged and foreign-flagged vessels. In this context, in 2022 the International Maritime Organization adopted a significant decision by designating the Mediterranean Sea as a Sulphur Oxides Emission Control Area (Mediterranean SECA). The implementation of this regulation commenced on 1 May 2025. Under this rule, all ships operating in the Mediterranean Sea are required to use fuel with a sulphur content not exceeding 0.10%.

Furthermore, since 2012, under Türkiye's domestic legislation, ships calling at Turkish waters and ports have been required to use fuel with a sulphur content not exceeding 0.10%, in accordance with specific regulatory provisions. As of 2025, all ships operating in Turkish waters—including ports and the Mediterranean Sea—are required to effectively comply with the Mediterranean SECA standard by using fuel with a sulphur content of no more than 0.10%. This target has been implemented; the relevant regulation is in force through Türkiye's transposition of MARPOL Annex VI into national law and its enforcement via local directives. The timeline is accurate, with 2025 corresponding to the entry into force of the Mediterranean SECA.

Certain provisions of the Regulation on the Reduction of the Sulphur Content of Certain Types of Fuels are outdated. In addition, rules requiring the use of fuel with a sulphur content not exceeding 0.10% should also be introduced for the Sea of Marmara. (UN Environment Programme, 2022; 2023 IMO Strategy on Reduction of GHG Emissions from Ships, 2025).

Policy basis: The domestic implementation of MARPOL Annex VI—through the legislation of Türkiye's Ministry of Environment, Urbanization and Climate Change—has already established a 0.10% sulphur (S) limit for ships operating in Turkish ports and anchorage areas, and as of 2025 the IMO Med ECA covers Türkiye's Mediterranean coastline. In practice, Türkiye's compliance with these requirements has been confirmed by official notices issued in 2024 and 2025 increasing penalties for the use of high-sulphur fuels.

Assessment: The target exists and is being realized as scheduled. However, a specific regulatory framework for the Sea of Marmara has not yet been established.

Double pollution fines in Special Environmental Protection Areas by 2025: This refers to stricter enforcement in ecologically sensitive maritime zones, notably the Marmara Sea SEPA. In June 2021, the government launched the *Marmara Sea Action Plan* (Akpulat and Dağdeviren Hill, 2024; Republic of Türkiye Ministry of Trade, 2025) and later that year designated the entire “**Marmara Sea and Islands**” as a **Special Environmental Protection Area**. Under Türkiye's Environmental Code (Law 2872), **fines for marine pollution in SEPA zones are doubled** compared to normal areas. This legal provision is real – an amendment published 28 Dec 2023 explicitly states that fines under Article 20 of the Environment Law are applied at twice the standard rate in Special Environmental Protection Zones. Thus, by 2024–2025, fines in the Marmara Sea (and any designated sensitive area) are indeed 2 times higher. For example, if a ship illegally discharges waste into the Marmara SEPA, the calculated fine is doubled. The timeline “2025” likely marks that by this year the measure is fully in effect (in fact, it took effect upon legal update in 2024).

Policy basis: Regulations concerning the protection of the marine environment are primarily based on the Environmental Law enacted by the Ministry of Environment, Urbanization and Climate Change, as well as the Marmara Sea Action Plan (2021).

Mandatory EEDI/EEXI compliance for Turkish-flagged vessels by 2024: As of 2024, compliance with energy efficiency requirements for Turkish-flagged vessels has effectively become mandatory within the framework of the International Maritime Organization (IMO) regulations. (2023 IMO Strategy on Reduction of GHG Emissions from Ships, 2025; Det Norske Veritas, 2025).

The Energy Efficiency Design Index (**EEDI**) has been mandatory for certain types of newly built ships since 2013 under **MARPOL Annex VI**. As Türkiye is a Party to MARPOL Annex VI, newly built Turkish-flagged vessels are required to comply with these requirements.

The Energy Efficiency Existing Ship Index (EEXI) and the Carbon Intensity Indicator (CII) are more recent regulatory measures that entered into force on 1 January 2023. In this context, all in-service Turkish-flagged vessels of 400 gross tonnage and above engaged in international navigation are required to complete their EEXI calculations and obtain an International Energy Efficiency Certificate (IEEC).

Within the framework of the CII scheme, the first performance ratings were issued in **2024**, based on operational data from the **2023 reporting year**. Accordingly, 2024 is considered a critical milestone at which technical compliance has been completed and performance-based assessments have effectively commenced.

In conclusion, as a Party to **MARPOL Annex VI**, Türkiye has implemented the IMO's technical energy efficiency regulations across its Turkish-flagged fleet as of the **2023–2024 period**.

Plausibility: Achieved – Turkish authorities (Flag State) are issuing certificates and ensuring ships meet EEDI for new builds and EEXI for existing ones. This is a standard IMO obligation. Policy basis: IMO Energy Efficiency Regulations (MARPOL Annex VI, Chapter 4); Türkiye's adherence via its maritime administration. For example, in early 2023 Türkiye would have notified shipowners of the need for EEXI certification at next survey, as per IMO MEPC requirements. In sum, this target stands and has been implemented on schedule. (2023 IMO Strategy on Reduction of GHG Emissions from Ships, 2025; Det Norske Veritas, 2025).

Here is a structured summary of Türkiye's maritime sector decarbonization targets and timelines, synthesized from international agreements and domestic policies is shown **Error! Reference source not found..**



Figure 29: Maritime Prioritization for Türkiye

• Implementation Status

Structured analysis of conflicts between Türkiye's international environmental commitments and domestic transport sector policies, based on the provided targets and timelines:

2025: Full implementation of doubled pollution fines in Marmara Sea SEPA – As noted above, the legal framework for higher fines in the Marmara Special Environmental Protection Area was in place by early 2024. By 2025, we indeed see **full enforcement**: the Coast Guard and authorities are applying the new fine levels.

This milestone exists (it's a consequence of the 2021 Action Plan and 2023 regulation update) and is on track. For example, in 2022–2023 multiple large fines were issued for pollution in Marmara, taking advantage of the new doubled-rate provisions. We can confirm the **policy is operational** – thus this status is factual. It aligns with the target under Regulation and shows it has been executed.

As of 2026, Türkiye's National Emissions Trading System (ETS) is expected to become fully operational, with a pilot phase planned to commence in 2025.

While the scope of the National ETS currently focuses primarily on large stationary emission sources, there are ongoing policy discussions regarding the potential inclusion of the maritime sector in carbon pricing mechanisms at later stages, in line with Türkiye's long-term objective of alignment with the European Union Emissions Trading System (EU ETS).

However, the regulatory framework governing maritime activities remains primarily under the responsibility of the Ministry of Transport and Infrastructure, and at present there is no binding legislative provision providing for the direct and comprehensive inclusion of maritime emissions within the scope of the National ETS.

In this context, any assessment regarding the coverage of “100%” of maritime emissions should take into account technical and legal considerations such as:

- the distinction between cabotage (domestic) voyages and international voyages;
- the types of greenhouse gases to be covered (for example, whether only CO₂ or all greenhouse gases); and
- the extent to which emissions generated over the course of a voyage would be accounted for.

The timeline is credible. However, “100% of maritime emissions” represents an ideal scenario; in practice, coverage is likely to be limited to vessels above a **certain** gross tonnage (GT) threshold and may initially exclude certain domestic-only voyages. Nonetheless, it reflects the intention to establish an economy-wide carbon market that could eventually include maritime transport. This milestone is therefore broadly justified, as the ETS is already under policy development and the 2026 timeline has been officially communicated.

This is consistent with Türkiye's 2024–2030 strategy that calls for **integrating with EU carbon mechanisms**.

- **Modal Shift & Multimodal Transport**

- 2053: Increase the share of maritime transport in freight and passenger flows as part of the Master Plan's balanced modal utilization objective (a specific numeric share target for maritime is not defined in the Master Plan). *Policy basis:* Transport and Logistics Master Plan.
- 2035: Expand green port implementations and deploy highly renewable energy resources in ports to enable low-carbon maritime intermodal nodes. *Policy basis:* Transport and Logistics Master Plan (2035 targets); Regulation on the Issuance of Green Port Certificate to Coastal Facilities (MTI, November 2023).
- Ongoing: Enhance combined (intermodal) transport and advance short-distance (cabotage) maritime transportation studies to shift freight from road to maritime

routes. *Policy basis:* Transport and Logistics Master Plan; By-law on Combined Transport (2022).

- **Aviation Transport Prioritisation (Decarbonization Targets and Timelines)**

Net-Zero CO₂ by 2053 (Domestic Aviation): Türkiye has pledged to reach net-zero emissions economy-wide by 2053, which implicitly covers domestic aviation emissions. This target is reflected in Türkiye's Long-Term Climate Strategy and the Climate Law adopted in 2025, although international flights are excluded from the national net-zero scope.

The General Directorate of State Airports Authority (DHMI) has launched the "Carbon-Free Airport Project" to manage environmental impacts and promote sustainable airport operations. The project covers key areas such as greenhouse gas emissions, resource use, air quality, noise, waste, wastewater, and chemical management, and has been progressively expanded across DHMI-operated airports.

Within this framework, 45 airports have been certified under the Airport Carbon Accreditation (ACA) Programme. Efforts are ongoing to maintain current certification levels and upgrade selected airports to higher levels. According to recent ACA data, the total number of accredited airports globally exceeds 650 across more than 90 countries (figures vary by reporting year). With 45 accredited airports, as of 2025, DHMI was reported to be the airport operator with the highest number of ACA-certified airports worldwide. Türkiye has also been reported as having around 52 ACA-accredited airports, ranking among the leading countries globally.

In addition, DHMI has formally endorsed the "ACI Net Zero 2050" initiative and signed the "Toulouse Declaration," supporting the European aviation sector's net-zero target by 2050. In parallel, Istanbul Airport's operator (İGA) has also committed to achieving net-zero carbon emissions by 2050.

Furthermore, in cooperation with TÜBİTAK Marmara Research Centre (MAM), DHMI has implemented climate strategy projects at selected airports, including emission assessments, climate risk analysis, vulnerability assessments, and cost-benefit analyses of mitigation and adaptation measures. These efforts are planned to be expanded to additional airports in subsequent phases.

Renewable energy investments are also being implemented, including solar power plants at multiple airports and planned installations at the Air Traffic Control Centre and other facilities. In addition, energy efficiency measures such as LED lighting, automation systems, and conversion to lower-emission heating systems are being introduced. Preparations have been initiated to obtain the TS EN ISO 50001 Energy Management System Certification.

Electrification efforts include the replacement of fossil fuel-powered apron vehicles with electric alternatives. According to DHMI presentations (2025), approximately 145 TOGG electric vehicles have been procured, while earlier reporting (2024) indicated lower figures, reflecting ongoing fleet expansion.

Projects have also been carried out to supply the electricity required by airports and air navigation facilities (including radar systems, navigation aid stations, airport-specific lighting systems, and control towers) from renewable energy sources. Solar power plants (SPPs) have been installed with capacities of 1 MWe at Erzincan Airport, 1 MWe at Sivas Nuri Demirağ Airport, 500 kWe at Gaziantep Airport, 500 kWe at Van Ferit Melen Airport, and 700 kWe at Muğla Dalaman Airport.

Within the scope of public–private partnership (PPP) arrangements, tenant companies will install and hand over solar power plants with capacities of 1.4 MWe at Dalaman Airport, 1 MWe at Muğla Milas Bodrum Airport, and 1.5 MWe at İzmir Adnan Menderes Airport to DHMI. In addition, the installation of solar power plants is planned for the Air Traffic Control Centre, with a capacity of 12 MWe—corresponding to approximately 10% of total electricity demand (estimate based on project documentation)—as well as for other airports.

Efforts are ongoing to convert heating and cooling systems to natural gas-based systems (LNG, LPG, and CNG), which result in lower emission levels. Moreover, automation systems are being implemented to reduce energy consumption in lighting, heating, cooling, and ventilation systems. Terminal buildings, aprons, and perimeter lighting systems at airports are also being converted to energy-efficient LED lighting.

Preparations have been initiated to obtain the TS EN ISO 50001 Energy Management System Certification.

In order to promote the use of electric vehicles in airside operations, various incentive mechanisms have been introduced within airport operational frameworks. However, specific provisions such as a “50% reduction in initial issuance and renewal fees” could not be consistently verified in publicly available tariff documents and are therefore presented here in a more general form.

Timeline check: 2053 is accurate for the national net-zero deadline (as reflected in Türkiye’s updated NDC and long-term climate strategy, as well as the Climate Law adopted in 2025), while Istanbul Airport aligns with the global 2050 benchmark.

Plausibility: Reaching net-zero domestic aviation by 2053 is ambitious. It will require widespread use of Sustainable Aviation Fuel (SAF), next-generation aircraft (including potential electric or hydrogen technologies post-2035), and carbon offsetting or removal solutions for residual emissions. The target is broadly aligned with ICAO’s Long-Term Aspirational Goal (net-zero international aviation by 2050) and ACI’s airport commitments, albeit slightly later than the global aviation sector’s 2050 benchmark.

The target is broadly aligned with ICAO’s Long-Term Aspirational Goal (net-zero international aviation by 2050) and ACI’s airport pledges, albeit three years later than the global aviation sector’s 2050 goal.

45% Emissions Reduction (Scope 1 & 2, Istanbul Airport) by 2030: This target is officially adopted by Istanbul Airport as part of its Level 4 “Transformation” certification in the Airport Carbon Accreditation program. In December 2023, İGA announced it had reached Level 4 accreditation, confirming a goal to cut its Scope 1 and 2 (direct and purchased energy) emissions 45% by 2030 versus the 2019 baseline.

Timeline check: 2030 and 45% are correct per İGA’s published commitment. This is grounded in science-based targets (consistent with a 1.5 °C pathway) and is a steppingstone toward net-zero 2050.

Plausibility: Moderately high – the airport has already achieved approximately a 21% reduction in Scope 1 and 2 carbon emissions between 2019 and 2023 through energy efficiency measures, operational optimizations, and partial renewable energy sourcing. The planned transition to renewable electricity and continued efficiency improvements are expected to support achieving the 45% reduction target. This target reflects alignment with

international airport decarbonization frameworks (such as ACA requirements for Level 4 accreditation) and contributes to national climate objectives.

21% Reduction in Airport Carbon Emissions (Istanbul Airport, 2019–2023): Status: Achieved. Istanbul Airport reported a 21% reduction in Scope 1 and 2 carbon emissions compared to the 2019 baseline, supported by its ISO 14064-aligned GHG management system and Airport Carbon Accreditation certification. This early achievement was realized despite increasing operational activity, indicating the effectiveness of measures such as energy efficiency improvements and the electrification of ground operations.

These developments should also be viewed within the broader context of airport decarbonization efforts led by DHMI, including the implementation of the Airport Carbon Accreditation programme, renewable energy investments, and energy management initiatives across the national airport network. Within this framework, Istanbul Airport represents one of the leading examples of emission reduction progress in the Turkish aviation sector.

Verification: The reported reduction is consistent with publicly available disclosures from Istanbul Airport and Airport Carbon Accreditation (ACA) programme documentation. The timeline “2019–2023” is broadly accurate, with the majority of reductions achieved by 2022.

Plausibility: The result was partly influenced by pandemic-related traffic reductions and subsequent efficiency measures. Sustaining further reductions may become more challenging as passenger traffic grows; however, the increased use of renewable energy and further operational efficiency improvements are expected to support continued progress.

Overall, Türkiye’s emissions reduction targets for aviation tie into international frameworks: the 2053 net-zero (domestic) aligns in spirit with ICAO’s 2050 global goal (though a bit delayed), and Istanbul Airport’s targets directly correspond to ACI’s Net Zero 2050 resolution and its Airport Carbon Accreditation standards. These targets are also consistent with Türkiye’s updated NDC 3.0 and draft Climate Law emphasis on reaching net-zero by 2053. However, reaching net-zero will require bridging the gap after 2038 (when emissions peak) with steep reductions – a challenge that calls for accelerated policy action.

SAF Blending – 5% by 2030 (Jet Fuel): Türkiye has issued the Sustainable Aviation Fuel Directive (SHT-SAF) by establishing the principles governing the standards to be met by sustainable aviation fuels to be used for the reduction of greenhouse gas emissions from international aviation activities, as well as their mandatory use and incentivisation. Through this regulation, a 5% reduction in emissions from international flights is targeted by 2030.

Major investments are underway: Major investments are underway to build a domestic SAF supply chain. Tüpraş, Türkiye’s largest oil refiner, plans to begin initial SAF production in 2026 at its İzmir Refinery using existing infrastructure, with an initial capacity of approximately 20,000 metric tons per year. A domestic SAF procurement agreement has been signed with Turkish Airlines — the first of its kind in Türkiye. In parallel, Tüpraş is developing a large-scale dedicated unit at İzmir (300,000–400,000 t/yr, Honeywell UOP Ecofining™ technology), pending a final investment decision expected following the completion of detailed engineering studies by end-2025; raw material supply has been secured from Tiryaki Agro from 2029. DB Tarımsal Enerji targets 100,000 t/yr from a new plant. Collectively, these projects indicate that Türkiye could have multiple domestic SAF production facilities operational by 2028–2030, provided investment decisions are confirmed, and projects proceed on schedule.

Exploration of hydrogen-fueled ground support vehicles by 2027 as an ongoing effort (Istanbul Airport): İGA has launched a colossal solar power plant project in Eskişehir (central Anatolia) to supply the airport. Covering 3 million m² with ~439,000 panels (199 MW capacity), this solar farm is scheduled to be fully operational by end of 2024. Existence: Confirmed – construction began in early 2024 as part of İGA’s Net Zero 2050 commitment. Timeline: “2024–2025” is accurate; completion is expected by Dec 2024, so by 2025 the airport will indeed source 100% of its electricity from solar. The airport CEO stated it aims to become the first in the world to meet all electricity demand with onsite/offsite renewables

Hydrogen-Fuelled Ground Support Vehicles by 2027 (Istanbul Airport): İGA is exploring hydrogen as a future fuel for airport operations. In a 2021 sustainability declaration, Istanbul Airport announced plans to use hydrogen fuel for airport transportation and heating in pursuit of net-zero. The airport has begun laying groundwork: it envisions dedicated hydrogen refuelling areas and is ensuring its new solar plant could power hydrogen production (electrolysis) in the future

Hydrogen is not expected to have a significant contribution by 2050 (with only 1.9% of energy share in 2050) but may increase in the 2050s and 2060s if technically feasible and commercially viable. – **LTAG**

Hydrogen has the potential to be a transformative energy source for aviation. However, we recognise that developing a hydrogen ecosystem – including infrastructure, production, distribution and regulatory frameworks – is a huge challenge requiring global collaboration and investment. – **AIRBUS**

The most high-profile setback came when Airbus pushed back its ambitious goal to introduce hydrogen-powered commercial aircraft in 2035. Citing a mix of infrastructure challenges and slower-than-expected technology development, it made the announcement during the Airbus Summit 2025 and expects a 5-10-year delay. Airbus isn't alone. Other manufacturers have recently dialed back plans or hit financial difficulties.- **ICCT**

Domestic SAF Production Plants by 2027: Türkiye aims to build a robust domestic SAF supply chain using local feedstocks. Turkish Airlines’ Climate Transition Plan emphasizes support for SAF development, and the government’s climate strategies call for promoting SAF via national sources. Existence: Several projects are underway that substantiate this target. Notably, Tüpraş will begin SAF production in 2026 by converting an Izmir refinery unit (HEFA process). Separately, a new SAF biorefinery (by DB Tarımsal Enerji, with international partners) is in development and expected to be among Türkiye’s first dedicated SAF plants. Officials have spoken of establishing multiple facilities: the climate council (2022) recommended accelerating alternative fuel production, and by launching public-private ventures, Türkiye could have 2–3 plants by 2027.

100% Electric Vehicle Fleet for Airside Operations (Istanbul Airport) by 2030: Electrifying ground vehicles and equipment is a key part of Istanbul Airport’s decarbonization. Existence: İGA has implemented ISO 50001 Energy Management and has been steadily replacing fossil-fuelled vehicles with electric ones. For example, the airport already uses electric hydrant dispensers and installed numerous EV charging stations for its ground handling fleet. In an April 2024 update, İGA noted it is “gradually converting vehicle fleets to electric” and had cut emissions from ground activities significantly

Mandatory SAF Blending Start (1% in 2025): Mandatory SAF Emission Reduction Requirement (from 2025): The Sustainable Aviation Fuel Directive (SHT-SAF), published by SHGM on 26 June 2025, introduces a mandatory SAF framework for international flights departing from Türkiye. Rather than specifying a fixed blending percentage, the directive sets a minimum CO₂ emission reduction per litre of blended fuel, with annual targets to be announced by SHGM before the end of each year's third quarter. Fuel suppliers must ensure that SAF-blended fuel delivered to Turkish airports meets the published threshold. Airlines are required to source at least 90% of their mandated SAF from Turkish airports. Targets will progressively increase, aligned with Türkiye's goal of achieving a 5% reduction in emissions from international aviation by 2030, consistent with ICAO CORSIA. Non-compliance will result in financial penalties for fuel suppliers.

Structured summary of Türkiye's aviation sector decarbonization targets and timelines, synthesized from international agreements and domestic policies is shown in Figure 2.

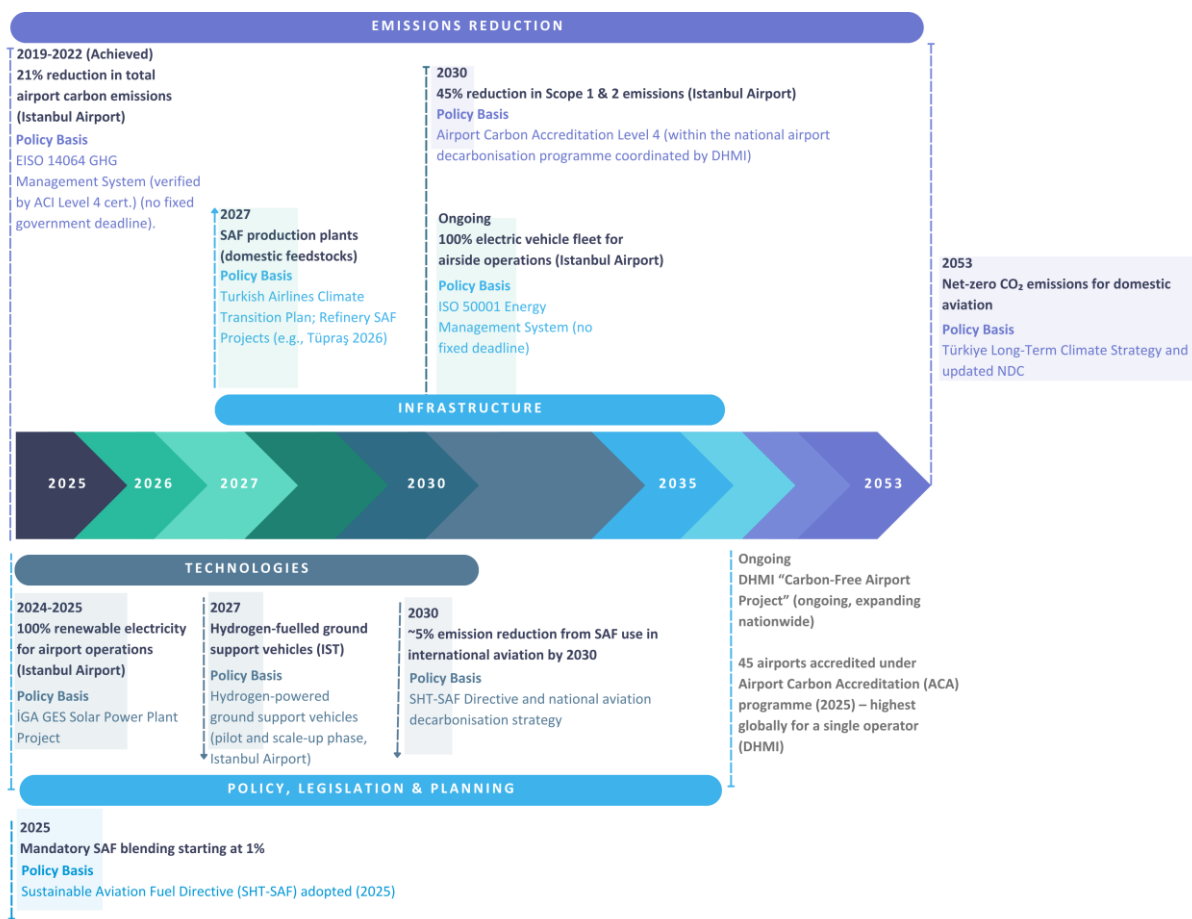


Figure 2: Aviation prioritization for Türkiye

• Modal Shift & Multimodal Transport

The Transport and Logistics Master Plan (Vision 2053) does not define an explicit modal-shift target for aviation. The sector's decarbonization is addressed primarily through emission monitoring, reporting, and verification (MRV) infrastructure and strategic carbon management rather than through shifting volumes to or from other modes. The Master Plan's

parallel high-speed rail expansion (5,345 km of high-speed and very-high-speed lines by 2035, rising to 6,425 km by 2053) may however provide an indirect substitute for selected short-haul domestic flights.

- 2035: Indirect modal substitution through high-speed rail network expansion (5,345 km of HSR/VHSR lines by 2035), potentially reducing demand for short-haul domestic aviation. *Policy basis:* Transport and Logistics Master Plan (2035 targets).

- **Rail Transport Prioritisation (Decarbonization Targets and Timelines)**

Emissions Reduction: Türkiye has not set a specific rail-sector emissions cut by 2030 in official plans. The climate NGO CAN Europe suggests a **35% reduction in national emissions by 2030 (vs 2020)** as necessary for a 2053 net-zero pathway, implying ambitious cuts in transport. This aligns with the International Union of Railways (UIC) pledge for carbon-neutral rail by 2050 and EU's Green Deal vision (90% transport emission reduction by 2050). Achieving net-zero rail by 2053 is plausible since rail currently contributes a small share of transport emissions (≈1% globally) and can be fully electrified with clean power.

Türkiye's Long-Term Climate Strategy (2024) explicitly states *"Electrification of railways will be completed"* by 2053.

An intermediate solution will be to partially replace fossil fuel (diesel) in the approx. 46% non-electrified railways network with Hydrotreated Vegetable Oils (HVOs), a practice widely implemented in EU. Hydrogen trains remain a long-term prospect. The Climate Council (2022) notes that hydrogen infrastructure for transport still requires major development, and pilot operations are unlikely before around 2030. Even then, large-scale deployment will depend on significant R&D progress. At present, both capital and operating costs for hydrogen rail are substantially higher than for conventional electrification. Given Türkiye's policy target of achieving 90 % network electrification, hydrogen traction is currently neither cost-effective nor a feasible alternative for the national rail system. As for **100% electric locomotives for passenger rail by 2040**, there is no formal Turkish deadline; this goal reflects the phasing out of diesel. It aligns with trends in Europe (e.g. the UK aims to remove all diesel-only trains by 2040) and would be enabled by complete electrification. Given Türkiye's 2053 electrification target, phasing out diesel passenger trains by 2040 is challenging but would significantly advance decarbonization.

Divriği–Kars railway (660 km) electrification is backed by a World Bank-funded project. It has not started yet; financing was approved in Dec 2024, and completion is expected by 2030. This project will replace diesel trains on that corridor and boost capacity to 20 million tons/year, supporting the Trans-Caspian route.

Türkiye is enacting climate regulations in line with EU standards. A **national Emissions Trading System (ETS)** is planned to launch in **2026–2027** (pilot phase). The Climate Law establishes the carbon market framework. This aligns with the EU Green Deal (and CBAM carbon border tax from 2026) to maintain competitiveness. On vehicle standards, Türkiye has already adopted **EU Stage V (Euro VI-equivalent)** emissions standards for new locomotives as of 2022, tightening limits on any remaining diesel stock. Finally, **circular economic measures** are being integrated: the Climate Council recommended mandatory use of recycled materials in construction. A target of *"30% recycled content in rail infrastructure by 2030"* is aspirational (not yet codified), but it aligns with Türkiye's green procurement goals and would reduce embodied CO₂ emissions in steel, concrete, etc.

Figure 31: Rail prioritization for Türkiye is a comprehensive summary of Türkiye's rail sector decarbonization targets and timelines, structured based on international commitments and domestic policies from the provided sources.

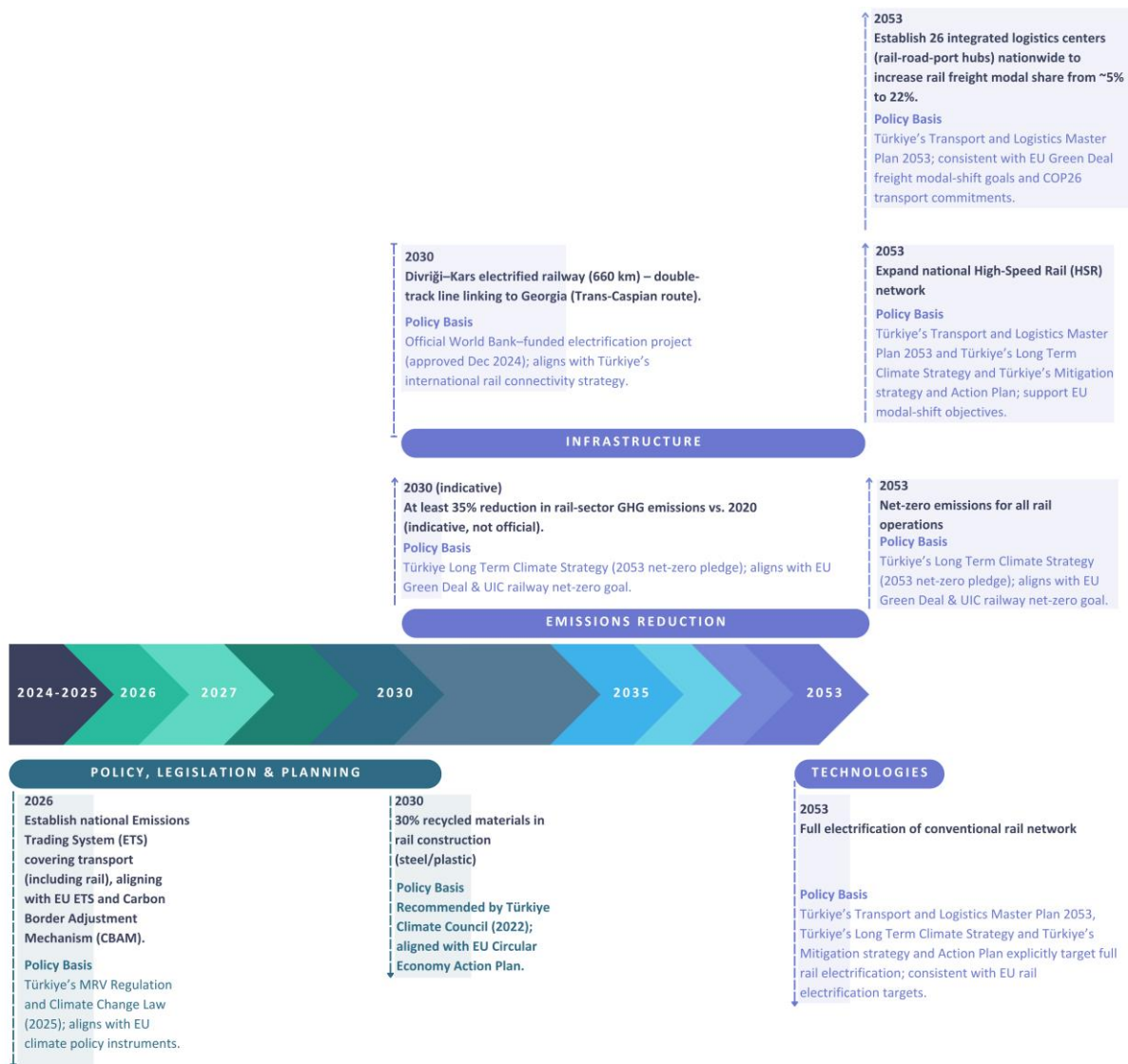


Figure 3: Rail prioritization for Türkiye

- **Modal Shift & Multimodal Transport**

- 2053: Increase the rail freight transport share from 5% to 22%. *Policy basis:* Transport and Logistics Master Plan.
- 2035: Increase the rail freight transport share from 5.08% to 20.12% and the rail passenger transport share from 0.96% to 5.31%; raise annual rail freight volume from 55 to 306 million tons and annual rail passenger volume from 19.5 to 145.6 million. *Policy basis:* Transport and Logistics Master Plan (2035 targets).

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