NET ZERO CITIES

EU MISSION PLATFORM | CLIMATE NEUTRAL AND SMART CITIES

1 Climate City Contract

2030 Climate Neutrality Action Plan

2030 Climate Neutrality Action Plan

of the City İzmir

İZMİR METROPOLITAN MUNICIPALITY

NetZeroCities has received funding from the H2020 Research and Innovation Programme under the grant agreement n°101036519.

Disclaimer

The content of this document reflects only the author's view. The European Commission is not responsible for any use that may be made of the information it contains.

Table of Contents

Summary

Cities play a crucial role in achieving climate neutrality. The most important reasons for this are that cities are the regions with the highest population and electricity consumption, and that strong networks that will channelize them towards climate targets are also located in cities.

The European Green Deal's goals of reducing emissions by 55% by 2030 and becoming the first climate-neutral continent by 2050 will be impossible to achieve without cities spearheading joint efforts. Therefore, following the radical and innovative path offered by the EU Climate Neutral and Smart Cities Mission for cities offers an important opportunity to achieve these goals.

Izmir is aware of how critical it is to achieve the goals set in the European Green Deal and be a part of the solution in this period when the effects of climate change are increasingly becoming more severe.

Following the path offered by the Climate Neutral and Smart Cities Mission means creating a city alliance in the fight against climate change without leaving anyone behind. Therefore, as a first step, Izmir focused on creating a fair, inclusive governance model by calling on the quintuple helix framework of the ecosystem (public, private sector, civil society, media) to be a part of the city alliance. It was met with great interest throughout the city in the awareness meetings held. Thanks to the existing capacity in Izmir's ecosystem, Global Climate Community (GCC) Izmir was established with great ambition.

We are aware that achieving the climate neutrality target in 2030 is a challenging goal due to reasons such as Izmir being the country's 3rd largest metropolitan city and an important industrial center. The city's desire and potential to work on climate change encourages Izmir to overcome this challenge.

Therefore, as a first step The Climate City Contract Action Plan builds on the city's existing action plans and strategies. Apart from that as a strong effort has been made to communicate the three elements of the Climate City Contract with each other. The point reached during the preparation of the Climate City Contract excites us to find more creative, fair and inclusive solutions in the coming periods.

We wholeheartedly believe that Izmir will be a unique living laboratory in its climate neutrality goal with its current capacity, perspective and ambition against climate change.

List of figures

List of tables

Abbreviations and acronyms

Abbreviations and acronyms	Definition
EU	European Union
IPCC	Intergovernmental Panel on Climate Change
NZC	NetZeroCities
GHG	Greenhouse gas
IMM	İzmir Metropolitan Municipality
CCC	Climate City Contract
IPPU	Industrial Process and Product Use
AFOLU	Agricultural, Forestry and Land Use
RES	Renewable Energy Systems
SECAP	Sustainable Energy Climate Action Plan
GCAP	Green City Action Plan
GCC İzmir	Global Climate Community İzmir (Küresel İklim Topluluğu İzmir)
ESCO	Energy Services Company
IFI	International Financial Institutions
NGO	Non-Governmental Organizations
SME	Small and Medium-sized Enterprises
PPP	Purchasing Power Parity
PV	Photovoltaic
MSW	Municipal Solid Waste
CAPEX	Capital Expenditures
OPEX	Operational Expenditure

2 Introduction

Introduction

The city of İzmir, nestled on the Aegean coast of Türkiye, is poised to embark on an ambitious journey towards climate neutrality and smart city transformation. As a pioneer city in the environmental protection and renewable energy, İzmir recognizes the urgent need to address the global climate crisis and embrace innovative technologies and sustainable practices for a more resilient and prosperous future.

The development of the Climate City Contract Action Plan marks a significant milestone in İzmir's commitment to reducing greenhouse gas emissions, adapting to the impacts of climate change, and fostering a smart and sustainable urban environment. This Action Plan outlines a comprehensive roadmap that sets clear objectives, strategies, and measures to bridge the gap between the current state and the envisioned climate-neutral and smart city future.

The local policy context in which the Action Plan is being developed is defined by several key factors. First and foremost, İzmir acknowledges the alarming consequences of climate change, such as rising temperatures, changing weather patterns, and increased vulnerability to natural hazards. Recognizing the pressing need for action, the city has already taken steps to mitigate these challenges by introducing renewable energy initiatives, promoting energy efficiency, and adopting sustainable transportation systems.

However, despite these efforts, İzmir faces significant gaps in its transition to a climate-neutral and smart city. One of the foremost challenges lies in the limited integration of cutting-edge technologies and data-driven solutions into urban infrastructure and governance systems. There is a need to harness the potential of digital innovation, IoT (Internet of Things), and artificial intelligence to enhance energy efficiency, optimize resource management, and improve the quality of life for İzmir's residents.

Moreover, while existing policies and programs have made progress in reducing carbon emissions, the current strategies lack a holistic and coordinated approach. The Climate City Contract Action Plan aims to address this gap by providing a comprehensive framework that aligns diverse stakeholders, streamlines policies, and mobilizes resources to maximize the impact of climate actions and accelerate the city's transformation towards sustainability.

In summary, the Climate City Contract Action Plan serves as a strategic guide for İzmir's journey towards climate neutrality and smart city development. By recognizing the local policy context and addressing the existing gaps, the Action Plan will pave the way for a more resilient, inclusive, and sustainable İzmir, positioning the city as a shining example for other regions in Türkiye and the European Union at large.

Figure 1: Flamingos from İzmir Bird Paradise

3 Work Process

Work Process	
Work process steps for İzmir CCC Action Plan:	
2023-02 → 2023-12	**Baseline Assessment – Updating GHG Inventory of the City** • A comprehensive assessment of current greenhouse gas emissions, energy consumption, transportation patterns, waste generation, and other relevant data. • Developing a comprehensive inventory report outlining the current state of emissions. • Analysing the city's current sustainability initiatives and policies to understand existing efforts. ■ Updated GHG Inventory
2023-06 → 2023-12	**Stakeholder Engagement and Mapping** • Identifying and engage key stakeholders, including local government officials, community groups, businesses, and academic institutions. • Mapping out stakeholder roles, interests, and potential contributions to the CCC Action Plan. ■ Stakeholders report
2023-06 → 2023-12	**Current Policies and Strategies Assessment** • Reviewing and assessment of existing climate-related policies, regulations, and strategies at the local, regional, and national levels. • Identifying gaps, overlaps, and inconsistencies in the current policy framework. • Evaluating the effectiveness of current initiatives in driving climate action and sustainability. ■ Current policies and strategies report
2024-01 → 2024-04	**Vision and Goals Definition** • Collaboratively developing a clear vision for İzmir as a climate-neutral and sustainable city by 2030. • Setting ambitious but achievable goals, aligning with the EU climate targets and addressing local priorities. ■ Vision and goals
2023-09 → 2024-03	**System Analysis and Identification of Barriers** • Conducting a detailed analysis of city systems, such as energy, transportation, waste management, and urban planning, to identify barriers to climate neutrality. • Engaging stakeholders in workshops and discussions to identify systemic challenges and opportunities. ■ Systemic barriers report
2024-05 → 2024-09	**Opportunity Identification and Prioritization** • Identifying potential solutions and opportunities within each city system to overcome barriers and achieve climate neutrality.

Work Process	
	• Prioritizing interventions based on feasibility, impact, and alignment with the city's goals. ■ Opportunities report
2024-10 → 2025-03	**Action Plan Development** <u>Identification Climate Neutrality Scenarios and Impact Pathways</u> • Developing and modeling different scenarios outlining potential pathways to achieve climate neutrality by 2030. • Assessing the potential impact of each scenario on emissions reduction, energy transition, economic growth, and social well-being. • Analyzing the trade-offs, co-benefits, and risks associated with different pathways. <u>Climate Neutrality Portfolio Design</u> • Designing a comprehensive portfolio of actions, projects, and initiatives that collectively contribute to climate neutrality. • Prioritizing and sequence the actions based on their potential impact, feasibility, and alignment with city goals. • Ensuring synergy and coherence among the different components of the portfolio to maximize effectiveness. <u>Indicators for Monitoring, Evaluation and Learning</u> • Defining a set of clear and measurable indicators to track progress towards climate neutrality. • Establishing monitoring and reporting mechanisms to regularly assess the implementation of the Action Plan. • Incorporating a robust evaluation and learning framework to adapt strategies based on data-driven insights. <u>Organizational and Governance Innovation Interventions</u>: • Evaluating the current organizational structure and governance mechanisms for climate action. • Identifying opportunities to enhance coordination, streamline decision-making, and allocate responsibilities effectively. • Implementing organizational and governance innovations to facilitate the execution of the Action Plan. <u>Social and Other Innovation Interventions</u>: • Developing and implementing a comprehensive public engagement strategy to raise awareness and promote sustainable behaviors. • Exploring innovative approaches to encourage community participation, social cohesion, and collective action. • Integrating social and behavioral insights into the design and implementation of climate initiatives. <u>Financing of Action Portfolio</u>: • Assessing the financial resources required for the implementation of the Action Plan. • Exploring diverse funding sources, including public budgets, grants, public-private partnerships, and innovative financing mechanisms.

Work Process	
	• Developing a robust financing strategy that ensures the availability of funds for the successful execution of the portfolio. ■ Action Plan
2025-01 → 2030-12	**Public Consultation and Feedback** • Engaging the public through workshops, meetings, and online platforms to gather feedback and ensure inclusivity. • Incorporating public input into the Action Plan to enhance its relevance and acceptance. ■ Public feedbacks
2023-02 → 2030-12	**Launch and Implementation** • Officially launching the İzmir CCC Action Plan, accompanied by a public awareness campaign. • Beginning the implementation prioritized measures and projects, monitoring progress and adapting strategies as needed.
2024-09 → 2030-09	**Continuous Development and Iteration** • Establishing a framework for continuous monitoring, evaluation, and iteration of the Action Plan. • Setting up regular reviews and milestones to assess progress, adjust targets, and incorporate new innovations and opportunities. ■ Annual monitoring and development reports

4 Part A – Current State of Climate Action

Part A "Current State of Climate Action" describes the point of departure of the city towards climate neutrality, including commitments and strategies of key local businesses, and informs the subsequent modules and the outlined pathways to accelerated climate action.

4.1 Module A-1 Greenhouse Gas Emissions Baseline Inventory

Table 4.1.1: Final energy use by source sectors

A-1.1: Final energy use by source sectors				
Base year	**2018**			
Unit	**MWh/year**			
	Scope 1	**Scope 2**	**Scope 3**	**Total**
Buildings	**7,614,644**	**8,551,162**		**16,165,806**
Electricity		*8,551,162*		
Natural Gas	*5,177,268*			
Fuel-oil	*191,237*			
Geothermal	*235,528*			
Coal	*869,706*			
LNG/CNG	*26,042*			
LPG	*1,113,451*			
Diesel	*1,412*			
Transport	**21,509,174**	**150,716**		**21,659,891**
Electricity		*150,716*		
Gasoline	*1,794,588*			
Jet kerosene	*1,637,825*			
LPG	*2,073,114*			
Diesel	*16,003,646*			
Waste				
IPPU[1]	**21,145,697**	**7,370,267**		**28,515,964**
Electricity		*7,370,267*		
Natural Gas	*15,812,932*			
Coke	*4,574,934*			
Coal	*305,319*			
LNG/CNG	*452,512*			
AFOLU[2]		**384,752**		**384,752**
Electricity		*384,752*		
TOTAL	**50,269,515**	**16,456,897**	**0**	**66,726,412**

Table 4.1.2: Emission factors applied

A-1.2: Emission factors applied						
Primary energy / Energy source	**Carbon Dioxide (CO_2)**	**Methane (CH_4)**	**Nitrous Oxide (N_2O)**	**F-gases**	**SF_6**	**NF_3**
Diesel	74.10	3.90	3.90	-	-	-
Gasoline	69.30	28.00	8.00	-	-	-
Fuel-oil	77.40	10.00	0.60	-	-	-
Jet kerosene	71.50	0.50	2.00	-	-	-
Natural Gas	56.10	5.00	0.10	-	-	-
LPG	63.10	1.00	0.10	-	-	-
LNG/CNG	64.20	5.00	0.00	-	-	-
Coal	101.00	10.00	2.00	-	-	-
Coke	98.30	10.00	2.00	-	-	-

F-gases: Hydrofluorocarbons and perfluorocarbons

SF_6: Sulphur hexafluoride

NF_3: Nitrogen trifluoride

Unit = kg/TJ

2006 IPCC Guidelines for National GHG Inventories, https://www.ipcc-nggip.iges.or.jp/public/2006gl/

GWP: CO_2: 1, CH4: 28, N_2O: 265

Table 4.1.3: Activity by source sectors

A-1.3: Activity by source sectors			
Base year	**2018**		
Unit: MWh	**Scope 1**	**Scope 2**	**Scope 3**
Sector: Buildings	**7,614,644**	**8,551,162**	
Municipality buildings/sites	*79,125*	*316,750*	
Tertiary buildings and other public buildings	*1,187,027*	*3,794,515*	
Residential	*6,348,492*	*4,209,803*	
Public Lighting		*230,094*	
Industry			
Energy generation			
Sector: Transport	**20,826,012**	**150,716**	
Municipality vehicle fleet	*192,508*		
Public transportation-municipality buses	*683,162*		
Public transportation-electricity systems		*150,716*	
Other vehicles	*18,820,614*		
Transit-bus station	*175,066*		
Civil aviation	*1,637,825*		
Sector: Waste			
(Activity)		(*)	
Sector: IPPU	**21,145,697**	**7,370,267**	
(Activity)			
Sector: AFOLU		**384,752**	
Agricultural irrigation		*384,752*	
TOTAL	**50,269,515**	**16,456,897**	0

AFOLU: Agriculture, Forestry and Land Use

IPPU: Industrial Process and Product Use

(*) included “Municipality buildings/sites

Table 4.1.4: GHG emissions by source sectors

A-1.4: GHG emissions by source sectors				
Base year	**2018**			
Unit	**tCO2e/year**			
	Scope 1	**Scope 2**	**Scope 3**	**Total**
Buildings	1,684,196	4,335,439	-	**6,019,635**
Transport	5,703,880	76,413	-	**5,780,293**
Waste*	691,456		-	**691,456**
Industrial Process and Product Use (IPPU)**	6,580,303	3,736,725	-	**10,317,028**
Agricultural. Forestry and Land Use (AFOLU)***	2,059,089	195,069	-	**2,254,158**
Total	**16,718,924**	**8,343,646**	**-**	**25,062,569**

* Included wastewater treatment (96,141 tCO2e)

** Included cement industry process (1,519,992 tCO2e)

*** Included non-energy related emissions (2,059,089 tCO2e)

A-1.5: Graphics and charts

Table 4.1.5 İzmir GHG emissions for 2018

Sector	MWh	tCO_2e	%
Total for Izmir	**66,726,400**	**25,062,569**	100%
Building, Equipment/Site	**40,067,386**	**13,879,952**	**55.4%**
Municipality Buildings/Sites	403,894	181,289	0.7%
Tertiary Buildings/Sites other than Municipality	4,808,950	2,128,887	8.5%
Residential	10,722,856	3,592,798	14.3%
Public Lighting	230,094	116,658	0.5%
Industry	23,901,592	7,860,319	31.4%
Transport	**21,659,891**	**5,780,293**	**23.1%**
Municipality Vehicle Fleet	193,836	52,492	0.2%
Public Transportation (Municipality Buses)	683,162	185,137	0.7%
Public Transportation (Electricity Systems)	150,716	76,413	0.3%
Other vehicles (private, other public etc)	18,819,286	4,992,974	19.9%
Transit – Bus Station	175,066	47,443	0.2%
Aviation	1,637,825	425,835	1.7%
Other Emissions	**384,752**	**4,465,606**	**17.8%**
Waste Disposal	-	595,316	2.4%
Wastewater Treatment	-	96,141	0.4%
Wastewater Treatment Process CH_4	-	*19,558*	0.1%
Wastewater Treatment Process CO_2	-	*47,128*	0.2%
Wastewater Treatment Process N_2O	-	*8,555*	0.0%
Wastewater Treatment Process Without Nit./Denit.	-	*134*	0.0%
Wastewater Discharge N_2O	-	*20,766*	0.1%
Process Emissions of Industry		1,519,992	6.1%
Livestock, manure management	-	2,059,089	8.2%
Irrigation	384,752	195,069	0.8%
Energy Generation	**4,614,371**	**936,717**	**3.7%**
Fuel Consumption for energy generation	4,614,371	936,717	3.7%

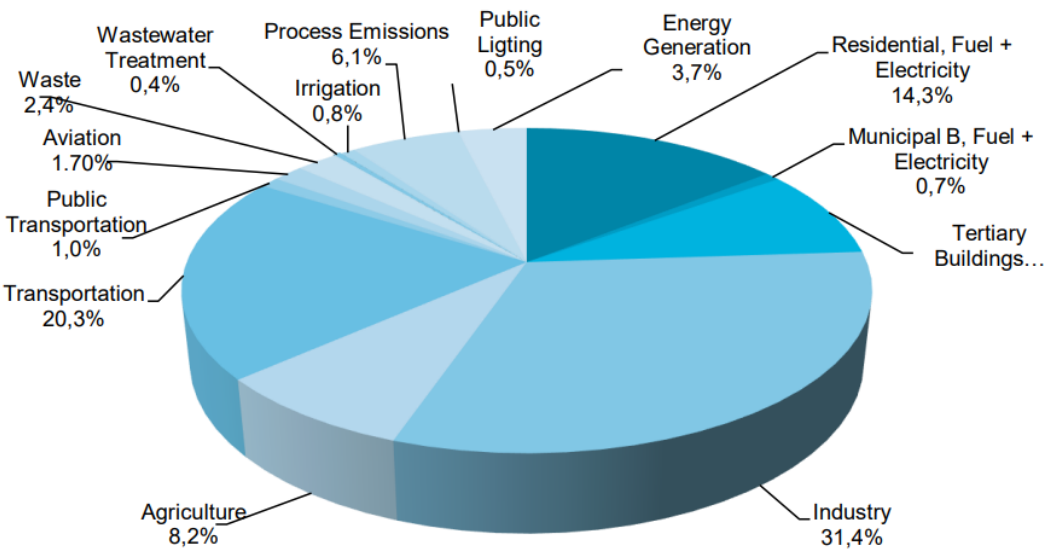

Figure 2 The distribution of GHG emissions in İzmir (2018)

A-1.6: Description and assessment of GHG baseline inventory

The latest GHG Baseline Inventory for the city of İzmir has been prepared in the year of 2020 by the Izmir Metropolitan Municipality as part of its commitment to the Covenant of Mayor. The inventory has aimed to provide a comprehensive overview of GHG emissions of the city and the key source of evidence on İzmir's GHG emissions trends. In the end, it helped the city to monitor progress towards its emissions reduction targets.

The base year for the inventory has been set as 2018 by considering comprehensive and reliable data availability.

The baseline emission inventory for the territory of Izmir has been calculated using the prevalent activity-based methodology, widely adopted by cities. This approach comprehensively encompasses all greenhouse gas emissions stemming from energy consumption, both directly (via fuel combustion) and indirectly (via electricity usage).

CO_2, CH_4, N_2O emissions have all been covered in the inventory due to Izmir's commitment to a holistic assessment. The assessment incorporates emissions from waste (CH_4), wastewater (CH_4, N_2O), enteric fermentation (CH_4) within livestock, and the utilization of chemical fertilizers (N_2O) in agricultural practices.

In the latest baseline inventory (conducted in 2020), the inventory boundary has been identified as the whole city of İzmir. It has mainly caused by the New Metropolitan Municipalities Law (6360), enacted in 2012 in Türkiye. The law expanded the administrative boundaries of metropolitan municipalities to the provincial boundaries. Thus, the jurisdiction of İzmir Metropolitan Municipality has been expended from central 19 districts to all 30 districts in 2014.

The sectors covered in the baseline inventory has included building, transport, waste and wastewater facilities, and agriculture (fertilizers) and livestock (enteric fermentation, manure management). Due to the complexity of calculations and data requirements, agricultural crops and residue related emissions have not been included in the inventory. The industrial GHG emissions have been calculated but not included in the baseline emission inventory of 2018.

In the inventory for the year 2018, IPCC has been preferred for emission factors of energy carriers.

IPCC, Tier-1 and Tier-2 methodology has been taken as basis for **greenhouse gas calculations**. Accordingly, it's been reported that the following formula have been used in the calculations according to the types of Scope-1, Scope-2 and Scope-3 greenhouse gas resources:

$$E_{GHG} = M_{Fuel} \cdot EF$$

where E_{GHG} is the amount of greenhouse emissions, M_{Fuel} is the fuel consumption and EF is the emissions factor.

It has been projected that İzmir's population will reach to 5.03 million ca in 2030 by considering annual population growth rate of 1.3%.

Table 1 and Figure 1 in section A-1.5 above are evaluated here.

GHG emissions including all energy carriers and emissions sources in the geographical and administrative boundaries of the city has been calculated as **25,062,569 tCO2e/y** for **2018**. The detailed breakdown can be seen in Table 1. Information has been disaggregated into sub-sectors in line with CoM guidelines. This analysis indicates that fuel consumption in buildings and industry accounted for the largest source of emissions, representing nearly 55.4% of the total emissions (Table 1). This sector is dominated by industrial buildings with a share of 56.7%, residential properties following second which account for 25.9% of emissions from buildings (or 31.4% and 14.3% of total emissions respectively). Transport is the second biggest emitter with a share of 23.1%. Waste and wastewater emissions account for around 2.8% of the total, while agriculture and livestock represent roughly 8.2% (excluding irrigation). Energy generation from fuel for own use account for 3.7% of total emissions and irrigation account for 0.8% of the total. When calculating industry emissions national statistics have been taken into account for fuel consumptions and electricity. For process emissions only fugitive emissions of clinker production is calculated since there was not information for calculating other process or fugitive emissions from other industrial sectors. Fuel consumption for energy generation is related with only electricity generation for own use (auto producers).

Izmir is the hub for the Aegean region, concentrating not only the industrial and commercial activities of the Province of Izmir but also naturally attracting neighbouring provinces such as Manisa, Uşak and Denizli. The long-term promotion of road transport by national policies and the neglect of rail in passenger as well as commercial transport has exploded automobile use both within the Izmir Province, among towns and prominently in and out of Izmir, but also to and from neighbouring Provinces mentioned above. In Figure 1, private car ownerships for instance has increased by 25% during the past four years, much higher than population growth. According to Figure 1, the highest greenhouse gas emissions in 2018 were industry with 31.4%. Other most greenhouse gas emission sources are transportation with 23%, residential with 14.3% and agriculture with 8.2%.

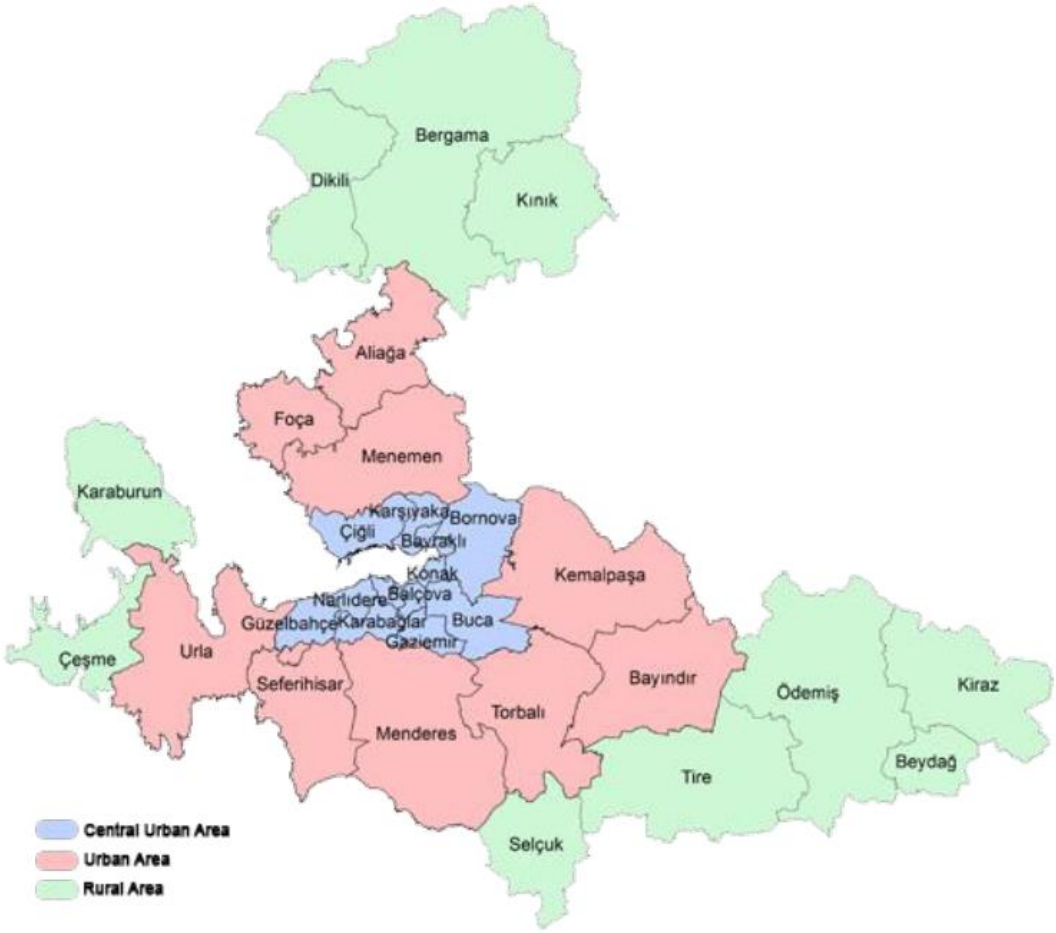

Figure 3: Map of Izmir Province, demonstrating urban and rural area locations.

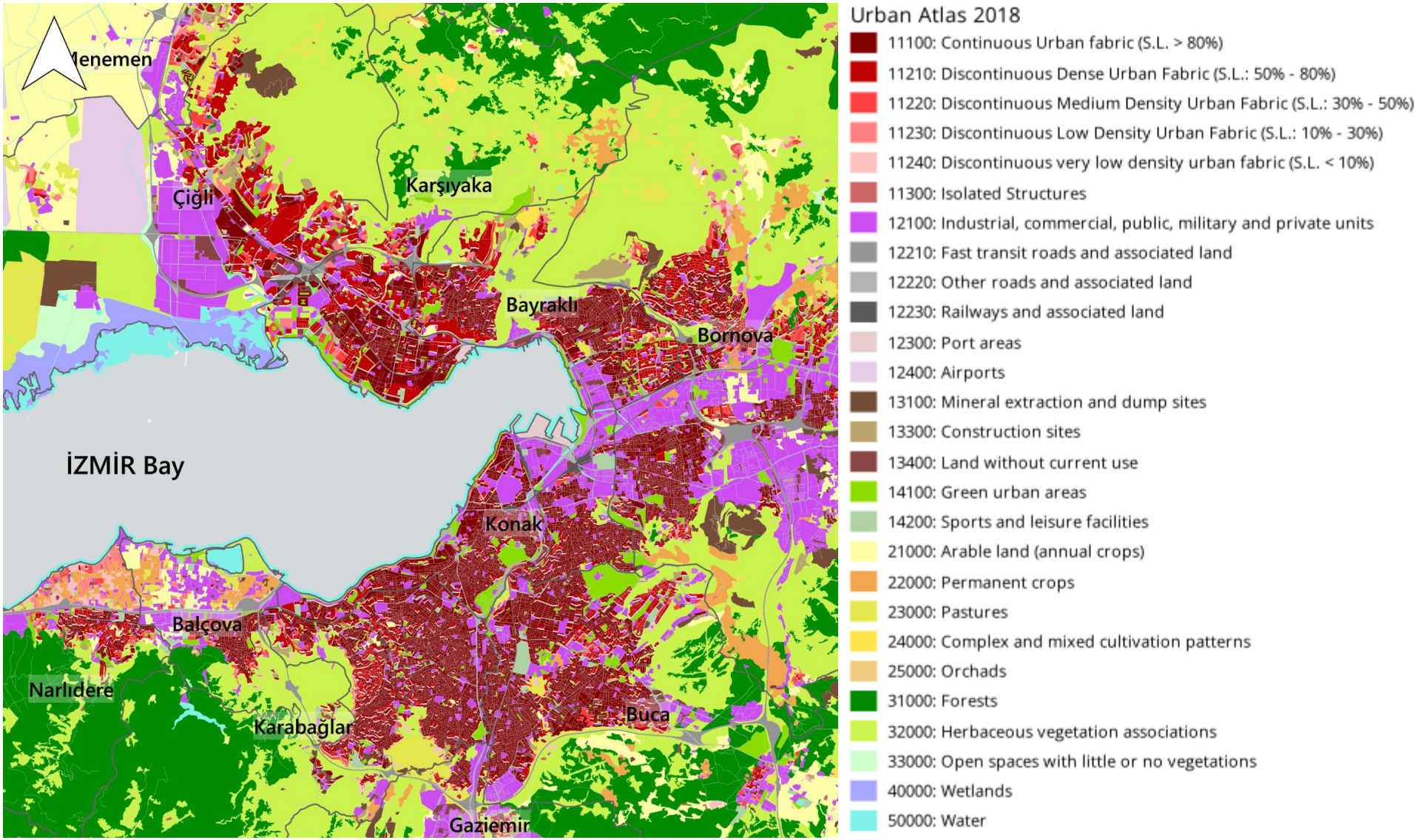

Figure 4: Urban atlas for the metropolitan area of İzmir (Copernicus, 2018) (Scale: 1:200.000)

4.2 Module A-2 Current Policies and Strategies Assessment

Table 4.2.1: List of relevant policies, strategies & regulations

A-2.1: List of relevant policies, strategies & regulations					
Type	**Level**	**Name & Title**	**Description**	**Relevance**	**Need for action**
Law	National	The Environmental Law (No:2872)	It is crucial in influencing climate change and sustainability policies and actions. It aims to safeguard and enhance the environment, ensuring sustainable development and well-being for current and future generations.	• provides a **comprehensive legal framework** for addressing env. issues and promoting sustainable development. • addresses **climate change** as a significant environmental concern. • mandates **environmental impact assessments** • sets guidelines for **waste management.** • establishes mechanisms for **environmental enforcement** and penalties for violations.	• Encouraging the adoption of **renewable energy** • Developing and implementing **climate adaptation strategies** • Raising **awareness** among citizens • İzmir needs to prioritize **sustainable urban planning**.
Law	National	Energy Efficiency Law (No:5672)	The law, aiming to reduce energy consumption, increase the use of renewable energy sources, and enhance energy efficiency, was designed to promote energy efficiency and conservation in various sectors of the economy.	• Improving energy efficiency helps to **reduce GHG emissions**. • Energy-efficiency is fundamental in the development of **smart cities**. • Energy efficiency complements **the integration of renewable energy sources** into the energy system.	• Regular energy audits. • Public education • New and more comprehensive financing and incentives • Continuous improvement in energy efficiency.
Law	National	Law on Utilization of Renewable Energy Sources (The Renewable Energy Law) (No: 5346)	The law, aims promoting the use of renewable energy in Türkiye, is a significant driver for renewable energy development in the country.	• a critical component in reducing GHG emissions and combating climate change. • helps to **diversify the energy mix**, reducing the city's dependency on	• **effective implementation of the law**'s provisions • **encouraging** private **investments** and **securing financing** for renewable energy projects.

A-2.1: List of relevant policies, strategies & regulations					
Type	**Level**	**Name & Title**	**Description**	**Relevance**	**Need for action**
				fossil fuels and enhancing energy security and resilience. • contributes to the development of **smart and sustainable cities**, a key aspect of the Mission. • support the country's efforts to meet its climate targets.	• **integrating** RES **into** the existing **electricity grid.** • emphasizing R&D to **improve renewable energy technologies**. • Raising **awareness** among the public
Directive	National	Directive on Energy Performance in Buildings (No: 27075)	The directive was introduced to promote energy efficiency in buildings by setting standards and requirements for thermal insulation in new and existing constructions.	It aims to achieve **climate neutrality** and creating **smart and sustainable cities** by lower energy consumption and GHG emissions.	• **Raising awareness** about the importance of thermal insulation and its impact on energy savings. • **Providing financial incentives and support** for building owners to invest in thermal insulation upgrades. • **Capacity building** to construction industry professionals. • **Stringent enforcement** of the regulation's requirements.
Action Plan	National	National Climate Change Action Plan 2011-2023	The plan is a **comprehensive policy document** to address the challenges of **climate change** and outline the country's strategy for mitigating GHG emissions and adapting to the impacts of climate change.	• The plan **aligns with** the broader **climate objectives** set by the EU. • It addresses both **climate change mitigation and adaptation**, providing a holistic approach to combatting climate change. • It encompasses **various sectors**, including energy, transportation, agriculture, industry, and	• **Collaboration** among different stakeholders • Engaging the public and **raising awareness** • **Innovative technologies and practices**

A-2.1: List of relevant policies, strategies & regulations					
Type	**Level**	**Name & Title**	**Description**	**Relevance**	**Need for action**
				waste management. • It reflects Türkiye's **national commitment** to international climate agreements.	
Action Plan	National	National Action Plan for Waste Management (2016-2023)	The action plan is **a national policy** with a multi-sectoral approach that aims to achieve a sound and **sustainable waste management** system in Türkiye.	• supports the Mission's goal of achieving **climate neutrality by 2050**. • aligned with the Mission's focus on **smart cities** by using technologies to improve the efficiency of waste management operations and services. • consistent with the Mission's emphasis on **citizen engagement**.	• Strategies to **reduce waste generation** at the source and promoting **recycling.** • Shifting to **separate collection** scheme. • **Increasing investment** in waste management infrastructure. • Engaging the public and raising **awareness**. • Encouraging businesses and industries to adopt **circular economy.**
Action Plan	Local	İzmir Sustainable Energy and Climate Action Plan (SECAP) 2020	It outlines the actions to combat climate change, based on the analysis of the city's current energy consumption, GHG emissions, infrastructure, and related factors.	• supports the Mission's goal of **achieving climate neutrality**. • aligned with the Mission's focus on **smart cities**. • consistent with the Mission's emphasis on **citizen engagement**.	• **GIS-based risk assessment** to better understand climate change impacts. • **Vulnerability mapping** for prioritizing adaptation measures.
Action Plan	Local	Izmir Green City Action Plan (GCAP) 2020	It aims to identify, prioritize and address the priority env. challenges, and establish a vision and projects to enable a green future for the city. It proposes 46 actions across 21 baskets that include infrastructure investments, policy		

A-2.1: List of relevant policies, strategies & regulations					
Type	**Level**	**Name & Title**	**Description**	**Relevance**	**Need for action**
			measures, capacity development and advocacy, all of which are designed to help achieve the vision for a green Izmir.		
Strategic Plan	Local	İzmir Municipality Strategic Plan 2020 - 2024	The Plan is a roadmap for the city of İzmir for the next five years. It sets out the city's vision, mission, and strategic goals, as well as the actions that will be taken to achieve these goals. The plan is participatory, with input from a wide range of stakeholders. The plan is flexible, allowing for adaptation as needed.	The plan includes a number of specific actions that are relevant to climate neutrality, including: • Increasing the use of renewable energy • Improving energy efficiency • Reducing greenhouse gas emissions • Adapting to the impacts of climate change	The plan is ambitious, but it is achievable with the right commitment and investment.
Action Plan	Local	İzmir Transport. Master Plan 2030	The plan is a comprehensive transportation plan for the city of İzmir. It was developed by the İzmir Metropolitan Municipality in collaboration with the World Bank and other stakeholders. The plan aims to improve the efficiency, reliability, and sustainability of İzmir's transportation system. It includes a number of strategies, such as: • Expanding the public transport. network, including the metro, light rail, and bus rapid transit. • Improving the walking and cycling infrastructure	The plan is relevant to the EU Cities Mission in several ways. It includes a number of specific actions that are relevant to climate neutrality, such as: • Reducing GHG emissions from the transport. sector • Promoting active transportation (walking and cycling) • Improving the energy efficiency of the transport. system	Collaboration between different stakeholders, such as the government, businesses, and civil society is needed to achieve sustainable transportation system.

A-2.1: List of relevant policies, strategies & regulations					
Type	**Level**	**Name & Title**	**Description**	**Relevance**	**Need for action**
			• Reducing the number of private cars on the road • Promoting intermodal transportation		

A-2.2: Description & assessment of policies

The Environmental Law (No:2872)

Law – National

The Environmental Law plays a significant role in shaping policies and actions related to climate change mitigation and sustainability efforts. Its primary objective is to protect and improve the environment, ensuring sustainable development and the well-being of both current and future generations. The law provides a comprehensive legal framework for addressing environmental issues and promoting sustainable development. It lays down the groundwork for various environmental regulations and policies, including those related to climate change, pollution control, waste management, and renewable energy.

The law provides a comprehensive **legal framework** for addressing environmental issues and promoting sustainable development. It lays down the groundwork for various environmental regulations and policies, including those related to climate change, pollution control, waste management, and renewable energy.

The law addresses **climate change** as a significant environmental concern. It provides the basis for implementing measures to reduce GHG emissions, promote energy efficiency, and foster the use of renewable energy sources in the city.

The law mandates **environmental impact assessments** for certain projects and activities that may have a substantial impact on the environment, including climate-related projects. This ensures that climate considerations are taken into account during the planning and approval processes of various initiatives.

The law sets guidelines for **waste management** practices, promoting the reduction, reuse, and recycling of waste materials. A **circular economy** approach is essential for mitigating climate change and achieving sustainability goals.

The law establishes mechanisms for **environmental enforcement** and penalties for violations. This is crucial in ensuring that climate-related regulations and policies are effectively implemented and complied with.

The key areas where action is needed includes:

- Encouraging the adoption of **renewable energy** sources and providing incentives for renewable energy projects can significantly contribute to reducing GHG emissions.
- İzmir needs to prioritize **sustainable urban planning**, including promoting public transportation, creating green spaces, and implementing energy-efficient building standards.
- Developing and implementing **climate adaptation strategies** is essential to address the potential impacts of climate change on the city's infrastructure, economy, and residents.
- **Raising awareness** among citizens about climate change and involving them in climate action initiatives can foster a sense of responsibility and collective action towards a sustainable future.

National Energy Efficiency Law (No:5672)

Law – National

National Energy Efficiency Law was designed to promote energy efficiency and conservation in various sectors of the economy. It aims to reduce energy consumption, increase the use of renewable energy sources, and enhance energy efficiency practices across industries, buildings, and transportation.

Key features of the law include (1) energy efficiency obligations for certain energy-intensive industries and large commercial buildings; (2) regular energy audits for specific enterprises to identify energy-saving opportunities and assess their energy performances; (3) an Energy Efficiency Fund to support energy efficiency projects and initiatives; (4) the adoption of energy management systems by large energy consumers to monitor and optimize their energy use; and (5) provisions for enhancing energy efficiency in public building.

The law is highly relevant to the EU Cities Mission. Energy efficiency is a critical component of climate change mitigation and sustainability efforts. The law's relevance to the mission can be understood in the following ways:

- **Climate change mitigation:** Improving energy efficiency helps to reduce GHG emissions by decreasing the energy consumption associated with fossil fuel-based energy production.
- **Smart cities development:** Energy-efficient practices and technologies are fundamental in the development of smart cities, which aim to optimize resource use, enhance quality of life, and promote sustainable urbanization.
- **Renewable energy integration:** Energy efficiency complements the integration of renewable energy sources into the energy system, making it easier to meet the city's energy needs sustainably.

While the law is in force more than 15 years and provides a solid legal framework for promoting energy efficiency, some key actions are still needed.

- Conducting **regular energy audits** for ensuring that obligated entities comply with energy efficiency obligations.
- **Public education** to raise the awareness on the importance of energy efficiency at homes.
- New and more comprehensive **financing and incentives** are essential for businesses and industries to invest in energy efficiency upgrades and projects.
- Regularly updating the energy efficiency targets and exploring new technologies and best practices will help achieve **continuous improvement** in energy efficiency.

Law on Utilization of Renewable Energy Sources (The Renewable Energy Law) (No: 5346)

Law – National

The law was enacted in 2005 with the primary aim of promoting the use of renewable energy in Türkiye. It has been a significant driver for renewable energy development in the country and plays a crucial role in achieving the EU Cities Mission in Izmir.

Its key features include:

- The law establishes a **feed-in tariff system** that guarantees fixed prices and purchase periods for electricity generated from renewable energy sources. It also mandates that electricity distribution companies are obligated to purchase a certain amount of renewable energy within their overall energy portfolio.
- The law sets out the procedures and requirements for obtaining **licenses and permits** for renewable energy projects. It aims to streamline the approval process to encourage investment in the renewable energy sector.

- The law provides various **incentives,** such as tax reductions, customs duty exemptions, and investment incentives, to attract private investments in renewable energy projects.
- The law introduced the **Renewable Energy Resource Areas** (YEKA) model, which designates specific areas for large-scale renewable energy projects, promoting competitiveness and efficiency in the sector.
- The law also encourages the use of **local**ly manufactured **equipment and technology** in renewable energy projects.

The law is highly relevant to the EU Cities Mission for several reasons:

- Renewable energy is a critical component in reducing GHG emissions and combating climate change. By promoting the utilization of RES, the law aligns with the mission's objective of achieving climate neutrality in Izmir.
- Emphasizing renewable energy helps to **diversify the energy mix**, reducing the city's dependency on fossil fuels and enhancing energy security and resilience.
- Incorporating renewable energy into urban infrastructure and energy systems contributes to the development of **smart and sustainable cities**, a key aspect of the Mission.
- As part of the EU, Türkiye has committed to the Paris Agreement and other international climate goals. The law's provisions support the country's efforts to meet its climate targets.

While the law provides a strong legal framework for renewable energy development, there is a need for continued action to maximize its potential impact:

- **Effective implementation of the law**'s provisions is essential to ensure that renewable energy projects are successfully developed and integrated into the energy system.
- **Encouraging** private **investments** and **securing financing** for renewable energy projects will require a conducive investment climate and financial incentives.
- **Integrating** renewable energy sources **into** the existing **electricity grid** requires careful planning and infrastructure upgrades to ensure smooth and reliable power supply.
- Emphasizing research and development to **improve renewable energy technologies** and their efficiency will contribute to the long-term success of renewable energy initiatives.
- Raising **awareness** among the public about the benefits of renewable energy and involving them in the transition process can create a supportive environment for renewable energy projects.

Directive on Energy Performance in Buildings (No: 27075)

Law – National

The regulation was introduced to promote energy efficiency in buildings by setting standards and requirements for thermal insulation in new and existing constructions. The main aim of the regulation is to reduce energy consumption for heating and cooling, lower greenhouse gas emissions, and enhance the overall comfort and sustainability of buildings.

It,

- sets out minimum requirements for thermal insulation in buildings,
- mandates the issuance of Energy Performance Certificates for buildings, which provide information about the building's energy efficiency and potential for improvement; and
- addresses thermal insulation requirements for existing buildings undergoing renovation or retrofitting.

Buildings are significant contributors to energy consumption and GHG emissions, and improving their energy efficiency is essential for achieving climate neutrality and creating smart and sustainable cities. Therefore, the law is highly relevant to the EU Cities Mission.

Enhanced thermal insulation in buildings reduces the need for heating and cooling, leading to **lower energy consumption and GHG emissions**. Improving the energy efficiency of buildings aligns with the objectives of smart cities, where resource optimization and sustainable development are central themes. Efficient insulation contributes to sustainable urban development by reducing the overall environmental impact of buildings.

To fully realize the benefits of the law, proactive actions are required:

- **Raising awareness** among building owners, construction professionals, and the public about the importance of thermal insulation and its impact on energy savings is crucial.
- **Providing financial incentives and support** for building owners to invest in thermal insulation upgrades can encourage widespread adoption.
- Offering training and **capacity building** to construction industry professionals will ensure that the best insulation practices are implemented.
- **Stringent enforcement** of the regulation's requirements will drive compliance and promote energy-efficient building practices.

National Climate Change Action Plan 2011-2023

Action Plan – National

The plan is a comprehensive policy document to address the challenges of climate change and outline the country's strategy for mitigating GHG emissions and adapting to the impacts of climate change. It covers a period of 12 years, aiming to set forth measures and actions to achieve sustainable development while contributing to global efforts to combat climate change.

The plan is highly relevant to the EU Cities Mission as it provides a national-level framework and guidance for local climate action. The relevance can be understood in the following ways:

- The plan **aligns with** the broader **climate objectives** set by the EU. By incorporating the national plan's goals and targets, the city of Izmir can ensure that its local climate initiatives are in line with Türkiye's overall climate strategy.
- The plan addresses both **climate change mitigation and adaptation**, providing a holistic approach to combatting climate change. This is crucial for the mission, as it emphasizes not only reducing GHG emissions but also enhancing resilience to the impacts of climate change in Izmir.
- The plan encompasses **various sectors**, including energy, transportation, agriculture, industry, and waste management. This comprehensive approach enables Izmir to identify opportunities for climate action across different sectors and tailor strategies accordingly.
- The plan reflects Türkiye's **national commitment** to international climate agreements, including the UNFCCC and its associated protocols. By adhering to the national plan, Izmir contributes to Türkiye's efforts in fulfilling its international obligations.

The success of the implementation of the plan requires active and coordinated actions at the local level in Izmir. The key areas where action is needed are:

- Effective implementation to strengthen climate actions requires **collaboration among different stakeholders**, including government agencies, local authorities, businesses, NGOs, and academic institutions.
- **Engaging the public and raising awareness** about climate change issues are vital for building community support and participation in climate initiatives.
- Embracing **innovative technologies and practices** can enhance the efficiency and effectiveness of climate actions in areas such as renewable energy, sustainable transportation, and green infrastructure.

National Action Plan for Waste Management (2016-2023)

Action Plan – National

The action plan is a national policy with a multi-sectoral approach that aims to achieve a sound and sustainable waste management system in Türkiye. The plan sets out targets for waste reduction, recycling, and disposal, including:

- reducing the amount of municipal waste generated by 10% by 2023,
- recycling 35% of municipal waste by 2023,
- decreasing the amount of waste disposed on land (open dumps + landfilling) from 88.7% to 65% by 2023.

The plan is relevant to the EU Cities Mission in several ways.

- First, the plan supports the Mission's goal of achieving **climate neutrality by 2050**. Waste management is a major source of GHG emissions, so reducing waste and increasing recycling will help to reduce overall emissions.
- Second, the plan is aligned with the Mission's focus on **smart cities**. Smart cities use technology to improve the efficiency of their operations and services, and waste management is a key area where this can be done.
- Finally, the plan is consistent with the Mission's emphasis on **citizen engagement**. The plan includes a number of measures to increase public awareness of waste management issues and to encourage citizens to take action to reduce waste.

The key areas need for action include:

- Implementing strategies to **reduce waste generation** at the source and promoting **recycling** practices to divert significant amounts of waste from landfills.
- Shifting to **separate collection** scheme for municipal solid waste to better apply sustainable waste disposal methods such as composting or waste incineration.
- **Increasing investment** in waste management infrastructure, including recycling facilities and waste-to-energy plants, to enhance overall waste management.
- **Engaging the public and raising awareness** about responsible waste disposal and recycling practices to improve waste management outcomes.
- Encouraging businesses and industries to adopt **circular economy** principles to reduce waste generation and support sustainable consumption and production.

İzmir Sustainable Energy and Climate Action Plan (SECAP) 2020

Action Plan - Local

The İzmir SECAP 2020 aims to reduce GHG emissions and improve energy efficiency in Izmir. The plan sets out a number of targets for 2030, including:

- reducing **GHG emissions** by **40%** compared to 2010 levels.
- increasing the **share of renewable energy** in the city's energy mix to **30%**.
- improving **energy efficiency** by **20%**.

The SECAP is relevant to the EU Cities Mission in a number of ways.

- The plan **supports** the Mission's goal of achieving **climate neutrality by 2050**.
- It is aligned with the Mission's focus on **smart cities**. Smart cities use technology to improve the efficiency of their operations and services, and energy management is a key area where this can be done. For example, smart energy management systems can be used to track energy consumption, identify areas where energy efficiency improvements can be made, and provide real-time information to citizens about their energy usage.
- Finally, the plan is consistent with the Mission's emphasis on **citizen engagement**. The plan includes a number of measures to increase public awareness of climate change and energy issues, and to encourage citizens to take action to reduce their energy consumption.

The need for action areas include:

- The GHG emissions **inventory** must be **more comprehensive** to include Agriculture, Forestry and Other Land Use (AFOLU) emissions.
- **Detailed risk assessments** for key sectors by advanced technologies such as GIS, remote sensing and climate modeling for better understanding how climate change may affect each sector and its interconnectedness.
- **Vulnerability mapping** will aid in prioritizing adaptation measures.

İzmir Green City Action Plan (GCAP) 2020

Action Plan - Local

The Izmir Green City Action Plan (GCAP) 2020 is a comprehensive plan that aims to prioritize and address environmental challenges in the city, while establishing a vision for a green future. The plan consists of three main sections, including preventative services carried out in crisis situations, works carried out within the scope of combating the pandemic, and monitoring and adaptation activities to be performed within the scope of recovery efforts in the aftermath of the pandemic. The plan also includes a business case development section, which provides detailed information around the action, including action owner, key stakeholders, steps for implementation, and economic costing. The plan is part of the 2020-2024 Izmir Metropolitan strategies, which are founded upon the historical heritage of Izmir with the city striving to strengthen the connections between the eastern and western communities.

The GCAP 2020 is relevant to the EU Climate-Neutral and Smart Cities Mission in several ways. The Mission aims to support cities in their transition to climate neutrality and to make them more sustainable, resilient, and innovative. The Izmir GCAP 2020 is a comprehensive plan that aims to prioritize and address environmental challenges in Izmir, Türkiye, while establishing a vision for a green future. The plan recognizes the need for participating cities to preserve the quality of their environmental assets and use natural resources sustainably, mitigate and adapt to the risks of climate change, and ensure that environmental policies and developments contribute to the social and economic well-being of residents. The Izmir GCAP 2020 is also part of the cities' obligation in joining the Covenant of Mayors (CoM) and is funded by the EU and supported by the European Bank for Reconstruction and Development (EBRD). The plan enables the collection and analysis of data in a structured and systematic manner for both climate change mitigation and adaptation, developing actions to help hit the CoM targets of 40% emission reduction by 2030 against 2018 baseline, increase the cities' resilience, and aligns with the EU's climate-neutral and smart cities mission. Therefore, the Izmir GCAP 2020 is relevant to the EU Cities Mission as it aligns with the mission's objectives and aims to make Izmir a more sustainable, resilient, and innovative city.

İzmir Municipality Strategic Plan 2020 - 2024

Strategic Plan - Local

The strategic plan for 2020-2024 outlines the municipality's vision for the city's future. The plan is based on the idea of positioning İzmir as a world city that is integrated with the rest of the world while being in harmony with its natural character. One of the key themes of the plan is the preservation of İzmir's historical and cultural heritage. It recognizes the importance of the city's rich history and aims to ensure that İzmir's unique social and cultural assets are protected and preserved. The plan also emphasizes the importance of revitalizing the city's historic sites and integrating them into the fabric of modern İzmir. Another important aspect of the plan is the development of İzmir's infrastructure. It outlines a number of initiatives aimed at improving the city's transportation network, including the strengthening of connections between the city center and the surrounding districts. The measures to improve the city's public transportation system, including the expansion of the metro network and the introduction of new bus routes. The plan focuses on the development of İzmir's economy by recognizing the importance of creating a business-friendly environment that encourages investment and job creation. To this end, the plan includes a number of initiatives aimed at attracting new businesses to the city and supporting the growth of existing businesses.

The plan has several aims:

- Creating a more liveable city: The plan aims to transform İzmir into a city with a high quality of life, where residents can enjoy a clean and healthy environment, access to cultural and recreational activities, and a sense of community.
- Promoting sustainable development: The plan aims to promote sustainable development in İzmir, with a focus on reducing the city's carbon footprint, improving waste management practices, and promoting the use of renewable energy sources.
- Improving transportation: The plan aims to improve İzmir's transportation network, with a focus on expanding the metro system, introducing new bus routes, and promoting the use of bicycles and other alternative modes of transportation.
- Enhancing social services: The plan aims to enhance social services in İzmir, with a focus on improving access to healthcare, education, and social welfare programs.
- Encouraging citizen participation: The plan aims to encourage citizen participation in decision-making processes, with a focus on promoting transparency, accountability, and civic engagement.

The strategic plan includes a number of initiatives for promoting sustainable development and reducing the city's carbon footprint, all are relevant with EU Mission's targets.

- Sustainable transportation: The plan includes initiatives aimed at improving the city's transportation network, including the expansion of the metro system and the introduction of new bus routes.
- Renewable energy: The plan includes measures to promote the use of renewable energy sources, such as solar and wind power. This is in line with the EU's goal of promoting the use of renewable energy and reducing dependence on fossil fuels.
- Waste management: The plan includes measures to improve the city's waste management system, including the development of a more sustainable and efficient system for collecting and disposing of waste.
- Preservation of natural areas: The plan emphasizes the importance of preserving İzmir's natural areas, including its agricultural land and forests; so, it is in line with the Mission's goal of promoting the preservation of natural areas and biodiversity.
- Smart city initiatives: The plan includes initiatives aimed at promoting the use of technology to improve the city's infrastructure and services. This is in line with the Mission's goal of promoting the development of smart cities and reducing energy consumption and GHG emissions.

İzmir Transportation Master Plan 2030

Action Plan - Local

The İzmir Transportation Master Plan 2030 is a comprehensive plan developed to address current and future transportation issues in the city of Izmir and its surrounding areas. The plan prioritizes public transportation systems and aims to develop a long-term approach to solving transportation problems. The main elements of the plan include policies and strategies related to public transportation systems, transfer centers, pedestrian and bicycle transportation, parking systems, road infrastructure and traffic systems, urban freight transportation systems, and transportation to surrounding settlements. The plan also includes recommendations for implementation and investment plans. Overall, the İzmir Transport Master Plan 2030 seeks to coordinate and integrate the transportation system in Izmir to create a more efficient and sustainable transportation network.

The plan prioritizes public transportation systems and aims to increase the use of public transportation by improving its quality and accessibility. The main strategies for the public transportation system include:

- Developing a comprehensive public transportation network that integrates different modes of transportation, such as buses, metro, tram, and ferry.
- Improving the quality of public transportation services by increasing the frequency of services, reducing waiting times, and providing comfortable and safe vehicles.
- Increasing the accessibility of public transportation services by expanding the coverage area and improving the connectivity between different modes of transportation.

- Encouraging the use of public transportation by providing affordable and convenient ticketing options, such as smart cards and mobile applications.
- Reducing the environmental impact of public transportation by promoting the use of low-emission vehicles and alternative fuels.

Several strategies have been introduced by the plan for pedestrian and bicycle transportation to promote sustainable and active modes of transportation. The main strategies and targets for pedestrian and bicycle transportation include:

Developing a comprehensive pedestrian and bicycle network that provides safe and convenient transportation for all users.

Improving the quality of pedestrian and bicycle infrastructure by maintaining and upgrading existing facilities and building new facilities where necessary.

Increasing the accessibility of pedestrian and bicycle facilities by expanding the coverage area and improving the connectivity between different modes of transportation.

Promoting the use of pedestrian and bicycle transportation by providing dedicated infrastructure and facilities, such as bike lanes, pedestrian crossings, and bike parking.

Improving the safety of pedestrian and bicycle transportation by implementing traffic calming measures, such as speed humps and roundabouts, and improving pedestrian and cyclist facilities.

Table 4.2.2: Emissions gap

A-2.3: Emissions gap										
	Baseline emissions		Residual emissions / offestting[1]		Baseline emissions reduction target[2]		Emissions reductions in existing strategies[3]		**Emissions gap** (to be addressed by action plan)[4]	
	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)	**(absolute)**	**(%)**
Buildings	14,816,668	59.12	0	0.00	14,816,668	100.00	3,900,589	26.33	10,916,079	73.67
Transport	5,780,294	23.06	1,847,481	31.96	3,932,813	68.04	2,432,813	42.09	1,500,000	25.95
Waste	691,457	2.76	24,178	3.50	667,279	96.50	667,279	96.50	–	0.00
IPPU*	1,519,992	6.06	–	0.00	1,519,992	100.00	0,00	0.00	1,519,992	100.00
AFOLU**	2,254,158	8.99	1,537,354	68.20	716,804	31.80	716,804	31.80	–	0.00
Total	**25,062,569**	**100.00**	**3,409,013**	**13.60**	**21,653,556**	**86.40**	**7,717,485**	**30.79**	**13,936,071**	**55.61**

[1] Residual emissions represent the emissions that cannot be reduced through climate action and are being offset. Residual emission may amount to a maximum of 20 % of all emissions, as stated in the Mission Info Kit.
[2] Baseline reduction target = Baseline emissions – residual emissions.
[3] Emission reductions planned for in existing action planning and strategies should be quantified per sector.
[4] Emissions gap = Baseline emission reduction target – Emissions reduction in existing scenarios.
* IPPU: Industrial Process and Product Use
** AFOLU: Agricultura, Forestry and Land Use

4.3 Module A-3 Systemic Barriers and Opportunities to 2030 Climate Neutrality

Table 4.3.1: Systems & stakeholder mapping

A-3.1: Systems & stakeholder mapping				
System description	**Stakeholders involved**	**Network**	**Influence**	**Interest**
Policy and Governance	İzenerji CO	GCC İzmir Coordination Office	In the profile of expert and administrator, possesses political and informational resources.	role of administrator.
	İzmir Metropolitan Municipality	GCC İzmir Steering Committee	In the profile of politician, expert and administrator, possesses political, legal and financial resources.	administrator / collaborative roles.
	İzmir Governorship Provincial Directorate of Environment, Urbanization and Climate Change	GCC İzmir Steering Committee	In the profile of politician, possesses political, legal and financial resources.	collaborative & supportive roles.
	İzmir Development Agency	GCC İzmir Steering Committee	In the profile of politician and expert, possesses financial and political resources.	collaborative & supportive roles.
	İzmir City Council	GCC İzmir Steering Committee	In the profile of politician and expert, possesses legal and political resources.	collaborative & supportive roles.
	TMMOB - Union of Chambers of Turkish Engineers and Architects İzmir	GCC İzmir Steering Committee	In the profile of special expertise, possesses political and informational resources.	collaborative & supportive roles.
	İzmir Chamber of Commerce	GCC İzmir Steering Committee	In the profile of special expertise, possesses informational resources.	collaborative & supportive roles.
	Aegean Region Chamber of Industry	GCC İzmir Steering Committee	In the profile of special expertise, possesses informational resources.	collaborative & supportive roles.
	Aegean Municipalities Union	GCC İzmir Steering Committee	In the profile of politician, possesses political and informational resources.	collaborative & supportive roles.
	Türkiye EU Delegation	European Union (EU)	In the profile of politician, possesses legal and political resources.	supportive roles.
	EU Climate Neutral Smart Cities Mission Commission	European Union (EU)	In the profile of administrator and expert, possesses informational resources.	administrator, collaborative & supportive roles.
	NetZeroCities (NZC) Platform	European Union (EU)	In the profile of administrator and expert, possesses informational resources.	collaborative & supportive roles.
	City Advisors	European Union (EU)	In the profile of expert, possesses informational resources.	supportive roles.

A-3.1: Systems & stakeholder mapping				
System description	**Stakeholders involved**	**Network**	**Influence**	**Interest**
Social and Cultural Systems	İzmir Metropolitan Municipality	GCC İzmir Steering Committee	In the profile of politician, expert and administrator, possesses political, legal and financial resources.	administrator & collaborative roles.
	İzmir City Council	GCC İzmir Steering Committee	In the profile of politician and expert, possesses legal and political resources.	collaborative & supportive roles.
	TMMOB - Union of Chambers of Turkish Engineers and Architects İzmir	GCC İzmir Steering Committee	In the profile of special expertise, possesses political and informational resources.	collaborative & supportive roles.
	İzmir Bars Association	GCC İzmir Steering Committee	In the profile of special expertise, possesses informational and legal resources.	collaborative & supportive roles.
	İzmir Medical Chamber	GCC İzmir Steering Committee	In the profile of special expertise, possesses informational resources.	collaborative & supportive roles.
	Union of Chambers of Tradesmen and Craftsmen of İzmir	GCC İzmir Steering Committee	In the profile of special expertise, possesses informational resources.	collaborative & supportive roles.
	Aegean Municipalities Union	GCC İzmir Steering Committee	In the profile of politician, possesses political and informational resources.	collaborative & supportive roles.
	Türkiye EU Climate Ambassadors	European Union (EU)	In the profile of special expertise, possesses informational resources.	supportive roles.
	Media Organizations		In the profile of special expertise, possesses informational resources. Has important role of publication and promotion.	supportive roles.
	Citizens		In the profile of special expertise, possesses informational resources and directly part of the influence.	supportive roles.
Urban Planning and Infrastructure	İzmir Metropolitan Municipality	GCC İzmir Steering Committee	In the profile of politician, expert and administrator, possesses political, legal and financial resources.	administrator & collaborative roles.
	İzmir Governorship Provincial Directorate of Environment,	GCC İzmir Steering Committee	In the profile of politician, possesses political, legal and financial resources.	collaborative & supportive roles.

A-3.1: Systems & stakeholder mapping				
System description	**Stakeholders involved**	**Network**	**Influence**	**Interest**
	Urbanization and Climate Change			
	İzmir Development Agency	GCC İzmir Steering Committee	In the profile of politician and expert, possesses financial and political resources.	collaborative & supportive roles.
	İzmir Universities Platform	GCC İzmir Steering Committee	In the profile of special expertise, possesses informational resources.	supportive roles.
Waste Management System	İzmir Metropolitan Municipality	GCC İzmir Steering Committee	In the profile of politician, expert and administrator, possesses political, legal and financial resources.	administrator & collaborative roles.
	İzmir Governorship Provincial Directorate of Environment, Urbanization and Climate Change	GCC İzmir Steering Committee	In the profile of politician, possesses political, legal and financial resources.	collaborative & supportive roles.
	İzmir Development Agency	GCC İzmir Steering Committee	In the profile of politician and expert, possesses financial and political resources.	collaborative & supportive roles.
Energy System	İzenerji CO	GCC İzmir Coordination Office	In the profile of expert and administrator, possesses political and informational resources.	role of administrator.
	Energy Industrialists and Businessmen Association	GCC İzmir Steering Committee	In the profile of special expertise, possesses informational resources.	collaborative & supportive roles.
	İzmir Universities Platform	GCC İzmir Steering Committee	In the profile of special expertise, possesses informational resources.	collaborative & supportive roles.
	TMMOB - Union of Chambers of Turkish Engineers and Architects İzmir	GCC İzmir Steering Committee	In the profile of special expertise, possesses political and informational resources.	collaborative & supportive roles.
Transportation System	İzmir Metropolitan Municipality	GCC İzmir Steering Committee	In the profile of politician, expert and administrator, possesses political, legal and financial resources.	administrator & collaborative roles.
	İzmir Governorship Provincial Directorate of Environment, Urbanization and Climate Change	GCC İzmir Steering Committee	In the profile of politician, possesses political, legal and financial resources.	collaborative & supportive roles.
Economic and Financial Systems	İzmir Metropolitan Municipality	GCC İzmir Steering Committee	In the profile of politician, expert and administrator, possesses political, legal and financial resources.	administrator & collaborative roles.

A-3.1: Systems & stakeholder mapping				
System description	**Stakeholders involved**	**Network**	**Influence**	**Interest**
	İzmir Chamber of Commerce	GCC İzmir Steering Committee	In the profile of special expertise, possesses informational resources.	collaborative & supportive roles.
	Aegean Exporters' Association	GCC İzmir Steering Committee	In the profile of special expertise, possesses informational resources.	collaborative & supportive roles.
	İzmir Commodity Exchange	GCC İzmir Steering Committee	In the profile of special expertise, possesses financial and informational resources.	collaborative & supportive roles.
	Aegean Region Chamber of Industry	GCC İzmir Steering Committee	In the profile of special expertise, possesses informational resources.	collaborative & supportive roles.
	Banks that have Green Financing	Financial	In the profile of special expertise, possesses financial resources.	supportive roles.
	Funding programs	European Union (EU)	In the profile of special expertise, possesses financial resources.	supportive roles.

A-3.2: Description of systemic barriers and opportunities – textual elements

With its multidimensional and multi-sectoral economic structure, İzmir has an important potential in terms of industry, agriculture, tourism, and service main sectors. The largest share in greenhouse gas emissions belongs to the industry sector with a ratio of 31.4%, followed by transportation with a rate of 23%, residences with a rate of 14.3% and agricultural activities with a rate of 8.2% (IMM SECAP, 2018)

Systems and Systemic Barriers

Energy System: This encompasses the production, distribution, and consumption of energy within the city. Systemic barriers within the energy system could include a heavy reliance on fossil fuels, inadequate renewable energy infrastructure, and inefficient energy use in buildings and transportation. Reliance on Fossil Fuels: İzmir's energy mix is heavily dependent on fossil fuels, particularly coal and natural gas, for electricity generation and transportation, leading to high greenhouse gas emissions. Inefficient Buildings: Many buildings in İzmir lack energy-efficient designs and technologies, leading to excessive energy consumption for heating, cooling, and lighting.

Limited Renewable Energy Integration: Despite its potential for solar and wind energy, İzmir's renewable energy capacity remains underutilized due to regulatory and technical barriers. Subsidies for competing fuels.

The following items provide a prime example of the difficulties encountered:

- Lack of legal framework for independent power.
- Producers
- Lack of enabling energy policy at EU level.
- Transaction costs.

Transportation System: This involves the networks and modes of transportation that move people and goods around the city. Systemic barriers may include a lack of public transportation options, inefficient traffic management, and a high number of privately owned vehicles. Lack of Sustainable Transportation: Insufficient public transportation options, limited cycling infrastructure, and high reliance on personal vehicles contribute to traffic congestion and emissions.

The following items provide a prime example of the difficulties encountered:

- Lack of enabling transport policy at EU level.
- Spatial dispersion or uneven accessibility.
- Psychosocial barriers to public transport use. (Risk of transmission of infections, exposure to crime and verbal offense)
- Psychosocial barriers to automated transport systems. (Such as driverless shuttles)

Urban Planning and Infrastructure: This relates to the layout, design, and development of the city. Systemic barriers might include zoning regulations that encourage urban sprawl, insufficient green spaces, and a lack of integration between land use and transportation planning. Urban planning policies that promote sprawl can lead to increased energy consumption for transportation and contribute to fragmented communities.

Waste Management System: Inadequate waste separation (mixed waste collection scheme) and recycling infrastructure result in significant amounts of organic waste going to landfills, contributing to methane emissions. İzmir is also observed to be one of the provinces in Türkiye that produces the most waste, producing one fourth of all hazardous waste produced in the country by itself. Despite the recovery potential of the waste types produced, the waste recycling rate remains at the very low level of 10%.

The following items provide a prime example of the difficulties encountered:

- Insufficient waste separation and quality of separated waste.
- Difficult balancing between promoting recycling and protecting consumers against harmful chemical substances in recycled materials.
- Inefficient energy recovery of waste.
- Limited community engagement and support.

Economic and Financial Systems: These refer to the financial mechanisms and incentives that influence investment and economic activities within the city. Systemic barriers might include subsidies for fossil fuels, lack of funding for sustainable projects, and financial constraints on implementing climate-friendly initiatives. Financial instability problems experienced recently in our country create inflation increase, medium-long term fluctuation, currency imbalance and market problems. This may pose a risk of adversely affecting the decision-making mechanisms of investors.

Policy and Governance: This involves the regulatory framework, policies, and decision-making processes that guide the city's actions. Systemic barriers may include conflicting policies, lack of coordination among different government bodies, and insufficient enforcement mechanisms. Policy Inconsistencies: Existing policies may lack clear and consistent incentives for adopting renewable energy, energy efficiency, and sustainable practices.

Regulation in Türkiye can be made in the short term, not the medium or long term. This situation may create the risk of not being able to foresee the future while making long-term project planning.

Renewable energy facility institutions may take a long time to obtain the required license. Registration requirements may need to be restructured in parallel with our target in order for Izmir to realize the climate transformation it needs. There might be a risk of needing new legislation in the field of renewable energy.

Social and Cultural Systems: These encompass the behaviours, attitudes, and values of the city's inhabitants. Systemic barriers might include resistance to change, lack of awareness or understanding of climate issues, and social inequalities that affect access to sustainable resources and services. Lack of Public Awareness: Limited understanding of climate change issues among residents can hinder the adoption of sustainable behaviours and initiatives. Also, the resulting poverty has changed people's priorities. Clean energy and environmental awareness carry the risk that basic needs will be left behind. For this reason, there may be a possibility that the Eco sociological transformation is not sufficiently embraced by the citizens of Izmir. Communities in a state of inequality, also linked to poverty, may be at risk of not being included in the climate change efforts.

Systemic Opportunities:

Renewable Energy Potential: İzmir's abundant solar and wind resources provide significant opportunities for expanding renewable energy generation. İzmir province is very rich in terms of wind energy with its theoretical capacity of 11,815 MW, and if the capacity factor is taken as 30%, the total amount of energy to be produced with this potential will be 31 billion kWh/year. This value is greater than the total electricity consumption of the Aegean region (~21 billion kWh in 2005).

In İzmir conditions, electrical energy that will meet the electricity needs of a family of 4 in an area of 25 m^2 can be produced with PV systems. With the decrease in costs, PV roof systems will become widespread rapidly.

It has been calculated that there is an apparent usable geothermal potential of 330,000,000 Kcal/h within the provincial borders of İzmir. While it is possible to heat an average of 80,000 houses with this amount of energy made visible, almost one-tenth of this amount can be heated. The apparent geothermal potential will increase by at least 5 times as a result of the research studies and drillings to be carried out in the existing geothermal areas within the province of İzmir.

Integrated Public Transportation: Investing in an efficient and well-connected public transportation system can reduce congestion and emissions.

Energy-Efficient Buildings: Implementing energy-efficient building codes and promoting retrofitting can reduce energy consumption and greenhouse gas emissions.

Circular Economy Initiatives: Enhancing waste separation, recycling programs, and composting can divert organic waste from landfills and promote resource efficiency. In order to set an example of a national industrial symbiosis model, the Industrial Symbiosis Program is carried out in İzmir in cooperation with the İzmir Development Agency and UNDP. They started an important initiative in Izmir by creating a digital-based governance platform that will bring businesses together to create industrial symbiosis relationships in İzmir.

They started an important initiative in Izmir by creating a digital-based governance platform that will bring businesses together to create industrial symbiosis relationships in Izmir.

Urban Greening: Creating more green spaces, parks, and urban forests can enhance biodiversity, improve air quality, and provide carbon sequestration. In İzmir's Strategy for Living in Harmony with Nature, important initiatives and policies have been established for solutions compatible with nature, such as Living Parks, İzmir Heritage Routes, which bridge the gap between urban and rural areas and aim to protect biodiversity.

Smart City Solutions: Utilizing smart technologies for energy management, waste reduction, and urban planning can optimize resource use and emissions.

Community Engagement: Educating and engaging residents in climate action through awareness campaigns, workshops, and incentives can drive behaviour change.

Local Partnerships: Collaborating with local businesses, universities, and NGOs can foster innovation and support the implementation of sustainable projects.

Policy Alignment: Aligning local policies with national and EU-level climate goals can create a supportive regulatory environment for climate neutrality.

Green Jobs Creation: The transition to a climate-neutral city can stimulate economic growth by creating new job opportunities in renewable energy, green technologies, and sustainable services.

A-3.3: Description or visualisation of participatory model for the city climate neutrality – textual and visual elements

As one of the 112 Mission cities selected for the Climate Neutral and Smart Cities Mission, Izmir has established the Global Climate Community Izmir to coordinate the efforts carried out within the Mission.

This community aims to collectively overcome the challenges of transitioning Izmir towards a climate-neutral future and create the broadest network of national and international supporters.

We seek to progress with a participatory roadmap towards the net-zero target by bringing together action plans prepared under various sectors and initiatives.

Izmir's climate community aligns its activities with the European Commission's Climate Neutral and Smart Cities Mission, in collaboration with the Mission Platform NetZeroCities.

Our initiative in Izmir strives to address citizen concerns while fostering innovation from various sectors and disciplines. Therefore, throughout the process, we uphold a transparent approach based on legitimate information.

To realize the targeted urban alliance, the governance model includes public, private sector and non-governmental organizations, chambers of profession and industry and commerce, media organizations and financial institutions.

Apart from executing the actions determined by the comprehensive and participatory roadmap; invites the city's citizens, artists, prominent figures, small/large private businesses, and other centres to expand the city alliance with the goal of a climate neutral city.

The selection of Izmir as one of the 60 CrAFt Cities has created an important opportunity for the climate neutral journey to progress, including artists, young people, and disadvantaged groups, without leaving anyone behind. It is aimed to spread the city alliance to a wider area with the activities and experiences to be carried out within the scope of CrAFt Cities.

There are 3 basic structures in the Global Climate Community İzmir governance model. These are the Steering Committee Coordination Office and Working Groups.

Steering Committee

It is the most representative advisory and support body of Izmir’s Mission Platform.

It is envisaged that İzmir's high-level administration and public institutions, chambers of industry and commerce, associations, unions, non-governmental organizations and private sector representatives will take part in the board.

The Steering Committee will represent the development and implementation of the Mission strategies in coordination with the EU Climate Neutral and Smart Cities Platform.

GCC İzmir Streeting Committee Organizations:

1. İzmir Metropolitan Municipality
2. İzmir Governorship Provincial Directorate of Environment, Urbanization and Climate Change
3. Aegean Region Chamber of Industry
4. Izmir Chamber of Commerce
5. City Council
6. Izmir Development Agency
7. TMMOB Izmir (Turkish Chamber of Architects and Engineers Izmir Branch)
8. Aegean Exporters' Unions
9. Izmir Bars Association

10. Izmir Medical Chamber
11. Izmir Commodity Exchange
12. İzmir Universities Platform
13. İzmir Province Municipalities Representative
14. Union of Aegean Municipalities
15. ENSIA (Association of Energy Industrialists and Businesspeople)
16. İzmir Union of Chamber of Merchants and Craftsmen

Coordination Office

It consists of the persons/institutions authorized by the Mayor of Izmir Metropolitan Municipality for the Mission of Climate Neutral and Smart Cities. Responsibility for the implementation of the Mission has been given to İZENERJİ CO by the Izmir Metropolitan Municipality.

The coordination office receives the support of all stakeholders of İzmir, manages training, workshops, monitoring, evolution, coordination and all other operational activities, and reports to the European Commission, determines implementation projects and works with EU relevant institutions for the development of project finance.

Working Groups

The Working Groups provide the information that will form the Action Plan and Investment Plan that make up the Climate City Contract, which will enable İzmir to achieve the title of "Mission City".

Each working group prepares its own Action Plan and Investment Plan.

With the signing of the Climate City Contract, the Working Groups implement, renew and report the relevant projects until 2030. Depending on the sector-based distinctions ıt is envisaged to consist of six categories as:

1. Energy Use and Building Applications
2. Energy Production
3. Mobility and Transportation
4. Nature Based Solutions
5. Circular Economy
6. Green Industry.

If necessary, new working groups can be formed.

Each of the Working Groups has common topics related to their fields of activity. These:

- Effective participation of the Citizen as well as the stakeholder institutions, companies and organizations will be ensured,
- Financial studies will be carried out in a wide range.
- All work will be carried out centered on the Urban alliance and participation.
- Disciplined and Reportable methodology will be used, and business standards will be established with regulations and directives.
- High-level effective communication network will be established and operated with stakeholders, public opinion and EU units.
- All R&D, innovation, innovative technology, and environmentalist studies will be evaluated in achieving the mission goals.

The process of data collection, analysis, evaluation, needs assessment and structuring and implementation of appropriate projects will be implemented.

5 Part B – Pathways towards Climate Neutrality by 2030

Part B represents the core of the Action Plan, shaped by local authorities, local businesses, and stakeholders, comprising of the most essential elements: scenarios, strategic objectives, impacts, action portfolios and indicators for monitoring, evaluation, and learning.

5.1 Module B-1 Climate Neutrality Scenarios and Impact Pathways

Table 5.1.1: Impact Pathways

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions)**	**Indirect impacts (co-benefits)**
Energy systems	Technology & Infrastructure	■ Deployment of RE systems, and energy efficiency measures, such as insulation and LED lighting. ■ Increased investment in R&D of new clean energy technologies. ■ Creation of new jobs in the clean energy sector. ■ Reduction in energy bills for businesses and households.	■ Deeper decarbonization of the energy sector ■ Increased energy security. ■ Improved air quality. ■ Reduced greenhouse gas emissions.	■ The deployment of renewable energy techs can displace fossil fuels, leading to direct emission reductions. ■ Energy efficiency measures can reduce the amount of energy required, also leading to emission reductions.	■ The deployment of renewable energy technologies can create new jobs and boost economic growth. ■ Improved air quality can reduce respiratory illnesses and premature deaths. ■ Reduced GHG emissions can help to mitigate climate change.
	Governance & Policy	■ Development of new policies and regulations to promote the deployment of renewable energy and energy efficiency measures. ■ Creation of new institutions and organizations to support the transition to a clean energy economy. ■ Increased public awareness of climate change and the need for action.	■ Deeper decarbonization of the energy sector. Increased participation and interest of stakeholders. ■ Increased energy security. ■ Improved air quality. Adoption of a low carbon lifestyle. ■ Reduced greenhouse gas emissions.	■ A clear market for the deployment of clean energy techs, leading to direct emission reductions. ■ The creation of new institutions and organizations can help to coordinate and scale up efforts to decarbonize the energy sector. ■ Increased public awareness can lead to changes in individual and household behavior, which can also lead to emission reductions.	■ The transition to a clean energy economy can create new jobs and boost economic growth. ■ Improved air quality can reduce respiratory illnesses and premature deaths. ■ Reduced GHG emissions can help to mitigate climate change.

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions)**	**Indirect impacts (co-benefits)**
	Social Innovation	■ Creation of community-based energy projects. ■ Increased participation of citizens in energy decision-making. ■ Development of new social enterprises to promote clean energy.	■ Deeper decarbonization of the energy sector. ■ Increased energy security. ■ Improved air quality. ■ Reduced greenhouse gas emissions.	■ The community-based energy projects can displace fossil fuels, leading to direct emission reductions. ■ Increased participation of citizens in energy decision-making can lead to changes in individual and household behavior. ■ The new social enterprises to promote clean energy can help to scale up the deployment of clean energy systems.	■ The transition to a clean energy economy can create new jobs and boost economic growth. ■ Improved air quality can reduce respiratory illnesses and premature deaths. ■ Reduced GHG emissions can help to mitigate climate change.
	Democracy / Participation	■ Increased public awareness of climate change and the need for action. ■ Development of new educational resources on clean energy. ■ Creation of new citizen participation mechanisms, such as energy advisory boards and community energy plans.	■ Deeper decarbonization of the energy sector. ■ Increased energy security. ■ Improved air quality. ■ Reduced greenhouse gas emissions.	■ Increased public participation can lead to changes in individual and household behaviour, which can also lead to emission reductions. ■ The development of new citizen participation mechanisms can help to build public support for clean energy policies and projects.	■ The transition to a clean energy economy can create new jobs and boost economic growth. ■ Improved air quality can reduce respiratory illnesses and premature deaths. ■ Reduced GHG emissions can help to mitigate climate change.

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions)**	**Indirect impacts (co-benefits)**
	Finance & Funding	■ Mobilization of public and private finance for clean energy projects. ■ Development of new financial instruments to support clean energy investments. ■ Creation of new financial incentives for clean energy technologies.	■ Deeper decarbonization of the energy sector. ■ Increased energy security. ■ Improved air quality. ■ Reduced GHG emissions.	■ The mobilization of public and private finance can help to accelerate the deployment of clean energy technologies, leading to direct emission reductions. ■ The development of new financial instruments can help to make clean energy investments more accessible and affordable. ■ The creation of new financial incentives can help to make clean energy technologies more competitive with fossil fuels.	■ These can help to address the financial barriers to a clean energy transition e.g., it can help to make clean energy projects more affordable and accessible to low-income households. ■ The transition to a clean energy economy can create new jobs and boost economic growth. ■ Improved air quality can reduce respiratory illnesses and premature deaths. ■ Reduced GHG emissions can help to mitigate climate change.
	Learning & Capabilities	■ Increased training and education on clean energy technologies. ■ Development of new skills and knowledge in the clean energy workforce. ■ Creation of new research and development initiatives on clean energy.	■ Increased deployment of clean energy technologies. ■ Reduced greenhouse gas emissions. ■ Creation of new jobs in the clean energy sector. ■ Increased energy security. ■ Improved air quality.	■ The development of new skills and knowledge in the clean energy workforce can help to accelerate the deployment of clean energy technologies, leading to direct emission reductions. ■ The creation of new R&D initiatives on clean energy can help to develop new clean energy technologies that are more efficient and affordable.	■ The transition to a clean energy economy can create new jobs and boost economic growth. ■ Improved air quality can reduce respiratory illnesses and premature deaths. ■ Reduced GHG emissions can help to mitigate climate change.

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions)**	**Indirect impacts (co-benefits)**
Mobility & Transport	Technology & Innovation	■ Deployment of new low-carbon transportation technologies & modes, such as electric vehicles and public transportation. ■ Increased investment in development of new transportation technologies.	■ The increase in the share of public transportation ■ Deeper decarbonization of the transportation sector. ■ Reduced GHG emissions.	■ The deployment of new low-carbon transportation technologies can lead to direct emission reductions.	■ Electric vehicles can be used to replace gasoline and diesel vehicles, leading to direct emission reductions. ■ Public transportation can be made more efficient and attractive, encouraging people to use it instead of private vehicles. ■ Smart mobility solutions can be used to improve traffic flow and reduce congestion, also leading to emission reductions. ■ Autonomous vehicles have the potential to revolutionize transportation, making it more efficient and sustainable.
	Governance & Policy	■ Development of a new mobility plan for İzmir. ■ Creation of a new public transportation authority. ■ Creation of car-free zones or congestion charge in the city centre.	■ Overall decrease in car use trend. ■ Deeper decarbonization of the transportation sector.	■ The new mobility plan can help to reduce the number of cars on the road, leading to direct emission reductions. ■ The new public transportation authority can help to improve the efficiency and attractiveness of public transportation. ■ The implementation of car-free zones leads to reduce GHG emissions.	■ The reduced greenhouse gas emissions can help to mitigate climate change. ■ The improved air quality can reduce respiratory illnesses and premature deaths. ■ The increased public health can improve the quality of life for residents.

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions)**	**Indirect impacts (co-benefits)**
	Social Innovation	■ Creation of community-based transportation projects. ■ Increased participation of citizens in transportation decision-making.	■ Increased access to affordable and sustainable transportation options for all residents, regardless of income or location. ■ Reduced traffic congestion and air pollution. ■ Increased social cohesion and community resilience. ■ Creation of new jobs and businesses in the low-carbon transportation sector.	■ The development of community-based transportation projects can help to reduce the number of cars on the road, leading to direct emission reductions. ■ Increased participation of citizens in transportation decision-making can help to create more sustainable transportation solutions that are supported by the community.	■ The reduced GHG emissions can help to mitigate climate change. ■ Increased social justice and equity. ■ Creation of a more sustainable and liveable city.
	Democracy / Participation	■ Creation of a new citizen advisory board for transportation. ■ Increased public awareness of the need for sustainable transportation. ■ Development of new transportation plans that are supported by the community.	■ Increased public support for sustainable transportation. ■ More equitable distribution of transportation resources. ■ Increased accountability of transportation decision-makers to the public. ■ Greater innovation in transportation planning and policy.	■ More sustainable transportation projects with the help of the new citizen advisory board for transportation. ■ Increased public awareness can help to change people's behavior to choose more sustainable transportation options. ■ The community supported plans can ensure the effective implementation and their desired outcomes.	■ Improved public health and well-being. ■ Enhanced liveability and attractiveness of the city. ■ The reduced GHG emission and improved air quality.
	Finance & Funding	■ Development of new financing mechanisms (such as a dedicated fund) to support sustainable transportation projects. ■ Creation of new public-private partnerships to finance sustainable transportation projects.	■ Increase in the number of people using sustainable transportation options. ■ Increase in the use of EVs. ■ New jobs in the sustainable transportation sector. ■ Deeper decarbonization of the transportation sector.	■ The new financing mechanisms can make sustainable transport. projects more affordable, leading to direct emission reductions. ■ The new public-private partnerships can help to leverage resources and expertise to finance sustainable transportation projects.	

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions)**	**Indirect impacts (co-benefits)**
	Learning & Capabilities	■ Establishing a training program on sustainable transportation for transportation planners and engineers.	■ İzmir could have a more knowledgeable and skilled workforce in sustainable transportation. ■ İzmir could attract more investment in sustainable transportation.	■ The more skilled workforce could help to develop and implement more effective transportation planning and engineering solutions in İzmir that reduce emissions.	■ The creation of new jobs in the sustainable transportation sector could boost the economy.
Waste & circular economy	Technology & Innovation	■ Development of a smart waste collection and transport system by using sensors, data analytics and spatial optimization. ■ The implementation of new / innovative recycling and disposal technologies. ■ The city could work with businesses to create zero-waste operations.	■ Shifting to separate waste collection scheme in metropolitan districts of the city. ■ More materials recycled and recovered in the MSW management system. ■ The decrease in the amount of waste sent to landfills. ■ Creation of new jobs in the waste management and recycling sector.	■ The decrease in fuel consumption by the optimized solid waste collection and transport. ■ The decrease in the amount of landfilled waste led to direct emission reductions. ■ Reduction in emissions with the increase in the amount of recycled and composted waste. ■ Increased energy recovery from waste by applied modern waste disposal technologies rather than landfilling.	■ Technology can help to reduce the costs of waste management, making it more affordable for businesses. ■ The improved air quality and water quality. ■ The creation of new jobs in the waste management and recycling sector could boost the economy.
	Governance & Policy	■ Development of a coordinated waste management plan with district municipalities. ■ The change in waste collection strategy from mixed waste collection to separate collection. ■ A law to ban the use of single-use plastics in municipal buildings. ■ Creating a public awareness campaign to educate residents about waste reduction and recycling.	■ A decrease in the number of single-use plastics used in municipal buildings. ■ An increase in the number of residents who are aware of waste reduction and recycling practices. ■ A decrease in the amount of waste sent to landfills.	■ The increase in the amount of recycled and recovered waste via the new separate collection strategy.	■ The change in public behaviour about waste generation and recycling.

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions)**	**Indirect impacts (co-benefits)**
	Social Innovation	■ The creation of platforms for dialogue, citizen-led projects, and the promotion of behavior change campaigns that encourage waste reduction, reuse, and recycling. ■ Promoting circular economy practices at the city level by raising awareness about the benefits of circular economy models, encouraging businesses and residents to adopt circular practices.	■ An increase in the number of residents who are aware of and participate waste reduction and recycling practices. ■ An increase in the number of community-based waste collection and recycling programs.	■ The increase in the number of community-based waste collection and recycling programs could lead to direct emission reductions, as these programs can help to reduce the amount of waste sent to landfills.	■ Development of sustainable consumer behavior among the people living in the city.
	Democracy / Participation	■ Establishment of a citizens' panel to advise on waste management policies. ■ Public meetings to discuss waste management issues. ■ Creation a website or social media page where citizens can share their ideas about waste management.	■ An increase in public awareness of waste management issues. ■ An increase in public support for waste reduction and recycling initiatives. ■ A decrease in the amount of waste sent to landfills.	■ The increase in public awareness of waste management issues could lead to direct emission reductions, as residents may be more likely to adopt sustainable waste management practices. ■ The increase in public support for waste reduction and recycling initiatives could lead to direct emission reductions, as the city may be able to implement more ambitious waste reduction and recycling programs.	■ The increase in public awareness of waste management issues could lead to improved public health and quality of life. ■ The increase in public support for waste reduction and recycling initiatives could lead to job creation and economic development.

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions)**	**Indirect impacts (co-benefits)**
	Finance & Funding	■ İzmir could secure funding from the government or private sector to invest in waste reduction and recycling infrastructure. ■ The İzmir Municipality could offer incentives to businesses and organizations that adopt sustainable waste management practices.	■ An increase in investment in waste reduction and recycling infrastructure. ■ An increase in the number of businesses and organizations that adopt sustainable waste management practices. ■ A decrease in the amount of waste sent to landfills.	■ The increase in investment in waste reduction and recycling infrastructure could lead to direct emission reductions. ■ The increase in the number of businesses and organizations that adopt sustainable waste management practices could lead to direct emission reductions, as these practices may reduce the amount of waste sent to landfills.	■ The increase in investment in waste reduction and recycling infrastructure could create jobs and stimulate the economy. ■ The increase in the number of businesses and organizations that adopt sustainable waste management practices could improve public health and quality of life.
	Learning & Capabilities	■ Establishing a training program for waste management professionals. ■ The city could offer scholarships to students who want to study waste management.	■ A more knowledgeable and skilled workforce in waste management. ■ The city could attract more investment in waste management.	■ The more knowledgeable and skilled workforce could help to develop and implement more efficient and less polluting waste management practices. ■ The more innovative waste management technologies could help to reduce the amount of waste sent to landfills.	■ The more knowledgeable and skilled workforce could improve public health and safety. ■ The more innovative waste management technologies could create jobs and stimulate the economy.
Green infrastructure & nature-based solutions	Technology & Innovation	■ Adoption of low carbon farming technologies and precision agriculture practices.	■ Increased utilization of renewable energy solutions in farming operations.	■ Reduced greenhouse gas emissions from agriculture due to improved practices. ■ Lower energy consumption	■ Enhanced agricultural productivity and profitability for local farmers. ■ Job creation and economic growth in the agriculture sector. ■ Improved resilience of the agriculture sector to climate change impacts.

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions)**	**Indirect impacts (co-benefits)**
	Governance & Policy	■ Development of specific programs promoting climate-smart agriculture. ■ Formation of inter-agency working groups to coordinate climate action efforts.	■ Full implementation of climate-resilient agriculture policies and regulations. ■ Establishment of a dedicated department for monitoring and enforcing climate-smart practices.	■ Clear guidelines and incentives for farmers to adopt low carbon farming techniques. ■ Improved enforcement of emissions-related regulations in agriculture.	■ Strengthened governance structures for sustainable agriculture. ■ Increased trust and cooperation among stakeholders in the agriculture sector.
	Social Innovation	■ Farmer awareness campaigns and training programs on climate-smart agriculture. ■ Formation of farmer cooperatives for knowledge sharing and resource pooling.	■ Increased adoption of sustainable farming practices among a wider group of farmers. ■ Enhanced social networks and collaborations among farmers and agricultural communities.	■ Reduced emissions through the widespread adoption of sustainable agricultural practices. ■ Improved local food security and resilience to climate-induced shocks.	■ Stronger social cohesion and sense of community among farmers. ■ Increased access to markets and fair pricing for agricultural products.
	Democracy / Participation	■ Establishment of farmer advisory groups for climate action planning. ■ Inclusion of farmers' voices in decision-making processes.	■ Strengthened participation of farmers in shaping agricultural policies. ■ Enhanced transparency in the allocation of resources for climate-smart agriculture.	■ Tailored climate action plans reflecting the needs and perspectives of farmers. ■ More effective implementation of emission reduction measures due to farmer engagement.	■ Increased trust between the local government and farming communities. ■ Greater civic engagement and awareness of climate change issues.
	Finance & Funding	■ Mobilization of initial funding for climate-smart agriculture projects. ■ Development of financing mechanisms to support farmers in adopting sustainable practices.	■ Attraction of additional investments from public and private sectors. ■ Expanded access to affordable loans and grants for farmers.	■ Investment in emission reduction technologies and infrastructure in agriculture. ■ Financial incentives for farmers to transition to low carbon farming.	■ Improved livelihoods for farmers through increased financial support. ■ Enhanced local economic development through agricultural investments.
	Learning & Capabilities	■ Capacity-building programs for farmers and agricultural extension services. ■ Development of educational resources and training materials.	■ Enhanced skills and knowledge among farmers in climate-smart agriculture. ■ Integration of climate resilience and sustainability into agricultural education.	■ Improved implementation of emission reduction techniques due to increased knowledge. ■ More effective adaptation to changing climate conditions.	■ Increased human capital in the agriculture sector. ■ Attraction of talent and expertise to the region, fostering innovation and growth.

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions)**	**Indirect impacts (co-benefits)**
Built environment	Technology & Innovation	■ Development of new technologies to improve the energy efficiency of buildings. ■ Investments in new materials and products that are more sustainable. ■ The city could work with businesses to develop new ways to use technology to improve the built environment.	■ The decrease in energy consumption in buildings. ■ The improvement in air quality. ■ The city could create new jobs in the green economy.	■ The decrease in energy consumption in buildings could lead to direct emission reductions, as buildings are a major source of GHG emissions.	■ The improvement in energy efficiency could lead to lower energy bills for residents and businesses. ■ The creation of new jobs in the green economy could boost the economy.
	Governance & Policy	■ Develop a new policy that sets clear goals and targets for energy efficiency in buildings. ■ The city could revise planning regulations to require new buildings to meet certain energy efficiency standards. ■ The city could provide financial incentives to businesses and residents to improve the energy efficiency of their buildings.	■ The decrease in energy consumption in buildings. ■ The improvement in air quality. ■ Creation of new jobs in the green economy.	■ The decrease in energy consumption in buildings could lead to direct emission reductions, as buildings are a major source of greenhouse gas emissions.	■ The improvement in energy efficiency could lead to lower energy bills for residents and businesses. ■ The creation of new jobs in the green economy could boost the economy.
	Social Innovation	■ Partnering with community organizations to develop and implement energy efficiency programs for low-income residents. ■ Launching a public awareness campaign to educate residents about the benefits of energy efficiency.	■ The increase in the number of energy efficient buildings. ■ The decrease in energy consumption.	■ The increase in energy efficient buildings could lead to direct emission reductions, as buildings are a major source of greenhouse gas emissions.	■ The increase in energy efficient buildings could lead to lower energy bills for residents and businesses. ■ The improvement in air quality could have a positive impact on public health. ■ The public awareness campaign could help to change people's attitudes and behaviors towards energy efficiency.

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions)**	**Indirect impacts (co-benefits)**
	Democracy / Participation	■ Creating a participatory process that involves residents, community organizations, businesses, and other stakeholders in shaping the city's sustainable building policies and initiatives. This can include public consultations, workshops, and forums. ■ Launching awareness campaigns to inform the public about the benefits of energy-efficient buildings and involve them in the decision-making process for sustainable urban development. ■ Creation of a website or social media page where residents can share their ideas about energy efficiency.	■ Through continued engagement, collaborative planning processes will become ingrained in the city's governance structure. This will result in policies and projects that align with the needs and aspirations of the community. ■ The increase in the number of people who are involved in energy efficiency projects.	■ The involvement of residents and stakeholders in decision-making will lead to more informed choices about energy-efficient building practices and policies, directly contributing to reduced energy consumption and emissions. ■ Participatory processes ensure that policies, regulations, and incentives align with the actual needs and preferences of the community, resulting in better-targeted efforts to reduce emissions.	■ The increase in public involvement in energy efficiency projects could lead to improved community cohesion and a sense of ownership over the city's energy future. ■ The increase in public awareness of energy efficiency issues could lead to changes in people's attitudes and behaviors.
	Finance & Funding	■ Setting up specific funding programs to support energy-efficient retrofits in residential and municipal buildings. This could include grants, low-interest loans, tax incentives, or partnerships with financial institutions. ■ Creation of specific support programs for the development of district heating and cooling.	■ A noticeable increase in the adoption of energy-efficient practices in both municipal and residential buildings. This will lead to visible energy savings and reduced GHG emissions. ■ The reduction in the reliance on fossil fuels for heating and cooling by Implementing the heat network infrastructure.	■ The reduction in energy consumption by implementation of energy-efficient measures in municipal and residential buildings will directly decrease carbon emissions and contribute to the city's climate goals.	■ The increased investments in energy efficiency and retrofitting can create job opportunities in fields such as construction, energy auditing, and green technology installation. This can contribute to the local economy and employment rates. ■ Energy-efficient upgrades will lead to better indoor climate conditions and increased comfort in buildings. This can improve the overall quality of life for residents and workers.

B-1.1: Impact Pathways					
Fields of action	**Systemic levers**	**Early changes (1-2 years)**	**Late outcomes (3-4 years)**	**Direct impacts (Emission reductions)**	**Indirect impacts (co-benefits)**
	Learning & Capabilities	■ Organization of workshops, training sessions, and capacity-building programs for architects, builders, municipal staff, and residents.	■ The increase in understanding about energy-efficient building practices, green technologies, and the benefits of sustainable building design. ■The city will have a pool of skilled professionals who can contribute to sustainable building practices. ■ The incorporation of learned best practices will become a standard approach in municipal planning and building design. This will result in more energy-efficient buildings and reduced emissions from the built environment.	■ The increased knowledge and capabilities among architects and builders will lead to the design and construction of energy-efficient buildings. This will directly reduce energy consumption and carbon emissions associated with building operations. ■ Capacity building efforts can empower building owners and residents to make informed decisions about retrofitting existing buildings with energy-efficient technologies, leading to decreased energy consumption and emissions.	■ The dissemination of knowledge and best practices from training sessions can lead to a broader understanding of energy efficiency in the community. This can result in a multiplier effect as individuals share their learning with others. ■ By promoting learning and capabilities, the city can foster an environment of innovation in sustainable building design, materials, and technologies. This can lead to the development of new solutions that benefit both the city and the wider industry. ■ Equipping citizens and professionals with the knowledge to make sustainable choices empowers them to actively contribute to the city's climate goals, enhancing a sense of ownership and collective responsibility.

B-1.2: Description of impact pathways

The impact pathways provide a roadmap for İzmir to transition to a more sustainable and resilient city, while also creating new economic opportunities and improving quality of life for its residents. They are based on best practices and lessons learned from other cities around the world that have successfully transitioned to a low-carbon economy.

In **the field of energy systems**, the main driving forces are systemic levers such as technology and infrastructure, governance and policy, and learning and capabilities. The early changes include the deployment of renewable energy systems and energy efficiency measures, such as insulation and LED lighting. These changes can help reduce energy bills for businesses and households, while also creating new jobs in the clean energy sector.

The late outcomes include deeper decarbonization of the energy sector and increased energy security. This can be achieved through the development of new clean energy technologies that are more efficient and affordable, as well as the creation of new R&D initiatives on clean energy. The transition to a clean energy economy can also create new jobs and boost economic growth, while reducing greenhouse gas emissions and mitigating climate change.

The direct impacts of these changes are focused on reducing greenhouse gas emissions and improving air quality. For example, the development of new skills and knowledge in the clean energy workforce can help accelerate the deployment of clean energy technologies, leading to direct emission reductions. The decrease in energy consumption in buildings could also lead to direct emission reductions, as buildings are a major source of greenhouse gas emissions.

The indirect impacts of these changes are co-benefits that can support economic growth, public health, and social equity. For example, improved air quality can reduce respiratory illnesses and premature deaths, while the creation of new jobs in the green economy can boost the economy. The improvement in energy efficiency could also lead to lower energy bills for residents and businesses.

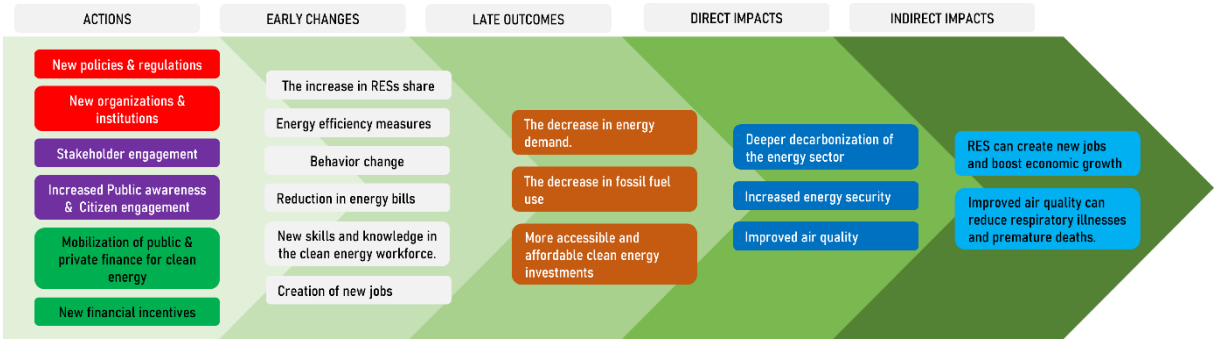

Figure 5 Impact pathways for energy systems

In **the field of mobility and transport**, the early changes include the deployment of new low-carbon transportation technologies and modes, such as electric vehicles and public transportation, with the help of technology and infrastructure, governance and policy, and social innovation. The development of a new mobility plan for İzmir, the creation of a new public transportation authority, and the creation of car-free zones or congestion charge in the city center are also early changes that can be implemented.

The late outcomes include the increase in the share of public transportation, deeper decarbonization of the transportation sector, and an overall decrease in car use trend. This can be achieved through the deployment of new low-carbon transportation technologies, such as electric vehicles, and the improvement of public transportation efficiency and attractiveness. Smart mobility solutions can also be used to improve traffic flow and reduce congestion, leading to emission reductions. Autonomous vehicles have the potential to revolutionize transportation, making it more efficient and sustainable.

The direct impacts of these changes are focused on reducing greenhouse gas emissions and improving air quality. For example, the deployment of new low-carbon transportation technologies can lead to direct emission reductions, while electric vehicles can be used to replace gasoline and diesel vehicles, leading to direct emission reductions. The implementation of car-free zones leads to reduced GHG emissions.

The indirect impacts of these changes are co-benefits that can support economic growth, public health, and social equity. For example, public transportation can be made more efficient and attractive, encouraging people to use it instead of private vehicles. This can lead to reduced traffic congestion, lower transportation costs, and improved air quality. The increased public health can improve the quality of life for residents, while the reduced greenhouse gas emissions can help to mitigate climate change.

In **the field of waste and circular economy**, the early changes include the development of a coordinated waste management plan with district municipalities, the change in waste collection strategy from mixed waste collection to separate collection, and the creation of a public awareness campaign to educate residents about waste reduction and recycling.

The late outcomes include a decrease in the amount of waste sent to landfills, an increase in the number of residents who are aware of and participate in waste reduction and recycling practices, and an increase in the number of community-based waste collection and recycling programs. This can be achieved through the implementation of coordinated waste management plans, the promotion of circular economy practices, and the development of sustainable consumer behavior among the people living in the city.

The direct impacts of these changes are focused on reducing greenhouse gas emissions and improving air quality. For example, the increase in the number of community-based waste collection and recycling programs could lead to direct emission reductions, as these programs can help to reduce the amount of waste sent to landfills. The decrease in the amount of waste sent to landfills can also help to reduce methane emissions, which are a potent greenhouse gas.

The indirect impacts of these changes are co-benefits that can support economic growth, public health, and social equity. For example, the development of sustainable consumer behaviour among the people living in the city can lead to reduced waste generation and increased recycling rates, which can help to reduce the environmental impact of waste. The creation of new jobs in the waste management and recycling sector could also boost the economy.

Overall, the changes in the field of waste and circular economy can help İzmir become more sustainable and resilient, while also creating new economic opportunities and improving quality of life for its residents.

In **the field of green infrastructure and nature-based solutions**, at the early stage İzmir aims adapting low-carbon farming technologies and precision agriculture practices, developing green roofs and walls, and implementing urban forestry programs.

The late outcomes of these changes include increased utilization of renewable energy solutions in farming operations, the decrease in energy consumption in buildings, and the improvement in air quality. This can be achieved through the deployment of new clean energy technologies, the improvement of energy efficiency in buildings, and the implementation of green infrastructure projects.

The direct impacts of these changes are focused on reducing greenhouse gas emissions and improving air quality. For example, the adoption of low-carbon farming technologies and precision agriculture practices can lead to direct emission reductions, as these practices can help to reduce the environmental impact of agriculture. The decrease in energy consumption in buildings could also lead to direct emission reductions, as buildings are a major source of greenhouse gas emissions.

The indirect impacts of these changes are co-benefits that can support economic growth, public health, and social equity. For example, the improvement in energy efficiency could lead to lower energy bills for residents and businesses, while the creation of new jobs in the green economy could boost the economy. The improvement in air quality can also reduce respiratory illnesses and premature deaths.

In **the field of built environment**, systemic levers such as technology and infrastructure, governance and policy, and social innovation are the main driving forces for change. The early changes include the development of a new policy that sets clear goals and targets for energy efficiency in buildings, the revision of planning regulations to require new buildings to meet certain energy efficiency standards, and the provision of financial incentives to businesses and residents to improve the energy efficiency of their buildings.

The late outcomes include the decrease in energy consumption in buildings, the improvement in air quality, and the creation of new jobs in the green economy. This can be achieved through the implementation of energy efficiency measures, the use of renewable energy sources, and the adoption of sustainable building practices.

The direct impacts of these changes are focused on reducing greenhouse gas emissions and improving air quality. For example, the decrease in energy consumption in buildings can lead to direct emission reductions, as buildings are a major source of greenhouse gas emissions. The improvement in air quality can also reduce respiratory illnesses and premature deaths.

The indirect impacts of these changes are co-benefits that can support economic growth, public health, and social equity. For example, the improvement in energy efficiency could lead to lower energy bills for residents and businesses, while the creation of new jobs in the green economy could boost the economy. The adoption of sustainable building practices can also lead to improved indoor environmental quality and increased comfort for building occupants.

5.2 Module B-2 Climate Neutrality Portfolio Design

Table 5.2.1: Description of action portfolios

B-2.1: Description of action portfolios		
Fields of action	**Portfolio description**	
	List of actions	**Descriptions**
Energy systems	Local renewable energy options study	Undertake an options study to understand the feasibility of deploying local renewable energy technologies and expanding the use of renewable electricity.
	Mass role out of photovoltaic cells on municipality owned assets and land e.g., municipality buildings, road reserves, bus stops.	Increasing energy prices and the rapid increase of exchange rates are the motivation for IMM to save and use the excess resources to promote other types of low carbon technologies in the city, especially technologies related to its own operations. Within the IMM strategic plan (2020-2024) there are 10 solar energy plants planned until the end of 2024. By increasing the municipality's renewable energy generation capacity, it diversifies the energy supply, reducing the exposure of the municipality buildings and key infrastructure to the risk of power shortages and blackouts as a result of the climate hazard.
	Municipality to encourage the private sector to install solar panels using existing national subsidies or financial schemes.	Total electricity consumption related emissions are 30% of the total emissions. This consumption consists of residential, tertiary buildings, public lighting. It is extremely essential to get private sector on board to be able to reach the desired emission reduction targets. After the latest legislation changes regarding grid connection fees, feed-in-tariff incentives introduced by the government have become ineffective. Although the procedures are eased step by step with legislation changes the incentives and fed-in-tariffs are no longer considered as incentives. After the latest legislation changes regarding grid connection fees, feed-in-tariff incentives introduced by the government have become ineffective. Although the procedures are eased step by step with legislation changes the incentives and fed-in-tariffs are no longer considered as incentives. When we look at the best practices of renewable energy penetration national incentives have been actively in the early stages then became a free market after certain thresholds. It is important to get

B-2.1: Description of action portfolios		
Fields of action	**Portfolio description**	
	List of actions	**Descriptions**
		central management on board for the uptake of renewables by citizens.
	Develop Izmir bioeconomy strategy and action plan.	It has become mandatory to make a transition from a structure based on unsustainable fossil resources to a bio-based economic system aiming to produce innovative and reliable products through the use of biobased resources. Efforts should be spent on the provision of biomass supply for bio-based products and services, diversification of biomass resources, fostering their production and ensuring sustainable provision in the fields of agriculture and forestry. Izmir has the potential to take important steps particularly towards transition to sustainable and nature-based agricultural practices, blue bioeconomy and forest bioeconomy in mountain ecosystems.
Energy Systems	Undertake a public lighting replacement scheme for all poles owned / run by municipality by installing LEDs.	Street lighting accounts for 4% of IMM's CO_2e emissions, equivalent to roughly 0.13% of total emissions for Izmir. When other street lighting* is added it is 0.8% of the total emissions. Studies indicate that replacing conventional bulbs with LEDs can reduce energy consumption for lighting by around 80% and lower operational costs, lower maintenance, longer lifetime of the system. The payback period usually is much less than other energy efficiency measures. There are other advantages of LED street lighting. The high quality of light is safer for vehicle drivers, cyclists, pedestrians. There are no toxic substances such as mercury, it is not hazardous as waste. More saving can be achieved by controlling illumination of certain areas (dimming lighting when unused) *Within the responsibility of district municipalities, Ministry of Transportation or Highways management
	Encourage the fuel switch from coal to more renewable sources in residential areas	2 % of total emissions and 22 % of fuel combustion emissions in residential buildings is from coal. Coal use has negative effects on public health as well as being the dirtiest fuel in all aspects. It is important to provide an environment for coal users to switch to cleaner resources. There is a process of urban transformation applied through the "Law No 6306 Transformation of Areas under Disaster Risk". Some of the residential buildings using coal as a fuel are also located in the planned Transformation Areas. Although at present it is more common to switch from coal to the use of natural gas, in order to achieve deeper decarbonisation, it will be necessary to switch away from fossil fuels and facilitate use of low and zero carbon energy technologies.
Mobility & transport	Promote a step change in the uptake of privately /commercially owned low emission vehicles:	This action will help Izmir take advantage from being at the forefront of the transition to electrified mobility through measures to that support electric vehicle use including: • priority parking for electric vehicles; • the provision of new and smart electric vehicle (EV) charging infrastructure; • To promote and encourage commercial buildings to have EV charging stations, with business licences granted by IMM. • Install EV charging stations for all municipal buildings and municipal parking area • Introduction of an all-electric / hybrid car club pool
	Apply smart traffic management, e.g., a command centre	The primary purpose of a smart city is to improve the quality and performance of public services, including transportation, by incorporating information and communication technologies. Traffic management systems,

B-2.1: Description of action portfolios		
Fields of action	**Portfolio description**	
	List of actions	**Descriptions**
		which help monitor, control, optimize, and operate traffic in urban areas. The streamed live data into the Transportation Management Centers allow transport officials and citizens to receive real-time updates about the city's transport conditions and availability. In Izmir, traffic flow and density can be monitored by the online platform of Izmir Transportation Center (IZUM) since 2018. The most important benefit of the system is the use of road capacities at high efficiency, a safer vehicle and pedestrian traffic, shortening travel times, and reduced accumulation and waiting times at the intersections. Currently, Izmir citizens can download the free application "IZUM" to smart devices. A summary of the system can be found at the beginning of the section. Although the system is in operation since 2018 Izmir wants to place more devices and enhance the system continuously.
	Eco driving training (driving more economically) for IMM employees (As per SEAP Action - in lieu of EV/hybrid vehicles)	The studies by transport experts indicates that there is a potential to decrease consumptions by eco driving trainings. ECOWILL project of EU conducted studies and found the positive effects of eco-driving as follows. • Average decrease in fuel consumption and CO2 emissions by 5-15% • Reduced noise (due to lower revs) • Positive effects on traffic safety: up to 40% fewer accidents • Lower maintenance costs (e.g., brakes, tyres) • Increase in comfort (fewer shifting gears, less braking, less stress) • Contributes to EU CO2 emission targets Training will be provided to drivers for the use of public transportation, vehicles with different driving experience and fuel consumption.
	Municipal Fleet and Service Vehicles: Electric and Low carbon vehicles	This action can be split into two parts, renewal of IMM's bus fleet by purchasing e-buses and the procurement of low carbon service vehicles. a) E-Buses purchase: IMM will continue and expand its efforts to replace old municipal buses and expand its existing capacity with e-buses. This action builds upon the ESHOT Strategic Plan, which has an expectation of approximately 400 e-buses to be purchased by 2024. Currently, 20 e buses have already been purchased from a local producer in 2017 at a cost of 400,000 EUR per bus, with a further 380 to be procured. After operating e-buses for 3 years, it has been observed by ESHOT that despite e-buses having a greater upfront cost of 250,000 EUR compared to diesel buses, they are 78% cheaper to fuel and 40% cheaper to maintain over the life cycle of the vehicle. Taking into consideration the renewal of older vehicles and projections for future capacity needed, ESHOT have planned the need to replace 871 buses in 2020-2025 and 530 buses between 2025 – 2030, totalling a need for 1,401 new buses to be purchased by 2030. As the first step of this renewal process, ESHOT will purchase 304 diesel buses in 2021. The remaining 1097 buses will be purchased as e-buses. b) Service Vehicle procurement: IMM currently tender the provision of service vehicles, which are predominantly made up of fossil-fuel based vehicles: petrol & diesel. According to IMM's Activity Report of 2018, IMM owns 120 passenger cars, 197 carry all trucks and cargo carrier vehicles, 9 land vehicles and 553 special purpose vehicles. In addition, IMM rented 235 vehicles (Passenger and van), 1.801 minibuses and buses, 12

B-2.1: Description of action portfolios		
Fields of action	**Portfolio description**	
	List of actions	**Descriptions**
		construction vehicles and 12 water tankers. This action aims to revise IMM's current procurement policy to encourage the provision of electric or low-carbon alternative vehicle types
	More sustainable urban mobility: mass transit and local mobility.	Develop and enhance the Municipalities urban mobility to enable the implementation of more diverse modes of low carbon transportation alternatives whilst reducing traffic congestions, by: <u>Mass transit schemes</u> By 2030, the rail system network will total 664.1 km including tramway, metro and IZBAN line • It is targeted to complete 312.1km rail system network. The line between F. Altay and Narlıdere will be finalized in 2021. Buca metro line has been planned and will be finalized by 2025. The tram line to Çigli is planned to be finalized in 2021. • Expanding the existing metro lines with Buca metro project which includes the construction of 13.3 km metro line and 11 underground stations • Introduce more park-and-ride systems in-line with the transportation master plan. Park-and- ride systems are located in 8 main transportation hubs, 21 transportation hubs and 23 transfer points totalling 52 points. • Additional 8 ferry and passenger ships will be purchased. • Implementation of park-and-ride systems to integrate private car using with public transportation system. <u>Local mobility schemes</u> • Assess feasibility of scaling up existing local mobility options E.g., scooter schemes and share-bike incentives. • Pedestrianisation of central city streets. 145 km length of street pedestrianization will be implemented in some of the districts such as Narlıdere, Balçova, Konak, Bornova, Buca, Karşıyaka, Çiğli until 2030 • Improve and expand the cycling infrastructure e.g., cycle lanes. The length of cycling route will be increased from 67km to 402 km until 2030.
	Develop more sustainable logistical practices.	baseline study will be undertaken with a view of informing policy development around the uptake of more sustainable practices and the adoption of environmental and cultural factors in port operations (international and national logistics) and the development of coastal structures. The basic aims of this these studies will focus on: • An understanding of current port infrastructure, assets and management structure / protocols. • Identify operation and smart-infrastructure improvements that can be made that improve the emissions and reduce the environmental impacts associated with port operations, enhancing them sustainability practices.
Waste & circular economy	Undertake circular economy assessments on all Municipality refurbishment and demolition projects, encouraging uptake in private projects.	IMM will commit to undertaking circular economy (CE) Assessments on all public building, refurbishment and demolition projects, and (where practicable) ensuring that the findings or recommendations are implemented. The aims of a CE assessment will be to identify opportunities to retain and reuse materials of buildings and develop a design and management strategy for ensuring that the building is easy to maintain, adapt and deconstruct in future. IMM should determine the content and scope of such studies, but key outputs are likely to include A pre-demolition audit (if applicable) highlighting reuse opportunities.

B-2.1: Description of action portfolios		
Fields of action	**Portfolio description**	
	List of actions	**Descriptions**
		• An estimate of construction, demolition and excavation waste arisings, with specific commitments (e.g. design strategies) for how these will be minimised and monitored • Specific design measures aimed at facilitating deconstruction and reuse. IMM will also develop a PR strategy (e.g. press releases and guidance) to promote CE assessments as a best practice measure that should be adopted by private businesses.
	Partner and / or cooperate with relevant institutions and organisations that can act jointly in line with Zero Waste Regulation to develop and invest in the necessary recycling infrastructures (bins, trucks, routes etc.).	This action would focus on investing in and developing the necessary smart waste collection infrastructure and assets that IMM requires to help advance the Izmir Integrated Solid Waste Management Plan 2018. The amount of solid waste per capita in Izmir has increased in recent years, rising from 390.55 kg per capita in 2008, 469.09 kg per capita in 2018 – a 20% increase. According to the (Izmir Province Integrated Waste Management Plan, the amount of waste per capita is expected to continue to rise in the next decade (p.99). In 2018, 4800 tons of waste was accepted per day in Harmandalı Solid Waste Storage Area. The amount of urban solid waste is expected to be 5,413 tons in 2025. This action is therefore necessary to minimise the increase in waste, and associated GHG emissions. There should be a focus on both expanding capacities to ensure that 100% of areas within the province receive a weekly collection, whilst also upgrading to a smart waste management system. The first stage of this action would involve filling the current data gaps regarding the current number of waste collection trucks and the district through Izmir that would require more extensive collection coverage.
	Development of a detailed analysis (number, type, size, age etc) and action plan for the development and low-emission management of dumpsites / landfills (both closed and operational). This could incorporate the development of mandatory energy recovery and landfill gas and anaerobic digestion.	When the necessary investments and preparations are completed, the emission of a large amount of methane into the atmosphere will be prevented.
	Investigate potential to provide dedicated waste collection for restaurant / food industry traders in-line with management infrastructure and technology.	There are a number of actions identified during studies and workshops that support “Zero Waste Regulation” and the efforts to reduce waste. All these actions are collected under one action. It is important to take action to reduce waste production in many ways. In case of a deviation from projections and a higher increase would lead to new investments needs for waste management. By preventing waste increase these investment need can be eliminated as well as lower GHG emissions. Undertaking awareness raising campaign’s and provide guidance / instruction on how citizens can embark on home or community composting (the recycling of organic wastes such as food and kitchen waste from households, restaurants, caterers), or other means of

B-2.1: Description of action portfolios		
Fields of action	**Portfolio description**	
	List of actions	**Descriptions**
		recyclable waste This will help to reach the objective of sustainable waste management and effective recycling with a view of encouraging and informing behaviour change.
	Establish a municipality-wide awareness campaign (schools etc) for waste reduction and separation at household level.	There are a number of actions identified during studies and workshops that support “Zero Waste Regulation” and the efforts to reduce waste. All these actions are collected under one action. It is important to take action to reduce waste production in many ways. In case of a deviation from projections and a higher increase would lead to new investments needs for waste management. By preventing waste increase these investment need can be eliminated as well as lower GHG emissions. Undertaking awareness raising campaign’s and provide guidance / instruction on how citizens can embark on home or community composting (the recycling of organic wastes such as food and kitchen waste from households, restaurants, caterers), or other means of recyclable waste This will help to reach the objective of sustainable waste management and effective recycling with a view of encouraging and informing behaviour change.
	Make separate collection of key dry recyclable materials mandatory, formulating policy at the district municipality level.	In line with the National Zero Waste Regulation and in collaboration with B.2.2.29, IMM will establish mandatory requirements for the separate collection of dry recyclable materials at the district municipality level and will be raise public awareness on this issue. In addition, according to the Regulation, District Municipalities of IMM are required to start implementation of Zero Waste Management System by 31 December 2020.
	Supplement and speed up investment in waste separation facilities, (dry recyclables and organic waste), a clean materials recovery infrastructure and composting facilities, building on the Integrated Solid Waste Management Strategy (2018).	In accordance with the targets of the Integrated Solid Waste Management Plan of IMM developed in 2018; waste have to be separated in source, or that mechanical / biological treatment has to be carried out, before waste is accepted to landfill. To ensure that, undertake an assessment study with a view to investing in waste separation facilities (such as Harmandalı Physical Separation Facility), a clean materials recovery facility and composting facility and complete the waste collection systems.
	Municipality to commit to banning the use of single-use plastics within their buildings, encouraging local businesses to do the same.	In order to reduce amount of non-recyclable and GHG emissions, Municipality will commit to banning the use of single-use-plastics within their buildings and operations, while encouraging other organisations, businesses and institutions to do same.
	Undertake an assessment of waste collection infrastructure (collection service, coverage rate, bins/ containers, vehicles), including smart collection systems and route	There are a number of actions identified during studies and workshops that support “Zero Waste Regulation” and the efforts to reduce waste. All these actions are collected under one action. It is important to take action to reduce waste production in many ways. In case of a deviation from projections and a higher increase would lead to new investments needs for waste management. By preventing waste increase these investment need can be eliminated as well as lower GHG emissions.

B-2.1: Description of action portfolios		
Fields of action	**Portfolio description**	
	List of actions	**Descriptions**
	optimisation software in collaboration with district municipalities.	Undertaking awareness raising campaign's and provide guidance / instruction on how citizens can embark on home or community composting (the recycling of organic wastes such as food and kitchen waste from households, restaurants, caterers), or other means of recyclable waste This will help to reach the objective of sustainable waste management and effective recycling with a view of encouraging and informing behaviour change.
Green infrastructure & nature-based solutions	Support the implementation of low carbon farming techniques and climate-smart agriculture across the province.	Development of resources and training scheme for farmers to support the transition to more sustainable agriculture that is more resilient to climate change, reduces greenhouse gas emissions and increase carbon sequestration rates. This would include the consideration of techniques that help address the "five pillars" of carbon farming. These are nutrient management, livestock management, soil and grassland management, renewable energy, ancient production basins.
Green Industry	Implement an environmental labelling scheme for companies within İzmir.	This action involves implementing a company-level environmental labelling scheme (and associated marketing strategy) to raise consumer awareness of sustainability issues and promote environmentally responsible production and purchasing decisions. The aim would be to encourage industrial businesses to participate in clean energy and green infrastructure efforts.
Built environment	Revise planning regulations and guidelines to ensure efficient water fittings in all new municipality buildings.	This action would involve collaboration with relevant bodies to review and update the appropriate planning regulation and guidelines to ensure that water efficient fixtures and fittings are considered in all new public buildings. This would involve considering the following water-consuming components: WC's, Urinals, taps (wash-hand basins and, where specified kitchen taps and wate disposal unit), showers, baths, dishwashers and washing machines
	Municipality to develop policy that commits to net zero in all new municipality buildings by 2030.	In order to adapt to climate change and its impacts, IMM will commit to net zero in all new municipality-controlled buildings and encourage other organisations, businesses and institutions to do the same.
	Insulation of Tertiary Buildings	Electricity consumption accounts for more than 90% of the total energy consumption of the tertiary sector, and therefore represents a major source of emissions. Insulation and energy efficient lighting installations will help to reduce these emissions as well as offering co benefits such as lower costs for businesses and other tertiary organisations. Mechanical and HVAC systems need to be considered for the efficiency of the systems.
	Energy Efficiency in Municipal Buildings	A Presidential Circular to achieve energy efficiency of 15% in all public buildings by 2023 have been published recently. The regulations also enforce to make energy audits and assignment of energy managers to buildings with a conditioned area of over 10.000 m2. Compared to the energy consumption of the buildings in the city, the municipal consumptions are relatively low with a 1.4% of all emissions. Taking measures for efficiency would have an environmental impact as well as financial for the Municipality. Financial savings would also help to finance other low carbon actions. When analysed more than 60% of the electricity emissions are from water pumps, wastewater treatment and drinking water treatment facilities. There are ongoing efforts to save energy by IZSU.

B-2.1: Description of action portfolios		
Fields of action	**Portfolio description**	
	List of actions	**Descriptions**
		Still IMM has more than 150 buildings/facilities for different purposes of use and with different sizes. When the facilities of affiliates are included, the number is much higher.
	Encourage and incentivise thermal insulating in existing residential buildings.	The total fuel consumption in residential buildings account for 60% of the emissions in the building sector. Any change will have an important impact on the CO2e emissions of the city. Due to geographical and climate conditions of Izmir, cooling requirements of buildings are as significant as heating requirements. Thermal insulation will reduce cooling consumption as well as heating need. Natural gas is the most common heating source for the city and is used within almost half of households. The remainder of households still predominantly use either fuel-oil, coal, LPG or electricity for heating.
	Encourage and incentivise energy efficient lighting systems in existing residential buildings (LED etc.)	The total fuel consumption in residential buildings account for 60% of the emissions in the building sector. Any change will have an important impact on the CO2e emissions of the city. Due to geographical and climate conditions of Izmir, cooling requirements of buildings are as significant as heating requirements. Thermal insulation will reduce cooling consumption as well as heating need. Natural gas is the most common heating source for the city and is used within almost half of households. The remainder of households still predominantly use either fuel-oil, coal, LPG or electricity for heating.
	Assess the feasibility of connecting public sector and/or industrial buildings to geothermal heat networks	Undertake mapping and associated baseline analysis to understand the number, distribution and fuel consumption of public sector and industrial buildings that currently use fossil fuel-based heating and understand the feasibility and potential benefits of connecting these to the geothermal heat network.
	Review and update the local level policies, planning regulations and guidelines for future and new municipality development around energy efficiency.	Establish a source of funding / subsidy for retrofitting existing privately-owned residential properties so that they become more energy efficient. Eligible retrofitting works could include, for instance, upgrading the building fabric (e.g., wall and roof insulation, windows, airtightness, etc.) or services (e.g., heating systems and water/sanitary fittings).
	Insulation of Tertiary Buildings Install Energy Efficient Light Bulbs in Tertiary Buildings	Electricity consumption accounts for more than 90% of the total energy consumption of the tertiary sector, and therefore represents a major source of emissions. Insulation and energy efficient lighting installations will help to reduce these emissions, as well as offering co-benefits such as lower fuel costs for businesses and other tertiary organisations. Mechanical and HVAC systems need to be considered for the efficiency of the systems.

Table 5.2.2: Individual action outlines

1) Review and update the local-level policies, planning regulations and guidelines for future and new municipality development around energy efficiency	
Strategic Plan Objectives:	Planned, Safe and Sound Settlement Areas Will be Developed or Regenerated.
Description	Establish a source of funding / subsidy for retrofitting existing privately-owned residential properties so that they become more energy efficient. Eligible retrofitting works could include, for instance, upgrading the building fabric (e.g., wall and roof insulation, windows, airtightness, etc.) or services (e.g., heating systems and water/sanitary fittings). This action will include the formation of associated administrative and oversight bodies as required to target and deliver any funding. It should be coordinated with Action B1. 11, which includes research and surveys aimed at assessing the existing energy performance of the building stock, in order to target areas currently exhibiting poor performance.
Rationale / Purpose	Planning regulations and building performance standards dictate the energy efficiency of buildings, which can help to reduce emissions (i.e., climate mitigation), as well as ensuring that buildings are better able to adapt to climate change. Given that buildings represent a key source of emissions in Izmir (roughly 42% as of 2018), and also have a significant impact on climate resilience (for instance, due to their impact on overheating, urban heat islands and flood risk), it is important to ensure that best practices are implemented wherever possible through strong policies and guidance. This has cross-cutting impacts on public health, quality of life and cost of living and would follow the identification of 'high-risk buildings' under Law No 6306.
Steps for Implementation	1. Establish a working group to review local level policies. 2. Conduct a study on energy efficiency design and materials to use taking into consideration future climatic conditions changing climate conditions and flexibility and adaptability in future use. 3. Engage District Municipalities that are important partners as they are the authority to grant license to new buildings. 4. Develop new planning regulations and guidelines for more energy efficient areas. 5. Cooperate with relevant stakeholders to implement the proposed actions
Project Type	Policy / Guidance
Field of action	Built environment
Systemic lever	Governance and police
Potential Emission Reductions	The new buildings are planned to be 50% more energy efficient then existing buildings 85,806 tCO2e in 2030
Potential Barriers	Distrust of the technologies Lack of awareness Resistance to proposed regulations and guidelines due to cost concerns. Higher costs
Action Owner	IMM
Stakeholders	MoEnvU Provincial Directorate of Environment and Urbanization Ministry. District Municipalities Izmir Chamber of Commerce, the Chamber of Architects and Engineers. Contractors procured for the Urban Transformation Areas
Financing Options	Municipal Budget

2) Explore ways to support residential retrofits being undertaken to a higher and greener energy performance standard.	
Strategic Plan Objectives:	Planned, Safe and Sound Settlement Areas Will Be Developed or Regenerated
Description	Explore the options that are available to support retrofitting of existing privately-owned residential properties so that they become more sustainable. Retrofitting practices could include but are not limited to. • upgrading the building fabric (e.g., wall and roof insulation, windows, airtightness, etc.) • services (e.g., heating systems and water/sanitary fittings), • green roofs • Water efficiency, rainwater/greywater collection for reuse and rehabilitation. Options to support retrofitting could include: • Adjusting permitting requirements for buildings that meet high standards of energy and water efficiency (e.g., fast-tracking permits, allowing greater floor area, etc.) • Developing public awareness campaigns and information schemes to promote uptake in residential retrofitting. This action should be coordinated with Action 1 (on top), which includes research and surveys aimed at assessing the existing energy performance of the building stock, in order to target areas currently exhibiting poor performance.
Rationale	Due to the age of the building stock of Izmir (46% having been built prior to 1990 and therefore prior to the introduction of thermal standards) there is likely to be poor building performance across the City, although there is currently no reliable data about the existing building stock in regard to age, household composition, heating systems, energy performance, etc. The energy efficiency and quality of housing stock not only dictates the emissions and cost associated with space heating and cooling, but if poor, it can expose the residents to a higher level of risk to extreme temperatures due to its heightened sensitivity to overheating. Furthermore, opportunities for improving the efficiency of water fixtures and fittings will help to reduce water demands and help remove dated plumbing (often cited as a reason for residents not drinking from the potable water network with dependency on bottled water). By retrofitting residential buildings, operational energy costs can be reduced, decreasing the resident's vulnerability to overheating, improve water efficiency and quality to reduce water stress and help to reduce GHG emissions.
Steps for Implementation	1. Undertake analysis of housing stock to identify those areas that are poorly performing, not set for urban transformation and where improvement would reduce energy poverty. 2. Create a suite of home energy retrofit options that target the most cost-effective carbon reduction and water efficiency opportunities. 3. Conduct Life Cycle analysis for green energy standards proposed to further investigate how buildings should be designed, constructed/retrofitted and operated. 4. Establish guidelines that address the definitions, technical standards, economic analysis, building envelope recommendations, and building mechanical and electrical systems. 5. Developing public awareness campaigns or incentive methods to contribute to household budgets, through tax reductions such as Energy Performance Regulation in Buildings (05.12.2008) on energy gains to be achieved and environmental protection
Type of action	Policy / Behavioral / Training
Field of action	Built environment
Systemic lever	Governance and Policy / Learning and Capabilities
Potential Emission Savings	The emissions savings depend on the nature of the incentive that is established. For context, if this was delivered for 50% of residential buildings in Izmir, achieving a 10% reduction in electricity demand and a 40% reduction in heat demand.

Plan for delivery	**Action owner**	IMM
	Stakeholders	MoEnvU, MoENR, IFI's, Izmir citizens, Businesses such as architects and designers, contractors / construction companies, manufacturers e.g., as insulation, heating systems, etc. Vulnerable groups: infirm, elderly.
	Financing options	Municipal budget, IFIs, Bank of Provinces, Private banks
	Revenue /savings opportunities	Savings opportunities will come from reduced energy costs, decreased pressure on energy networks, and public health benefits from more comfortable homes.
Impact measures	• Electricity consumption in residential buildings. • Heating / cooling consumption in residential buildings	
Estimated cost	**CAPEX:** **OPEX:** €2,081,250 **Design/development costs:** €312,188	
Estimated benefits	**Health impacts:** Public health – more active lifestyles **Economic Development:** increased economic efficiency; economic growth **Environment:** Mitigation of GHG Emissions	
1/25,000 scaled IMM Environmental Plan Alignment	Not spatially dependent.	

3) More sustainable urban mobility: mass transit and local mobility	
Strategic Plan Objectives:	Public Transport Will Be Affordable, Energy Efficient, Fair, Comfortable, Available to and Accessible for all residents. A Sustainable Transport System Will Be Created with a Harmonious Interaction Between Different Modes of Transport, Offering Different Options
Description	Develop and enhance the Municipalities urban mobility to enable the implementation of more diverse modes of low carbon transportation alternatives whilst reducing traffic congestions, by: <u>Mass transit schemes</u> By 2030, the rail system network will total 664.1 km including tramway, metro and IZBAN line • It is targeted to complete 312.1km rail system network. The line between F. Altay and Narlıdere will be finalized in 2021. Buca metro line has been planned and will be finalized by 2025. The tram line to Çiğli is planned to be finalized in 2021. • Expanding the existing metro lines with Buca metro project which includes the construction of 13.3 km metro line and 11 underground stations. • Introduce more park-and-ride systems in-line with the transportation master plan. Park-and- ride systems are located in 8 main transportation hubs, 21 transportation hubs and 23 transfer points totaling 52 points. • An additional 8 ferry and passenger ships will be purchased. • Implementation of park-and-ride systems to integrate private car using with public transportation system. <u>Local mobility schemes</u> • Assess feasibility of scaling up existing local mobility options e.g., scooter schemes and share-bike incentives. • Pedestrianization of central city streets. 145 km length of street pedestrianization will be implemented in some of the districts such as Narlıdere, Balçova, Konak, Bornova, Buca, Karşıyaka, Çiğli until 2030 • Improve and expand the cycling infrastructure e.g., cycle lanes. The length of cycling route will be increased from 67km to 402 km by 2030.

Rationale	As Izmir has grown, so has the number of private vehicles on the roads from 477,773 in 2008 to 765,657 in 2018. This has led to reduced air quality and congestion. This action will help reduce dependence on fossil fuel private vehicles by offering a range of local and longer distance, low carbon, mobility options. Damage and disruption to transport infrastructure is also a key factor in amplifying the impact of a climate related event, especially in densely populated cities such as Izmir. By diversifying and improving the transport infrastructure within the City it will create an overarching transport infrastructure that can provide more effective protection and support recovery.	
Steps for Implementation	<u>Mass-transit schemes</u> In line with the Transportation Master Plan of Izmir 2030, this action is already being progressed including: 1. Procurement of construction works of Buca metro. 2. Construction of metro line including civil and E&M works 3. Procurement of metro vehicles 4. Handing over to Izmir Metro AŞ for operation 5. Development plans to be updated considering planned main transportations hubs, transportation hubs, transfer points and P&R locations. 6. Metro station designs to consider planned P&R areas. 7. Construction and operation of park-and-ride systems <u>Local mobility schemes</u> 1. Feasibility studies to be prepared for scaling up existing scooter schemes and share-bike incentives. 2. Development plans to be updated considering planned pedestrianization projects. 3. Preparation of hardscaping and landscaping design of pedestrianization projects 4. Construction of pedestrianization projects 5. Development plans to be updated considering planned cycling routes. 6. Preparation of cycling infrastructure design 7. Construction of cycling infrastructure 8. Undertake and implement awareness raising campaigns on road safety.	
Type of action	Capital project	
Field of action	Mobility & transport	
Systemic lever	Finance and founding	
Potential Emission Savings	**Mass transit schemes**: 805.216 tCO2e reduction in 2030. 12% reduction targeted of all transportation except logistic emissions and additional 5% for intercity speed train investments. **Local mobility schemes:** 410.473 tCO2e reduction in 2030. 5% reduction targeted for cycling and 5% for pedestrian of all transportation except logistic emissions	
Plan for delivery	**Action owner**	• IMM:
	Stakeholders	• ESHOT • IZBAN • Izmir Metro CO • TCDD • 2nd Regional Directorate of Highways. • Professional chambers • District municipalities • Headman's and Citizens
	Financing options	Municipal budget, IFIs, Bank of Province, PPP, private operators
	Revenue /savings opportunities	Greater uptake of public transportation will result in higher revenues for the city.

Impact measures	• All air quality indicators • Concentration of heavy metals in soils (zinc, cadmium) • Annual CO2 equivalent emissions per capita • Annual CO2 emissions per unit of GDP • Transport modal share in total trips (Public Transport) • Transport modal share in total trips (Walking) • Transport modal share in total trips (Bicycle) • Kilometers of road dedicated exclusively to public transit per 100,000 population. • Kilometers bicycle path per 100,000 population • Share of population having access to public transport within 15 min by foot • Interruption of public transport systems in case of disaster • Efficiency of transport emergency systems in case of disaster
Estimated cost	**CAPEX: -** Pedestrianization: €172,405,000 for 145km of 15m width pavement. -Cycling Infrastructure: €69,498,000 for 351km 5m wide infrastructure. **OPEX:** N/A **Design/development costs:** N/A
Estimated benefits	**Health impacts:** Public health – more active lifestyles and reduced pollution. Public safety - particularly for more vulnerable people such as children and elderly **Economic Development:** Increased economic efficiency; economic growth; employment creation; avoided damages. **Social Inclusion:** Access to basic services; social equity **Environment:** reduced pollution, mitigation of GHG emissions.
1/25,000 scaled IMM Environmental Plan Alignment	1. Gulf of Izmir 2. Central City 3. Urban / Rural Periphery

4) Local renewable energy options study **Renewable electricity installations for residential, municipal buildings and other public buildings** **Renewable electricity installations for industrial consumers.**	
Strategic Plan Objectives:	Access to Reliable, Sustainable and Affordable Energy by Everyone Will be Promoted
Description	Undertake an options study to understand the feasibility of deploying local renewable energy technologies and expanding the use of renewable electricity. This should be done across İzmir, but opportunities may exist in areas in the city that are close to high energy users (for example, heat networks near universities, hospitals or industrial zones and / or cooling networks for offices) and in informal settlement areas where there is limited access to grid electricity.
Rationale	This action is a first step to rolling out renewable electricity technologies across the province, which would improve the security and reliability of Izmir's energy supply and reduce the carbon intensity of electricity use.
Steps for Implementation	Appoint a project team to conduct the analysis (e.g., consultants and/or different IMM departments) Project team to investigate feasibility of technologies such as wind, solar PV / solar hot water, heat pumps, batteries, district heating, micro-CHPs and fuel cells, identifying suitable pilot projects. Search for financing options for different actions (ESCOs or similar financing mechanisms can also be considered as an option) IMM to review and sign off on suitable locations for pilot project(s), if any Conduct pilot projects, monitor and publicize results, and assess whether to pursue additional projects
Type of action	Plan / Strategy leading to Capital project
Field of action	Energy Systems
Systemic lever	Technology and infrastructure

Potential Emission Savings	Greenhouse gas reduction will be achieved by installing 850 MW solar PV in buildings and using 45 MW solar energy in agricultural irrigation. Additionally, **1.358.793,3 tCO_2e** is addressed for this Action Plan related to renewable electricity installations for residential, municipal buildings and other public buildings. Additionally, **3.365.588,5 tCO_2e** is addressed for this Action Plan related to renewable electricity installations for industrial consumers.	
Plan for delivery	**Action owner**	IMM
	Stakeholders	District Municipalities and MoENR – General Directorate of Energy Affairs Academics, consultancy firms and other knowledge institutions that can inform or conduct the study
	Financing options	IMM would likely need to provide funding for the initial study but there may be potential to collaborate with an industrial or academic partner organization. ESCOs or similar financing mechanisms can also be considered as an option for project delivery.
	Revenue /savings opportunities	If a micro grid is implemented, this could offer reduced exposure to energy price hikes, reduced exposure to damage from blackouts, etc. along with potential revenue from the sale of surplus power.
Impact measures	A proportion of total energy demand derived from RES as a share of total city energy consumption. Share of population with an authorized connection to electricity Average share of population undergoing prolonged power outage in case of climatic extremes over the past 5 years	
Estimated benefits	**Health impacts:** Improved air quality through use of local renewable energy sources, potential reductions in fuel poverty. **Economic development:** This action can create jobs if projects are implemented. **Environment:** reduced pollution, mitigation of GHG emissions. **Other:** Improved resilience of the energy system.	
1/25,000 scaled IMM Environmental Plan Alignment	1. Gulf of İzmir 2. Central City 3. Urban / Rural Periphery	

5) Mass role out of photovoltaic cells: municipality owned assets and land e.g., municipality buildings, road reserves, bus stops.	
Strategic Plan Objectives:	Access to reliable, sustainable and affordable energy by everyone will be promoted
Description	Investments for 15 MW solar energy in buildings owned by municipalities and their subsidiaries by 2030.
Rationale / Purpose	Izmir already had plans to invest in solar energy with the motivation to be a good example for its citizens. Increasing energy prices is another motivation for IMM to save and use the excess resources to promote other types of low carbon technologies in the city, especially technologies related to its own operations. With the rapid increase in exchange rates, the prices have inflated significantly in the previous years. Within the IMM strategic plan (2020-2024) there are 10 solar energy plants planned until the end of 2024. There are 4 different solar energy investments planned with a total of 0.2 MW capacity within the short term. We can easily assume that IMM will develop more projects after the year 2024. By increasing the municipality's renewable energy generation capacity, it diversifies the energy supply, reducing the exposure of the municipality buildings and key infrastructure to the risk of power shortages and blackouts as a result of a climate hazard.
Steps for Implementation	Most of the implementation steps mentioned below are in progress especially on the agenda of Directorate of Climate Change and Clean Energy Department. 1. Analysis of legislations and potential of buildings, lands, bus stops etc 2. Analysis of possible financing methods; revenue sharing, unlicensed energy production rights of municipalities, public and private collaboration

	3. Start implementations according to Strategic Plan 4. Expand the plans for the next Strategic Plan period.
Project Type	Capital Project
Field of action	Energy Systems
Systemic lever	Finance and funding
Risk and/or vulnerabilities addressed	**Risks:** IM5, IM6 **Opportunity:** IM7:
Potential Emission Reductions	12,168 tCO_{2e} in 2030 with 15 MW installation
Potential Barriers	Frequently changing legislation Complex permission processes from DSOs DSOs doubts about sufficient infrastructure for additional RE sources High initial costs. Lack of cooperation between institutions
Action Owner	IMM
Stakeholders	District Municipalities Manufacturers Finance institutions
Financing Options	Municipal Budget, PPP, IFI's, Bank of Province

6) Support the implementation of low carbon farming techniques and climate-smart agriculture across the province.	
Strategic Plan Objectives:	Food Safety Will Be Provided, Nutrition Will Be Improved, and Sustainable Agriculture Will Be Supported. In Order to Adapt to Climate Change and its Impacts, Actions Will Be Taken in All Areas, Primarily in Agriculture and Energy
Description	Development of resources and training schemes for farmers to support the transition to more sustainable agriculture that is more resilient to climate change, reduces greenhouse gas emissions and increases carbon sequestration rates. This would include the consideration of techniques that help address the "five pillars" of carbon farming. These are: - **Nutrient Management**: which looks at ways to improve storage and application of fertilizers and manures, which would increase efficiency and decrease emissions. - **Livestock Management:** A focus on animal health and welfare to reduce fatalities and stimulate healthy gut activity, exploring different grass types and supplements. - **Soil and Grassland Management:** Looking at soil biology including micro-organisms and Earthworks. Avoiding soil disturbance as much as possible and adopted practices such as injection fertilizers, and extended leys. - **Renewable Energy:** opportunity to diversify and consider using solar power and other renewable energies to generate electricity and sell the surplus back to the grid. - **Ancient Production Basins:** Agricultural production basins where low-carbona and rain-based production takes place, biodiversity is rich, and production is mostly based on pure (ancestry) seed crops.
Rationale	In order to improve food security while also reducing food waste globally and to mitigate negative climate change impacts. CO2e emissions from livestock are one of the highest emissions of the city. According to the 2018 baseline emissions inventory undertaken by Izmir's SECAP, there are nearly 750 thousand livestock within the city of Izmir accounting for 90% of the CH4 emissions from enteric fermentation. 937 thousand sheep and goats account for 7% of the enteric fermentation. The use of chemical fertilizers is 8% of the total agriculture related emissions (2.06 million tCO2e), which equates to 1.2% of all emissions within the province.

Steps for Implementation	1. Undertaken more in-depth analysis of agricultural sector and product pattern, including an examination of the key biophysical, economic, and social components of the agricultural system to understand the characteristics of the sector. 2. Draw on analysis to determine possible practices that are most at risk and/or contribute the greatest CO2e and eliminate them gradually. 3. Engage with farming community and cooperatives to understand most effective training formats and support required for transition to more sustainable practices. 4. Supporting more sustainable agricultural practices at the basin scale, which could include, but are not limited: a. Giving purchase guarantee to low carbon strategic products, b. Supporting rain-based agricultural and ancient production basin products, c. Supporting the production of goats and sheep grazing in natural pastures, preparing and implementing pasture plans for small cattle, establishing a private dairy network for small cattle, d. Organic farming practices, e. Energy efficient and low carbon irrigation system, f. Low-cost monitoring, g. Supporting the development of water meadow and buffalo breeding, h. Promoting pasture instead of forage plants that consumes a lot of water, i. Farming practices with high biodiversity, changing the agricultural crop pattern, j. Providing water management suitable for climate change in agricultural production, and reducing agricultural irrigation, k. Supporting heirloom and native breeds, l. Providing active support for the branding, patenting, packaging and export of climate-friendly products. 5. Undertake appropriate training workshops across the agricultural basins. 6. Establishment of the agriculture high school. 7. Track progress of implementation and evaluate impact	
Type of action	Capacity-building, Capital and implementation projects	
Field of action	Green infrastructure & nature-based solutions	
Systemic lever	Learning and capabilities	
Potential Emission Savings	Savings from irrigation (20% Efficiency): 49,479 tCO2e by 2030 Savings from chemical fertilizers 55,609 tCO2e by 2030 (20% decrease) Savings from manure management 173,260 tCO2e by 2030 Savings from transforming the animal stock 438,456 tCO2e by 2030 *It is estimated there will be an addition of 10 sheep for each cow removed from the herd	
Plan for delivery	**Action owner**	IMM
	Stakeholders	Izmir International Agricultural Research and Training Centre, Izmir Provincial Directorate of Agriculture and Forestry, District Municipalities (especially rural Districts), Farmers and cooperatives
	Financing options	Municipal budget, private banks, funding sources as identified by the Climate Smart Agriculture guide
	Revenue /savings opportunities	Savings opportunities will come from public health benefits from food safety and reduced GHG emissions.
Impact measures	• Quality of Environmental assets – water bodies and soil. • Emissions associated with agriculture. • Economic cost of climate event impacts	
Estimated cost	**CAPEX:** N/A **OPEX:** N/A **Design/development costs:** €19,000 - €25,000	
Estimated benefits	**Economic Development:** increased economic efficiency; economic growth **Environment:** Mitigation of GHG emissions, enhanced ecological value.	

1/25,000 scaled IMM Environmental Plan Alignment	Agricultural Basins

7) Revise planning regulations and guidelines to ensure efficient water fittings in all new municipality buildings	
Strategic Plan Objectives:	A Sustainable Urban Infrastructure Will Be Built to Contribute to the Urban Economy
Rationale / Purpose	As per LU1.16 this action would involve collaboration with relevant bodies to review and update the appropriate planning regulation and guidelines to ensure that water efficient fixtures and fittings are considered in all new public buildings. This would involve considering the following water-consuming components: WC's, Urinals, Taps (wash- hand basins and, where specified kitchen taps and waste disposal unit), showers, baths, dishwashers and washing machines.
Steps for Implementation	1. Establish a working group to review local level policies. 2. Conduct a study on energy efficiency design and materials to use taking into consideration future climatic conditions changing climate conditions and flexibility and adaptability in future use. 3. District Municipalities are important partners as they are the authority to grant licenses to new buildings. 4. Develop new planning regulations and guidelines for more energy efficient areas. 5. Cooperate with relevant stakeholders to implement the proposed actions
Type of action	Governance and Policy
Systemic lever	Governance and Policy
Potential Emission Reductions	This will have an indirect impact on emission reductions, by reducing water consumption and therefore the energy consumed in the water purification, transportation and disposal.
Potential Barriers	The agenda and priorities change rapidly in line with the country and local context. Lack of financing. Lack of human resources to conduct studies
Action Owner	IMM
Stakeholders	District Municipalities under Metropolitan Area IZSU Other public institutions NGOs and TMMOB – for consultancy Manufacturers, implementers – cooperation Finance institutions – financing the investments
Financing Options	Municipal Budget

8) Municipality to commit to net zero energy in all new municipality-controlled buildings by 2030.	
Strategic Plan Objectives:	In Order to Adapt to Climate Change and its Impacts, Actions Will Be Taken in All Areas, Primarily in Agriculture and Energy
Description	In order to adapt to climate change and its impacts, IMM will commit to net zero in all new municipality- controlled buildings and encourage other organizations, businesses and institutions to do the same.
Rationale	Rising national energy dependency on foreign fuels and market prices volatiles are a big challenge facing the world. IMM would like to showcase some of the projects within the urban transformation program by delivering net zero buildings and thus also developing financial and technical feasibilities for similar projects to copy and to study the possibilities and feasibility of delivering net zero buildings in the city of Izmir.

	The EU Energy Performance of Buildings Directive (consolidated version) requires all new buildings to be nearly zero-energy by the end of 2020. Considering that Türkiye is a candidate country, Izmir would be a template for the rest of the country. Note: There are 8 buildings planned within the 2020-2024 Strategic Plan of IMM. IMM is encouraged to adopt this target for all future buildings, including those in the 2020-2024 IMM Strategic Plan where feasible.	
Steps for Implementation	1. Establish a working group to study the design, implementation, and additional cost for net zero buildings which particularly emphasis on water efficiency which has high carbon impacts. 2. Review municipality construction and refurbishment program 3. Conduct feasibility studies for priority buildings 4. Set program for committing to zero carbon. 5. Develop and implement projects. 6. Target to be met by implementing projects in stages. With sustainable low energy to be achieved between 2020-2025; nearly zero buildings between 2025-2030 and then net zero energy buildings from 2030 onwards.	
Type of action	Plan / strategy plus capital investment for future building investment	
Field of action	Built Environment	
Systemic lever	Learning and Capabilities	
Potential Emission Savings	By committing to net zero in all new municipality buildings, this will not reduce the current baseline of emissions, but will help avoid potential future emissions that these buildings would have been produced if built to existing standards. Because there is currently no information about the proposed future buildings it is not possible to calculate emissions savings at this time.	
Plan for delivery	**Action owner**	IMM
	Stakeholders	Academics Consultancy companies for Green Buildings Finance institutions
	Financing options	Municipal budget, IFIs, Bank of Provinces, private banks, Green Bonds,
	Revenue /savings opportunities	Savings opportunities will come from reduced energy costs, decreased pressure on energy networks and public health benefits
Impact measures	Annual emissions associated with new public sector buildings	
Estimated cost	**CAPEX:** N/A **OPEX:** N/A **Design/development costs:** €21,000 - €31,000	
Estimated benefits	**Health impacts:** Public health – reduced pollution **Economic Development:** Increased economic efficiency, revenue/savings generating activities. **Social Inclusion:** Skills development **Environment:** Mitigation of GHG Emissions	
1/25,000 scaled IMM Environmental Plan Alignment	Not spatially dependent	

9) Undertake circular economy assessments on Municipality refurbishment and demolition projects and encourage their uptake in private projects	
Strategic Plan Objectives:	A Sustainable Urban Infrastructure Will Be Built to Contribute to the Urban Economy
Description	IMM will commit to undertaking circular economy (CE) Assessments on all public building, refurbishment, and demolition projects, and (where practicable) ensuring that the findings or recommendations are implemented. The aims of a CE assessment will

	be to identify opportunities to retain and reuse materials of buildings and develop a design and management strategy for ensuring that the building is easy to maintain, adapt and deconstruct in future. IMM should determine the content and scope of such studies, but key outputs are likely to include: • A pre-demolition audit (if applicable) highlights reuse opportunity. • An estimate of construction, demolition and excavation waste arisings, with specific commitments (e.g., design strategies) for how these will be minimized and monitored. • Specific design measures aimed at facilitating deconstruction and reuse. IMM will also develop a PR strategy (e.g., press releases and guidance) to promote CE assessments as a best practice measure that should be adopted by private businesses.	
Rationale	Building construction, retrofit and demolition creates significant volumes of waste and in addition results in significant emissions from the manufacturing and construction process. Undertaking CE assessments will help to identify opportunities for reusing and recycling building materials, reducing the volume of waste to landfill and the need for virgin materials with associated extraction and processing impacts. IMM has greatest control over their own building stock, and the IMM Strategic Plan identifies several new buildings and retrofit plan. With significant private sector development, particularly within the allocated 'Urban Transformation Areas', this action will also encourage the private sector to also undertake CE assessments.	
Steps for Implementation	1. IMM must define the scope and process for carrying out CE assessments. This will include defining standards and design evidence requirements for pre-demolition audits, the method for estimating and monitoring waste arising, and the level of detail required for any design for deconstruction strategy. 2. Based on the outputs of (1), develop and disseminate guidance on how to carry out a CE assessment, both internally within IMM and externally so that private companies can develop their own targets as appropriate. 3. Allocate the individual(s) or department(s) responsible for ensuring they are carried out on IMM projects, e.g., ensuring that design teams have engaged with contractors to identify CE measures and ensure these are written into specifications or contracts in collaboration with IMM project decision makers. 4. Publicize positive outcomes (e.g., waste reduction and cost savings) through press releases and social media to promote uptake by private businesses	
Type of action	Plan / Strategy	
Field of action	Built environment	
Systemic lever	Governance and policy	
Potential Emission Savings	This action should result in a reduction in emissions associated with material efficiency, less demand for raw materials (higher use of recycled materials) and therefore less demand for manufacturing and transport of those materials. The emissions figures have not been calculated at this time.	
Plan for delivery	**Action owner**	IMM
	Stakeholders	District Municipalities Design teams, engineers, contractors Waste and recycling facilities Industries / organizations that can use the waste
	Financing options	Municipal budget.
	Revenue /savings opportunities	Circular Economy Assessments aim to maximize overall resource efficiency, helping to avoid costs of construction, demolition and refurbishment. Although some 'circular' solutions may cost more in the short term, these costs can often be recouped because of the ease of deconstruction, higher resale value, etc.
Impact measures	Waste diverted from landfill	
Estimated cost	**CAPEX:** N/A **OPEX:** N/A **Design/development costs:** €40,000 - €50,000	

Estimated benefits	**Health impacts:** Reduced waste to landfill, reduced air pollution and less dust due to lower rates of demolition, more efficient logistics during construction, and lower levels of waste production **Economic development:** Opportunities to develop new industries related to (de)construction, innovative design and construction techniques, and greater need to reclaim, reuse and recycle materials. **Social Inclusion:** Wider, global positive impacts result from lowering the demand for raw materials which have a high social, economic, and environmental cost due to the extraction and processing involved
1/25,000 scaled IMM Environmental Plan Alignment	Not spatially dependent

10) Insulation of Tertiary Buildings / Industrial Buildings **11) Install Energy Efficient Light Bulbs in Tertiary Buildings**	
Strategic Plan Objectives:	A Sustainable Urban Infrastructure Will Be Built to Contribute to the Urban Economy
Rationale / Purpose	Electricity consumption accounts for more than 90% of the total energy consumption of the tertiary sector, and therefore represents a major source of emissions. Insulation and energy efficient lighting installations will help to reduce these emissions, as well as offering co-benefits such as lower fuel costs for businesses and other tertiary organizations. Mechanical and HVAC systems need to be considered for the efficiency of the systems.
Steps for Implementation	1. Develop a working group with sector representatives, NGOs, financial institutions. 2. Cooperate with relevant stakeholders. 3. Study on incentive alternatives within the jurisdiction of the local governments 4. Examine the awareness level of SMEs, owners of tertiary buildings. 5. Build a communication strategy to increase awareness of energy efficiency, highly efficient appliance uses and behavioral change of the business owners. Note: Tertiary buildings tend to have higher energy demands as well as higher energy prices when compared with the residential or industrial sectors. This means that energy efficiency measures in tertiary buildings may have a shorter payback period which may help to promote uptake of these measures.
Field of action	Built environment
Systemic lever	Governance and Policy
Potential Emission Reductions	Due to the difficulty in determining the number and size It is not easy to make assumptions about the number or size of the tertiary buildings pool, several assumptions based on as in separate residential units. The assumptions are made considering the total energy consumption of the sector. It is assumed that 40% reduction in all fuel and 35% reduction in electricity consumption. 1.066.962 tCO2e reductions in 2030 378.126 tCO2e reductions in 2030 by awareness campaigns. Additionally, **5,431,447.5 tCO_2e** is addressed for this Action Plan related to energy saving, building retrofit for industrial buildings including insulation, district heating & cooling and lighting.
Potential Barriers	Lack of awareness Unwilling to change habits High initial costs. Potential mismatch in knowledge, influence and incentives between tenants and landlords Lack of cooperation between institutions
Action Owner	IMM in conjunction with tertiary building owners / managers

Stakeholders	MoEnvU District Municipalities NGO's (IZODER, ENVERDER etc.) Manufacturers Finance institutions
Financing Options	Municipal Budget, IFIs, PPP, Bank of Provinces, Private Developers,

12) Energy Efficiency in Municipal Buildings	
Strategic Plan Objectives:	A Sustainable Urban Infrastructure Will Be Built to Contribute to the Urban Economy
Rationale / Purpose	A Presidential Circular to achieve energy efficiency of 15% in all public buildings by 2023 have been published recently. The regulations also enforce to make energy audits and assignment of energy managers to buildings with a conditioned area of over 10.000 m^2. Compared to the energy consumption of the buildings in the city, the municipal consumptions are relatively low with a 1.4% of all emissions. Taking measures for efficiency would have an environmental impact as well as financial for the Municipality. Financial savings would also help to finance other low carbon actions. When analysed more than 60% of the electricity emissions are from water pumps, wastewater treatment and drinking water treatment facilities. There are ongoing efforts to save energy by IZSU. Still IMM has more than 150 buildings/facilities for different purposes of use and with different sizes. When the facilities of affiliates are included, the number is much higher.
Steps for Implementation	1. Create an interdisciplinary project team and establish rules for investment decisions. 2. Prepare feasibility studies for energy efficiency measures prioritizing buildings/facilities with high consumptions. 3. Search for financing options for different actions (ESCOs or similar financing mechanisms can also be considered as an option) 4. Conduct pilot projects
Field of action	Built environment
Systemic lever	Governance and policy learning and capabilities
Potential Emission Reductions	The reduction assumptions are made considering the total energy consumption of Municipal Buildings. It is assumed that 40% of energy consumption in 50 % of the buildings will be reduced. When the efficiency of the municipal water pumping stations is ensured, a total reduction of 67.884 tCO2e will be achieved in 2030.
Potential Barriers	The agenda and priorities change rapidly in line with the country and local context. Lack of financing Lack of human resources to conduct studies
Action Owner	IMM All subsidiary companies
Stakeholders	District Municipalities under Metropolitan Area Being a good showcase IMM can share its experience with district municipalities and lead them take action for their buildings. Other public institutions NGOs and TMMOB – for consultancy Manufacturers, implementers – cooperation Finance institutions – financing the investments
Financing Options	Municipal Budget, ESCOs, IFIs.

13) Encourage and incentivize thermal insulation in existing residential, municipal buildings and other public buildings **14) Encourage and incentivize energy efficient lighting systems in existing residential, municipal buildings and other public buildings (LED etc.)**

Strategic Plan Objectives	A sustainable urban infrastructure will be built to contribute to the urban economy
Rationale / Purpose	The total fuel consumption in residential buildings account for 60% of the emissions in the building sector. Any change will have an important impact on the CO2e emissions of the city. Due to geographical and climate conditions of Izmir, cooling requirements of buildings are as significant as heating requirements. Thermal insulation will reduce cooling consumption as well as heating need. Natural gas is the most common heating source for the city and is used within almost half of households. The remainder of households still predominantly use either fuel-oil, coal, LPG or electricity for heating.
Steps for Implementation	1. Establish a team with sector representatives, NGOs, financial institutions. 2. Cooperate with relevant stakeholders. 3. Study on incentive alternatives within the jurisdiction of the local governments 4. Examine the awareness level of citizens. 5. Build a communication strategy to increase awareness and inform about the incentives
Field of action	Built environment
Systemic lever	Democracy and participation governance and policy
Potential Emission Reductions	It is assumed that there will be a 40% reduction in fuel consumption and 10% reduction in electricity consumption in residential buildings. Insulation: 693.974 tCO2e in 2030 Lighting: 124.610 tCO2e in 2030 Awareness: 402.733 tCO2e in 2030 will be achieved by 12% reduction of 80% of the residential buildings. Additionally, **760,249.7 tCO_2e** is addressed for this Action Plan related to energy saving, building retrofit for residential, municipal buildings and other public buildings buildings including insulation, district heating & cooling and lighting.
Potential Barriers	Lack of cooperation between institutions Lack of support from central government Lack of awareness Unwilling to change behaviour High initial costs (for most of the households)
Action Owner	IMM
Stakeholders	Building Owners MoEnvU – for regulatory support Izmir Metropolitan Municipality - can have a catalyser role for bringing different parties to develop business schemes, subsidies by different parties, etc. District Municipalities under Metropolitan Area - to take action to control and promote the actions of NGO's (IZODER, ENVERDER etc.) – increase public awareness and bring together the industry players Manufacturers, implementers. Finance institutions – develop business models and financial solutions to promote activities
Financing Options	Municipal Budget, IFIs, PPP, Bank of Provinces, Private Developers,

15) Apply smart traffic management, e.g., introducing a command center	
Strategic Plan Objectives	A Sustainable Transport System Will Be Created with a Harmonious Interaction Between Different Modes of Transport, Offering Different Options
Rationale / Purpose	The primary purpose of a smart city is to improve the quality and performance of public services, including transportation, by incorporating information and communication technologies. Traffic management systems, which help monitor, control, optimize, and operate traffic in urban areas. The streamed live data into the Transportation Management Centers allow transport officials and citizens to receive real-time updates about the city's transport conditions and availability.

	In Izmir, traffic flow and density can be monitored by the online platform of Izmir Transportation Center (IZUM) from 2018. The most important benefit of the system is the use of road capacities at high efficiency, a safer vehicle and pedestrian traffic, shortening travel times, and reduced accumulation and waiting times at the intersections. Currently, Izmir citizens can download the free application "IZUM" to smart devices. A summary of the system can be found at the beginning of the section. Although the system is in operation since 2018 Izmir wants to place more devices and enhance the system continuously.
Steps for Implementation	Some of the actions by IZUM can be summarized as incorporating smart intersections (402), monitoring traffic at 110 points, traffic measuring (201 points), management of public transportation system with 1500 buses, data gathered from 65 parking lots and other roadside parking, accident and road closure data, meteorological data. 1. The system has been quite new and needs to improve efficiency constantly. 2. The system will be expanded to the other districts (districts outside the city center). 3. Update needed regularly with additional modes of transportation or infrastructure (car club, bicycle schemes, charging infrastructure data, etc. to be implemented) 4. Analyse the big data gathered periodically to implement more efficient measures. 5. Promote the system to increase the use by citizens
Field of action	Mobility & transport
Systemic lever	Technology and infrastructure, learning and capabilities
Potential Emission Reductions	Calculated a 10% emission reduction targeted by 2030. 625.295 tCO2e in 2030. Additionally, **1.000.000 tCO_2e** is addressed for this Action Plan.
Potential Barriers	The system is already in operation since 2018. Data security High number of data users (system capacity)
Action Owner	IMM,
Stakeholders	• IZUM • Citizens • Entrepreneurs (for new app development) • NGOs (cyclists, pedestrians, logistic sector representatives, etc.)
Financing Options	Municipal Budget, IFIs, PPP, Bank of Provinces.

16) Eco driving training (driving more economically) for IMM employees (As per SEAP Action - in lieu of EV / hybrid vehicles)	
Strategic Plan Objectives:	A Sustainable Transport System Will Be Created with a Harmonious Interaction Between Different Modes of Transport, Offering Different Options
Rationale / Purpose	The studies by transport experts indicate that there is a potential to decrease consumption by eco driving training. The ECOWILL project of the EU conducted studies and found the positive effects of eco-driving as follows. 1. Average decrease in fuel consumption and CO2 emissions by 5-15% 2. Reduced noise (due to lower revs) 3. Positive effects on traffic safety: up to 40% fewer accidents 4. Lower maintenance costs (e.g., brakes, tires) 5. Increase in comfort (fewer shifting gears, less braking, less stress) 6. Contributes to EU CO2 emission targets. Training will be provided to drivers for the use of public transportation, vehicles with different driving experience and fuel consumption.
Steps for Implementation	Intelligent Energy Europe Program of EU indicates 5-10% less fuel consumption of participants of Eco driving courses. 1. Study with experts to compile updated “Eco-driving tips.” 2. Determine different levels and lengths of education schemes (long versions for new drivers, shorter for experienced) 3. Set quality standards for the trainings. 4. Conduct training the trainer seminars for drivers of different levels.

	5. Quantitative targets: Training of at least 100 driving instructors and educating 40,000 learner and novice drivers starting with public transportation drivers. 6. Conducting at least 4000 Eco driving trainings per year till 2030. 7. Prepare and distribute flyers about “Eco driving tips” Use posters, billboards to inform citizens. 8. Establishing a program with driving schools for all drivers to benefit from eco-training trainings
Field of action	Mobility & transport
Systemic lever	Learning and Capabilities
Potential Emission Reductions	Calculated by considering public transportation consumptions and logistic sector (assumptions made by using public transportation, light and heavy-duty vehicles) 10 % emission reduction targeted by 2030. 128.649 tCO2e reductions in 2030.
Potential Barriers	Lack of awareness from logistic sector, citizens Lack of cooperation between institutions Lack of supporting regulations Lack of human resources
Action Owner	IMM
Stakeholders	• ESHOT • Logistic sector • Professional chambers • Local municipalities • Driving schools • Ministry of Transportation and Infrastructure
Financing Options	Municipal Budget, PPP, IFIs, Bank of Provinces,

17) Municipal Fleet and Service Vehicles: Electric and Low-carbon Vehicles	
Strategic Plan Objectives	A Sustainable Transport System Will Be Created with a Harmonious Interaction Between Different Modes of Transport, Offering Different Options Access to Reliable, Sustainable and Affordable Energy by Everyone Will be Promoted
Description	This action can be split into two parts, renewal of IMM’s bus fleet by purchasing e-buses and the procurement of low carbon service vehicles. **a. E-Buses purchase:** IMM will continue and expand its efforts to replace old municipal buses and expand its existing capacity with e-buses. This action builds upon the ESHOT Strategic Plan, which has an expectation of approximately 400 e-buses to be purchased by 2024. Currently, 20 e-buses have already been purchased from a local producer in 2017 at a cost of 400,000 EUR per bus, with a further 380 to be procured. After operating e-buses for 3 years, it has been observed by ESHOT that despite e-buses having a greater upfront cost of 250,000 EUR compared to diesel buses, they are 78% cheaper to fuel and 40% cheaper to maintain over the life cycle of the vehicle. Taking into consideration the renewal of older vehicles and projections for future capacity needed, ESHOT have planned the need to replace 871 buses in 2020-2025 and 530 buses between 2025 – 2030, totalling a need for 1,401 new buses to be purchased by 2030. As the first step of this renewal process, ESHOT will purchase 304 diesel buses in 2021. The remaining 1097 buses will be purchased as e-buses. **b. Service Vehicle procurement:** IMM currently tenders the provision of service vehicles, which are predominantly made up of fossil-fuel based vehicles: petrol & diesel. According to IMM’s Activity Report of 2018, IMM owns 120 passenger cars, 197 carryall trucks and cargo carrier vehicles, 9 land vehicles and 553 special purpose vehicles. In addition, IMM rented 235 vehicles (Passenger and van), 1.801 minibuses and buses, 12 construction vehicles and 12 water tankers. This action aims to revise IMM’s current procurement policy to encourage the provision of electric or low-carbon alternative vehicle types.

Rationale	53% of public transport is delivered by buses. Most of these are diesel fuelled, with relatively high operating costs, risks of oil price volatility and environmental concerns. The EU has set ambitious targets to reduce the number of fossil fuel vehicles should be reduced by 50% by 2030, and by 2050 all fossil fuel vehicles should be eliminated. The city has already purchased 20 electric buses. However, most of IMM's fleet is old, inefficient and the comfort for passengers can be improved. A comprehensive upgrade program will be a key driver of modal shift, resulting in improved air quality, reduced noise levels and improved comfort.	
Steps for Implementation	**E-Bus purchase:** 1. Establish annual targets for fleet replacement. 2. Engage with funders to determine finance options. 3. Identify new sites for charging buses and service vehicles, taking into consideration the space requirements, charging rates and grid capacity. This could include dedicated charging sites for many buses or en-route charging. 4. Prepare feasibility studies for PV for clean energy production to reduce emissions further. **Service Vehicles procurement:** 1. Establish the timeframe for service vehicle renewal / replacement. 2. Revise existing service vehicle procurement policy to reflect the desire for electric or low-carbon vehicles. 3. Prepare the procurement documents and release the invitation for tender.	
Type of action	Capital project	
Field of action	Mobility & transport	
Systemic lever	Finance & Funding	
Potential Emission Savings	55% of emission reduction targeted in 80% of all vehicle fleet. 127.494 tCO2e savings in 2030.	
Plan for delivery	**Action owner**	ESHOT
	Stakeholders	IMM
	Financing options	Municipal budget, IFIs, Bank of Provinces, PPP, private operators
	Revenue /savings opportunities	After the initial outlay, the operating costs of electric vehicles will be lower than for the existing fleet. It will be possible to save EUR 14,500 from fuel cost and EUR 3,900 from maintenance cost for one bus per year. Increased revenue may also be generated through higher public transport patronage. Air quality benefits may also lead to avoided healthcare costs.
Impact measures	• The proportion of fleet that is electrified. • Public transport CO2 emissions • Number of EV passengers • Total number of EVs in fleet	
Estimated cost	**CAPEX:** €400,000,000 - €600,000,000 **OPEX:** €78,000 - €98,000 **Design/development costs:** €64,000 - €80,000	
Estimated benefits	**Health impacts:** Public health – reduced pollution **Economic Development:** Increased economic efficiency; economic growth; employment creation, Revenue/savings generating activities. **Social Inclusion:** Access to basic services **Environment:** reduced pollution, mitigation of GHG emissions.	
1/25,000 scaled IMM Environmental Plan Alignment	Not Spatially Dependent	

18) Promote a Step Change in the Uptake of Privately and Municipality Owned Low Emission Vehicles

Strategic Plan Objectives	A Sustainable Transport System Will Be Created with a Harmonious Interaction Between Different Modes of Transport, Offering Different Options Access to Reliable, Sustainable and Affordable Energy by Everyone Will be Promoted	
Description	This action will help Izmir take advantage from being at the forefront of the transition to electrified mobility through measures to that support electric vehicle use including: • priority parking for electric vehicles. • the provision of new and smart electric vehicle (EV) charging infrastructure. • To promote and encourage commercial buildings to have EV charging stations, with business licenses granted by IMM • Install EV charging stations for all municipal buildings and municipal parking areas. • Introduction of an all-electric / hybrid car club pool	
Rationale	Emissions from fossil fuel degrade Izmir's air quality, which is significantly poorer in the city center, and contribute to climate change. EV have several advantages, including lower emissions, noise and vibration levels. The environmental impact of fossil fuel vehicles is leading to stricter EU emissions standards leading to several major automotive producers have announcing they will stop working on diesel engines and concentrate on hybrid and electrical vehicle engines in the first half of the next decade. A local brand of e-vehicle is under development. Mass production will start in the next 3-5 years. Furthermore, EVs typically have lower the operating costs of the municipal fleet over time, with generally lower maintenance costs, and EVs will not be dependent on the volatile prices of oil. Promoting hybrid and electric vehicles in the city is also one of the actions planned in Izmir Transportation Master Plan (2019). Supporting the uptake of EVs will help improve Izmir's environment and benefit from being at the forefront of the transition.	
Steps for Implementation	**Priority parking and EV charging infrastructure:** 1. Undertake mapping of dedicated parking areas and street parking 2. Develop provision standards for EV charging sites (including catchment / distribution density, charging capacity (speed), type of charging connections. 3. Identify spaces within municipal buildings, municipal parking areas and streets which have beneficial positioning / access that can be reserved for EVs. 4. Re-paint parking spaces and add install new signage. 5. Work with GDZ Electricity for a feasibility study to evaluate grid capacity for installation of charging infrastructure. 6. Monitor and enforce correct use of parking spaces. 7. Work with EV charging operators to fund, install and operate charge points. These could be connected to other municipal infrastructure such as lighting columns. 8. Work with private parking operators to encourage their support of priority parking for EVs and installation of charging infrastructure. 9. Develop policies for EV parking and charging within new development. 10. Stakeholder engagement consultations and public awareness campaigns for the use of EV's and Road Safety. 11. To promote and encourage commercial buildings to have EV charging stations through business licenses granted by IMM. **Introduce EV / Hybrid vehicle car club:** 1. In conjunction with identifying EV priority parking, identify locations for positioning EVs to be used as part of a shared pool 'car club'. These could be specific locations on residential streets, or within development areas. 2. Set up carpool club sharing company or working with existing car club operators to provide EVs. 3. Promote benefits of scheme	
Type of action	Capital projects	
Field of action	Mobility & transport	
Systemic lever	Finance & Funding	
Potential Emission Savings	In existing strategy (İzmir SECAP 2020), 335.686 tCO_2e was considered by 30% of private cars switching to electric vehicles by 2030. Additionally, **500.000 tCO_2e** is addressed for this Action Plan.	
Plan for delivery	**Action owner**	IMM

	Stakeholders	Izelman CO Ministry of Transportation and Infrastructure GDZ Electricity NGOs District Municipalities Citizens Entrepreneurs, start-ups, EV retailors, car club operators. Developers
	Financing options	Municipal budget, IFIs, private finance (charging companies, car companies etc), PPP, Bank of Provinces,
	Revenue /savings opportunities	Electric vehicles will lower OPEX of the municipal fleet over time as EVs will not be dependent on the volatile prices of oil and generally have fewer associated maintenance costs. Air quality benefits may also lead to avoided healthcare costs.
Impact measures	• All air quality indicators • Concentration of heavy metals in soils (zinc, cadmium) • Annual CO2 equivalent emissions per capita • Annual CO2 emissions per unit of GDP • Average age of car fleet total and by type • Share of total passenger car fleet run by electric hybrid fuel cell Liquefied Petroleum Gas LPG and Compressed Natural Gas CNG energy total and by type • Number of private EVs • Number of charge points delivered	
Estimated cost	**CAPEX:** €17,000 for 50 rapid charging points. €11,000 for 50 slow charging points. **OPEX:** N/A **Design/development costs:** N/A	
Estimated benefits	**Health impacts:** Public health – reduced pollution **Economic Development:** Increased economic efficiency; economic growth; employment creation, Revenue/savings generating activities. **Social Inclusion:** Access to basic services **Environment:** reduced pollution, mitigation of GHG emissions. .	
1/25,000 scaled IMM Environmental Plan Alignment	1. Gulf of Izmir 2. Central City	

19) Develop more sustainable logistical practices	
Strategic Plan Objectives:	Gulf of Izmir and All the Coastal and Marine Areas Will Be Protected and Used Sustainably A Sustainable Transport System Will Be Created with a Harmonious Interaction Between Different Modes of Transport, Offering Different Options
Description	A baseline study will be undertaken with a view of informing policy development around the uptake of more sustainable practices and the adoption of environmental and cultural factors in port operations (international and national logistics) and the development of coastal structures. The basic aims of this these studies will focus on: • An understanding of current port infrastructure, assets, and management structure / protocols. • Identify operation and smart-infrastructure improvements that can be made that improve the emissions and reduce the environmental impacts associated with port operations, enhancing their sustainability practices. Opportunities to leverage the knowledge and best practice regarding efficient/green operations will be sought through operational and management PPP options.
Rationale	Izmir's geographical position caused the development of sea transportation, and the city is a big hub for industry. Alsancak port located at centre, Çeşme, Dikili, Seferihisar ports providing international connections via shipping, Aliağa port which is an industrial area with petrol transport and Alaybey shipyard where the military facilities are located. These ports play an integral role in city's transportation links, by helping create more sustainable logistical operations in the port, it will positively influence both national and

	international transportation from these facilities regarding their environmental impacts, use of natural resources and greenhouse gas emissions produced.	
Steps for Implementation	For the baseline studies: • Develop the scope and specification of the study, working with appropriate stakeholders. • Identify and secure the necessary funding. • Procure a contractor to carry out the study.	
Type of action	Plan / Strategy	
Field of action	Mobility & transport	
Systemic lever	Learning & Capabilities	
Potential Emission Savings	Emissions of ports are not calculated separately from the city emissions; savings are not foreseen for port operations	
Plan for delivery	**Action owner**	IMM
	Stakeholders	MoTI MoEnvU General Directorate of Maritime Affairs Professional Chambers Local Municipalities Marine and Heavy Vehicle Logistic Sector Representatives International Ship Companies IZDENIZ
	Financing options	Municipal budget, Bank of Provinces, O&M PPP, private sector
	Revenue/savings opportunities	Savings opportunities will come from reduced energy costs, decreased pressure on energy networks and public health benefits
Impact measures	• All air quality indicators • Concentration of heavy metals in soils (zinc, cadmium) • Annual CO2 equivalent emissions per capita • Annual CO2 emissions per unit of GDP • Water Quality: Eutrophication • Sediment Quality • WFD Assessment: Seagrass	
Estimated cost	**CAPEX:** N/A **OPEX:** N/A **Design/development costs:** €8,000 - €20,000	
Estimated benefits	**Health impacts:** Public health – reduced pollution. **Economic Development:** Increased economic efficiency; economic growth; employment creation **Social Inclusion:** Access to basic services **Environment:** reduced pollution, mitigation of GHG emissions.	
1/25,000 scaled IMM Environmental Plan Alignment	Gulf of Izmir	

20) Assess the feasibility of connecting public sector and / or industrial buildings to geothermal heat networks	
Strategic Plan Objectives:	Access to Reliable, Sustainable and Affordable Energy by Everyone Will be Promoted

Description	Undertake mapping and associated baseline analysis to understand the number, distribution and fuel consumption of public sector and industrial buildings that currently use fossil fuel-based heating and understand the feasibility and potential benefits of connecting these to the geothermal heat network. Heat networks operate most efficiently when there is a high anchor load and therefore it is expected that the focus will initially be on large public sector or industrial buildings (or zones).	
Rationale	Heat generation can result in high carbon emissions. Connecting high heat users to the existing geothermal heat network and/or delivering new heat network(s) could result in the provision of more efficient, lower carbon heat. As with other forms of decentralized energy systems, it also offers benefits in terms of resilience and security of energy supply. At present there is very limited data available regarding the prevalence of different fuels and heating systems in Izmir, due in part to the number of informal settlements. In order to realize the potential benefits of heat networks, it is first necessary to undertake feasibility work to understand the scale and spatial distribution of opportunities along with their potential benefits.	
Steps for Implementation	1. Create a project team from different departments and establish rules for investment decisions. 2. Undertake area-wide fuel consumption and heating demand analysis of existing buildings (in particular, large public sector or industrial buildings) to identify heat network opportunity areas followed by more detailed feasibility work for opportunities with the greatest potential in terms of energy / CO2 savings, cost effectiveness and deliverability. 3. Analysis of the geothermal network for capacity, sizing, and investment needs 4. IMM and stakeholders to agree on capital project opportunities that can be taken forward following results of the feasibility studies. Although it is out of the scope of this report to identify opportunity areas, we note that some of the existing buildings in the geothermal region include: Dokuz Eylül University Hospital Campus, Izmir Economics University, Balçova Municipality Sports Facilities, Narlıdere Municipality	
Type of action	Plan / Strategy	
Field of action	Built environment	
Systemic lever	Learning & capabilities	
Potential Emission Savings	Savings not calculated for the action, although it would be anticipated that substantial emission savings could be achieved as a result of diverting buildings away from a reliance on fossil fuel heating and towards a geothermal.	
Plan for delivery	**Action owner**	IMM
	Stakeholders	Izmir Geothermal CO Public buildings Geothermal energy companies Finance institutions Technical experts, consultants, and academics
	Financing options	Municipal Budget
	Revenue /savings opportunities	Potential cost savings if the new source of heat is cheaper than existing fuels.
Impact measures	• Fossil fuel consumption in buildings • Total geothermal energy consumption by year • Share of industrial energy consumption from renewable energy • A proportion of total energy demand derived from RES as a share of total city energy consumption. • Average carbon factor of heat generated / used	
Estimated cost	**CAPEX:** N/A **OPEX:** N/A **Design/development costs:** €20,000 - €33,000	

Estimated benefits	**Health impacts:** Improved air quality through use of local renewable energy sources, potential reductions in fuel poverty. **Economic development:** Potential to create jobs during roll-out of the heat network. **Environment:** reduced pollution, mitigation of GHG emissions.
1/25,000 scaled IMM Environmental Plan Alignment	1. Gulf of Izmir 2. Central City 3. Urban / Rural Periphery

21) Encourage the fuel switch from coal to more renewable sources in residential areas (geothermal, electricity).	
Strategic Plan Objectives:	Access to Reliable, Sustainable and Affordable Energy by Everyone Will be Promoted
Rationale / Purpose	2 % of total emissions and 22 % of fuel combustion emissions in residential buildings is from coal. Coal use has negative effects on public health as well as being the dirtiest fuel in all aspects. It is important to provide an environment for coal users to switch to cleaner resources. There is a process of urban transformation applied through the "Law No 6306 Transformation of Areas under Disaster Risk". Some of the residential buildings using coal as a fuel are also located in the planned Transformation Areas. Although at present it is more common to switch from coal to the use of natural gas, in order to achieve deeper decarbonization, it will be necessary to switch away from fossil fuels and facilitate use of low and zero carbon energy technologies.
Steps for Implementation	1. Determination of coal-consuming residential areas and consumptions e.g., through surveys and GIS mapping 2. Determination of the conversion potential from coal to geothermal and/or electricity from renewable sources 3. Analyse expansion of natural gas infrastructure if other renewable sources are not available or feasible for the citizens. 4. Increase awareness among citizens using coal about the benefits of other energy sources including externalities.
Field of action	Energy systems
Systemic lever	Learning and Capabilities
Potential Emission Reductions	The emission reduction is calculated assuming 50% of coal consuming households switch to natural gas in order to be conservative on the calculations. The exact household number which is using coal is not known. However, the average heating demand is calculated as ~5,700 kWh/household. Based on this, it is calculated that over 210 thousand households are consuming coal for heating. 83,331 tCO2e reductions by 2030.
Potential Barriers	Lack of awareness Unwilling to cooperate and change habits of citizens High initial costs. Lack of cooperation between institutions
Action Owner	IMM
Stakeholders	Citizens Contractors of Transformation Area Projects Academics, consultancy companies for detailed studies Financial institutions
Financing Options	IFIs, PPP, Bank of Provinces.

22) Undertake a public lighting replacement scheme for all poles owned / run by municipality by installing LEDs.	
Strategic Plan Objectives:	Access to Reliable, Sustainable and Affordable Energy by Everyone Will be Promoted
Rationale / Purpose	Street lighting accounts for 4% of IMM's CO2 emissions, equivalent to roughly 0.13% of total emissions for Izmir. When other street lighting* is added it is 0.8% of the total emissions. Studies indicate that replacing conventional bulbs with LEDs can reduce

	energy consumption for lighting by around 80% and lower operational costs, lower maintenance, longer lifetime of the system. The payback period usually is much less than other energy efficiency measures. There are other advantages of LED street lighting. The high quality of light is safer for vehicle drivers, cyclists, pedestrians. There are no toxic substances such as mercury, it is not hazardous as waste. More savings can be achieved by controlling illumination of certain areas (dimming lighting when unused) *Within the responsibility of district municipalities, Ministry of Transportation or Highways management
Steps for Implementation	1. Analyse the energy use by lighting zone. 2. Prepare feasibility studies for installation of LEDs, prioritizing zones with higher energy use. 3. Search for financing options; PPP (public-private-partnerships), revenue sharing and other schemes to be investigated. 4. Plan the roll out of existing lighting poles when broken or economic life is over. 5. Conduct pilot projects to test the advantages of LEDs. IMM has targets since 2014 and planned to start the implementation in 2020.
Field of action	Energy systems
Systemic lever	Learning and Capabilities Finance and Funding
Potential Emission Reductions	Reductions for IMM: 10,980 tCO2e in 2030 Reductions from other institutions' consumptions: 111,102 tCO2e in 2030
Potential Barriers	Lack of human resources to conduct studies Lack of cooperation between institutions Lack of finance
Action Owner	IMM
Stakeholders	District Municipalities Ministry of Transportation and Infrastructure Regional Directorate of Highways Manufacturers Installers Finance institutions Citizens as users
Financing Options	Municipal Budget, PPP, IFIs, Bank of Provinces.

23) Implement an environmental labelling for companies within Izmir.	
Strategic Plan Objectives:	Access to Reliable, Sustainable and Affordable Energy by Everyone Will be Promoted
Description	This action involves implementing a company-level environmental labelling scheme (and associated marketing strategy) to raise consumer awareness of sustainability issues and promote environmentally responsible production and purchasing decisions. The aim would be to encourage industrial businesses to participate in clean energy and green infrastructure efforts.
Rationale	'Green' labelling schemes include, for example, organic certification and fair-trade products, sustainable timber, or energy efficiency ratings for appliances. The aim is to help customers understand the environmental and social sustainability impacts of their decision-making and by extension promote responsible purchases. Some research suggests that green labelling schemes can directly increase the value of a product, which offers potential economic benefits to participating organizations, along with sustainability benefits.
Steps for Implementation	1. Form a project team to assess opportunities to deploy labelling schemes, considering topics such as appropriate sectors, market trends and relevant legislation. 2. Once a suitable initiative is identified, develop a marketing campaign to (a) encourage businesses to participate in these efforts and (b) raise consumer awareness.

	3. Monitor uptake and the success of the scheme	
Type of action	Plan / Strategy	
Field of action		
Systemic lever	Finance and Funding, Learning and capabilities	
Potential Emission Savings	There would be positive mitigation effects if, for instance, energy labelling of appliances resulted in significant increases in efficiency and a net decrease in fuel consumption.	
Plan for delivery	**Action owner**	IMM
	Stakeholders	District Municipalities within the Metropolitan Area Private Sector companies, cooperatives, and NGOs Finance institutions
	Financing options	Municipal budget
	Revenue /savings opportunities	Potential increase in product value (for more environmentally friendly products)
Impact measures	Qualitative market research survey to understand any shift in customer decision making around responsible purchasing.	
Estimated cost	**CAPEX:** N/A **OPEX:** €500, - €700 **Design/development costs:** €10,000 - €13,000	
Estimated benefits	**Health impacts:** Depends on the sectors or businesses targeted for labelling. **Economic development:** The innovation needed to develop lower-impact products can create new jobs **Environment:** reduced pollution, mitigation of GHG emissions. **Social:** Skills development.	
1/25,000 scaled IMM Environmental Plan Alignment	1. Gulf of Izmir 2. Central City 3. Urban / Rural Periphery	

24) Municipality to encourage the private sector to install solar panels using existing or new national subsidies or financial schemes.	
Strategic Plan Objectives:	Access to Reliable, Sustainable and Affordable Energy by Everyone Will be Promoted
Rationale / Purpose	Total electricity consumption related emissions are 30% of the total emissions. This consumption consists of residential, tertiary buildings, public lighting. It is absolutely essential to get the private sector on board to be able to reach the desired emission reduction targets. After the latest legislative changes regarding grid connection fees, feed-in-tariff incentives introduced by the government have become ineffective. Although the procedures are eased step by step with legislation changes the incentives and feed-in-tariffs are no longer considered as incentives. There are still some advantages implementing solar energy systems under the form of energy cooperatives which can easily be led by local government and NGOs. When we look at the best practices of renewable energy penetration national incentives have been actively in the early stages then became a free market after certain thresholds. It is important to get central management on board for the uptake of renewables by citizens.
Steps for Implementation	1. Create a project team from different departments to assess key renewable energy opportunities / locations within Izmir. 2. Study best practices of incentives, financial schemes from around the world 3. Prepare guidelines that will help citizens and business owners with the legislation and procedures. 4. Establish an energy cooperative to set an example for the citizens.

	5. Provide or support consultancy services for citizens. 6. Conduct awareness increasing activities for citizens. 7. Investigate and put in practice new subsidies, financial schemes with international funding mechanisms, public/private finance institutions. 8. Lobbying to establish incentive mechanisms at national level
Field of action	Energy systems
Systemic lever	Learning and Capabilities, Finance and Funding
Potential Emission Reductions	895 MW of installation of solar pv 726,024 tCO2e reduction in 2030
Potential Barriers	Unwilling to change habits. Lack of human resources to conduct studies. Lack of cooperation between institutions Weaknesses of the grid infrastructure
Action Owner	IMM
Stakeholders	District Municipalities Citizens Consultants and/or academia for consultancy services to citizens Private sector businesses and organizations Renewable technology providers and installers Financial institutions
Financing Options	Municipal Budget, IFIs, PPP, Bank of Provinces.

25) Develop Izmir bioeconomy strategy and action plan	
Strategic Plan Objectives	The Right Ecosystem Will be Created to Make İzmir an Attraction Center for New Investments, Technological Innovations, and Creative Industries.
Description:	Covers all kinds of industries and economic sectors producing, managing and distributing biological resources (e.g., Agriculture, Food, Forestry, Fishery and other bio-based industries).
Rationale	It has become mandatory to make a transition from a structure based on unsustainable fossil resources to a bio-based economic system aiming to produce innovative and reliable products using bio- based resources. Efforts should be spent on the provision of biomass supply for bio-based products and services, diversification of biomass resources, fostering their production and ensuring sustainable provision in the fields of agriculture and forestry. Izmir has the potential to take important steps particularly towards transition to sustainable and nature-based agricultural practices, blue bioeconomy, and forest bioeconomy in mountain ecosystems.
Steps for Implementation	1. A meeting should be organized with the relevant public institutions, private sector institutions, universities, chambers, cooperatives, and associations in order to identify the areas of Izmir offering a bioeconomy potential, which will constitute the basis for the strategic plan of IMM. 2. IMM should appoint individual(s) or department(s) in charge who will ensure the conduct of the relevant strategy on the part of the administration. 3. The relevant bioeconomy strategy and action plan should be prepared, and services should be procured on the issue. 4. Strategy should be created, and the results obtained should be ensured to be shared widely through the strategy website, press releases and social media. 5. The action plan should be created via a dialogue conference in order to determine the internal officers of IMM and the relevant external institutions who are in charge of the implementation processes. 6. The structure founded at IMM for monitoring the relevant strategy and action plan (Item 2) should be authorized to perform the monitoring activities and be ensured to be competent in the relevant job.
Action Type	Plan / Strategy
Field of action	Energy systems

Systemic lever	Learning and Capabilities	
Expected reduction in emissions	This action will result in reduced emissions through the recycling of bio-based waste materials, reduced use of raw materials (conversion of recycled materials into biomass and biogas) and thus a reduced transportation requirement for the disposal of these materials (e.g., designing bioreactors for the fast production of compost fertilizers in marketplaces and where segregation is not required). Emission figures have not been calculated yet.	
Implementation plan	**Action Owner**	IMM
	Stakeholders	District Municipalities Industries / industrial organizations which may use the wastes Cooperatives. Technical experts, consultants, and academicians
	Financing Options	Municipality Budget
	Revenue /savings opportunities	Bioeconomy is a key component of circular economy, and hence will maximize total resource efficiency by means of conversion of waste into resources. Some "circular" solutions will become suitable and cost-efficient once they are disseminated to residential areas, which are responsible for the large building stocks of the city (e.g., garden wastes produced by districts where garden houses are common and, on a smaller scale, by large housing complexes can be used in pyrolysis facilities for bio coal production).
Impact measures	To be determined because of the strategy and action plan produced as part of this action.	
Estimated cost:	**CAPEX:** - **OPEX: -** **Design/Development Costs: -**€60,000	
Estimated benefits	**Health impacts:** Production of food supplement and nutraceuticals (e.g., extraction of bioactive substances from agricultural production wastes and agricultural industries' waste). In addition, production of disinfectants under pandemic conditions (e.g., food businesses employing fermentation of sugar products whose shelf life has expired and producing industrial ethyl alcohol to be used in cologne making). **Economic development**: Will increase industrial symbiosis potential among industrial businesses. In addition, contribution will be made to the production of food with added value and clean energy thanks to reduced dependency on fossil fuels. **Environmental:** Bioeconomy practices will result in reduced carbon emissions. They will support smarter use of natural resources and prevent wastage.	
IMM Spatial Strategy Alignment	1. Gulf of Izmir 2. Central City 3. Urban / Rural Periphery	

26) Make separate collection of key dry recyclable materials mandatory, formulating policy at the district municipality level.	
Strategic Plan Objectives:	Sustainable Waste Management and Recycling Mechanisms Will Be Developed
Description	In line with the National Zero Waste Regulation, IMM will establish mandatory requirements for the separate collection of dry recyclable materials at the district municipality level and will be raise public awareness on this issue. In addition, according to the Regulation, District Municipalities of IMM are required to start implementation of Zero Waste Management System by 31 December 2020.
Rationale	According to the waste characterization study of Izmir Province conducted in 2018, the samples identified that recyclable packaging waste was the most prominent element (with an average of 18.97% by weight). Therefore, mandatory separate collection of dry recyclable materials will:

	• reduce the amount of waste sent to landfill (the reduction rate of waste sent to disposal should be at least 15% according to the National Zero Waste Regulation) and therefore, decrease the land needed for landfilling. • be beneficial for the economy. • help to achieve one of the goals of the Integrated Solid Waste Management Plan of IMM developed in 2018, which is to collect at least 12% of packaging waste separately at source by 2023.	
Steps for Implementation	1. Explore the regulatory and fiscal measures available to the municipality to set enforceable policies for dry recycle separation. 2. Baseline assessment of current markets and infrastructure for recyclable collection, separation, processing, and export. 3. Evaluate and determine practical infrastructure requirements needed for District Municipalities to undertake effective separate waste collection (i.e., bin, storage, collection, bulking and processing requirements) 4. Engage with District Municipalities 5. Formulate and approve policy and enforcement measures. 6. Develop implementation plan to include infrastructure investment and revisions to building codes required.	
Type of action	Enforcement with potential capital investment	
Field of action	Waste & circular economy	
Systemic lever	Governance and Policy	
Potential Emission Savings	In combination with action number 30.	
Plan for delivery	**Action owner**	IMM
	Stakeholders	MoEnvU, Provincial Directorate of Environment and Urbanization, CEVKO Foundation, District Municipalities, Izmir citizens.
	Financing options	Municipal budget
	Revenue /savings opportunities	Revenue could be generated from the key dry recycled materials
Impact measures	• Share of the population with weekly municipal solid waste (MSW) collection • Proportion of MSW that is sorted and recycled total and by type of waste e.g., paper glass batteries PVC bottles metals	
Estimated cost	**CAPEX:** Collection asset set-up cost: €980,000 - €1,230,000 **OPEX:** Public Information Campaign: €1,300 – 1,600, Collection asset cost per year: €1,600,000 - €2,400,000. **Design/development costs:** Studies and Information Campaign: €23,000 - 29,000	
Estimated benefits	**Economic Development:** economic growth; employment creation; revenue generating activities. **Social Inclusion:** skills development (behavioral) **Environment:** Mitigation of GHG Emissions	
1/25,000 scaled IMM Environmental Plan Alignment	Not spatially dependent.	

27) Supplement and speed up investment in smart-waste separation facilities, (dry recyclables and organic waste), a clean materials recovery infrastructure and composting facilities, building on the İzmir Integrated Solid Waste Management Plan (2018).	
Strategic Plan Objectives:	Sustainable Waste Management and Recycling Mechanisms Will Be Developed
Description	In accordance with the targets of the Integrated Solid Waste Management Plan of IMM developed in 2018; waste must be separated in source, or that mechanical / biological treatment has to be carried out, before waste is accepted to landfill. To ensure that, undertake an assessment study with a view to investing in waste separation facilities (such as Harmandalı

	Physical Separation Facility), a clean materials recovery facility and composting facility and complete the waste collection systems.	
Rationale	• Segregating recyclable waste will reduce the amount of waste sent to landfill, and thus, the land needed for landfilling will decrease. • Recycled materials will be introduced to the economy. • Biodegradable wastes are evaluated in compost production before disposal.	
Steps for Implementation	1. Assess expected quantities of different waste streams. 2. Assess current infrastructure and expected infrastructure / area needs, for waste separation, recovery, and composting. 3. Identify requirements for separate collection, recovery, and composting, including any funding or financial support, technology assessment. 4. Complete the investment of waste collection systems to facilitate the separation and processing of recyclable and biodegradable waste	
Type of action	Capital project	
Field of action	Waste & circular economy	
Systemic lever	Learning and Capabilities	
Potential Emission Savings	The specific reduction associated with this action has not been calculated at this time, however emissions can be reduced as: • Waste separation, minimization, reuse and recycling reduce GHG emissions by conserving raw materials and fossil fuel use during the products' life cycle. • Waste offers a significant source of renewable energy. Incineration and other thermal processes for waste-to-energy, landfill gas recovery and utilization, and use of anaerobic digester biogas can play important roles in reducing fossil fuel consumption and GHG emission. • Increasing the material recovery rate and compost production reduces GHG emissions that are currently associated with their disposal in landfill.	
Plan for delivery	**Action owner**	IMM
	Stakeholders	MoEnvU, Provincial Directorate of Environment and Urbanization, District Municipalities, Investors
	Financing options	Municipal budget, IFIs, Bank of Provinces, PPP, private banks
	Revenue/savings opportunities	Revenue could be generated from reuse of dry recyclables
Impact measures	• Share of the population with weekly MSW collection • Proportion of MSW that is sorted and recycled total and by type of waste e.g., paper glass batteries PVC bottles metals	
Estimated cost	**CAPEX:** €8 / tone for a clean materials facility and €18 / tone for a composting facility. **OPEX: N/A** **Design/development costs: N/A**	
Estimated benefits	**Health impacts:** public health – reduced pollution **Economic Development:** economic growth; employment creation; revenue generating activities. **Social Inclusion:** skills development (behavioural) **Environment:** Mitigation of GHG Emissions, reduced pollution	
1/25,000 scaled IMM Environmental Plan Alignment	Not spatially dependent.	

28) Partner and/or cooperate with relevant institutions and organizations that can act jointly in line with the Zero Waste Regulation to develop and invest in the necessary recycling infrastructures (bins, trucks, routes etc).	
Strategic Plan Objectives:	Sustainable Waste Management and Recycling Mechanisms Will Be Developed

Rationale / Purpose	This action would focus on investing in and developing the necessary smart waste collection infrastructure and assets that IMM requires to help advance the Izmir Integrated Solid Waste Management Plan 2018. It would be developed in-line with actions B-2.2.26 and B-2.2.29. The amount of solid waste per capita in Izmir has increased in recent years, rising from 390.55 kg per capita in 2008, 469.09 kg per capita in 2018 – a 20% increase. According to the (Izmir Province Integrated Waste Management Plan, the amount of waste per capita is expected to continue to rise in the next decade (p.99). In 2018, 4800 tons of waste was accepted per day in Harmandalı Solid Waste Storage Area. The amount of urban solid waste is expected to be 5,413 tons in 2025. This action is therefore necessary to minimize the increase in waste, and associated GHG emissions. There should be a focus on both expanding capacities to ensure that 100% of areas within the province receive a weekly collection, whilst also upgrading to a smart waste management system. The first stage of this action would involve filling the current data gaps regarding the current number of waste collection trucks and the district through Izmir that would require more extensive collection coverage. Developed in-line with the timeframes for the construction of disposal and recycling facilities, outlined in the Izmir Integrated Solid Waste Management Plan 2018
Steps for Implementation	1. Cooperate with District Municipalities for effective recycling. Determine the necessary infrastructures needed (bins, adequate trucks, route optimizations, etc.) 2. Harmandalı waste separation unit will be finalized. 3. Establishment of new waste transfer stations (5 already planned till 2025) 4. Operation of recycled waste transfer stations to include monitoring and reporting on targets. 5. Effective cooperation with private/public recycling institutions/facilities 6. Raising awareness of the public on recycling 7. Raise awareness and encouragement activities and campaigns for the use of recycled materials through channels such as print, visual media and social media.
Field of action	Waste & circular economy
Systemic lever	Learning and Capabilities
Potential Emission Reductions	Although waste reduction in general would likely result in lower emissions (e.g., due to the reduced need for processing / management, transportation and incineration or landfill gas), the potential magnitude of reductions is not possible to quantify without further detailed feasibility studies.
Potential Barriers	Difficulty in achieving long-term behaviour change among the public and institutions Lack of cooperation between institutions and departments. Increased amount of waste per capita
Action Owner	IMM
Stakeholders	Ministry of Environment and Urbanization District Municipalities Recycle facilities. Finance institutions
Financing Options	PPP, IFI's, State Investment, Municipal Budget, Municipality Issued Green Bonds,

29) Development of a detailed analysis (number, type, size, age, etc.) and action plan for the development and low-emission management of dumpsites / landfills (both closed and operational). This could incorporate the development of mandatory energy recovery and landfill gas and anaerobic digestion.	
Strategic Plan Objectives:	Sustainable Waste Management and Recycling Mechanisms Will Be Developed
Rationale / Purpose	When the necessary investments and preparations are completed, the emission of a large amount of methane into the atmosphere will be prevented.

Steps for Implementation	Harmandalı Solid Waste Landfill Facility has already been rehabilitated and electricity generation has started at the end of 2019. The energy generation capacity is 15 MW and can be extended up to 45MW. The landfill area uses the energy generated within the site. Harmandalı SWLF is operated by a private company under the control of our Municipality under Public Procurement Law No. 2886. • It should be investigated if the Harmandalı model is applicable to Bergama due to lower capacity there. • Alternative investment models need to be investigated for Bergama landfill. • Conduct studies on the 2 landfills to see the potential of rehabilitation. • Since IMM now has necessary experience, the 5 open landfills will be turned into regulated landfills.
Field of action	Waste & circular economy
Systemic lever	Learning and Capabilities
Potential Emission Reductions	Reductions from all landfills: 667,279 tCO2e in 2030 Electricity generation from biogas in Harmandalı: 136,890 tCO2e in 2030 when the facility reaches full capacity of 45MW.
Potential Barriers	Lack of financial resources Inapplicability due to low capacities of landfills other than Harmandalı Landfill gas decreases over time, eventually becoming a non-viable source of energy. In line with the Waste Hierarchy, and in line with Circular Economy principles, waste should be significantly minimized (if not eliminated) over time, making it a sub-optimal energy source in the medium to long term
Action Owner	IMM
Stakeholders	MoEnvU MoAF District Municipalities Investors Finance institutions
Financing Options	Municipal Budget, IFIs, PPP, Bank of Provinces.

30) Municipality to commit to banning the use of single-use plastics within their buildings and operations, encouraging local businesses to do the same.	
Strategic Plan Objectives:	Institutional Capacity and Functioning Will Be Made More Effective, Economic and Efficient
Description	In order to reduce the amount of non-recyclable waste and GHG emissions, Municipality will commit to banning the use of single-use plastics within their buildings and operations, while encouraging other organizations, businesses and institutions to do the same.
Rationale	According to the United Nations Environment Program report “Single-Use Plastics - A Roadmap for Sustainability”, the impacts of single-use plastics include: • Impacts on wildlife from direct ingestion/entanglement or from ingestion of microplastics following plastic degradation. • Blockage of watercourses and sewage systems. • Visual impacts and dissemination from litter. • Economic costs of beach and sea clean-up and economic impacts on fisheries, tourism and shipping industries. • Plastic production and disposal generate GHG emissions, and the majority of plastics are not recycled. IMM has direct control over municipal buildings. Banning the use of single-use plastics is a simple step to reduce İzmir’s total amount of non-recyclable waste and GHG emissions
Steps for Implementation	**Municipality to commit to banning the use of single-use plastics:** 1. Stakeholder mapping and confirmation of policy scope. 2. Inventory of single-use plastics 3. Identify potential alternatives and any essential/non-substitutable items.

	4. Carry out impact assessment of costs and risks. 5. Develop and implement plans, including allocating roles and responsibilities, communication strategy and timeframe. 6. Implementation and monitoring. **Encouraging local businesses to do the same:** 1. Voluntary reduction strategies for local businesses and agreements 2. Stakeholder mapping 3. Develop case studies and "how to" guides (including mode policies). Public campaign to encourage uptake. 4. Monitoring of uptake.	
Type of action	Plan / Strategy	
Systemic lever	Governance and policy learning and capabilities	
Field of action	Waste & circular economy	
Potential Emission Savings	The emissions savings cannot be quantified at this stage since the amount of single-use plastic is not known. A ban has the potential to: • Reduce overall waste generation • Reduce GHG emissions.	
Plan for delivery	**Action owner**	IMM
	Stakeholders	Local Businesses NGOs Citizens
	Financing options	Municipal budget
	Revenue /savings opportunities	Savings opportunities will come from public health benefits
Impact measures	• Annual CO2 equivalent emissions per capita • Annual CO2 emissions per unit of GDP • Total solid waste generation per capita • GDP per domestic material consumption • Proportion of municipal solid waste that is sorted and recycled total and by type of waste e.g., paper glass batteries PVC bottles metals	
Estimated cost	**CAPEX:** N/A **OPEX:** €600 - 800 **Design/development costs:** €15,000 - €20,000	
Estimated benefits	**Health impacts:** Public health – reduced pollution **Economic Development:** Increased economic efficiency, Revenue/savings generating activities. **Social Inclusion:** Strengthens social fabric. **Environment:** reduced pollution	
1/25,000 scaled IMM Environmental Plan Alignment	Not spatially dependent	

31) Investigate potential to provide dedicated waste collection for restaurant / food industry traders in-line with management infrastructure and technology. **32) Establish a municipality-wide awareness campaign (schools etc.) for waste reduction and separation at household level.** **33) Undertake an assessment of waste collection infrastructure (collection service, coverage rate, bins/ containers, vehicles), including smart collection systems and route optimization software in collaboration with district municipalities.**	
Strategic Plan Objectives:	Sustainable Waste Management and Recycling Mechanisms Will Be Developed

Rationale / Purpose	There are several actions identified during studies and workshops that support "Zero Waste Regulation" and the efforts to reduce waste. All these actions are collected under one action. It is important to take action to reduce waste production in many ways. In case of a deviation from projections and a higher increase would lead to new investments needs for waste management. By preventing waste increase these investment need can be eliminated as well as lower GHG emissions. Undertaking awareness raising campaign's and provide guidance / instruction on how citizens can embark on home or community composting (the recycling of organic wastes such as food and kitchen waste from households, restaurants, caterers), or other means of recyclable waste This will help to reach the objective of sustainable waste management and effective recycling with a view of encouraging and informing behaviour change.
Systemic lever	Leaning and Capabilities
Field of action	Waste & circular economy
Steps/Actions for Implementation	**Establish a municipality-wide awareness campaign (schools etc) for waste reduction and separation at household level:** • Several awareness-raising activities and meetings have already been planned in the IMM Strategic Plan. District Municipalities are also conducting training in schools. IMM can cooperate with District Municipalities for the dissemination of these trainings to a wider audience. • Prepare promotion material visual, social media short info messages animations shared on social media accounts, billboards on busy routes can be used for the purpose. • Competitions and reward mechanisms will be established. **Investigate potential to provide dedicated waste collection for restaurant / food industry traders in- line with management infrastructure and technology:** • IMM can study the areas where food businesses are more concentrated. • Conduct a study to identify an area where the collected waste can be composted. One of the transfer centers where relevant District Municipalities bring the waste can be investigated. • Cooperate with District Municipalities to collect food waste. • Competitions and reward mechanisms will be established. **Undertake an assessment of waste collection infrastructure (collection service, coverage rate, bins/ containers, vehicles), including smart collection systems and route optimization software in collaboration with district municipalities:** • Cooperation with District Municipalities is crucial since it is their responsibility to collect waste. • Undertake a study for the optimization of container size, vehicle sizes, route optimization. • Undertake a study about smart systems including benchmarks from the world and Türkiye.
Potential Emission Reductions	Supporting actions for B-2.2.29, emission reductions cumulated.
Potential Barriers	Resistance to change habits. Lack of cooperation with District Municipalities Lack of human resources to conduct studies
Action Owner	IMM
Stakeholders	District municipalities Izmir citizens Restaurants, food industry CEVKO Foundation Ministry of Environment and Urbanization
Financing Options	Municipal Budget, PPP, Private Investment, Bank of Provinces, IFIs.

34) Emission reductions in industrial processes	
Potential Emission Savings	**1.519.992 tCO_2e** is planned to be reduce in industrial processes.

B-2.3: Summary strategy for residual emissions

After the residual emissions are determined in the baseline greenhouse gas inventory, offsetting strategies for mitigation, removal and preserving processes will be drafted. The steps of this process are planned below:

A) Calculate Residual Emissions: Before you can offset emissions, you need to accurately calculate the number of residual emissions you want to offset. This involves measuring or estimating the emissions that remain after implementing all feasible emissions reduction measures.

B) Prioritize Reductions: First and foremost, focus on reducing emissions at the source as much as possible. Residual emissions should only be considered after all reasonable efforts to minimize emissions have been exhausted. This involves implementing energy efficiency measures, switching to renewable energy sources, improving operational processes, and more.

C) Identification of the areas where removal and preservation projects will be carried out: green and blue infrastructure improvements will become the main focus. The blue infrastructure will consist of stabilisation projects for the improvement of rivers, lakes, peatlands, wetlands and biodiversity conservation. Urban agriculture, mangrove, rain gardens, etc. will be evaluated in terms of green infrastructure.

D) Purchase Carbon Offsets: These can include reforestation projects, renewable energy projects, methane capture from landfills or agriculture, and more. Ensure that the offsets you purchase are independently verified and certified according to recognized standards like the Verified Carbon Standard (VCS), VERRA or Gold Standart. In the near future, carbon emission trading legislation will be introduced in the domestic market in Türkiye. It will be possible to sell carbon credits while buying them.

E) Transparency and Reporting: Establish a system to transparently record our offsetting activities and emission reductions.

F) Ensuring Stakeholder Engagement: Involve employees, citizens and other key stakeholders in offsetting and emission reduction efforts.

G) Monitoring: Ensuring that emissions and the effectiveness of offsetting strategies are regularly measured.

5.3 Module B-3 Indicators for Monitoring, Evaluation and Learning

Table 5.3.1: Impact Pathways

B-3.1: Impact Pathways							
Outcomes/ impacts addressed	**Action / Project**	**Indicator No.**	**Indicator name**	**Unit**	**Target values**		
					2025	**2027**	**2030**
GHG reduction		EN-01	Annual amount of greenhouse gas	tCO_2e/y	-	-	-
GHG reduction		EN-02	Annual energy consumption	MWh/y	-	-	-
GHG reduction		EN-03	Annual energy intensity	MWh/m^2	-	-	-
GHG reduction		EN-04	Installed photovoltaic solar power capacity	MWp	-	-	-
GHG reduction		EN-05	Annual photovoltaic solar energy production	MWh/y	-	-	-

B-3.1: Impact Pathways							
Outcomes/ impacts addressed	**Action / Project**	**Indicator No.**	**Indicator name**	**Unit**	**Target values**		
					2025	**2027**	**2030**
GHG reduction		EN-06	Photovoltaic solar-induced greenhouse gas reduction	tCO_2e/y	-	-	-
GHG reduction		EN-07	Percentage of total photovoltaic solar installations covering the municipality's electrical energy consumption	%	-	-	-
GHG reductio		EN-08	Percentage of total photovoltaic solar installations covering the total energy consumption of the municipality	%	-	-	-
GHG reduction		EN-09	Annual CO_2 emissions per unit of GDP	€/GDP	-	-	-
GHG reduction		MO-01	Road length dedicated to public transport per 100,000 capita	km	-	-	-
GHG reduction		MO-02	The length of bicycle path per 100,000 capita	km	-	-	-
Co-benefits		MO-03	The ratio of population having access to public transport within 15 min by foot	%	-	-	-
GHG reduction		EN-10	The ratio of covering the city's energy demand by renewable energy	%	-	-	-
GHG reduction		EN-11	Proportion of fleet that is electrified	%	-	-	-
GHG reduction		EN-12	Annual CO_2 equivalent emissions per capita	CO_2e/ca	-	-	-
Circular Economy		CE-01	Total solid waste generation per capita	kg/ca·d	1.1	1	0.95
Circular Economy		CE-02	The percentage of separate collection of the waste in metropolitan area of the city.	%	30	50	100
Circular Economy		CE-03	The percentage of separate collection of the waste in the whole city.	%	10	30	70
Circular Economy		CE-04	Recycling and recovery ratio for packaging waste	%	25	50	90
Circular Economy		CE-05	The percentage of organic waste disposed by landfilling	%	90	50	0

Table 5.3.2: Indicator Metadata

B-3.2.1: Indicator Metadata	
Indicator Name	**Annual amount of greenhouse gas**
Indicator Unit	tCO2e/y

Definition	Monitoring the amount of greenhouse gases to be calculated for all sectors
Calculation	The relevant fuel type or energy quantity multiplied by the emission factor for that fuel
Indicator Context	
Does the indicator measure direct impacts (i.e., reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it impact?	Especially all buildings and transport
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Co-Benefits
Can the indicator be used for monitoring impact pathways?	[yes/no]
If yes, which NZC impact pathway is it relevant for?	Impact Pathways according to - according to Module B-1
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes. (CoM)
Data requirements	
Expected data source	
Expected availability	
Suggested collection interval	
References	
Deliverables describing the indicator	
Other indicator systems using this indicator	
B-3.2.2: Indicator Metadata	
Indicator Name	**Annual energy intensity**
Indicator Unit	MWh/m2
Definition	Only the energy used in buildings is taken into account. It includes monitoring of energy efficiency actions.
Calculation	The relevant fuel type or energy quantity multiplied by the emission factor for that fuel
Indicator Context	
Does the indicator measure direct impacts (i.e., reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it impact?	Buildings (Residential, municipal etc.)
Does the indicator measure indirect impacts (i.e., co- benefits)?	No

If yes, which co-benefit does it measure?	Co-Benefits
Can the indicator be used for monitoring impact pathways?	[yes/no]
If yes, which NZC impact pathway is it relevant for?	Impact Pathways according to - according to Module B-1
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes. (CoM)
Data requirements	
Expected data source	
Expected availability	
Suggested collection interval	
References	
Deliverables describing the indicator	
Other indicator systems using this indicator	
B-3.2.3: Indicator Metadata	
Indicator Name	**Annual CO2 equivalent emissions per capita**
Indicator Unit	tCO2e/capita
Definition	It measures and monitors the amount of greenhouse gas emissions per capita
Calculation	Total greenhouse gas emissions of the city divided by its population
Indicator Context	
Does the indicator measure direct impacts (i.e., reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it impact?	It effects all emissions sources except industry
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Co-Benefits
Can the indicator be used for monitoring impact pathways?	[yes/no]
If yes, which NZC impact pathway is it relevant for?	Impact Pathways according to - according to Module B-1
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	CoM
Data requirements	
Expected data source	
Expected availability	
Suggested collection interval	

References	
Deliverables describing the indicator	
Other indicator systems using this indicator	
B-3.2.4: Indicator Metadata	
Indicator Name	**Annual photovoltaic solar energy production**
Indicator Unit	MWh/y
Definition	Total electric energy produced by the photovoltaic power system connected to the installed power
Calculation	A feasibility study is carried out based on the solar radiation in the city. In Izmir, the theoretical value for rooftop installations is approximately 1753 kWh/kWp.
Indicator Context	
Does the indicator measure direct impacts (i.e., reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it impact?	Especially buildings
Does the indicator measure indirect impacts (i.e., co- benefits)?	Yes
If yes, which co-benefit does it measure?	Reduces air pollution. Green job opportunities are created.
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	Provides early greenhouse gas reduction
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes. CoM
Data requirements	
Expected data source	
Expected availability	
Suggested collection interval	
References	
Deliverables describing the indicator	
Other indicator systems using this indicator	
B-3.2.5: Indicator Metadata	
Indicator Name	**Greenhouse gas reduction from photovoltaic systems**
Indicator Unit	tCO2e/y

Definition	The contribution of the annual electrical energy produced by the photovoltaic power system to GHG mitigation is measured and monitored.
Calculation	For GHG mitigation calculation, the electrical energy produced by the photovoltaic system is multiplied by the emission factor of the national electricity grid
Indicator Context	
Does the indicator measure direct impacts (i.e., reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it impact?	Especially buildings
Does the indicator measure indirect impacts (i.e., co- benefits)?	Yes
If yes, which co-benefit does it measure?	Reduces air pollution. Green job opportunities are created
Can the indicator be used for monitoring impact pathways?	Yes
If yes, which NZC impact pathway is it relevant for?	For greenhouse gas reduction, early change
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes. CoM
Data requirements	
Expected data source	
Expected availability	
Suggested collection interval	
References	
Deliverables describing the indicator	
Other indicator systems using this indicator	
B-3.2.6: Indicator Metadata	
Indicator Name	**Kilometres bicycle path per 100,000 population**
Indicator Unit	km/100,000
Definition	Measures greenhouse gas reduction by increasing the length of cycle paths per 100 thousand inhabitants
Calculation	
Indicator Context	
Does the indicator measure direct impacts (i.e., reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it impact?	Transport-Road

Does the indicator measure indirect impacts (i.e., co- benefits)?	Yes
If yes, which co-benefit does it measure?	a healthier population and a reduction in air pollutants
Can the indicator be used for monitoring impact pathways?	[yes/no]
If yes, which NZC impact pathway is it relevant for?	Impact Pathways according to - according to Module B-1
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no]
Data requirements	
Expected data source	
Expected availability	
Suggested collection interval	
References	
Deliverables describing the indicator	
Other indicator systems using this indicator	

6 Part C – Enabling Climate Neutrality by 2030

Part C “Enabling Climate Neutrality by 2030” aims to outline any enabling interventions, i.e., regarding organizational setting or collaborative governance models or related to social innovations – designed to support and enable the climate action portfolios described in Module B-2 as well as aiming to achieve co-benefits outlined in the impact pathway (Module B-1).

6.1 Module C-1 Organisational and Governance Innovation Interventions

Module C-1 “Organisational and Governance Innovation Interventions” consists of a summary table, listing organizational and governance interventions and describing their impact (C-1.1) and a section for more detailed descriptions and comments (C-1.2).

Table 6.1.1: Enabling organisational and governance interventions

C.1.1: Enabling organisational and governance interventions					
Intervention name	**Description**	**Responsible entity/dept./person**	**Involved stakeholder**	**Enabling impact**	**Co-benefits**
(Indicate name of intervention)	*(Describe the substance of the intervention)*	*(Indicate responsible)*	*(List all stakeholder involved and affected)*	*(Describe how intervention enables climate neutrality)*	*(Indicate how intervention helps achieve impact listed in Module B-1)*
GCC İzmir Steering Board	A committee that brings together stakeholders within the İzmir.	İzenerji CO	16 members of steering board	To encourage and support the development and implementation of Mission strategies.	GCC İzmir works for democracy and participation in order to realize the aim of making the city a climate neutral, healthy and more liveable city.
Energy Use and Building Applications Working Group	Working group (WG) for individuals/ organizations who are experts or motivated in energy applications in buildings.	GCC İzmir	16 members of steering board will be divided into working groups	To develop strategies on energy use in buildings to increase energy efficiency in İzmir.	Working for all systemic levers in the field of Energy systems
Energy Production Working Group	WG for individuals/ organizations who are experts or motivated in			To promote sustainable energy production and distribution in İzmir.	Working for all systemic levers in the field of Energy Production

C.1.1: Enabling organisational and governance interventions					
Intervention name	**Description**	**Responsible entity/dept./person**	**Involved stakeholder**	**Enabling impact**	**Co-benefits**
	energy production and usage.				
Mobility and Transportation Working Group	WG for individuals/ organizations who are experts or motivated in effective transportation systems.			To implement sustainable and effective transportation systems in İzmir.	Working for all systemic levers in the field of Mobility and Transportation
Nature Based Solutions Working Group	WG for individuals/ organizations who are experts and motivated in environmental solutions.			To promote environmentally friendly and sustainable solutions throughout the city.	Working for all systemic levers in the field of Nature Based Solutions
Circular Economy Working Group	WG for individuals/ organizations who are experts and motivated in circular economy.			To encourage waste management and resource use based on circular economy principles in İzmir.	Working for all systemic levers in the field of Circular Economy
Green Industry Working Group	WG for individuals/ organizations who are experts and motivated in sustainable industry.			To promote sustainable production methods and green industry projects in İzmir.	Working for all systemic levers in the field of Green Industry

C-1.2: Description of organisation and governance interventions

Izmir is a city with strong capacity and experience in joint production processes in the fight against climate change. The coming together of all institutions and networks serving the climate neutral journey in Izmir at GCC Izmir creates an important opportunity to coordinate this strong capacity. The organizations in the GCC Izmir Steering Committee consist of representatives who have played an active role in the fight against climate change. It is aimed to coordinate all experiences regarding climate change in Izmir under the umbrella of GCC Izmir.

GCC Izmir aims to be a flexible model to make the participatory process sustainable while moving towards climate neutrality. It is shaped according to current needs within the framework of the principled attitude determined by the society regarding sustainability. In this context, it is possible to add new institutions and stakeholders and to implement the necessary changes in the governance structure over time.

GCC Izmir has 6 principles under 2 main headings: process design and output design.

Three process design principles ensure procedural quality:

1. Inclusiveness to bring together different actors and multiple types of knowledge on an equal basis

2. Openness to adopting, integrating and sharing knowledge

3. Legitimacy to ensure that the process contains legitimate and reliable information and is trusted by participants and wider urban actors.

Three output design principles indicate what types of results should be produced due to co-production:

1. Actionable information for policy and planning ensures that co-produced knowledge is immediately relevant and translated into policy and planning

2. Usable knowledge and empowerment ensure that co-produced knowledge outcomes are valuable to and adopted by many actors

3. Expanding institutions to provide synergy enables co-produced knowledge to be linked to multiple goals, strategies and agendas within the city. This helps create synergies across sectors.

Establishing trust, evaluating feedback and producing evidence-based information play an important role in the sustainability of society. It uses digital solutions to achieve this goal. GCC Izmir website is designed as the main communication tool of the community. As the Website becomes more dynamic over time, it is aimed to include online democratic participation tools for citizens and partners. At the same time, it is aimed to build trust and increase the courage to come together in line with common goals by transparently sharing the processes and outputs of the projects carried out within the scope of GCC Izmir.

Feedback mechanisms and learning processes play an important role in building trust. A transparent and participatory process with evidence-based information must be followed to enable meaningful learning and evaluation. The reflexive monitoring approach is an important point to support the learning and evaluation process at GCC Izmir. This approach for the transformative monitoring framework/dynamic learning agenda will be followed in 5 steps:

1- Planning reflective monitoring as an integral part of GCC Izmir from the beginning

2- Ensuring that all actors involved in the co-production are involved in the process.

3- A Secretary who can be coached for the role of reflexive monitor in the Working Groups is determined. The primary responsibility of the secretary is to guide the reflexive monitoring process. This is a challenging role as it requires certain skills, including the ability to balance. Drill into the big picture to facilitate meetings and sessions, synthesize large amounts of information, and ask important specific questions from those involved.

4- Evaluating the practices in the co-production journey using a timeline. This is done by regularly correlating the information obtained from the mirror tracking process with the delivery process.

Critical milestones are identified, relevant learning questions are formulated and tracked. Actions are determined in a way that reflects the work involved in GCC Izmir's climate neutral solutions.

5- Sticking to the method and taking the time to learn and adapt the practice.

Organizing surveys on all developments in the working groups regarding GCC Izmir's Climate Neutral solutions and sharing the lessons learned as a result of the surveys will be another step that facilitates the building of trust.

At the same time, it is planned that the working groups will meet every 2 weeks to determine, revise action plans and develop projects suitable for these actions.

The Steering Committee is planned to meet every 4 months to support the legitimacy of the prepared developments, their evaluation and dissemination to wider audiences. Determined meeting periods can be kept flexible according to current needs.

Figure 6: Logo of the GCC İzmir (Global Climate Community İzmir)

6.2 Module C-2 Social and Other Innovation Interventions

Module C-2 “Social and Other Innovation Interventions” consists of a summary table, listing organizational and collaborative governance interventions and describing their impact (C-2.1) and a section for more detailed descriptions and comments (C-2.2).

Table 6.2.1: Enabling social innovation interventions

C.2.1: Enabling social innovation interventions					
Intervention name	**Description**	**Responsible entity/dept./person**	**Involved stakeholder**	**Enabling impact**	**Co-benefits**
(Indicate name of intervention)	(Describe the substance of the intervention)	(Indicate responsible)	(List all stakeholder involved and affected)	(Describe how intervention enables climate neutrality)	(Indicate how intervention helps achieve impact listed in Module B-1)
THE CITTASLOW METROPOLIS İZMİR	The principles of the concept of "Cittaslow Metropolis" are listed as "community and solidarity", "good governance", "urban eco system", "people-oriented economy", "food for all" and "eco-mobility".	City Strategies and Local Solutions Branch Directorate, which is part of the Strategy Development Department of the İzmir Metropolitan Municipality.	Cittaslow Metropolis International Working Group, civil society representatives, professional chambers, experts, and academics	It emphasizes the importance of slowing down urban processes and taking protective measures for both living spaces and nature, ensuring a sustainable urban environment. This approach inherently supports reduced carbon emissions and sustainable urban planning.	Empowering marginalized and disadvantaged groups. Through activities such as vocational training for women and young people, health screenings for children, and services designed to bolster household economies, the initiative seeks to uplift these population segments, ensuring their active participation in the community.
CrAFt CITIES	Creating Actionable Futures, in short: CrAFt, places the transition to climate neutrality at the heart of urban stake holders. The cities join a growing European urban movement that brings together their citizens, policy makers, arts, and academia that would typically not work together -to co- shape the transition to climate neutrality. CrAFt offers a	Izmir Metropolitan Municipality İZENERJİ CO	60 CRAFT CITIES Academicians, Artists, City Planners, Architects Residents of İzmir	CrAFt helps bring together cities and their citizens, policymakers, the arts and academia to jointly shape the transition to climate neutrality. It aims to test and share collaborative local governance models to leverage the values of inclusivity, aesthetics and	Storytelling campaign on actionable climate neutral futures for, with and by citizens Engagement with cultural, artistic and creative sectors, property owners and tenants, citizens and communities

C.2.1: Enabling social innovation interventions					
	community where changing business-as-usual becomes easier as many other cities are going on a similar journey.			sustainability for climate neutral cities.	
EMERGENCY SOLUTION TEAM	The Emergency Solution Team, which set out to distribute the opportunities offered by the municipality equally in every region of the city; It was founded in July 2020 by Izmir Metropolitan Municipality Mayor Tunç Soyer to identify service deficiencies from the citizens' perspective in the underdeveloped areas of the city in terms of service, to eliminate possible inequality in municipal services with social participation and to strengthen the communication between the municipality and the citizens.	City Strategies and Local Solutions Branch Directorate, which is part of the Strategy Development Department of the İzmir Metropolitan Municipality	District Municipalities, Neighbourhood Residents	Developing solutions compatible with nature, such as using plants that require minimum water in the parks, increasing green areas, creating neighbourhood gardens, increasing bus lines in desired regions according to the needs reported to the emergency support office.	According to the feedback from the residents of the neighbourhood, it will become a quieter, cleaner and healthier city by increasing public transportation and green area solutions. The creation of neighbourhood gardens has enabled the increase of nature-friendly job opportunities in the city.
GREEN TRANSFORMATION PROGRAM	It is an initiative carried out to solve the problem of 'energy poverty' in regions where disadvantaged people live densely.	İZENERJİ CO	THE CITTASLOW METROPOLIS İZMIR ONUR ENERGY	Increase in Energy Efficiency with less energy consumption	Challenging Economic Crisis with Reduced Invoices
YOUNG SUSTAINABILITY AMBASSADORS PROGRAM	It is an initiative that aims to train the human resources that the business world needs in the field of sustainability after the EU Green Deal and at the same time to mobilize young people to contribute to sustainable development goals.	Izmir Sustainable Urban Development Network	Izmir Metropolitan Municipality, Izmir Development Agency, İZDOĞA CO (Subsidiary of IMM), Izmir Planning Agency and SÜGEP Academy	Creating opportunities for young people to receive training on the European Green Deal and Sustainable Development Goals and to produce projects for these goals at the end of the training.	Producing projects for a more liveable, healthy and fair city, spreading the goals to young audiences, increasing participation and awareness, contributing to increasing climate-friendly job opportunities.

C-2.2: Description of social innovation interventions

THE CITTASLOW METROPOLIS İZMİR

İzmir, as the first Cittaslow Metropolis candidate city in the world since 2021, aims to adopt this philosophy on a larger scale. The project's objectives include ensuring a quality and attractive life through technology, promoting sustainable development that respects regional values, ensuring income justice, and preserving natural, cultural, and historical importance.
The Cittaslow Neighbourhood Program within this initiative focuses on achieving a social transformation aligned with the philosophy of slowness. Key features of this program include ensuring equal and fair access to basic needs, designing environments for all ages, promoting safe walking and biking paths, and optimising public spaces based on general needs. In the broader context, the Cittaslow Metropolis İzmir project aligns with climate neutrality goals by advocating for a slowed-down, sustainable approach to urban living, which can lead to reduced carbon emissions and a more environmentally friendly urban planning approach.

Innovative Aspects:
Cittaslow Neighbourhood Program: A transformative approach promoting a slower-paced daily life, ensuring equal access to basic needs, and optimizing public spaces for community benefits.
Engagement Mechanisms: The initiative fosters community engagement through the 'Social Dialogue Team', which develops mechanisms to ensure residents' access to essential services and promotes their overall well-being. Integration of Global Urban Priorities: The project aligns global urban challenges with the Cittaslow philosophy, ensuring that urban solutions are both innovative and rooted in the core principles of the Cittaslow movement.

The Cittaslow Metropolis İzmir initiative is designed to transform the urban environment, benefiting both direct and indirect stakeholders. The direct beneficiaries are the residents of İzmir, who will experience improved quality of life by adopting the Cittaslow principles. This includes access to safe walking and biking paths, public spaces tailored to general needs, enhanced social interaction, support for local businesses, and preservation of local identity, culture, history, traditions, and nature. Indirectly, the project also benefits the broader community by fostering a culture of participation-oriented activities, promoting local employment opportunities, and encouraging volunteering and solidarity. In essence, the Cittaslow Metropolis İzmir initiative aims to create a harmonious urban environment that prioritizes the well-being of its inhabitants and the preservation of its cultural and natural heritage.

Lessons to be Learned:
Collaborative Approach: The project underscores the importance of collaboration with international and local stakeholders, including civil society representatives, professional chambers, experts, and academics. Such a collective approach ensures a holistic understanding of urban challenges and the development of practical solutions. Data-Driven Decision Making: The project's partnership with the EKOKENT Research and Application Center of İzmir University of Economics emphasizes the importance of scientific methods and data-driven insights in urban planning.

Planned Benefits:
Enhanced Urban Environment: The project aims to improve the quality of life by slowing down urban processes, ensuring access to essential goods and services, and optimizing public spaces for community benefits.
Addressing Environmental Concerns: The project seeks to tackle challenges like unhealthy nutrition, poverty, and air pollution by taking precautions to protect living spaces and nature. This inherently supports the reduction of greenhouse gas emissions and other environmental co-benefits.

Strengthening Community Spirit: The project emphasizes the physical and mental health of society, maintaining community spirit and renewable energy use.

The Cittaslow Metropolis İzmir project provides a roadmap for cities to achieve a harmonious balance between urban development and environmental sustainability, focusing on community well-being and climate action.

EMERGENCY SOLUTION TEAM

Emergency Solution Team institutionalized under the umbrella of the municipality;
It created a business model that will work integrated with other units of the municipality in order to quickly solve the city's problems and to implement the work to be done systematically and quickly.
According to this model, Field researchers knock on all doors in the neighbourhoods designated as the Emergency Solution Teamwork area, learn the expectations of each household regarding municipal services and analyse the problems. After this process, the report prepared for the neighbourhood was submitted to Izmir Metropolitan Municipality.
It is forwarded to the Presidency and Coordination Office. Then, the units go out into the field and identify the problems stated by the neighbourhood residents. In the final stage, a meeting is held with the units related to the decisions made and task distribution in the area under investigation and the foundations of the manufacturing process are laid.

The Emergency Solution team, which has been working in 6 districts since its establishment, has met with 20,408 households in 40 neighbourhoods to date.
The resolved issues cover almost all the services that a Metropolitan Municipality should provide from a social democratic perspective. The Emergency Solution Team, which serves all the needs of the people of Izmir, from road works to parks, from social assistance to sports fields, from disinfection to cleaning, from traffic regulations to demolition of abandoned buildings, from infrastructure works to landscaping, undertakes an important task to distribute the prosperity in Izmir equally to all neighbourhoods.
Functioning of the Emergency Solution Team; It is grouped under four main headings: "Strategy", "Discovery", "Planning" and "Execution".

The Emergency Solutions Office's key initiatives supporting the climate neutrality goal are shared below:

1- Using plants that require minimum water in the parks. For example, the plants used in Buca Fırat Living Park and Karabağlar Şehit Yahya Efiloğlu Fruit Park are plants that require little irrigation. Plants such as quince, fig, mulberry, olive, almond tree or thyme and wild strawberry were preferred. In addition, solar lighting systems were installed in the parks.
2- Neighbourhood Gardens: Neighbourhood gardens have been created in the slums in the metropolis, within all the reinforced concrete structures. Agricultural production is carried out and residents of the neighbourhood are given training on agriculture, production and soil.
"A garden area was created in Kadifekale, the Emergency Solution Team working area, in order to increase agricultural activities in the city center and contribute to the family economy. Activities are organized with the participation of neighbourhood residents in this area, which strengthens the feelings of solidarity, neighbourliness and success together and emphasizes the importance of agriculture. Neighbourhood Garden was a successful project. Mayor Tunç Soyer decided to expand the project throughout Izmir. Garden areas were also created in Buca Mustafa Kemal and Fırat Neighbourhoods. Field preparation studies were carried out in Bornova and Karabağlar districts. Efforts are being made to expand the establishment of gardens to every neighbourhood in the metropolis. "
3- Public Transportation: Bus lines were added to neighbourhoods where there were no bus lines or arrangements were made on the routes. In this way, people can reach the places they want to go by choosing public transportation rather than using their personal vehicles.
4- Investments in Social or Sports Activities: Neighbourhood residents are directed to an active life. Within the borders of the neighbourhood, Sports facilities, walking paths are being built and free sports training is provided. Citizens who access social activities within the neighbourhood can spend time in touch with nature. With the influence of the recreation areas built, activities and places to spend time are increasing within the borders of the neighbourhood.

All work to be done within the scope of the Emergency Solution Team is determined with a participation-oriented approach. Investments are made to meet the needs of citizens with public

resources. Everyone decides on the investment to be made in their own neighbourhood. Thus, a participatory, democratic and accountable model is created. The usability of investments made in line with needs also increases to the same extent.

GREEN TRANSFORMATION PROGRAM

According to the World Energy Outlook 2021 report, 770 million people still cannot access electricity and suffer from energy poverty. The Minister of Energy and Natural Resources announced that 3,365,784 electricity subscribers and 710,364 natural gas subscribers were processed due to the fact that they could not pay their debts in the 9-month period from January 2019 to September.

An energy efficiency program aiming existing residences and small workplaces with broad participation has not been executed in Türkiye yet.

An energy efficiency program is recommended for residential and Micro/Small businesses.

Within the scope of the proposed program, an energy efficiency technical help desk can be established, financing of energy efficiency and renewable energy investments can be facilitated, and energy poverty can be reduced.

The Green Transformation Program was planned to develop energy efficiency applications for Households / Residences (Package-1), Small Business (Package-2) and low-Income families (Package-3)

IZENERJI will work within an operational profit margin and use all its profits for disadvantage groups (Package-3).

Expected outcomes of the program are shared below:

- Increase in Energy Efficiency with less energy consumption
- Challenging Economic Crisis with Reduced Invoices
- Reducing Greenhouse Gases with struggle with climate change
- Social Impact with awareness and opportunity rise

YOUTH SUSTAINABILITY AMBASSADORS PROGRAM

The Youth Sustainability Ambassadors Program is an initiative that aims to mobilize young people to train the human resources that the business world needs in the field of sustainability after the EU Green Deal and to contribute to the Sustainable Development Goals (SDGs), also called Agenda 2030. It aims to provide university graduate and postgraduate students with experience by participating in project-based applications in line with the SDGs, and to offer new career opportunities to create trained human resources for the sustainability departments of public and private sector organizations.
Our Youth Sustainability Ambassadors will produce projects that provide solutions to local problems from the perspective of the UN Global Goals. They will gain field experience through the internship opportunity offered to them and will begin to see sustainability as a new career field. Thanks to the training and internship program, young people who are provided with project-based internship opportunities in the sustainability offices of the private sector and local governments will have a new career opportunity as 'Sustainability Ambassador'.

CrAFt CITIES

Izmir, one of the 60 cities selected as CrAFt Cities, will be able to benefit from the following opportunities:

- Gain experience from other CrAFt Cities
- Making climate neutrality more inclusive, empowering and accessible to all
- Using the arts, culture and creative sectors as catalysts for transition
- Joining a new generation think tank with students and youth communities

- Participate in a storytelling campaign about actionable climate-neutral futures
- Shape policy briefs to inform and advise national and European policy makers
- Showcase your projects at CrAFt events, storytelling and publications
- Gain first access to the CrAFt Impact Model and Guidance Package

In the workshops held in the first phase of the initiative, Izmir learned from the experiences of other selected CrAFt CITIES regarding sustainable, beautiful and climate neutral solutions and had the opportunity to share İzmir's own experience. It is planned that the events that will contribute to the CrAFt CITIES Program in Izmir will have a design that focuses on artists, disadvantaged groups, young people and children for a climate-neutral, more participatory and aesthetic city. The events and communication strategy to be held in Izmir within the scope of CrAFt CITIES are in the planning stage.

6.3 Module C-3 Financing of Action Portfolio

Table 6.3.1: Summary of interventions with cost implication

Action/ intervention name	Responsible entity and person	Start/end date	Field of action	Impact	Total cost estimated
Promote a Step Change in the Uptake of Privately and Municipality Owned Low Emission Vehicles	IMM	2023-2030	Transportation	335.686 tCO2e *in the existing strategy (SECAP 2020).* 500.000 tCO2e *for the Mission Action Plan*	~ € 0.7 billion
Apply smart traffic management, e.g. a command centre				625.295 tCO2e *in the existing strategy (SECAP 2020).* 1.000.000 tCO2e *for the Mission Action Plan*	
Eco driving training (driving more economically) for IBB employees (As per SEAP Action - in lieu of EV / hybrid vehicles)				128.649 tCO2e *in the existing strategy (SECAP 2020).*	
Municipal Fleet and Service Vehicles: electric and Low-carbon vehicles.				127.494 tCO2e *in the existing strategy (SECAP 2020).*	
More sustainable urban mobility: mass transit and local mobility.				1.215.689 tCO2e *in the existing strategy (SECAP 2020).*	~ € 10.24 billion
Review and update the local-level policies, planning regulations and guidelines for future and new municipality development around energy efficiency.	IMM	2023-2030		85,806 tCO2e *in the existing strategy (SECAP 2020).*	~ € 3.4 billion

Action/ intervention name	Responsible entity and person	Start/end date	Field of action	Impact	Total cost estimated
Insulation of Tertiary Buildings / Industrial Buildings	IMM & Industry & Other Public Organizations		Built Environment & Energy Systems	1,445,088 tCO2e *in the existing strategy (SECAP 2020).* 5,431,447.5 tCO2e *for the Mission Action Plan*	*includes building insulation, district heating and cooling systems & indoor and outdoor lighting.*
Energy Efficiency in Municipal Buildings	IMM			67.884 tCO2e *in the existing strategy (SECAP 2020).*	
Encourage and incentivise thermal insulating in existing residential, municipal buildings and other public buildings	IMM & Residential & Other Public Organizations			1.221.317 tCO2e *in the existing strategy (SECAP 2020).* 760,249.7 tCO2e *for the Mission Action Plan*	
Encourage and incentivize energy efficient lighting systems in existing residential, municipal buildings and other public buildings (LED etc.)	IMM & Residential & Other Public Organizations				
Encourage the fuel switch from coal to more renewable sources in residential areas (geothermal, electricity)	IMM & Residential			83,331 tCO2e *in the existing strategy (SECAP 2020).*	
Undertake a public lighting replacement scheme for all poles owned / run by municipality by installing LEDs.	IMM			122,081 tCO2e *in the existing strategy (SECAP 2020).*	
Mass role out of photovoltaic cells on municipality owned assets and land e.g. municipality buildings, road reserves, bus stops.	IMM			12,168 tCO2e *in the existing strategy (SECAP 2020).*	
Municipality to encourage the private sector to install solar panels using existing national subsidies or financial schemes.	IMM & Industry & Other Public Organizations			726,024 tCO2e *in the existing strategy (SECAP 2020).*	

Action/ intervention name	Responsible entity and person	Start/end date	Field of action	Impact	Total cost estimated
Development of a detailed analysis (number, type, size, age, etc.) and action plan for the development and low-emission management o dumpsites / landfills (both closed and operational) - Electricity generation from biogas	IMM			136,890 tCO2e *in the existing strategy (SECAP 2020).*	
Local renewable energy options study Renewable electricity installations for residential, municipal buildings and other public buildings Renewable electricity installations for industrial consumers.	IMM & Industry & Residential & Other Public Buildings			*4,724,381.8 tCO2e* *for the Mission Action Plan*	**~ € 4.8 billion**
Development of Sustainable Waste Management and Recycling Mechanisms	IMM	2023-2030	Waste and Circular Economy	*667.279 tCO2e* *in the existing strategy (SECAP 2020).*	~ **€ 0.5 billion**
Supporting low-carbon agricultural techniques and climate-friendly smart agricultural practices	IMM & Farmers		Agriculture, Forestry and Land Use	716.804 tCO2e *in the existing strategy (SECAP 2020).*	**~ € 0.4 billion**
Reduce the IPPU emissions.	IMM & Industry		Industrial Process and Product Use (IPPU)	*1.519.992* tCO2e *for the Mission Action Plan*	**~ € 0.1 billion**
			TOTAL	*7.717.485 tCO2e* *in the existing strategy (SECAP 2020).* *+ 13.936.071 tCO2e* *for the Mission Action Plan* ***= 21.653.556 tCO2e***	**~ € 20.1 billion**

7 Outlook and next steps

Plans for next CCC and Action Plan iteration

As we conclude this Action Plan within the framework of the Climate City Contract (CCC), it becomes evident that İzmir is embarking on an ambitious journey towards climate neutrality by 2030. The meticulous planning and strategic interventions outlined in the preceding sections lay a strong foundation for our efforts. However, this is just the beginning, and there is much work to be done.

Key Conclusions:

Commitment to Climate Neutrality: İzmir is resolutely committed to achieving climate neutrality by 2030. This commitment is underscored by the comprehensive assessment of our current climate actions, the exploration of various pathways, and the design of a robust climate neutrality portfolio.

Collaboration and Innovation: Our Action Plan emphasizes the importance of collaboration, innovation, and social engagement. İzmir recognizes that addressing climate change requires collective action and the nurturing of a culture of innovation.

Adaptability and Learning: Monitoring, evaluation, and learning are core elements of our plan. İzmir will remain flexible and adaptable, ready to adjust strategies and actions based on insights gained through ongoing assessment.

Next Steps:

In the pursuit of climate neutrality, the following steps will guide İzmir's actions in the immediate future:

Implementation: The practical implementation of the Climate City Contract begins. We will work diligently to put our planned actions into practice, adhering to the timelines and milestones set in the Action Plan.

Stakeholder Engagement: İzmir will intensify its efforts to engage citizens, businesses, research institutions, and civil society in the co-creation of climate solutions. We will actively seek their input and collaboration.

Monitoring and Evaluation: Robust monitoring and evaluation mechanisms will be established to track progress and ensure that our actions align with our climate neutrality objectives. These mechanisms will inform adaptive strategies as necessary.

Learning and Knowledge Sharing: İzmir is committed to actively participating in joint learning initiatives to exchange knowledge and best practices with other cities and stakeholders. We will seek opportunities to share our experiences and learn from others.

Continual Refinement: The Action Plan will be a living document, subject to refinement as we gather insights and assess our progress. İzmir remains dedicated to refining its strategies to ensure they remain effective and relevant.

Ensure the Climate Neutral Transition Benefits Every Citizen: The challenges of poverty, gender equality and accessibility for people with disabilities will be more intensely focused on to be considered and promoted during the preparation and implementation of every climate action plan to ensure equal opportunities for all, ensuring that no one is left behind.

In summary, İzmir's Climate City Contract Action Plan reflects our unwavering dedication to a sustainable and climate-neutral future. The path forward is clear, and we are ready to take the necessary steps to turn our commitments into tangible actions. As we move forward, we invite collaboration, engagement, and shared learning, confident that together, we can build a resilient and sustainable İzmir for generations to come.