Ankara Metropolitan Municipality

ANKARA GREEN CITY ACTION PLAN



Team





EBRD GREEN

TAIL Business

AMM Climate Change and AMM Climate Change Zero Waste Department

and Clean Air Directorate

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Foreword from the Mayor



Dear Citizens of Ankara,

Our Capital, which had a small population and consisted only of Ulus and its surroundings during the establishment period of our Republic, has become a developing metropolis with a population of up to six million in the last 100 years. Ankara continues its development without compromising its goal of being an example in Turkiye and for other cities around the world.

As Ankara Metropolitan Municipality, we work tirelessly to support our city to be sustainable, resilient and inclusive. We are taking steps to combat the climate crisis, which is one of the biggest threats to the future of the world we live in and which will have devastating effects on our city.

In today's world where energy resources and access to these resources are of great importance, researching and revealing Ankara's own renewable energy potential will be an important topic for a green Capital Ankara.

In 2020, our capital city became part of the European Bank for Reconstruction and Development (EBRD) Green Cities Programme which we believe will contribute to our city in line with the goal of a greener, more liveable Capital Ankara, which we want to leave to future generations. In this context, we believe that the publication of our Ankara Green City Action Plan (GCAP), which was developed with the cooperation of the European Bank for Reconstruction and Development and with support from Arup, can be a catalyst for climate action and the implementation of initiatives that support our broader environmental goals for the city of Ankara.

The Green City Action Plan is a plan to enable cities to tackle a wide range of relevant environmental challenges, typically including issues with water, air, soil and climate change. Our aim is to build a better and more sustainable future for Ankara and its citizens with our understanding of a municipality which is human-oriented, transparent, and participatory together with our stakeholders.

We believe this goal will be achieved through the identification of our capital's environmental challenges and priorities, establishing a long-term vision and combining these with investments in sustainable infrastructure and new policy measures.

Within the framework of the Ankara Green City Action Plan (GCAP), we are working on improving our rail system projects to decarbonise the transportation systems and promote public transportation. On our agenda, there are efforts to establish solar power plants in order to meet our electricity need. We will priortise smart applications that will ensure supply, distribution and control of Ankara's water. We plan to increase the capacity of our wastewater treatment plants, taking into account the efficiency in the reuse of treated water. We will continue to develop projects that follow the principles of climate change and sustainability in order to increase air quality, protect and enrich ecology and biodiversity.

While planning these projects, we are preparing comprehensive, multi-sectoral inclusive plans for vulnerable groups. The Green City Action Plan (GCAP) also supports us in moving forward with work we've already began, such as the Climate Action Plan. We highlight smart applications that will ensure the supply, distribution and control of Ankara's water. We design our wastewater treatment plants by considering the capacity increase and efficiency in the reuse of treated water. We continue to develop projects that take into account the principles of climate change and sustainability in order to increase air quality, protect and enrich ecology and biodiversity. While planning all these projects, our comprehensive, multi-sectoral and inclusive work for vulnerable groups continues. In addition, the Ankara GCAP will be the continuation and complement of our previous work, such as the Climate Action Plan, which we produced and following. We prepared the Local Climate Change Action Plan, which we announced to the public in 2021, to make our city more resilient to extreme and destructive natural events, and to determine actions to reduce the possible damage and greenhouse gas emissions of these natural events to our city. Again, at the end of 2021, we took the first steps in projects such as the Ankara Bicycle Strategy Master Plan, for more sustainable and environmentally friendly transportation, and for projects that will save time on the road. We have recently started the Sustainable Urban Mobility Plan project for accessible transportation for all.

We dream of "Ankara, a green capital city that prioritises a balanced use of natural resources and sustainable development, is sensitive to the environment and climate, is inclusive, fair, innovative, accessible, and has a high quality of life passing on to future generations".

I believe that the Ankara Green City Action Plan, which supports positive environmental action now and for the future will be beneficial for our capital and I would like to thank everyone contributed to the development of this plan.

Mansur Yavaş Mayor of Ankara Metropolitan Municipality

Executive Summary



The Green City Action Plan (GCAP), prepared under the management of Ankara Metropolitan Municipality (AMM) within the scope of the European Bank for Reconstruction and Development (EBRD) Green Cities Programme, aimed to develop actions to overcome priority environmental challenges Ankara is facing (**Figure 1**). In doing so, the GCAP will assist the City to become the **"green capital"**.



As a result of analysing the challenges within key city sectors, the baseline environmental conditions, the living conditions of the residents and their needs and expectations, the priority environmental challenges were identified as follows.

• Air quality

1

- Climate change mitigation
- Adaptation and resilience
- Water quality and efficiency
- Waste management
- Conservation of ecosystem and biodiversity
- Soil and groundwater quality

To deal with these challenges, a **vision** for Ankara was developed, which outlines a desired future for the city.

The Vision of Ankara GCAP

Green capital city Ankara,

prioritising sustainable development and a balanced use of natural resources, being sensitive to environment and climate, inclusive, fair, innovative, accessible and having a high quality of life. 28 sector-specific actions were developed in response to Ankara's environmental challenges in line with the vision and strategic objectives.

Of these 28 actions:

- 19 are investment (76%), 7 are policy (19%), and 2 are other initiatives actions (5%).
- The sectors of the 19 investment actions are air quality, energy, transportation, smart city, water and waste water, solid waste, biodiversity, land use, buildings, and soil. 7 policy actions are about risk, land use, buildings, and GESI. 2 other initiatives actions are about solid waste.

The general evaluation of the Ankara GCAP Actions, their distribution by sectors, the range of how many job opportunities created through the actions and the financial source are given in **Table 1**.

In line with the goal of Ankara to become the "green capital city", a significant number of stakeholders participated in every stage of the Ankara GCAP process. Stakeholders led the way in determining and prioritising the challenges of Ankara and the actions to address them.

Throughout the process, 25 engagement meetings, including launch events, workshops and focus group meetings, 2 surveys, 50 AMM GCAP Team and Project Team coordination meetings, and 2 AMM Steering Committee Meetings were held. A total of 750 internal and external stakeholders participated in all of these activities.

Sector	Nb of actions	Job creation potential	Total reduction of CO2 (tCO2/a)	Share in total budget (%)	Possible Financial Sources
Air Quality	1	5-12	-	0,4	International Financing Institutions, National resource, AMM
Energy	2	8-12	82,430	3	Export Credit Agencies, International financing institutions, Türkiye Bank of Provinces, Local banks and leasing companies, Financing facilities, AMM
Transportation	4	1500-2000	389,852	73	AMM, EGO, BELKA, Related Ministry, PPP Projects, Loans, Tax Benefits and Purchase Incentives, Grant Programmes
Smart City	2	40-45	-	1	International financing institutions, National resource, AMM, Private organisations, Development Agencies
Water and Wastewater	3	15-20	3,243	8	Export Credit Agencies, International financing institutions, Türkiye Bank of Provinces, Local banks and leasing companies, Financing facilities, AMM, ASKI
Solid Waste	4	25-35	14,590	0,5	European Union Funds, United Nations Development Programme, Export Credit Agencies, International financing institution, Türkiye Bank of Provinces, Türkiye Sustainable Energy Financing Facility, AMM, District Municipality, Ankara Chamber of Industry, Development Agencies
Risk	1	5-10	-	0,035	European Union Funds, United Nations Development Programme, Export Credit Agencies, International financing institutions, Türkiye Bank of Provinces, Ankara Chamber of Industry, Development Agencies
Biodiversity	1	15-20	750	0,2	International financing institutions, AMM, Municipal resource, Private organisations, Development Agencies
Land use	3	400-500	34,156	13	European Union Funds,International financing institutions, National resource, AMM, EGO, Related Ministry, PPP Projects, Loans, Private construction companies, Developers, Private organisations, Development Agencies
Buildings	2	70-100	259	0,1	International financing institutions, National resource, AMM
Soil	1	250-300	-	0,76	European Union Funds, United Nations Development Programme, International financing institutions, Türkiye Bank of Provinces, Ankara Chamber of Industry, Development Agencies
GESI	4	50-100	-	0,005	International financing institutions, EU, National resource, AMM, Private organisations
Total	28	2383-3154	525,280	100	

Table 1: Generalevaluation of actionsdeveloped in the AnkaraGreen City Action Plan



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Abbreviations and Definitions

ACCAP	Ankara Climate Change Action Plan	GCAP	Green City Action Plan
AFAD	Disaster and Emergency Management Authority	GDP	Gross Domestic Product
AMM	Ankara Metropolitan Municipality	GEFF	Green Economy Financing Facility
AOÇ	Atatürk Forest Farm	GESI	Gender Equality and Social Inclusion
ASKİ	Directorate General of Ankara Water and Sewerage Administration	GHG	Greenhouse gas
ATMP	Ankara Transportation Master Plan	GIS	Geographic information system
AYKOME	Infrastructure Coordination Centre	HKDYY	Air Quality Assessment and Management Regulation
BELMEK	Ankara Metropolitan Municipality Vocational Training Courses	HUWRIC	Hacettepe University Women's Issues Research and Implementation Center
BELTEK	Ankara Metropolitan Municipality Technical Training Courses	HPP	Hydroelectric power plant
BMS	Building Management System	IFS	International financing institutions
CAPEX	Capital expenditure	İLBANK	Ilbank Inc.
CMIP6	Coupled Model Intercomparison Project Phase 6	INDC	Intended Nationally Determined Contribution
CO	Carbon monoxide	IPA	Instrument for Pre-accession Assistance
CO ₂	Carbon dioxide	IPCC	Intergovernmental Panel for Climate Change
DoGWM	Directorate of General Water Management	loT	Internet of things
MoEUCC	Ministry of Environment, Urbanisation and Climate Change	IT	Information technologies
MoTI	Ministry of Transport and Infrastructure	ISKUR	Turkish Employment Agency
DMA	District Metered Areas	JICA	Japan International Cooperation Agency
DSI	State Hydraulic Works	KOSGEB	Small and Medium Enterprises Development Organisation of Turkey
EBRD	European Bank for Reconstruction and Development	LEZ	Low Emission Zone
ECAs	Export Credit Agencies	METU	Middle East Technical University
ECWMF	European Centre for Medium-Range Weather Forecasts	MM	Metropolitan Municipality
EGO	Ankara Electricity, Gas and Bus Operations Organisation – EGO General Directorate	MoUECC	Ministry of Urban environment and Climate Change
EPC	Energy Performance Agreements	NDC	Nationally Determined Contributions
EPDK	Energy Market Regulatory Authority	NEEAP	National Energy Efficiency Action Plan
ERP	Enterprise Resource Planning	NGO	Non-Governmental Organisation
ET	Evapotranspiration	NO	Nitrogen oxide
EU	European Union	OECD	Organisation for Economic Co-operation and Development

OIZ	Organised Industrial Zone
OPEX	Operating expenditure
Р	Pillar
POPS	Persistent Organic Pollutants
PM	Particulate Matter
RCP	Representative Concentration Pathways
RBMP	River Basin Management Plan
R&D	Research and Development
PPP	Private public partnership
SEP	Stakeholder Engagement Plan
SME	Small and medium sized enterprises
SO	Strategic object
SO ₂	Sulphur dioxide
SPP	Solar power plant
SUMP	Sustainable Urban Mobility Plan
TAR	Technical assessment report
ТВВ	The Union of Municipalities of Turkey (TBB)
TL	Turkish Liras
TOD	Transit-oriented development
ТОКІ	Housing Development Administration
TPL	Tax Procedure Law
TSMS	Turkish State Meteorological Service
ТИВІТАК	The Scientific and Technological Research Council of Turkey
TUIK TURKSTAT	Turkish Statistical Institute
UÇES	EU Integrated Environmental Approximation Strategy
UHYS	National Basin Management Strategy
UKOME	Transportation Coordination Centre
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant



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Introduction

A Green City Action Plan (GCAP) is a city-specific plan to prioritise tackling environmental challenges. The Ankara GCAP aims to present a healthier and more sustainable future for Ankara and its residents. It identifies local environmental challenges in sectors including energy, transportation, water and wastewater, solid waste, land use, buildings, biodiversity, soil, and climate change. The GCAP targets improving the city's resilience and adaptation to climate change with project proposals and policy initiatives. The context of the GCAP is framed by defining, prioritising, and linking the city's environmental challenges. Within the context of the GCAP, baseline assessments have been conducted by examining the environmental impact of several sectors. In order to improve the quality of the local environment and the resilience of the city to climate shocks, actions have been developed to lessen the effects of identified pressures and challenges, and experts have created overall cost estimates, financing options and timelines for these prioritised actions.



The GCAP plan is structured as follows:

Section 1, includes the Executive Summary

Section 2, provides the plan introduction and presents information about the context, purpose and geographical framework of the city.

Section 3, gives information on the main principles and framework for the GCAP approach. It summarizes the preparation steps of the GCAP in the order of vision, strategic objectives and action development, benefit assessment, and financial assessment within the framework of the principles derived from the methodology.

Section 4, presents the assessment on the current baseline of the city for each sector in the light of the key findings from the indicator database, the technical assessment process, and the policy framework. The priority challenges identified after the baseline assessment are then explained.

Section 5, includes descriptions of the vision, pillars, and strategic objectives of Ankara identified as a result of the baseline assessment, challenges, and stakeholder engagement activities.

Section 6, presents the GCAP actions with their explanations classified under sectors and cross-cutting themes. Then, the strategic objectives and pillars to which the actions are related, the timeline of the actions, and the benefit assessment are explained.

Section 7, outlines the monitoring and evaluation process of the GCAP actions. The monitoring and evaluation process provides a roadmap for monitoring, reporting, and validating data. The tools identified to measure the effectiveness of the GCAP process are explained by monitoring the implementation, the impact, and exemplifying the monitoring framework.

Section 8, is the Appendices in which detailed information about the topics listed below is given.

Appendix 1: Action Fact Sheets presents each action's name, sector, description, action category, priority challenge, location/proposed pilot area, under which pillar and strategic objectives it is evaluated, preparatory tasks and follow up tasks, project duration, action implementation steps with their timeline, estimated budget, financial source, benefits, beneficiaries, owner/responsible institutions and organizations, and third parties involved.

Appendix 2: The review of the Existing Plans, Programs, Legislative Measures, and Strategies.

Appendix 3: Vulnerable Groups and Current Policy Assessment presents vulnerable groups, their demographic, geographical and socio-economic aspects, and current policy assessment specific to Ankara.

Appendix 4: Regulatory Perspective presents legislative assessment related to the financing of actions.

Appendix 5: Internal and External Stakeholder Engagement includes activities undertaken in the context of the Ankara GCAP.



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In terms of geographical and spatial structure, Ankara is the capital city of Türkiye, located in the geographical centre of the country. The city has a surface area of 24,521 km². Its population has increased from 3,889,199 in 2000 and 4,771,716 in 2010, to 5,747,325 in 2021. The city population is predicted to be 6,260,000 by 2025¹. A continental climate is dominant in the inner parts of Ankara, where the summer months are hot and dry and winters are cold and rainy. However, the temperate and rainy characteristic of the Black Sea climate is observed in the northern parts. Therefore, the amount of precipitation differs between the northern and southern parts of Ankara.²

The first settlements of Ankara, which were established on a plateau and surrounded by mountains, were limited by the bowl-shaped topography. Population growth and rapid urbanisation in Ankara have led to an increase in the built environment and growth of the city on the outskirts. However, the city has spread along various corridors over the years. Ankara is surrounded by three river basins, which are the Sakarya, Kızılırmak and Konya Closed Basins. **Figure 2** shows Ankara Metropolitan Municipality Area and its 25 Districts.



The GCAP is a plan that identifies challenges and sets out strategic objectives and actions, presented by sector The GCAP provides a comprehensive framework or pathway for Ankara to become a green city. In developing the plan a review of rules and arrangements, plans, programmes and strategies in Ankara was undertaken. All of this supporting evidence was classified based on its relationship with the Ankara GCAP sectors and according to the responsible institutional bodies. See *Table 36 in Appendix 2*.

Figure 2: Metropolitan Area and 25 Districts of Ankara

1 TÜİK. (2022). Population of provinces by years. Retrieved from: https://data.tuik.gov.tr/ Bulten/ Index?p=45500#.~: text=%C4 %B0stanbul'un %20 n%C3%BCfusu %2C%20bir%20%C3 %B6nceki,832%20ki %C5%9Fi%20ile e%20Antalya%20izledi

 2 T.R. Culture and Tourism Ministry. (2022). Ankara history and other info. https://ankara.ktb.gov.tr/ TR-152389/ankara-tarihoe-ve-digerbilgiler.html





The Green City Action Plan Creation Approach

This section consists of the main components and development phases of the Ankara GCAP's approach including the preparation steps of the plan, the vision development, pillars and strategic objectives, and the actions. A brief explanation for the benefits and financial assessment of the actions of the Ankara GCAP is also given and the stakeholder engagement framework is summarised.



3.1 Preparation Steps of the Ankara GCAP

The Ankara GCAP started with the inception phase, followed with the city baseline assessment, and ends up with the final GCAP document with a detailed analysis of the actions. The Ankara GCAP development process comprises six main stages:

- 1. Inception and mobilisation
- 2. City baseline assessment of Ankara
- 3. Prioritisation of the environmental challenges
- **4**. Setting the City vision and strategic objectives
- 5. Development of the GCAP actions (28 actions in total)
- 6. Preparation of the final GCAP document

These stages can be accepted as a filtering process for the data collection on the Ankara's current situation so that a list of actions was ultimately obtained for each sector with all the necessary details.

3.2 Vision, Pillars, Strategic Objectives and Actions

Vision and Pillars

The overall GCAP vision of Ankara, reflects the city's ambition to consider indicator-based sectors and crosscut issues such as risk and vulnerabilities, gender equality and social inclusion (GESI) in the context of the smart city. The primary basis of Ankara GCAP's vision is improvement and protection of the environment, as well as the consideration of vulnerable groups, and of the city's resilience. In line with this vision, four distinctive pillars have been defined. The pillars under Ankara GCAP vision are as follows: environmental protection, decarbonisation, resource efficiency and circular economy, and resilience. These are subcomponents of items processed in the vision statement. The pillars were formed as umbrella themes for the strategic objectives.

Strategic Objectives

The strategic objectives, which make up the scope of the pillars, were established to serve the vision to become a green city and overcome the environmental challenges of Ankara. The aims of the strategic objectives are to draw different paths to ultimately fulfil the pillars of the Ankara GCAP vision. Subcomponents of each strategic objective are explained in *Section 5.2 Pillars and Strategic Objectives*.

Actions

Actions of Ankara GCAP have been identified for achieving the strategic objectives and their subcomponents. These have been developed in the form of key steps. A comprehensive, incremental, and inclusive approach is being used to define the actions and review them regarding the environmental, social, and economic impacts. The Ankara Green City actions are categorised as follows:

- Investment: actions related to capital expenditures to urban infrastructure (19 actions)
- *Policy:* actions regarding legislation, policy-making issues, or standard-setting measures (7 actions)
- Other initiatives: partnerships, campaigns, awareness-raising activities, and other efforts to enable strategic objectives (2 actions).

3.3 Selecting and Developing Actions

Identifying the actions for the Ankara GCAP consisted of a series of background processes starting with the baseline assessment, reviewing the current environmental challenges and needs of Ankara, defining the strategic objectives and engaging with the stakeholders at every step.

- **Technical assessment of indicators:** The state, pressure, and response indicators were graded using a traffic light system illustrating how indicators have trended since 2010 in Ankara and indicating whether their conditions of the related indicator were improving or worsening. The findings of this technical assessment have been utilised to shape the actions of the Ankara GCAP, to address the city's major challenges and priorities.
- **Technical approach and analysis of Experts:** Sector experts of the Ankara GCAP played a key role in the technical assessment, prioritisation of challenges, vision definition, and defining objectives. They also gave key input in developing actions considering scientific facts and standards, and the current needs of Ankara.
- **Stakeholder engagement process:** From the beginning of the project, internal and external stakeholders were consulted to understand the main challenges, priorities and needs of Ankara. At each stage of the GCAP's preparation, the verification and definition of problems expressed by internal and external stakeholders were prioritized.

3.4 Benefit Assessment

The actions put forward in the Ankara GCAP have the potential to contribute to a range of primary benefits and co-benefits for Ankara.

- **Primary benefits as green benefits** are comprised of; reduced emissions, improved energy efficiency, improved climate resilience, increased green and recreational areas, improved air, water and soil quality, reduced pollution, improved and maintained ecosystem services.
- **Co-benefits** fall into three categories: benefits to resilience, economic benefits, and social benefits. These are explained in further detail below:
 - o Resilience benefits: improved public health, the accessibility of sustainable food and energy, improved access to educational services, supply chain security, access to sustainable housing and water services, and prevention and mitigation of natural disaster impacts and future pandemics.
 - o Economic benefits: increased local business opportunities, revenue generation, and cost savings.
 - o Social benefits: enhanced gender equality, improved social equality, reduced poverty, improved, community engagement, improved safety (e.g., road safety, GBVH, crime, etc), training/ educational opportunities for women, elderly, the youth and minorities, barrier free access / improved access to services, addresses the vulnerable population and the Gender Equality and Social Inclusion aspects of the actions are detailed.

These benefits and the contribution of the Ankara GCAP's actions are described in the section "6.2.4 Benefit Assessment of Actions" and Appendix 1 Action Fact Sheets.

3.5 Stakeholder Engagement Framework

Stakeholder engagement was carried out at each stage in the development of the Ankara GCAP process. From the beginning of the project, stakeholder engagement has not only aimed to obtain opinions, evaluations, and insights from the stakeholders, but also inform them about the process and increase their awareness on issues related to the GCAP. To ensure this, workshops, focus group meetings, one to one discussions and surveys were carried out through whole process.

The stakeholders of the Ankara GCAP were structured into two groups; Internal and External stakeholders. Internal stakeholders consist of Ankara Metropolitan Municipality internal units, AMM associated administrations and AMM affiliates. External stakeholders include district governorates, public institutions and organizations, metropolitan district municipalities, ministries, academia and universities, international organizations, citizens' assemblies, non-governmental organizations (NGOs) and the private sector.

Three initial meetings were held during the inception phase of the project. The information meeting was the first one where high level executives of the Municipality were informed about the project. The purpose of the kick-off meeting was to introduce the project teams and present the project plan, schedule, stakeholder engagement, best practices of GCAPs. The aim of the Launch Event, hosted by the Mayor, was to announce the Ankara GCAP to all of the internal stakeholders and to inform them about the process.

Four significant stakeholder engagement activities provide direct input to the key stages in the development of the Ankara GCAP. The first internal and external stakeholder workshop was organised in the beginning of the City baseline assessment phase, where the environmental state and challenges were identified together with stakeholders. Following this, the second internal and external stakeholder engagement was designed as workshop series with the aim of prioritising the challenges that emerged as a result of the previous workshop. In the phase of determining the vision and strategic objectives of Ankara GCAP, ideas were developed together with the internal and external stakeholders and their contributions were received through a survey. The final engagement was carried out in two steps such as focus group meetings held with internal stakeholders and a survey circulated to internal and external stakeholders. The aim of these activities as a part of Ankara GCAP action development process was to generate sector-specific actions to overcome environmental challenges. The stakeholder engagement activities were a foundational pillar to support decision making in respect of the Ankara GCAP.

The framework is presented in **Figure 3**, and the details are given in the *Appendix 5 Internal and External Stakeholder Activities*.

Figure 3: Details of the initial meetings and stakeholder engagement activities





4th Internal and External Stakeholder Engagement Focus Group Meetings

70 internal stakeholders (17 online focus group meetings) 56% male, 43% female, 1% not responded)







City Baseline

In this section, the baseline assessment of the city is made through socio-economic, political assessment and the current environmental situation in detail. The environmental challenges and sectoral challenges that put pressure on the environment are emphasized and the process of prioritisation is given.



4.1 Socioeconomic and Policy Baseline

National attempts in Türkiye and local initiatives specific to Ankara are contributing to the creation of a baseline for Ankara to become a green city. At the COP27 Organization held in Egypt on 6-18 November 2022, Türkiye announced the Nationally Determined Contribution (NDC) target for 2030.³ In the city context, the baseline for the planning and implementation of GCAP actions has already been laid. Ankara Climate Change Action Plan (2019), which evaluates the impacts of climate change, was prepared by AMM, and the Clean Air Action Plan (2020-2024) was developed by MoEUCC. Thus, certain energy efficiency and green city targets for Ankara have already been defined.

AMM intends a 55% reduction of carbon emissions by 2030 compared to 1990 levels. According to the Presidential Circular dated 15/08/2019 and numbered 2019/18, 15% energy savings should be achieved in large buildings belonging to AMM and affiliates by the end of 2023. Along with the emission reduction targets of Ankara Climate Change Action Plan, aiming towards more sustainable and environmentally friendly transportation with the Ankara Bicycle Strategy and Masterplan, AMM has started working to prepare the Ankara Sustainable Urban Mobility Plan (SUMP) as of the end of 2022. This comprehensive transport plan is expected to include an Activity Based Transport Model and create sustainable mobility policies.

The Ankara Clean Air Action Plan defines certain actions related to the path towards being a green city, which are;

- Promote and expand construction of thermal insulation in accordance with the standards for energy saving in buildings until the end of 2024.
- Ensure that all kinds of solid fuel are delivered by authorised producers/importers/distributors and sold by authorised companies.
- Training on air quality improvement in terms of solid-fuel usage through pilot schools in neighbourhoods.
- Discourage the use of coal or any other fossil fuel other than natural gas for heating purposes in all workplaces and buildings where there is a natural gas installation.
- Ensure that aid is given as natural gas instead of solid fuels when distributed as social aid.
- Increase urban forests throughout the province and determine suitable areas close to settlements with a dense population during the building of urban forests.

Taking this into account, Ankara's socio-economic and political background is at the right point to prepare and implement a Green City Action Plan as a complementary action-oriented plan to achieve energy efficiency and carbon neutrality targets. All stages of the GCAP have been prepared in a way to cover all socio-economic and vulnerable groups.

4.1.1 Local Governance

The Republic of Türkiye is a unitary and constitutional republic. The legislative power is vested in the Grand National Assembly of Türkiye. The executive power and functions are exercised and carried out by the President in conformity with the constitution and laws. Regarding central government structure, Türkiye is divided into provinces by geography, economic conditions and public service requirements; provinces are further divided into lower levels of administrative units (districts, neighbourhoods). The local governments are public corporate bodies established to meet the common and local needs of the inhabitants of the provinces, municipal districts and villages. The administrative organisation structure of Türkiye in detail is presented in **Figure 4**.


Provincial Pri vate

Administr ations

Municipalitie s

Villages

Economic Instituties

Organisations with Public

Status Regulat ory and Supervisory Authoritie s

Science Art Culture

Social Intituties

Professional

Organisations

Administr ative

Organisations

Regional Organisations



Ankara Metropolitan Municipality is a public legal entity that has administrative and financial autonomy with a two-tier governance and planning system. AMM coordinates the functioning of 25 District Municipality, fulfils its statutory duties, performs the responsibilities of and exercises their statutory powers, and has a decision-making body which is elected by voters. The metropolitan municipality is made up of the metropolitan mayor, the metropolitan council and the metropolitan administrative board. The administrative structure and responsibilities of Metropolitan Municipalities are clearly defined in the Metropolitan Municipality Law No. 5216. Among the responsibilities of AMM, the items related to the themes evaluated in the Ankara GCAP are as follows:

- · Preparing the strategic plan, annual goals, investment programs and accordingly the budget
- Drawing up and licensing development plans and all land development implementation in connection with the design, construction, maintenance and repair of works
- Drawing up, or causing to draw up and be implemented the metropolitan transport masterplan, planning and coordinating transport and public transport services
- · Setting up geographic and urban information systems

Citv

Area

District s

- Constructing squares, boulevards, avenues and main roads, to have them built, to maintain and repair them
- Issue permits to and inspecting grade one polluting businesses, including foodstuff enterprises. Establishing and operating laboratories to test foodstuffs and beverages

District municipalities⁴, as sub-administrative authorities of Ankara, are responsible for issuing regulations, imposing and implementing municipal bans, imposing penalties; construction, maintenance and repair of health, educational, and cultural facilities and buildings; parking; sports, recreation and entertainment places and parks; providing potable, domestic and industrial water; ensuring the removal of wastewater and rainwater; establishing a public transportation system including buses, tunnels and rail systems; determining time and ticket schedules and routes; determining and operating the stops and parking lots, and carrying out the works required by traffic regulations.

4.1.2 Demographic Context

According to the Turkish Statistical Institute data, Ankara's population was 5,663,322 in 2020, which corresponds to 6.8% of the entire country population⁵. Among Ankara's districts, Keçiören (938,568) and Çankaya (925,828) have the largest population, both of which are within the top three in Türkiye.

4 District municipalities are subject to the Municipal Law No. 5393 published in the Official Gazette dated 03.07.2005 No. 25874.

President

Ministries

Vice-president

Supporting Institutio n

Council of Stat e

Council

Court of Account s

Economic and Social

Subsidiarie s

The total population aged 0-4 is 6.6%, the total population aged 5-19 is 21%, the total population aged 20-34 is 24.6%, the total population aged 35-49 is 29.5%, the total population aged 50-64 is 10.7% and the total population aged 65 and above is 7.6%. The proportion of the total population aged 25-64 years and actively working in Ankara is above the average of Türkiye⁶. The population growth rate is 0.43% annually, with a population of 6,260,000 estimated in 2025, presented in the **Figure 5**⁷.



Keçiören District has the highest population density in Ankara with 5,902.9 person/km2. It is followed by Altındağ (3,220.9), Yenimahalle (3,175.3) and Etimesgut (2,180.6) Districts, while Çamlıdere (11.4) and Kalecik Districts (11.7) have the lowest population density. **Figure 6** shows the spatial density distribution in Ankara. The average rate of household size in Ankara is 3.12⁹.



Figure 6: Population density distribution (person/km²)¹⁰

5 TURKSTAT 2020, Provincial Populations by Years

6 TURKSTAT 2020, Population Distribution by Age Group and Gender

7 TURKSTAT 2018, Population Projections, 2018-2020

8 TURKSTAT 2020, Population Projections, 2018-2020

9 Average household size by province, 2008-2020

10 TURKSTAT 2020, Provincial/ District Center, Town/Village Population and Annual Population Growth Rate by Province and District; Ministry of National Defense General Directorate of Map Provincial and District Areas The parts of the population with a low ability to adapt to the dangers posed by climate change are groups who are considered both economically and socially vulnerable.¹¹ These groups are women, children between ages 0-4, adults above age 65, people with disabilities, migrants and refugees, crowded households, individuals with low levels of education, the long-term unemployed, low-income groups, and the homeless. Vulnerable groups, their demographic, geographical and socio-Economic Aspects, and current policy assessment are presented in the *Appendix 3 Vulnerable Groups and Current Policy Assessment*.

Vulnerable groups are located in Ankara's north and northeast, as well as in the city's historical, old settlements. These communities have lower levels of educational attainment and lower participation in employment in the labour markets. Some of these communities live in the peripheries of the city of Ankara, often on vacant land, where urban renewal projects are undergoing, while the rest live closer to the centre of northern districts¹². The low-income groups living in the peripheries of Ankara are less mobile compared to high income groups. They are also less resilient to economic and climatic events that limit their access to basic urban services such as water and wastewater services. In Sincan, Pursaklar, Altındağ, Gölbaşı and Mamak Districts where the income level is low, transport expenditures are low, and these districts are among the districts that receive water bill aids. Though the scale of energy poverty is not known, Mamak, Hıdırlıktepe, Dikmen and Northern Ankara, where non-insulation and coal/wood heating are highly common, are districts where low-income groups, which include rural and urban people in poverty, and women-headed households, are vulnerable to energy poverty.

There is severe lack of updated data on women's vulnerability in Ankara in the face of climate adaptation and mitigation risks. For example, in transportation sector, women's mobility patterns in the city are not effectively and adequately considered, which negatively affects accessibility and affordability.

Women are less mobile compared to men in the city. On the other hand, women's low representation in urban transportation, water and wastewater, solid waste and energy sector is a significant obstacle for climate adaptation and resilience. To briefly illustrate a selective set of figures in the transportation sector, men fill STEM (Science, Technology, Engineering, Mathematics) jobs, along with the bus and metro driver jobs. Based on the EGO data, 85% of the EGO staff is male. In the water and wastewater sectors, 85% of the ASKI staff is male, while women are employed in 15% of the positions. In the energy sector, there is precarious employment of women with engineering degrees in non-technical jobs in the sector, where high technical skills are important.

Disadvantaged groups generally live in the northern and northeastern parts of Ankara, as well as in historical and old settlements throughout the city. Youth unemployment rate (15-24 age) of the city is 30.2%¹³, and young women are more at risk for unemployment. In the case for urban adaptation sectors, generally young people, particularly young women, living in the peripheries of Ankara are target groups for upskilling labor policies.

In terms of settlement geography, low-income people living in squatter housing with limited access to large-scale green areas are the most vulnerable to climate change. When the flood disasters between 2018-2020 were examined, Mamak was found to be the most exposed district to flooding events. Çankaya follows Mamak in this respect given the burden on water infrastructure from high urbanisation as seen in **Figure 7**.

11 These groups are; women, children aged 0-4, adults aged 65 and over, disabled, immigrants and refugees, crowded households, individuals with low education levels, long-term unemployed, low-income groups and homeless.

12 Ataç, Ela. 2016. A Divided Capital: Residential Segregation in Ankara. Metu Journal of the Faculty of Architecture 33 (1): 187-205

13 TURKSTAT 2020, Labour Statistics Figure 7: Cases of floods happened between the years 2018-2020¹⁴



As of 2019, Ankara's car ownership is 264 cars per 1,000 inhabitants, the highest car vehicle ownership rate in Türkiye. the average for Türkiye is 142 per 1,000, and within Istanbul is 186 per 1,000¹⁵. Given the high vehicle ownership in Ankara, traffic and environmental pollution are among the city's major problems.

4.1.3 Economic Context

In 2020, Türkiye's Gross Domestic Product (GDP) was calculated at \$716 billion; compared to \$761 billion in 2019.¹⁶ This amounts to a 5.9% decrease from 2019 to 2020. In the same period, GDP per capita decreased from \$9,213 to \$8,597, approximately a 6.7% decrease. The country has achieved a 1.8% growth rate in 2020.¹⁷ In terms of sectoral activity in Türkiye, the industry sector holds the highest share of the total GDP, accounting for 19.1%. This is followed by the trade sector with 12.4%, transportation & logistics with 7.9%. and the agriculture sector with 6.7%. As of September 2021, the export to import ratio is 82.1%¹⁸. As in other economies, the pandemic has had a significant negative influence on the country's economy, with the service sector most negatively impacted. In this period Türkiye has provided 9.5% of GDP in support, in the form of equity, loans and other supports in the country. For local context, information about economic growth, the labour force, and major industry for Ankara is given in the following sections.

4.1.3.1 Economic Growth

With a GDP of \$69.7 billion, Ankara is the second-largest economy in Türkiye. It contributed 0.59% to Türk'ye's GDP growth (1.79%) between 2020 and 2021, the highest percentage amongst all of the provinces in Türkiye.¹⁶ 40% of all the information and communication companies in Türkiye are based in Ankara, constituting 55% of the sectors employment running 40% of all technology and communication projects.

14 Ankara Climate Action Plan 15 Urban Mobility Report 2020, UITP & UCLG MEWA

16 TURKSTAT News Bulletin - Gross Domestic Product by Province-2019

17 Central Bank of Türkiye October 2021 presentation

18 TURKSTAT International Trade Statistics, September 2021 The economy of Ankara relies almost equally on three main sectors: the public sector, education, health and social services (17.8% of GDP), the service and commerce sector (18.3% of GDP), and the industrial sector (17.7% of GDP)¹⁹. According to 2019 figures, the GDP per capita in Ankara was \$12,508, which is 35.8% above the national average. As of 2020, the annual average equivalent household disposable income was calculated as 41,567 Turkish Lira, which is 24.3% above the national average income. The poverty rate in Ankara is 9.9%, which is well below the national average of 15%. While the poverty line in the province increased from 10,011 TL to 11,743 TL between 2019-2020, the number of individuals living in poverty increased from 529,000 to 549,000.²⁰

4.1.3.2 Labour force

The labour force of Ankara consists of 2,182,000 people, of which 712,000 are women. There are 1,763,000 economically inactive people in Ankara, which comprises 31% of the total population. This is due to factors such as inability to find and gain employment, working seasonally, care and domestic duties, continuing education and training, retirement, and inability to work. In Ankara, the service and commerce sector have the largest share of total employment at 75.3%, followed by the industry sector at 21.2%. Labour participation in the agriculture sector is at 3.4%¹⁹. 61% of the population of Ankara work in micro and small enterprises which are those with less than 50 employees. 16% of the population (more than 350,000 people) work at state institutions.

Ankara's household incomes are 24.3% higher than the country's average income. The employment rate of women is lower (28.7%) compared to men (65.6%). Due to the traditional division of labour and the perception of female and male roles in the household, the demands of care are often seen as the responsibility of women. Women in employment in Ankara have differing education levels. 59.7% holding a university or higher degree, 23.4% have holding a secondary school education, 15.1% having a primary school education and 7.8% that are unable to read or write are actively working. In terms of men in employment in Ankara, 78.5% holding a university or higher degree, 63.5% finished education with a secondary school degree, 68.1% having a primary school education, and 30.8% that are unable to read or write are actively working. Women who are illiterate or have primary or secondary school degrees have a very low employment rate. In contrast, the employment rate for men without a secondary school degree remains high. As women's education levels go up, the employment rate for women increases.²⁰

In terms of people with disabilities in employment, there is a regulation which imposes a 4% minimum hiring quota for public institutions and a 3% minimum hiring quota for private enterprises. Although public institutions comply with the quota, the unemployment rate amongst the disabled population remains at 78% according to the Confederation of People with Disabilities.

4.1.3.3 Major industries

Industry developments in Ankara are often inspired by the public sector. The defence industry makes up a large share of the province's economy, with several companies in this area such as MKE, TUSAŞ, TAI, ASELSAN, ROKETSAN, and HAVELSAN. The demand from this sector has supported the development of the machine and metal industry. 40% of industrial companies operate in machine and metal equipment production. Furniture production is the single largest industrial sector, comprising 23% of the sector. There are 11,700 industrial companies and 13 organised industrial zones (OIZ) in Ankara, one of which specialises in livestock. 69% of the industrial companies are micro, 24% small, 6% medium, and 1% are large-scale enterprises. Overall, 241,305 people work in the industrial sector in Ankara²¹

In industrial sector employment, 16.2% work in metal production, 11.5% work in machine and equipment, and 8.5% work in the food industry. Medium-high technology accounts for 55.5% of industrial sector exports.²² **Figure 8** shows the breakdown of industrial enterprises by sector.

19 Turkstat Gross domestic product by province, by economic activity branches (A10), at current prices, 2018-2020

22 Ministry of Industry and technology Ankara Situation 2019 report

²⁰ TURKSTAT 2020, statistics of Labor force, statistics of poverty

²¹ Industry registry data October 2021

Figure 8: Breakdown of Industrial Enterprises by sectors



In 2019, the number of brands/patents, and design applications reached 9,386,985 and 2,926. This constitutes 7.9%, 12.1% and 7.5% of total applications in Türkiye.²³

In 2020, 11,028 new enterprises were established in Ankara. Wholesale and retail trade companies make up the highest share of newly established enterprises, followed by construction (17.9%), industry (16.1%), information and communication (3.5%) and accommodation and food service (2.5%). In 2020, 2,780 enterprises ended their operations.²⁴

4.1.3.4 Municipal Financial Sources

According to the Gross Domestic Product (GDP) statistics by provinces for 2020; Ankara gained a share of 9.6% from the total GDP with 482.59 billion TL. The 2021 AMM budget was approved as 7.7 billion TL, of which, 6.97 billion TL was projected as income and the remaining TL 730 million will be borrowed.²⁵ The consolidated budget of the municipality with the two general directorates EGO and ASKI (Directorate General of Ankara Water and Sewerage Administration) was approved at TL 13.34 billion.

The "Ankara public investment budget" for 2021 was announced as TL 15.5 billion for new and on-going investments²⁶ of which TL 1.9 billion will be financed through external loans. In the Official Gazette dated February 12, 2020, the "Ankara Public Investment Budget" for 2020 was announced as 6.4 billion TL.

The use of financial instruments and access to finance is higher than the national average in Ankara. In terms of the financial situation, Ankara ranks second after Istanbul with respect to individual deposits. As of December 31, 2020, with TL 472 billion, the province's deposit accounts constitute 14.3% of the total banking sector deposits. Total loans disbursed in Ankara correspond to 12.3% of total banking loans with a total amount of TL 424 billion.²⁷ As of December 6, 2021, Fitch has categorised the national long-term rating as AAA. In 2020, the budget surplus for AMM reached €417 million (EUR 486 million including depreciation). The economic performance of the city had a positive impact on the credit rating and borrowing capacity of the municipality.

23 Ministry of Industry and Technology Ankara Status 2019 report

24 Ankara Chamber of Commerce October 2021 statistics

> 25 https://www.ankara.bel.tr/ meclis-kararlari

26 Official Gazette dated February 127 Turkish Banks Association 2020 statistical figures

28 Ministry of Industry and technology Ankara Situation 2019 report In 2019, fixed investments amounting to TL 9.9 billion were made in Ankara within national incentive programmes. Of these investments, 46% were made in the industry sector followed by service (40%), mining (10%) and energy (4%)²⁸.

4.1.3.5 Municipal Financial Summary

AMM's financial analysis summary was completed for the period 2017-2020. The income-expenditure balance increased from EUR 244 million to EUR 417 million between 2017 and 2020, largely due to the decrease in expenditures. As presented in **Figure 9**, the rate of increase in revenue from 2017 to 2020 was calculated at 36%, with a significant increase of 22% between 2019 and 2020.



Figure 9: AMM Municipal Financial Summary

4.1.4 Sector-based Policy Framework

This section summarises past, current, and proposed future plans, policies, studies and initiatives to promote sustainable urban development and support urban resilience in the City of Ankara. In 2015, Türkiye declared its Intended National Contribution Document (INDC) study with a target to reduce Green House Gas (GHG) emissions by 21% relative to the business-as-usual scenario by 2030. **Figure 10** shows the targets by years to achieve the 21% decrease through mitigation scenario.





29 https://yesilgazete.org/ turkiyenin-iklim-hedefi-ne-olmali-2resmi-indcnin-degerlendirilmesi/ During the COP27 Organization held in Egypt on 6-18th November 2022, Türkiye announced the new National Declaration of Contribution (NDC) target for 2030 as a 41% reduction from the Business-as-Usual scenario³⁰.

The Turkish Ministry of Trade issued Türkiye's Green Deal Action Plan in July 2021. The Action Plan includes 32 targets and 81 actions related to carbon at the border regulations, green and circular economy, green finance, clean, affordable, and secure energy supply, sustainable agriculture, sustainable smart transport, climate change combating, diplomacy and European Green Goals reconciliation information and awareness activities. Enabling green investment through green finance, use of a cleaner energy supply model, establishment of internationally competitive, sustainable, efficient and technological farming policy, sustainable and intelligent transportation systems, and harmonization with the EU's environmental regulations are some of the main actions mentioned in the plan.

Some of the outputs are:

- Carbon at the Border Harmonization of standards and certification activities within the scope of the EU's border carbon regulation
- Green and Circular Economy Preparation of needs and impact analysis reports on the basis of priority sectors
- Green Finance- Preparation of draft legislation for the development of the ecosystem that will enable the development of green finance in Türkiye
- Clean and Reliable Energy Supply Installing 1 GW capacity each year until 2027 for new solar and wind power plant development
- Sustainable and Smart Transport Determining the requirements and standards needed in the installation, equipment, and operation of Electric Vehicle charging stations
- · Combating with Climate Change- Türkiye Climate Change Mitigation Report preparation

4.2 Baseline Assessment

Animportant step in the environmental assessment of Ankara's current situation is the technical assessment. The aim was to analyse the baseline using the indicators stated in the EBRD's GCAP Methodology. This gave a chance to evaluate Ankara's key issues and challenges in an efficient and evidence-based way and formed the basis for a roadmap.

From the data collection process, analysis and research that was carried out within the scope of the assessment of Indicator Database, the data was successfully obtained over the total 134 benchmarked indicators. As a result of the analysis and research carried out on the collected data, the values of 93% of the relevant indicators were calculated.

According to the GCAP Methodology, the indicators consist of; state indicators which present the current state of the environment, pressure indicators that cause pressure on the environment, and response indicators which are developed by the plans and policies of institutions which are aimed to overcome given challenges. As a result of the technical analysis performed over indicators, a database was created for Ankara, environmental challenges were identified and prioritised. The development of the indicator database is summarised in **Figure 11**.

30 https://iklim.gov.tr/turkiyeulusal-katki-beyani-ni-cop27-deacikladi-haber-84)





During the process of developing the indicator database, data related to the environmental and urban systems of Ankara was collected. Indicators have been analysed with consideration to predefined criteria using the traffic light system. Data has been obtained through primary sources which were provided by the data holder, and secondary sources such as institutional reports. Where needed, in line with the methodology, assessments and estimates have been made, in order to fill in gaps in the dataset.

Some of the issues examined during the process were:

- · Institutions and organizations contacted during the data collection process
- Data assessment
- · The criteria defined for the data quality assessment and results
- · Using the traffic light system to assess the indicators and results

Detailed analysis of the environmental state indicators was carried out in areas of air quality, water, soil, green spaces, biodiversity and ecosystem, mitigation, and adaptation. In addition, the indicators of urban sectors which put pressure on the environment were analysed through the lenses of transport, energy, land use, buildings, industry, wastewater, and solid waste. Initially, the current baseline assessment was made under each sector. The general context which relates to each given indicator, data context, and key finding were then examined and lastly the sectoral experts analysed the challenges and priorities related to the indicators.

Figure 12 shows the relationships between urban sectors putting pressure on the environment, and which sector is related with which environmental challenge within the framework of the GCAP.





In the following sections, the summary of the current situation is presented, along with the findings of the technical assessment under the state and pressure indicators. For each indicator, a "traffic light" system consisting of green, yellow and red is used for giving the evaluations. The criteria for evaluation and the distribution of the indicators are presented in **Figure 13**.



Figure 13: Traffic light system evaluation criteria and distribution of indicators

4.2.1 State Indicators

Air Quality

During the technical assessment process, Ankara's air quality was examined. The indicators and results of the current situation are listed in **Table 2**.

Indicator	Value	Year	Status
Average annual concentration of $PM_{_{2.5}}$	21.57 µg/m³	2021	>20 10-20 <10
Average annual concentration of PM_{10}	53.66 µg/m³	2021	>50 20-50 <20
Average annual concentration of SO2	7.21 µg/m³	2021	> 50 20-50 <20
Average annual concentration of NOx	88.80 µg/m³	2021	>80 40-80 <40

18 air quality monitoring stations in Ankara are currently active in the National Air Quality Monitoring Network, operated by the Ministry of Environment, Urbanisation and Climate Change. In air quality measurement stations meteorological data is under constant monitoring, alongside pollutants such as: Particulate Matter (PM10, PM2,5), Sulfur Dioxide (SO₂), Nitrogen Oxides (NO, NO₂, NO_x), Carbon Monoxide (CO) and Ozone (O₃). The largest share of emissions of air pollutants in Ankara is from the transport sector. Traffic emissions are the significant source of air pollution, which results from the use of a large number of old and diesel vehicles. Industry is another severe source of pollutants. The other main sources of air pollution are fossil fuel dominated domestic heating and energy generation.

Traffic-related air pollution causes an increased risk of death, particularly from cardiopulmonary issues. Due to exposure to PM-derived magnetite nanoparticles in the air; the risk of neurodegenerative diseases such as Alzheimer increases, and there is an increase seen in non-allergic respiratory symptoms and diseases. The limited use of renewable energy in the city, the limited applications of 'zero emission zones' in city plans, and the limited budget for the renewal of old public transport vehicles, are the main challenges.

Water Bodies

During the technical assessment process, Ankara's water bodies were examined through certain indicators. The results of the current situation are listed in **Table 3**.

Indicator	Value	Year	Status
Biochemical Oxygen Demand (BOD) in rivers and lakes	5.00 mg/L	2021	>4 2-4 <2
Ammonium (NH4) concentration in rivers and lakes	12.00 µg/L	2021	>200 150-200 <150
Bathing waters meeting minimum standards	-	-	< 70 70-95 >95

Table 3:Evaluation of the waterbodies through indicators

Here, the main investigation has been on the quality of bodies of surface water in the city, specifically the concentration of biochemical oxygen demand, ammonium (NH4) concentration and the bathing water standards of the rivers and lakes. The concentration of biochemical oxygen demand has been above the acceptable limit of 4 mg/l for the last two years. The quality and quantity of water bodies will be determined by monitoring River Basin Management Plans (RBMPs), which have been prepared accordingly.

Table 2:Evaluation of the airquality through indicators

Drinking Water/Water Use

During the technical assessment process, Ankara's drinking water and water use were examined through certain indicators. The results of the current situation are listed in **Table 4**.

Table 4: Evaluation of the drinking water/water use through indicators

Indicator	Value	Year	Status
Water samples complying with the national potable water quality standards	% 82.6	2021	<90 97-90 >97
Water Exploitation Index	% 6.07	2020	>40 20-40 < 20

The quality of the drinking water supply in Ankara is subject to control and monitoring for public health and safety. The "Regulation on Water Intended for Human Consumption" is used in the evaluation of the quality of tap water. According to this regulation, the number of inspections and controls to be carried out is calculated corresponding to the daily consumption of water.

Ankara's drinking water system requires strict regulatory compliance. As shown by the tap water analysis, the drinking water system is low performing and requires attention. Considering that all samples taken from the ASKİ İvedik Drinking Water Treatment Plant are at an acceptable standard, it is likely that the unacceptable tap water samples are as such because of issues within the drinking water system and network. In addition, the change in pressure that occurs during water cuts can cause quality incompatibility (mixing poor and high quality water) within the system. Although the water use index has performed at a good standard in 3 separate years, the monitoring of the levels of water supply taken from renewable fresh water sources is still important.

Soil

During the technical assessment process, the status of soil in Ankara was examined against certain indicators. The results of the current situation are listed in **Table 5**.

Indicator	Value	Year	Status
Contaminated sites	1 field	2020	>20 10-20 <10
Concentration of mercury in the soil	-	-	>10 0.3-10 <0.3
Concentration of cadmium in the soil	0.7 mg/kg	2019	>12 0.8-12 <0.8
Concentration of zinc in the soil	69.37 mg/kg	2019	> 720 140-720 <140
Concentration of mineral oil in the soil (using infrared spectroscopy)	-	-	>5000 50-5000 <50

There is not any detailed information available for the type, size and ownership of contaminated sites in Ankara. It is estimated that soil contamination might have been caused by industrial sources in some individual locations, but this does not characterise the overall soil of Ankara. In the literature search, no information was found on the concentration of mercury and cadmium in the soil. Landowners are responsible for taking necessary precautions, determining the extent of pollution, eliminating the effects of pollution, and meeting the costs of remediation. The outcomes of ongoing 'Identification and Remediation of Contaminated Sites with Persistent Organic Pollutants (POPs) Project' which is being carried out by MoEUCC will help to characterise the soil contamination in Ankara. Contaminated Sites Information system is not open for public use. The remediation works of 15 old dumpsites are considered as priority.

Table 5: Evaluation of the soil in Ankara through indicators

Green Spaces

During the technical assessment process, the status of green spaces in Ankara was examined against certain indicators. The results of the current situation are listed in **Table 6**.

Indicator	Value	Year	Status
Open green space area ratio per 100 000 inhabitants	13.96 hectar	2018	<7 10-7 >10
Share of green space areas within the urban limits	% 18.72	2020	<30 50−30 >50

Table 6: Evaluation of the green spaces in Ankara through indicators

The key sectors influencing the provision of green space in Ankara are the construction industry and the public sector in relation to land use structure. The latter has a positive impact, as several public institutions provide large-scale green spaces to the city, whereas the former puts development pressure on both greenfield land and underutilised inner-city lands. Availability of green spaces is satisfactory and meets standards (according to the data of AMM, there is in total; 1,070 parks and green areas with 2,932 ha area). However, the distribution of green areas is uneven and the access to green spaces at district and neighbourhood levels is limited. Also, green spaces within the city are not well-connected.

There are problems affecting quality and quantity of green spaces in Ankara. Inner city land is typically under private ownership and there are insufficient resources to acquire inner city lands for public services. Increasing pressure is also coming from landowners and developers to obtain more urban development rights. These factors limit the city's power to provide adequate green spaces, especially at district and neighbourhood levels. The decline in green space per capita in recent years is mainly due to the limited increase of new green spaces against the high increase of urban populations and production of built-up areas. Urban planning, particularly urban regeneration, is an opportunity to enhance green space provisioning, along with other necessary public services within the urban limits. Therefore, it is important to prepare specific plans and strategies such as green belt policies, the Sustainable Urban Mobility Plan, the Climate Action Plan, and the Green City Action Plan, as well as integrated and climate-sensitive urban development plans.

Biodiversity and Ecosystem

During the technical assessment process, status of biodiversity and ecosystems in Ankara was examined using certain indicators. The results of the current situation are listed in **Table 7**.

Indicator	Value	Year	Status
Abundance of bird species Rate of change in bird population in a year	% 3.25 reduction	2020	Strong decline (> 2%) Slight decline Positive or stable
Abundance of other species The rate of change in a given species (other than birds; all mammals, fish, reptiles and amphibians) population in a year	% 9.24 reduction	2021	Strong Slight decline Positive or Stable

Habitat loss causes both damage to ecosystems and loss of biodiversity. Sectors which cause habitat loss include construction, renewable energy plants, the agricultural industry, power transmission lines, faulty roads, train line construction, mines, sand quarries, forest management, forest fires, invasive species, and stray animals.

Habitat loss and climate change also contribute to and cause the extinction of species. Excessive use of natural resources causes damage to ecosystems, and this along with habitat loss results in a loss in both the quality and quantity of biological diversity.

Table 7: Evaluation of biodiversity in Ankara through indicators

Mitigation (GHG Emissions)

During the technical assessment process, status of GHG emissions mitigation in Ankara was examined through certain indicators. The results of the current situation are listed in **Table 8**.

Table 8:Evaluation of mitigation inAnkara through indicators

Indicator	Value	Year	Status
Annual CO_2 equivalent emissions per capita	4.06 ton	2020	>10 5-10 <5
Annual CO_2 emissions per unit of GDP (in m. USD)	0.32 ton	2021	>0.8 0.35-0.8 <0.35

The increasing population and consumption habits are major challenges for Ankara, together with gas and coal consumption for heating and a dependence on private cars for transportation.

According to the 2019 Greenhouse Gas Inventory, buildings are the main emission source (approaching 46%) within 60% of fixed sources in Ankara (29% residential and public buildings, 17% Commercial Buildings and street lighting) followed by the transportation sector with 36%. Natural gas is the major source of emissions in both residential and public buildings, whereas electricity consumption is the primary source of emissions from commercial buildings. The GHG Inventory shows that coal consumption is still a significant source of emissions (~19% of residential and public buildings emissions). Transport emissions are mainly caused by diesel consumption in private cars (76%), followed by LPG (13.7%) consumption.

A proposed shift to electric vehicles will provide a significant opportunity for GHG and particulate matter emissions in general. In terms of buildings, the share of coal consumption in building emissions is significantly high, which needs to be a priority to mitigate.

Adaptation to Climate Change

During the technical assessment process, status of adaptation in Ankara was examined through certain indicators. The results of the current situation are listed in **Table 9**.

Indicator	Value	Year	Status
The estimated economic damage from natural disasters as a share of GDP	% 0.001	2019	
		>1 0.5-1 <0.5	
Percentage of public infrastructure at risk	-	-	
			>20 10-20 <10
Percentage of households at risk	_	_	
-			>20 10-20 <10

Evaluation of adaptation in Ankara through indicators

Table 9:

Heatwaves, droughts, and floods are some of the extreme weather events which affect Ankara. Ankara's infrastructure, water supply and agriculture are major sectors which are vulnerable to the impacts of climate. Climate projections show that Ankara has been experiencing warming since the 1950s. In addition to increased temperatures, reduced precipitation, increasing humidity and a decrease in the number of cold days are all expected to increase pressure on the city infrastructure, agriculture, and energy consumption patterns.

The amount of heavy rainfall and flooding in Ankara has increased in the last 10 years. Floods are caused partially due to the weak city infrastructure and planning practices. In recent years, AMM has made several interventions to try to prevent the reoccurrence of floods in Ankara.

Other critical impacts of climate change in Ankara are water shortages and their impact on agriculture. AMM is planning and implementing projects regarding water reuse, reducing leakages, and preventing city floods. Expected changes in ambient temperatures may reduce fuel usage, including from natural gas and coal, used for heating, but will likely also cause an increase in electricity needed for cooling. Agricultural activity and productivity is also expected to be affected, due to the increasing amounts of climate extremes and increased disease. Therefore, the key challenges for the adaptation of Ankara to climate change are the weak city infrastructure and existing built environment.

4.2.2 Pressure Indicators

Transportation

During the technical assessment process, status of transportation in Ankara was examined through certain indicators. The results of the current situation are listed in **Table 10**.

Indicator	Value	Year	Status
Average age of car fleet (total and by type)	13,21 age	2021	>12 6-12 <6
Percentage of diesel cars in total vehicle fleet	% 36	2021	>30 20-30 <20
Fuel standards for light passenger and commercial vehicles	EURO 6	2021	EURO 4 or EURO 5 EURO 6 below
Share of total passenger car fleet run by alternative energy (total and by type)	% 40.08	2021	<1 1-3 >3
Transport modal share in commuting	-	-	>50 30-50 <30
Transport modal share in total trips	-	-	>50 30-50 <30
Motorisation rate Number of private vehicles (cars, motorcycles) per capita	0.30 piece	2021	>0.4 0.3-0.4 <0.3
Average number of vehicles (cars and motorbikes) per household	0.925 pieces	2021	>1 0.5-1 < 0.5
Kilometres of road dedicated exclusively to public transit per 100 000 population	1.76 km	2021	<10 10-40 >40
Kilometres of bicycle path per 100 000 population (distinguished between mixed use and dedicated)	0.65 km	2021	<15 15-25 >25
Share of population having access to public transport within 15 min by foot	% 89	2021	< 60 60-80 >80
Average travel speed on primary thoroughfares during peak hour	39.7 km/saat	2022	<15 15-30 >30
Travel speed of bus service on major thoroughfares (daily average)	30	2021	< 15 15-25 >25
Interruption of public transport systems in case of disaster	Bus and rail transit systems are able to run in case of disaster, but with reduced efficiency	2021	Bus and rail transit systems are able to run normally in case of disaster disaster
Efficiency of transport emergency systems in case of disaster	Emergency transport systems are able to run normally in case of disaster	2021	Emergency transport systems are able to run normally in case of disaster

Table 10:Evaluation of thetransportation sectorthrough indicators

The transport sector represents the second largest source of GHG emissions in Ankara. Mode choice significantly affects the GHG emissions and air pollution from urban transport, and no up-to-date data is available for the current modal share of trips, including walking and cycling, in Ankara. Decarbonisation of road-based public transport is of critical importance, since 18% of the total of 1838 municipal and non-municipal buses still use diesel.

The public transport network is generally used for mixed traffic, and exclusive bus lanes do not exist. The rail network and cycleways are still insufficient. Within the scope of the EIT Urban Mobility Project, seven electric bicycle stations, 60 charging units, and 25 electric bikes were installed in metro stations where there is intense urban mobility flow. Ankara's rapid urban sprawl has increased both travel distances and car dependency. Subsequently, the city faces major challenges related to congestion and poor air quality. The Sustainable Urban Mobility Plan (SUMP) Project for the city has been started in the second half of 2022.

Energy

As defined in the technical assessment process, the current context of the energy sector in Ankara is listed in **Table 11**.

Indicator	Value	Year	Status
Share of population with an authorised connection to electricity	% 100	2021	> 70 70-90 >90
Electrical interruptions Average annual power outage time per customer	12.47 hr	2021	>13 10-13 <10
Percentage of network line losses	5.17	2021	>10 5-10 <5
Share of population with access to quality heating / cooling	% 97.24	2020	<70 70-90 >90
Share of households connected to district heating	% 0.138	2021	<25 25-50 >50
Share of district heating from less carbon intensive sources	% 0	2021	>30 10-30 <10
Share of district heating from carbon intensive sources	% 0	2021	>75 40-75 <40
Share of district heating in renewable resources	% 0.138	2021	<10 10-50 >50
Share of renewable in total energy consumption	% 42.1	2020	<10 10-20 >20
Power outages by climate extremes	% 0.4	2020	>25 10-25 <10

Energy is responsible for a large share of Ankara's total Carbon Footprint at 60%, of which 47% belongs to buildings and general lighting. Fossil fuels such as natural gas, coal and fuel oil are used in Ankara's industrial facilities, which leads to intense energy consumption. It is seen that intensive and less intensive carbon sources are used for heating/cooling in residences and public buildings.

Table 11: Evaluation of the energy sector through indicators

Land Use

As defined in the technical assessment process, the current context of land use in Ankara is listed in **Table 12**.

Indicator	Value	Year		Status	
Population density on urban land Number of people living in the urbanized area of the municipality per km ²	7673.47 Residents/ km²	2021	< 2500: >12000	2500-4000 or 7000-12000	4000- 7000
Average commuting distance	21.00 km	2021	>10	5-10	<5
Average commuting time	85.00 min	2021	>60	30-60	<30
Population living within 20 minutes to everyday services	-	-	<50	50-75	>75
Growth rate of built-up areas	% 2.24	2021	>5	3-5	<3
Share of brownfield development	N/A	2021	<20	20-40	>40
Vacancy rates of commercial buildings	% 17.50	2020	>10	6-10	<6
Vacancy rates of residential buildings	% 11.00	2020	>10	6-10	<6

Table 12:Evaluation of the landuse of Ankara throughindicators

Land use in Ankara has passed through rapid and uncontrolled urban growth and sprawl. In both innercity areas and suburbs, medium and large-scale urban development projects have been carried out. Urban growth was due to both population increase and the general growth of the construction industry in Türkiye. This period of urban growth and expansion has led to a range of land use challenges.

Buildings

As defined in the technical assessment process, the current context of the buildings sector in Ankara is listed in **Table 13**.

Indicator	Value	Year		Status	
Electricity consumption in buildings	48.36 kWh/m ²	2020	.75	47.75	. 47
			>/3	4/-/3	>47
Electricity consumption in residential building	25.06 kWh/m ²	2020	>26	21-26	<21
	10C 00 LW/L (m.0	0000			
Electricity consumption in commercial buildings	186.33 KWN/MZ	2020	>213	122-213	<122
Electricity consumption in public buildings	119 79 kWh/m ²	2020			
	115.15 KWII,III	2020	>213	122-213	<122
Fossil fuels consumption for heating and cooling	139.34 kWh /m²	2020			
			>148	104-148	<104
Fossil fuels consumption for heating and cooling in residential buildings	126.93 kWh/m ²	2020	>126	96-126	<96
			>120	90-120	\$90
Annual fossil fuels consumption for heating and cooling in commercial buildings	198.68 kWh/m ²	2020	>210	127-210	<127
Fossil fuels consumption for heating and cooling in public					
buildings	-	-	>210	127-210	<127
Share of new buildings with green certification	% 0.037	2021			
			<25	25-50	>50
Share of buildings with energy performance certificates	% 43	2019			
			<25	25-50	>50

Table 13:Evaluation of the buildingsin Ankara throughindicators

In terms of buildings, with the population increase within the city, the number of newly added buildings is increasing rapidly. This shows that, progress needs to be made in the field of energy efficient buildings by monitoring and optimizing the energy consumption of these buildings.

Industries

As defined in the technical assessment process, the current status of the industry sector in Ankara is listed in **Table 14**.

 Table 14:

 Evaluation of the industry

 sector through indicators

Indicator	Value	Year	Status
Electricity consumption in industries, per unit of industrial GDP	0,34 kWh	2020	>0.4 0.3-0.4 <0.3
Heat consumption in industries, per unit of industrial GDP	0,30 kWh	2020	>0.25 0.1-0.25 <0.1
Heavy metals (Pb) emission intensity of manufacturing industries Heavy metal equivalent emitted per million USD Gross Value Added	0,005 Kg	2020	>0.04 0.02-0.04 <0.02
Fossil fuel combustion in industrial processes, per unit of industrial GDP	1,09 MJ	2020	>2.2 1.4-2.2 <1.4
Share of industrial energy consumption from renewable energy	% 42,11	2020	<10 20-10 >20
Share of industrial waste recycled	% 0	2020	< 80 95-80 >95
Percentage of industrial wastewater	% 63	2020	< 40 60-40 >60

Industries are the significant source of emissions and they affect the air quality in Ankara. Hydrocarbon based fossil fuels such as natural gas, coal, and fuel oil, which produce high emissions, are used in industrial facilities with high levels of energy consumption in Ankara. There is a high waste heat potential in many areas of the industry, especially in the Iron-Steel, Glass, Ceramic, Cement and Paper sectors. Recovering and using waste heat in systems with high efficiency will reduce natural gas and electricity demand. The use of waste heat in the fight against increasing energy costs will provide protection from economic shock.

The term industrial waste covers both hazardous and non-hazardous waste from manufacturing operations within the city of Ankara. The low levels of industrial waste recycling is a common issue in Türkiye. As a solution, industrial symbiosis as the efficient use of underutilised resources (including waste, by-products, residues, energy, water, logistics, capacity, expertise, equipment and materials) by one company or industry over a longer period of time results in waste reduction through waste reuse and a higher efficiency of resource use.

Water and Wastewater

As defined in the technical assessment process, the current context of the water sector in Ankara is listed in **Table 15**.

Indicator	Value	Year	Status
Domestic water consumption per capita	99.74 liter	2021	<80; 80-120 or 120-200 >250 200-250
Non-revenue water	% 37.79	2020	>45 30-45 <30
Daily number of hours of continuous water supply per household	24 hr	2021	<12 12-20 >20
Energy used for urban water production and supply The amount of electricity used for water production, storage and distribution per cubic meter	0.013 Kwh/m ³	2021	>0.5 0.35-0.5 <0.35
Potable water storage The amount of drinking water stored in the tanks in terms of the average daily volume of water consumed	0.68 day	2021	<0.5 0.5-1 >1
Water consumption per unit of city GDP	0.020 liter	2020	>0.055 0.022- 0.055 <0.022
Share of Industrial water consumption	% 20	2021	>50 17-50 <17
Percentage of residential and commercial wastewater treated	% 50	2021	<40 40-60 >60
Percentage of buildings (non-industrial) equipped to reuse grey water	% 0.04	2021	< 60 60-80 >80
Percentage of treated wastewater from energy generation activities	-	-	< 40 40-60 >60
Sewer Network Integrity (Pipe break) Annual average length of broken/deteriorated sewer pipes	4.7 km	2021	>10 2-10 <2
Energy used for wastewater collection and treatment The amount of electricity consumed for collection and treatment, including sludge treatment per cubic meter of wastewater	0.21 kWh	2020	>1 0.75-1 <0.75
Sludge safely treated disposed of or safely used	% 100	2020	< 50 50-80 >80
Percentage of dwellings damaged by the most intense flooding in the last 10 years	% 0.01	2021	> 3 0.5-3 <0.5
Annual number of storm water/sewerage overflows	382 piece	2021	>50 <u>20-50</u> <20

Table 15:Current Context of Waterand Wastewater

The water supply in Ankara comes from both surface and underground sources. The most important indicators on the efficiency of drinking water networks are the active loss and leak detection of ASKI regarding physical losses and leaks, which is currently transitioning to a new operating system. In the Water Balance Form for 2020 published by ASKI, it is stated that 37% of the total amount of water entering the distribution system is lost water. Wastewater lines throughout the province are collected through a gravity sewer system. As the wastewater collection system works using gravity, and the Tatlar Wastewater Treatment Centre (WWTP) produces electricity via biogas, the indicator linked to the amount of electrical energy consumed per unit of wastewater collected and treated (m³) in the wastewater treatment plants, including the wastewater collection system and sludge treatment in Ankara, is evaluated as 'good performance'. Although data on the percentage of treated wastewater from energy facilities in Ankara.

Solid Waste

As defined in the technical assessment process, the current context of solid waste sector in Ankara is listed in **Table 16**.

Table 16: Evaluation of the solid waste sector through indicators

Indicator	Value	Year		Status	
Total municipal solid waste generation per capita	430.7 kg/Year	2020	>500	300-500	<300
Waste collection service coverage rate	%100	2021	<80	80-90	>90
Proportion of dry recyclables	%30	2018	-15	15-25	>2E
Proportion of organic waste	%53.7	2021		15-55	
Municipal solid waste treated in sorting, processing and treatment plants.	%100	2021	<5	5-20	>20
Municipal solid waste disposed in open dumps	%0.07	2021	>20	10-20	<10
Municipal solid waste disposed in EU-compliant/ equivalent sanitary landfills	%99.93	2018	<80	80-90	>90
Remaining life of current landfill(s)	25 years	2021	<5	5-8	>8

Ankara Metropolitan Municipality performs services related to the reuse, storage, and disposal of wastes and excavations, apart from collecting the wastes at the source and transporting them to the transfer stations, which are the responsibility of the district municipalities. The average amount of solid waste collected daily in Ankara is 5,000 tons (1,825 kton/year). Municipal wastes in Ankara are collected by district municipalities.

In the province, there are 20 transfer stations operated by the Municipality. Wastes are transported and processed to privately operated integrated solid waste facility in Sincan and solid easte site in Mamak. Leachate collection systems are used at both sites. Both sites produce landfill gas which is then used to generate electricity. On the other hand, medical wastes are collected by the contracted company and thermally disposed of at the facility in Sincan.

4.2.3 Cross cutting Themes

Cross-cutting themes within the Ankara GCAP are Smart Maturity, Risk and Vulnerabilities and Gender Equality and Social Inclusion (GESI) which have direct or indirect impacts on sectors that put pressure on the environment. In the following sections, the general outcomes of the related assessments are explained.

4.2.3.1 Smart Maturity Assessment

The main purpose of smart city applications is to help cities manage their services more effectively to deliver a range of benefits for their citizens including reducing pollution, reducing the ecological footprint of urban operations and creating a sustainable, healthy and liveable environment. Therefore, the Smart City approach and Green City objectives are completely in harmony under the theme of sustainability.

Ankara has included smart actions in its corporate strategic plan to increase the number of smart city applications that improve day to day life and to develop its geographic database. Departments closely related to the green city, such as the IT department, ASKI, and EGO, lead in-house smart developments. In the near future, projects in Ankara such as GIS, SCADA, electric vehicles, smart meters, waste monitoring, energy tracking, open data platform, security (physical and cyber), monitoring natural areas and preparing a new zoning plan will need to be managed with practical and efficient methods.

AMM collects and stores data for its operations. There are qualitative and quantitative gaps in data production in terms of data capturing, standardisation and currency. However, due to the administrative structure in the country, many institutions have a say in urban data.

These include ministries, special administrations (i.e, Organised Industrial Zones, Chamber of Commerce & Industry), district municipalities, the private sector (energy distribution, telecom and technology companies) and the army (in upper scale map production).

In July 2022, in line with the Mayor's initiative on open governance, AMM took a proactive step for open data and released "Şeffaf Ankara" (eng: Transparent Ankara), a map-based open data platform. It includes modules such as culture, transportation, environment/health, society, education, science/ tech, city general 1.796 datasets, Baskent Card transactions, locations of disaster relief vehicles, service/ product purchase tenders (and video recordings), maintenance, weather etc. With the "API download" support on the platform, it is possible for the private sector and entrepreneurs to analyse needs and develop solutions. In the near future, new datasets on transportation, health and disasters will be added to the platform.31

In assessing the maturity of the city of Ankara for the adoption of smart initiatives based on all available information, it appears that the city of Ankara has a high potential to successfully implement a strategic approach in the coming years. The current status of smart city applications in Ankara is listed as follows:

- · Başkent Mobil (Capital City Mobile), the main citizen interaction channel of AMM, has recently improved its content. General information is published instantly in the parks and green areas and there are disaster and weather modules within the app. There are two main areas of potential with this app. The first one is the "Notify Urgently and Send Photo" module in which urban residents can report to AMM environmental problems, dumped waste, chemical pollution, and air pollution. Secondly, as recently developed software, it has the potential of more interaction modules being embedded later on.
- · ASKI can monitor water leakage from the SCADA center remotely, but the current SCADA is insufficient for ASKI's current and future needs. (1) Existing SCADA software does not handle system development. (2) The capacity of the existing SCADA does not support adding more field equipment to the system. (3) ASKI's many water tanks, pressure providers and pumping stations in scattered areas are not controlled by SCADA, which causes an excessive loss of water, energy and risk for the life of workers.
- In the city, energy and natural gas sales and distribution are carried out by the private sector, and water distribution and sales are carried out by AMM. Therefore, the water sector is the most likely area for implementing smart meters. Approximately 420,000 subscribers have smart water meters.
- · Integrated Solid Waste Management System in Waste Management covers the collection, transportation, separation and disposal of mixed wastes. It is ensured that the projects, events and competitions carried out on the Zero Waste website are announced, awareness is raised, and the direct recycling, recovery and disposal of wastes are coordinated. The Zero Waste mobile application, on the other hand, is in the testing phase as a "smart assistant" application that guides citizens in the evaluation of waste.
- · The e-environment applications offered by MoEUCC started integration under the system EÇBS (Integrated Environmental Information System). Currently the following items can be managed by EÇBS: solid waste, wastewater, incident notification, combustion, environmental permits, registration of waste producing industries, ship waste, carbon market, and processing contaminated sites. Some subsystems, such as the Air Quality monitoring system, will also be integrated in the near future.
- · The most prominent technologies in urban e-services are; smart mobile applications, e-government platform infrastructure and the use of GIS. Opportunities are being sought for large-scale applications such as smart meters.

4.2.3.2 Risks & Vulnerabilities Assessment

The vulnerability assessment for cities consists of three phases. They are; assessing the city's exposure to hazards (hazards, climatic factors), assessing its susceptibility (size of expected impact), and assessing adaptability and capacity (ability to respond, respond or recover). The thematical components of the J1 URL: https://seffaf.ankara.bel.tr/ vulnerability concept is presented in Figure 14.

Figure 14: Evaluation factors necessary to determine the city's vulnerability



The current context of the city in relation to global climate change and environmental pollution, and the greatest risks that may affect Ankara are as follows:

- **Drought:** In recent years, rapid population growth, improper land use, and pollution, as well as global climate change and thus drought have adversely affected the water resources. Agricultural drought is expected to increase gradually in the districts south of Ankara in the Central Anatolian agricultural basin.
- Floods: Serious floods have been encountered during the spring and summer seasons between 2018 and 2021. High structural fragility of the housing stock, excessive impermanent surfaces and inadequacies of the utilities for the infrastructure are major issues. AMM has identified and implemented flood prevention measures in several specific locations in Ankara, which have experienced frequent floods in recent years.
- Heat and cold waves: Scenarios for Ankara indicate that the percentage of hot days will increase up to 30% in 2040.
- **Urban heat island:** There are two main zones with high-risk potential in terms of heat island. The first zone starts from Sincan and includes Eryaman, Etimesgut and Ostim, and extends towards the city center, i.e., Ulus and Kızılay. The second risk area in the city includes Temelli, Malıköy and Türkobası sections in the direction of Polatlı. As for the southern part, the eastern and western parts of the Middle East Technical University (METU) Forest (Çayyolu in the west, Çankaya districts in the east and its surroundings) have similar characteristics.
- Air quality: Air pollution issues due to the heating in buildings in Ankara have been reduced throughout the city since the utilisation of natural gas in the mid-1990s. However, with coal aids and increasing motor vehicle traffic, air pollution is above EU limit values in some districts. According to the measurement results carried out by MoEUCC, Demetevler and Siteler, measurement station results were evaluated as "sensitive" on the Ministry website. This indicates possible health effects on the public and some serious health effects for vulnerable groups. Recent and short-term analyses show that pollutant values in Ulus and Sihhiye air quality monitoring stations in Ankara have increased to a level that threatens public health, especially in terms of particulate matter. Distributing natural gas instead of coal to low-income residents is also a good practice for reducing GHG emissions and improving air quality.
- Water Supply and System stress: In 2020, the physical water loss in Ankara was at 35%, compared to 27.45% in Izmir, and 20.68% in Istanbul. Potable water of Ankara is provided from dams and underground waters. The irregular and decreasing trend of precipitation regimes cause low water levels in the dams. Ankara province is located within 3 river basins in Türkiye which are Sakarya, Kızılırmak and Konya Closed Basins. According to the estimations, there could be up to a 75% decrease in the gross water potential from the Sakarya basin in the 2041-2070 period with the effects of climate change. In Kızılırmak, up to a 60% decrease may occur in the gross water potential of the basin for the same period. ASKI's studies to prevent water loss in distribution networks are seen as the measures for preventing damages and efficient use of water resources.

- Wind and Dust Storms: Ankara is one of the places where thunderstorms are seen most frequently in the Central Anatolia region. The tornados often cause damages to rooftops.
- **Erosion:** According to the General Directorate of Combating Desertification and Erosion, the region of Ankara is placed among Türkiye's most exposed to erosion due to its geographical location, topographic structure, climate, inappropriate agricultural practices, pasture and forest destruction, and the soil's sensitivity to erosion.

4.2.3.3 Gender Equality and Social Inclusion (GESI) Assessment

The GESI approach considers unequal power relations and inequalities experienced by individuals as a result of their social identities, and how these identities intersect to create experiences of economic vulnerability and exclusion. It focuses on actions to address these unequal power relations and inequalities, reduce disparities, and ensures equal human rights, environmental responsibilities, economic and urban opportunities, and respect for all individuals.

The women's Non-Governmental Organisations (NGO) work with Ankara Metropolitan Municipality (AMM) to shape the gender policies of Ankara specifically under the Local Gender Equality Plan, where a discussion on green actions is beneficial in the future. AMM has been working with the women NGOs and initiatives to develop its Local Equality Action Plan, to become a part of the Women Friendly Cities Program. AMM places a strong emphasis on safety, education, and the prevention of gender-based violence and harassment. This is assisted by a monitoring committee, composed by the Turkish Union of Municipalities, Federation of Women's Associations of Türkiye, Women and Gender Research Center of Ankara University (KASAUM), Yenimahalle Municipality, Gender Equality Monitoring Association, Hacettepe University Women's Issues Research and Implementation Center (HUWRIC) and Women's Coalition. In September 2021, the city founded the Head of Department for Women and Family Services. The Department conducted a survey with 8000 women. Following the survey results, the city prepared and implemented a local equality plan between 2018 and 2020.³²

In 2021, the city continued with the Local Equality Plan for the period of 2021-2024. This current Local Equality Action Plan aims to increase women and girls' access to education, local decision-making mechanisms, urban services, health care services, and women's economic inclusion in the urban economy through women's cooperatives.³³ AMM addresses violence against women at an urban scale by developing its digital infrastructure to tackle incidents, improving the lighting, and other physical design in public areas (i.e., placing buttons for emergencies) along with increasing the number of counselling centres for women and improving access to these centres by placing kiosks at metro stations.³⁴

AMM Strategic Plan (2020-2024) takes into account gender equality issues under socio-cultural and economic targets. Skills development training for unemployed women and utilising women's shelters are specifically emphasized. The city already has programmes of training for women's cooperatives.

In 2022, the city of Ankara plans to undertake training for irrigation and greenhouse techniques at women's clubs to make these training programmes more accessible. The city also plans to provide signage tax deductions addressing women entrepreneurs.³⁵

A summary assessment of the current situation in Ankara within the scope of GESI is presented as follows:

- My purple map project has potential for assessing and monitoring gender-based violence in the city.
- The municipality can lead skills transfer processes in green jobs. It has a protocol between BELTEK and Gazi University and already offers technical vocational trainings. AMM can expand on this training capacity.
- AMM can play a positive role in bridging trust and financial opportunities and foster energy initiatives (such as companies, cooperatives, etc.) that would co-benefit vulnerable populations,

32 AMM Local Equality Action Plan, 2019-2020. Accesible at https://www.ankara.bel.tr/kadincalismalari/verel-esitlik-Action-plani

33 AMM Local Equality Action Plan 2021. Accessible at https://www. ankara.bel.tr/files/4016/4241/3935/ yerel-esitlik.pdf

34 AMM Local Equality Action Plan 2021. Accessible at https://www. ankara.bel.tr/files/4016/4241/3935/ yerel-esitlik.pdf

35 11 women were given training in partnership with another women's non-governmental organization.

not only limited to women. There has already been some early experience with energy initiatives in Turkey.

• AMM has partnerships with women NGOs to counter gender-based violence and sexual harassment on an urban level.

4.2.4 Sectoral Content and Responsible Authorities of the GCAP

The Status, Pressure and Response indicators show the analysis framework starting from the current situation assessment, to the development of green city actions. **Table 17** shows the administrative units related to environmental status topics and sectors that put pressure on the environment.



Table 17: Status, Pressure and Response Indicator Topics and Related Units

4.3 Challenges

The Ankara GCAP aims to identify the priority environmental challenges and sectors that put additional pressure on the city's environment, and to develop strategic objectives and actions that will help to address these challenges. Following the baseline assessment, a series of stakeholder engagement and sector expert meetings were held to identify the priority challenges. In this section, the environmental and sectoral challenges identified for Ankara as a result of the assessments and the priority thematic areas created by grouping the challenges are explained.

4.3.1 Environmental Challenges

The environmental challenges facing Ankara are adaptation and mitigation in response to climate change, air pollution and GHG emissions, soil, green spaces, and biodiversity and ecosystems. These are described in more detail below.

Adaptation and mitigation to climate change

The most prominent impact of climate change for Ankara is floods and droughts that are expected to increase in intensity and frequency. Planning processes which do not take environmental impacts into account, and the inefficient use of natural resources for agriculture, industry and housing on a sectoral basis, are among the most important problems related to the city's adaptation to climate change.

Air pollution and GHG emissions

The baseline analysis, the technical assessment process and the stakeholder engagement activities highlighted some specific challenges for air quality in Ankara:

- Emissions from transportation are a major source of air pollution due to the large scale use of old and diesel vehicles in traffic.
- Industry emissions are another serious source of pollutants. Some of the main industrial areas remain inside the city due to rapid development and expansion and are getting closer to residential areas.
- Other main sources of air pollution include domestic heating and energy generation, where fossil fuel dominates heat and energy production.
- The use of renewable energy in the city is not widespread enough.
- · Zero Emission Zone' designs in city plans are lacking.
- There are 18 air quality monitoring stations already active in Ankara. There is a need to complete some stations' missing data and improve their quality further. Some stations do not monitor PM2.5, which is responsible from many health-related problems, and most of the stations do not have O3 analysers, which are important chemicals in photochemical smog. No station currently measures non-methane volatile organic compounds (NMVOCs), which are a set of organic compounds that are typically photochemically reactive in the atmosphere.
- There is not a holistic and detailed air quality emission inventory developed for Ankara or sophisticated air quality modelling done for the province, taking into account the shares of traffic, industry, residential heating and power generation in the deteriorating air quality of the region.
- Air quality monitoring stations are mainly located in the central districts of Ankara, but more data quality measures are needed to monitor the situation in the north, west and south of the Ankara metropolitan area.

• When the wind direction is southwest-northeast in Ankara, air pollution originating from OIZs located in the southwest of the city can be carried to the city center. Therefore, it is necessary to monitor this situation with meteorological data.

Soil

As a result of the baseline assessment process and stakeholder engagement activities, the findings regarding soil and groundwater pollution in Ankara are listed below:

- The Contaminated Sites Information system (MoEUCC) is not open for public use and soil contamination information is limited.
- Contaminated sites in Sincan and Kahramankazan are in the remediation processes based on the Ankara Environmental State Report. The status of the remediation works is not known in detail.
- · Soil and groundwater contamination caused by boron is mentioned in some articles.
- There are 15 landfills that have been used before 2016 which need to be closed and remediated.

Biodiversity and Ecosystems

Several challenges related to biodiversity and ecosystems in Ankara were identified through the baseline assessment process and stakeholder engagement activities:

- The decrease in biodiversity and extinction of some species have been detected. In Ankara 1.2% of all bird species and 4% of all plant species are in danger of extinction. One of the reasons for the vulnerability of these species is the decrease of food resources and increase of habitat loss, due to the climate change, drought and construction activities.
- · Overuse of natural resources has harmed Ankara's ecosystems and subsequently biodiversity.
- Natural or artificial green areas for supporting biodiversity in the city are insufficient, and they
 are not spatially interconnected.
- · Local plant species have not been prioritised in green areas.
- Additional legal and institutional arrangements are needed on issues such as the protection of nature, the risk of chemicals, climate change and water management.
- · Biodiversity is not sufficiently considered in new investments and projects.
- Inventory and management plans for wetlands in the country have been completed. However, monitoring studies are progressing slowly.

Green Spaces

The city is rich in terms of green and open spaces, due to the presence of public institutions with large green campuses/areas (i.e., METU Campus and Forest, Atatürk Forest Farm, Atatürk's Mausoleum). However, green areas are not evenly distributed across the city and the lack or insufficient nature of green and open spaces are big challenges in some inner-city districts, especially in areas with high population density. The uneven distribution of green spaces also limits the connectivity and continuity of existing green and open spaces.

4.3.2 Sectoral Challenges

The sectoral challenges facing Ankara are water and wastewater, land use, transportation, buildings, energy, solid waste, smart city, risk, and gender equality and social inclusion. These are explained further below.

Water and Wastewater

Through the baseline assessment process and stakeholder engagement activities, several challenges related to the water and wastewater sector in Ankara were identified:

- The dam water occupancy rate is at a critical level.
- A high amount of energy is consumed for the operation of the drinking water distribution network, where the water loss rate is high (37%).
- The percentage of treated industrial wastewater has been decreasing over the years. At the same time, there are 15 wild waste landfills in Ankara that have been left out of use. Discharge of industrial wastewater without treatment and waste storage areas cause water pollution.
- · Combined wastewater and rainwater systems exist in many parts of the city.
- Some parts of the water supply system and sewerage system have reached the end of their economic life.
- The drainage system cannot serve the entire city.
- There is not any study on sustainable drainage systems.
- There is no use for treated wastewater and gray water, and there is a lack of legislation on gray water reuse and stormwater harvesting.
- The treatment rate of domestic and commercial wastewater is equivalent to half of the city's water consumption and it needs to be improved.
- There is ineffective coordination between institutions/organizations related to the water management. Many institutions have the authority to protect and use water resources.
- The prevention strategy specified in the river basin management plans prepared by the Ministry of Agriculture and Forestry has not been implemented or followed-up. (The plans are followed by DSI.)
- There are deficiencies in infrastructure, public database, measuring of the water's quality and quantity, and the monitoring of the basin's bodies of water.
- Ankara is still in the transition phase towards a basin-based management system.
- There is a lack in the management of the non-commercial city water and a lack of an approach for "fit for purpose" use of water.
- The full water cycle is not considered in spatial planning.
- There is inappropriate consumer behaviour towards sustainability and climate resilience seen throughout Ankara.

Land Use

Through the baseline assessment process and stakeholder engagement activities, several challenges related to the land use in Ankara were identified:

- In recent decades, urban development projects have rapidly expanded the city both within the urban limits as well as on the outskirts. A significant part of this growth has been greenfield development due to the difficulties in redeveloping or transforming inner-city areas.
- Despite the difficulties in urban regeneration, several slum or squat transformation projects have started in recent decades. These projects resulted in renewal of some informal settlements but they were also criticized for displacement and gentrification³⁶.
- Ankara has been experiencing rapid and uncontrolled growth. It is observed that the urban development of Ankara covered an area of about 2 km² in 1924, reached 43 km² in 1955, 279 km² in 1985, and 468 km² in 2018³⁷.
- Urban sprawl has resulted in the creation of unnecessary building stock. Vacancy rates in residential and commercial buildings are remarkably high.

36 Gentrification is a concept that was first used by sociologist Ruth Glass in 1964, on the change of the social structure of the neighborhoods with the purchase and demolition of the houses in the working-class neighborhoods of London by the upper and middle class and replacing these houses with luxury ones.

37 Bayar, R. (2020). Land Suitability Analysis of Ankara City Urban Growth Areas. Journal of Ankara University Faculty of Language, History and Geography,60(1), 39-59.

- Uncontrolled growth has led to high populations in neighbourhoods on the outskirts of the city. This adds to problems with urban mobility by increasing travel distances and times. The average commute in Ankara is long in both time and distance.
- Urban agriculture contributes to the city's relationship with nature, increases air quality, and prevents the heat island effect by balancing the urban climate, as well as providing healthy and safe food access through economic, social, and spatial aspects. There are urban agricultural opportunities in Ankara, but they are not used effectively. Atatürk Forest Farm (AOÇ), Çiğdemim Community Garden, Mutlukent Community Garden, and BAKAP Agriculture Campus, are areas where AMM provides training opportunities to the farmers within the scope of the Capital Ankara Development Project. These can be given as examples of urban agricultural practices of different scales in Ankara.
- Government policies encourage investment in construction to support national economic growth, which adversely impacts Ankara's land use development. The increasing desire for more construction, results in excessive use of land for urbanisation and urban sprawl as well as increasing transport distances, spending for infrastructure, and emissions in Ankara.
- The city's master plan, 2023 Ankara Capital City Master Plan, is insufficient to shape current urban development. Since the projection year of the plan ends in 2023, a new Master Plan is needed to implement the plans prepared to combat climate change, be more sustainable and support green urban development policies and actions.

Transportation

Through the baseline assessment process and stakeholder engagement activities, several challenges related to the transportation sector in Ankara were identified:

- Transportation in Ankara is not based on rail systems, but based on road transportation.
- Road based transportation is one the most significant sources of greenhouse gas emissions and a major cause of air pollution which is mainly produced by old vehicles and diesel cars.
- Due to the increasing rate of motorized vehicles, car dependency and poor air quality stand as significant challenges.
- No current data is available for the current modal share of trips.
- The road based public transport network operates in mixed used traffic system and there are no dedicated bus lanes.
- Local decision makers stated the reasons for not implementing the reserved bus lanes as the lack of enforcement, the negative reaction of private car users to the separation of the road to buses, and the operational problems faced by bus services in other cities.
- · The rail system and cycle way networks are insufficient.
- Despite AMM's efforts to develop cycle way projects, cycling has not still been adopted as an urban transport mode.
- There are barriers against the widespread use of active modes (walking and cycling) such as: limited road and pavement width, lack of road safety, and lack of related facilities (rest benches, bicycle parking, etc.)
- The narrowness of the pavements, surface problems, pavement obstacles, and pedestrian ramps (i.e, slope, surface, narrowness problems of ramps) are problematic in terms of accessibility. There is no comprehensive database for accessibility of pavements, ramps, and crossings.
- Legal measures to restrict or ban the use of old cars and diesel fuelled vehicles are insufficient. There is no regulation to ensure the transition to energy efficient instruments with financial instruments.
- Rapid urban sprawl has been observed in Ankara, increasing travel distances.

Buildings

Through the baseline assessment process and stakeholder engagement activities, several challenges related to the building sector in Ankara were identified:

- In parallel with urban population growth in Ankara, the increase in building energy consumption is the main focus of discussions. 70% of total electricity usage is attributed to buildings. The electricity and fossil fuel consumed in buildings does not exceed critical values, but the issue should be kept under control.
- There is a requirement for an energy identity certificate for new buildings under construction. Ensuring this requirement will contribute to the goal of energy efficient buildings.
- The proportion of buildings with green certificates is relatively low compared to the total buildings (in 2022 this was 0.037%). However, the number of these buildings has continued to trend upwards compared to previous years. There are a total of 26 buildings with this certificate in Ankara. In 2022, 60 buildings are awaiting approval for this certificate.
- Annual average fossil fuel consumption per square meter in residential buildings is increasing. In recent years, a negative trend has emerged with a noticeable rapid increase in consumption.
- · Energy-efficient building stock is low.
- There is a lack of social awareness for building energy efficiency, green building issues, and the relationship between energy consumption and climate change.
- Although new buildings are generally built with energy efficiency, many old buildings do not meet energy efficiency requirements.

Energy

Ankara's energy sector causes significant air quality problems in the city. This is due to the use of intense carbon-derived fossil fuels such as natural gas, coal and fuel oil, which produce emissions, for heating/ cooling in industrial facilities, residences and public buildings with intense energy consumption. Through the baseline assessment process and stakeholder engagement activities, several challenges related to the energy sector in Ankara were identified:

- Since there is no data on the values of renewable energy consumption specific to each province, the average of Türkiye was used. Although it has been observed that the share of total energy consumption obtained from renewables increased over the years, it has not reached to the desired level.
- The use of solar energy on all lands owned/operated by the municipality and the use of LED in lighting systems are low. They should be expanded.
- Energy efficiency is not sufficiently promoted through planning.
- R&D into renewable energy sources should be prioritised.
- The share of the population with access to quality heating or cooling is high. However, a mix of carbon-intensive (such as coal, heating oil) and less carbon-intensive fuels (such as natural gas and LPG) are used for district heating. Vulnerable groups living under poverty are especially noted to be using coal more than other sources. There is also an argument that the recent increase in gas and electricity prices has led more people to use coal and wood.
- There are potential geothermal resources in Ankara. These are located at districts (such as Beypazarı, Kızılcahamam, and Ayas etc.) far away from where most of the population live. Further site studies are required to understand these reserves.
- The number of households connected to district heating is low in Ankara.
- The ratio of green-certified buildings compared to the total amount buildings is very low. However, there is an observable upward trend when compared to previous years.
- High renewable energy installation costs, and lack of financial resources remain as obstacles to energy transition.

• Infrastructure deficiencies such as non-durable building stock and network constraints are seen in Ankara.

Solid Waste

Through the baseline assessment process and stakeholder engagement activities, several challenges related to the solid waste sector in Ankara were identified:

- As waste is not sorted efficiently at the source (households), dry recyclables are contaminated with organics which affects treatment/recycling activities.
- · There are no widescale green waste composting practices.
- · There are no well-established food waste recycling and reclamation opportunities.
- · Construction and demolition wastes are not recycled usefully.
- Innovative waste management technologies (gasification, pyrolysis) are either not feasible or not viable.
- Waste collection route optimisation is an important challenge which needs to be addressed, using analytical tools and methods.
- Separate collection of green waste from parks and organic waste from markets needs to be improved.
- There are a lack of cooperative mechanisms to prevent illegal waste collection from streets or to integrate the informal waste pickers workforce, into formal collection systems.
- Alternatives to some product types (single use plastics) are not widespread, which could help to curb some avoidable waste generation.
- With increase in socio-economic status, the consumption of households and production of solid waste has also been seen to increase.
- · Source reduction of some waste types (e.g., food waste) is difficult to enforce.
- There is a lack of effective coordination between relevant institutions for source separation of wastes.
- The spread of waste prevention projects is insufficient and the public awareness of waste reduction and separation at source (in households) is low.
- Since there is no separate waste collection infrastructure (e.g. separate waste collection bins), and separate waste collection programs by district municipalities in the current system, it is difficult for households to dispose of their waste effectively even if it is separated at source.
- There is a need to establish a standardised approach to retrieve, analyse, report, and monitor data reported about solid waste at the city scale.

Smart City

Through the baseline assessment process and stakeholder engagement activities, several challenges related to the smart city applications in Ankara were identified:

- There are difficulties in data collection and its perception in the city. The stakeholders of City services are at different levels of maturity in data capture.
- Not all units of AMM give the same consideration to all aspects of data, such as its importance (which has been noted with technology and digitalisation). The technological capabilities of ASKI, EGO and IT departments may be considered as more developed.
- A clear and comprehensive smart city action plan and data management strategy are needed.
- The private sector does not have public data that enables it to develop applications and solutions for urban services. AMM published an open data platform in July 2022. It offers entrepreneurs the opportunity to download APIs. This platform can help to overcome this challenge.
- The city needs a way to collaborate, in order to make better use of and produce outputs which are compatible with national data sources.

- Although it varies depending on their content, smart apps developed for the city have huge download potential due to the interest of the private sector and citizens. METU Technopark creates a widely innovation ecosystem. The city hosts many companies that provide R&D, software and technological hardware services to ministries. These private sector companies have the potential to produce digital solutions to the challenges of the "green city".
- The AMM administration needs more data to understand the city, to analyse and compare the
 necessities, and to plan useful improvements. However, the amount of data is not the only factor.
 There is a need for an approach focused on data integration, open data, updating the data and
 organizing spatial data. For example, there is insufficient geographic coverage of data on air
 quality of the city and insufficient real-time operational data for water infrastructure.

Risk and vulnerabilities

Through the baseline assessment process and stakeholder engagement activities, some challenges underlying the risks and vulnerabilities seen in Ankara have been identified:

- Fossil fuel consumption in transportation and natural gas use in buildings are the main emission sources in Ankara.
- Emissions originating from coal used for heating and wastewater make up a relatively low share of the total emissions, but they are a quick and easy mitigation potential.
- Private car use for urban transport and the resources used to adapt to cold weather conditions are the main causes of high emissions.
- High diesel consumption has been an issue due to the fuel pricing policies which have operated until now.
- Frequent and heavy rainfall in some urban areas of Ankara is becoming more of an issue.
- Although the measures implemented in certain points in Ankara have had single solutions, more comprehensive and effective solutions are needed due to the increasing frequency and intensity of precipitation in the climate projections.
- There is a need to improve water distribution, sewerage, and drainage infrastructure.
- Floods, droughts, and epidemics are putting pressure on the city's infrastructure, residents, and economy.
- Drought is a significant risk affecting Ankara's water resources and threatening access to water and agricultural activities throughout the city.
- Increasing population, consumption habits and an inadequate city infrastructure are among the main problems in the city.
- The municipality has limited authority over most of the policies.
- In Ankara there are significant challenges in making changes and adjustments to the existing built environment and regarding misapplications in city plans.
- · An early warning system is needed for the disaster management system to work more effectively.

Gender Equality and Social Inclusion

Through the baseline assessment process and stakeholder engagement activities, several challenges related to the gender equality and social inclusion in Ankara were identified:

- Along with the lack of gender-based policy development in municipal service planning, genderdisaggregated data is also needed. All these issues can cause inequalities in mobility.
- · Lack of gender disaggregated data leads to gender blind policies in municipal service planning.
- Fragmented service systems foster social exclusion risks and impacts urban resilience targets negatively (i.e., fragmented transportation systems foster car culture and car dependency).
- The unemployment rate for women in Ankara is higher than optimal.³⁸
- All sectors are male dominated. The ongoing bus conversion project by BELKA is an opportunity

to create jobs for women.

- Rising energy prices are increasing energy poverty.
- There is no detailed data collection on district heating systems and/or renewable energy sources and their use by vulnerable groups.
- · There is no comprehensive study on the extent of energy poverty at a local level.
- Gender-based violence and sexual harassment are important issues to be considered in all of the GCAP actions.
- More design measures and policy planning in social inclusiveness are needed to increase the
 accessibility of public places for the elderly and disabled, especially parks, avenues and large
 streets.

4.3.3 Prioritised Challenges

In the light of all these assessments, ten priority challenges emerged in Ankara:

- Challenges in adaptation and mitigation to climate change due to the deviation from seasonal normal temperature anomalies and increasing of the intensity and frequency of floods and drought,
- 2. Air pollution and GHG emissions that are mainly sourced from fossil fuel consumption in traffic, industry and residential heating, and electricity generation,
- 3. Pressure on the water resources,
- 4. Limited green areas with unequal distribution and weak connections with each other,
- 5. Pressure on the biodiversity and ecosystems,
- 6. Rapid urbanisation and urban sprawl,
- 7. Car dependency and high use of the road-based public transport system,
- 8. High energy-consumption of the industrial facilities, the use of fuels that produce intense emissions for heating/cooling purposes in the buildings and the low use of the renewable energy sources and their challenges,
- 9. Challenges experienced in terms of energy efficiency of buildings,
- 10. Insufficient recycling in Ankara in terms of solid waste management.

As a result of the technical analysis of the challenges created by the sectors, the identified needs, environmental conditions and living conditions of the residents and the expectations of the stakeholders, **the priority environmental challenges** were identified as follows.

- Air quality
- Climate change mitigation
- Adaptation and resilience
- Water quality and efficiency
- Waste management
- Conservation of ecosystem and biodiversity
- Soil and groundwater quality

These are accepted as priority areas that will help to improve the quality and efficiency of the city's infrastructure. All of these studies and the prioritised challenges will contribute to answering the question of *"What kind of vision, strategic objectives and actions should Ankara develop on its way to becoming a green city?"*.



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Developing a Vision, Pillars and Objectives

In the GCAP Preparation phase, the first step is to determine the vision statement of the desired future for the city, and then to set out the strategic objectives for the main pillars (priority action areas). During the phase of vision objective setting, some of the feedback received from the stakeholders as part of the prioritisation of challenges were used as alternative vision statements for both the development of vision and pillars. These were grouped according to their different sectors so that the objectives can be better selected. This study was then circulated through a survey for input and further feedback from internal and external stakeholders.



5.1 Vision Statement

The Ankara GCAP vision was determined considering priority environmental challenges of Ankara. In line with this, some specific aspects that form the Ankara GCAP vision are:

- A sustainable development and balanced use of resources which addresses planning and transport consideration in environmental and climate policies, along with mitigation and adaptation to climate change,
- · Being inclusive, fair and accessible in addressing GESI considerations,
- · An increased quality of life with a "green" emphasis.

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In line with all of the analysis, findings, assessments, stakeholder outputs and using the GCAP methodology, the vision for the Ankara GCAP was formed as:

The Vision of Ankara GCAP

Green capital city Ankara,

prioritising sustainable development and a balanced use of natural resources, being sensitive to environment and climate, inclusive, fair, innovative, accessible and having a high quality of life.

5.2 Pillars and Strategic Objectives

Following the prioritisation of the challenges, the strategic objectives to overcome these challenges are grouped under the topics of air quality, climate change, land use and green spaces, biodiversity and ecosystems, transportation, buildings, energy, waste, water and GESI. These were shown to internal and external stakeholders for their input, through a survey within the framework of stakeholder participation. Stakeholders prioritised strategic objective proposals developed under each topic. With the evaluation of this prioritisation by sector experts, strategic objectives were grouped under the umbrella of "**Pillars**" which are "**environmental protection**", "**decarbonisation**", "**resource efficiency**" and "**circular economy**" and "**resilience**".

The Strategic Objectives, identified within the scope of each pillar, as presented in **Figure 15**, state what needs to be done in order to reach the target of Green City Ankara. Each highlights the challenges that have emerged during the baseline and technical assessment processes and what priorities have emerged through the stakeholder engagement activities.


The pillars and their related strategic objectives are presented along with brief descriptions in the following sections.

5.2.1 Pillar 1: Environmental Protection

Environmental protection is defined as preventing, reducing, and eliminating pollution and any other sources of environmental degradation. The protection of the environment is in line with the principles of environmental sustainability and sustainable development. This is the common property of all living things, which mostly includes efforts, aimed towards preventing deterioration and destruction of the environment and ecological balance, eliminating existing deterioration, improving and developing environmental quality, and preventing pollution of the environment. In the context of the Ankara GCAP, the main components of environmental protection are the effective use of natural sources, eliminating air pollution, and the protection of biodiversity and ecology.

5.2.1.1 Strategic Objective 1: Conserve and efficient use natural resources

Resource efficiency means using the limited resources of the earth in a sustainable manner by enabling conservation of nature and an efficient use of resources. In the context of the Ankara GCAP, to achieve this, it is fundamental to protect wetlands, to ensure the protection of water basins and prevent construction around them using planning, to enable development of blue and green infrastructure and ensure its integration with grey infrastructure, to increase the number or capacity of wastewater treatment plants, and to ensure the implementation of preventive measures against soil pollution and prioritise the cleaning of contaminated sites.

5.2.1.2 Strategic Objective 2: Improve air quality

Air pollution is the contamination of an indoor or outdoor environment by any chemical, physical or biological agent that modifies the natural characteristics of the atmosphere. To eliminate the harmful effects of air pollution, air quality needs to be improved for Ankara. In this respect, the Ankara GCAP aims to apply schemes to increase air quality, encourage the use of renewable energy sources, prioritise environmental values in city plans and urban construction, and enable effective monitoring of air quality as well innovating new ways to do this.

5.2.1.3 Strategic Objective 3: Conserve and enrich ecology and biodiversity

Conserving biodiversity means preserving the diversity of both species and habitats, their functional capabilities and ecosystem services, contributing to the sustainable use of eco-systems, and promoting the fair and equitable sharing of the benefits which arise from biodiversity. This definition aims to increase the presence of open and green spaces in the city, to restore destroyed natural areas and ecosystems, to protect biodiversity in new developments and projects, to increase habitat connectivity both within the city and to the biodiverse reserve areas outside the city, addressing this in urban plans, actions and policies, and to prioritise local plant species that are resistant to drought and climate change.

5.2.2 Pillar 2: Decarbonisation

Decarbonization involves a reduction of greenhouse gases generated by burning fossil fuels. By preventing emissions using low-carbon renewable energy sources such as wind, solar, hydropower, geothermal, and biomass a lower level of greenhouse gases, primarily carbon dioxide, emitted by human activity should be achieved. This requires both the reduction of carbon released into the atmosphere through emission capture, and the reduction of carbon dioxide from transportation and power generation to meet the global temperature target. There is an urgent need to reconsider how human activities produce and consume energy, and to operate a radical shift to renewables and low-carbon energy sources. In the context of the Ankara GCAP, the main components of decarbonisation are defined as: control of strategy and policy on reduction of emissions through urban plans and policies which have sustainability as the basic principle, shifting to enable development of sustainable transport modes, developing policy and practice for energy efficiency in buildings, and focusing on the use of renewable energy sources.

5.2.2.1 Strategic Objective 1: Develop sustainable plans and policies

Sustainable development is the development which takes into account current needs, without compromising the needs of future generations³⁹. Sustainable policies and plans are a subset of measures that are capable of achieving desired goals, which are politically feasible, and also economically viable. Related to this, the Ankara GCAP aims to control urban sprawl with a green belt and similar practices, to ensure public transport oriented urban development, to design rail systems for the existing dense residential and commercial areas, and to develop participatory planning practices.

39 https://www.un.org/en/ academic-impact/ sustainability#.~: text=In%201987 %2C%20the%20 United%20Nations, geliştirme%20 ihtiyaçlar%2C %20ama%20 with%20 the

5.2.2.2 Strategic Objective 2: Develop sustainable transport systems

The car-dependent transport system damages the environment, climate, nature, and negatively affects health and the quality of life. Being dependent on the use and maintenance of cars has negative consequences for three aspects of sustainability: economic, social, and most significantly the environment. Therefore, a transport system based on car use is unsustainable. In the Ankara GCAP, the aim is to develop a sustainable transport system through reducing dependence on cars, promoting the transition to public transport and other active modes of transport such as walking and cycling, decarbonising the public transport system including a transformation to more energy efficient vehicles, and creating an integrated, accessible, and inclusive transport system.

5.2.2.3 Strategic Objective 3: Develop energy efficient practices in built environment

Buildings consume around 70% of generated electrical power in the developed world and they are responsible for 40% of CO₂ emissions. Therefore, radical improvement in energy efficiency is fundamental to global sustainability and to achieve several of the Sustainable Development Goals⁴⁰. In this project, in order to develop energy efficient practices in the built environment, specific factors must be fulfilled, such as prioritising energy efficiency in new buildings, ensuring a refit of existing buildings with the energy efficient ones, ensuring the integration of renewable energy systems into the buildings, taking into account vulnerable groups while developing energy efficient practices, increasing the number of buildings with green certificates, and reducing the carbon footprint of the wastewater and drinking water infrastructure.

5.2.2.4 Strategic Objective 4: Stimulate the use of renewable energy sources

Renewable energy sources are the ones from natural and persistent flows of energy in our immediate environment, which include bioenergy, solar energy, geothermal energy, hydropower, and wind. As an objective of the Ankara GCAP, the aim is to disseminate practices for increasing energy efficiency and energy performance, to give importance to studies in R&D towards renewable energy sources, to expand the use of solar energy, to develop district heating systems, and to ensure the recovery of waste heat energy.

5.2.3 Pillar 3: Resource Efficiency and Circular Economy

Considered in terms of the relationship between natural raw materials or other resources and the benefits gained from their use, resource efficiency means using the Earth's limited resources sustainably while minimising the impact on the environment in both production and consumption. The aim is to create more with less and to deliver greater value with less input. It helps to maximise the benefits of products and services while minimizing consumption and waste, requiring less energy and material for production. A Circular Economy implies a fundamental transition in the EU, away from a linear economy and to the one where resources are not simply extracted, used, and thrown away, but are put back in the loop to ensure more use of resources. It sets out measures for more efficient use of resources and minimisation of waste. In the context of the Ankara GCAP, the main components of resource efficiency and circular economy are, efficient use of resources such as wastewater, rainwater, waste and recycling, and surface drainage. This includes developing related technical and social plans and policies.

40 https://unece.org/sustainable -energy/news/ improving-energy -efficiency-built-environment



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5.2.3.1 Strategic Objective 1: Use resources efficiently

Efficient use of resources may have significant positive effects on the environment, public health, and the economy by facilitating enhancement. For example, water quality including the preservation of aquatic ecosystems, the preservation of drinking water supplies, and effective waste management. Within the context of the GCAP, efficient use of resources consists of constructing wastewater and rainwater collection systems as separate sewers and ensuring that they are operated separately. This includes developing innovative control and monitoring methods in order to reduce the loss-leakage rate of drinking water, reducing pressure on the natural water resources by developing alternative resources, improving the circular economy of the city, and reducing the amount of waste accumulating in landfills.

5.2.3.2 Strategic Objective 2: Ensure the recovery of resources

The definition of resource recovery is the process of turning waste into valuable products. In line with this, there is a need to use sustainable recovery methods for flood management and surface drainage. This includes developing the following: complying with sponge city requirements, enabling segregation waste at source, developing institutional and social capacity for waste reduction and recycling, and enabling the expansion of the applications of both industrial symbiosis and urban metabolism.

5.2.3.3 Strategic Objective 3: Create plans and policies for efficient use of resources

Strategic plans and policies which follow contemporary conditions need to be developed to ensure the efficiency of using resources. Preparation of basin-based water-wastewater management plans in line with the city's infrastructure requirements is significant. There must also be a creation of a management system which includes monitoring and control mechanisms to ensure the continuity of the works. There is also a need to pursue social justice whilst developing the circular economy. For efficient use of resources, the Ankara GCAP must enable managing existing public assets and facilities in line with their lifecycle, to collect, store, interpret and share data by accepting the data as a new source. It is also important to take into account the GESI principles and other similar principles. Using smart and innovative technologies and planning a "Data and Technology Architecture" are also important assets.

5.2.4 Pillar 4: Resilience

Resilience is a concept which takes its origins from biology, ecosystems and the environment and it is directly related to the research areas such as climate change, sustainability, ecology, and risk management. Resilience is the ability of any urban system, community or society to withstand multiple shocks and stresses, recovering rapidly and ensuring the continuity of urban services. A resilient city maintains harmony and development in the face of constant change, whilst preserving its basic functions, structures, and identity, overcoming any emerging shock or stress. It requires identifying and assessing hazards and risks, reducing vulnerability and exposure, and increasing adaptive capacity and emergency readiness. In the context of the Ankara GCAP, the main concerns for resilience are climate change and its related risks, the adaptive capacity of the city, the risk management and development of the related urban plans and policy-making instruments.

5.2.4.1 Strategic Objective 1: Recognise risks associated with climate change

More frequent and extreme drought, storms, heat waves, rising sea levels, melting glaciers, and warmer seas may directly damage animals, ruin their habitats, and have negative impacts on human populations and livelihoods. To be aware of the risks related with climate change in the context of the Ankara GCAP, the city must ensure the integration of climate change risk projection into municipal plans, actions and policies, and develop actions for the groups of disadvantaged and vulnerable people that are expected to be most affected by the climate change.

5.2.4.2 Strategic Objective 2: Enhance resilience of the city

Defined as the capacity of any urban system to absorb shocks and pressures, recover, and maintain continuity of urban services, there are specific steps available to enhance resilience of the city. To enable the resilience of Ankara within the GCAP context, the city must update its adaptation capacity according to the changing conditions. The reuse of the uncultivated agricultural lands should be encouraged. Importance should be given to the preventive risk management strategies against natural disasters, and strategies should be developed to increase the variety of the resources purposed for water including restoring streams within the city, where possible. In addition, the risk factors of the city should be monitored digitally and reviewed by the relevant stakeholders, so that the effects of disaster and crisis periods that deepen social inequalities could be tried to be eliminated.

5.2.4.3 Strategic Objective 3: Plan urban development in line with environment and climatic conditions

Urban and regional plans, policies, and strategies are the basis for enabling urban resilience in a controlled and manageable manner. So that the urban development is planned in line with the environment and climate, certain aspects should be satisfied. The priorities of urban transformation should include environment and climate aspects. Compact urban growth and curbing of urban sprawl should be ensured. Change resistant infrastructure and super structure designs should be made. Environmental and climate based policies should give priority to social justice, and green infrastructures should prioritise accessibility and security relating to gender.

In line with the Ankara GCAP vision and strategic objectives, the action development process was initiated to reveal the concrete outputs of all the studies developed up to this stage. The process to develop the actions is composed of various technical evaluations, stakeholder engagement approaches, and expert reviews in order to define the most appropriate actions for the city of Ankara.



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Action Development Process

The Ankara GCAP Action Development process started after the prioritisation of challenges. During the baseline and technical assessments, challenges were identified which had arisen from the state of the environment and sector-based pressures, and these were prioritised with the input from the stakeholders. Then, to identify steps needed to overcome these challenges in order to achieve Green City Ankara, the Vision and Strategic Objectives were identified. This was done through evaluating the contributions and suggestions from the stakeholders. The Strategic objectives were designed under the Pillars "Environmental Protection", "Decarbonisation", "Resource Efficiency", and "Circular Economy and Resilience". In order to overcome the city's environmental issues, actions were prioritised regarding the implementation of the defined objectives. These actions consist of various policies, investments and initiatives, which are to be used, by sector, to help to realise the Ankara GCAP's vision and objectives. The Action development process phases are presented in **Figure 16**.



Figure 16: The Process of Creating List of Actions



6.1 Defining Actions

In this section, the actions are introduced considering the division of sectoral or environmental state issues. They were identified based on the key challenges identified in *Section 4.3 Challenges*. The actions under each topic or sector represent how to overcome the current challenges through specific projects in Ankara. A brief description of the actions is given in **Table 18** and the detailed project cards for the actions are presented in the *Appendix 1 Action Fact Sheets*.

Table	1	8	•
Acti	n	ns	•

Code	Action	Description
Air Qualit	у	
AQ.1	Air Quality Monitoring, Emission Inventory and Air Pollution Modeling	It is important to establish air quality observing stations in the city center, traffic dense regions, organized industrial zones and background areas. Air quality monitoring should include CO, NOx (NO and NO2), SO2, O3, NMVOCs, PM2.5, PM10 air quality parameters and meteorological variables. Air pollution emission inventories serve for trend analyses, regional and local scale air quality modeling projects, regulatory impact assessments and human exposure studies. Air quality modeling is a mathematical, physical and chemical simulation of how air pollutants transport, disperse and react in the atmosphere to affect ambient air quality. Within the scope of the action by establishing the Air Quality and Meteorology Measurement Stations and determining the air pollution composition, ICP-MS (inductively coupled plasma mass spectrometry) and element-based (partly heavy metal) particulate matter (PM10 and/or PM2.5) to be collected on the filter with high-volume samplers, detailed content and composition studies and SEM (Scanning electron microscope) and particle visuals, number, shape and size studies will be possible.
Energy		
E.1	Meeting the energy needs of municipal affiliates that consume large amounts of electricity, with renewable energy (SPP, HPP etc.)	It is aimed to meet the energy needs of affiliates that consume high amounts of electricity, such as wastewater treatment plants, metro stations, and production facilities, with renewable energy sources as part of Municipality's decarbonization efforts. As a pilot project, it is planned to establish a utility scale solar power plant with an installed capacity of 80 MW for EGO Rail Systems. This action will be initiated by energy efficiency studies of metro stations and main buildings.
E.2	Establishing a solar power plant to meet the wastewater treatment electricity need of ASKI	This action aims to build a solar power plant for decarbonisation of ASKI operations. A solar power plant with a capacity of 35 MW will be constructed for 19 wastewater treatment plants with a total 920,000 m3/day capacity. Tatlar WWTP consumes the large portion of total electricity consumption by all WWTPs in Ankara. There are other existing studies by AMM to prepare SPPs such as floating SPP with a capacity of 1 MW, 8 MW SPP in Tatlar WWTP and 5 MW SPP in Ivedik WTP. ASKI operations are reported to be energy efficient by the officials.

Code	Action	Description
Transport		
T.1	Development of the rail system network	The planned rail system projects implemented within this action will be a strong step to decarbonise the public transportation system and promote the transition to public transport and active modes of transport (walking and cycling).
T.2	Prioritising conversion of fosil fueled buses to electric buses and/or replacement with electric buses	It is aimed to prioritise the conversion and/or replacement of all fossil fuel buses with electric buses and to operate electric buses, with the purpose of decarbonising the public transport system. Depending on the age of the fleet and the condition of the engine and body of the bus, bus conversion can be much less costly than purchasing a purpose-built electric bus, so both options (conversion / new purchase) should be considered.
T.3	Development of a cycle feeder network and dissemination of cycling	It is targeted to construct cycle feeder routes integrated with the rail system and main bus lines to promote the use of bicycles as a means of transport. In addition, activities will be conducted to disseminate sustainable means of transport (e-scooters, bicycles, etc.) among women, children, youth and disabled people, within the scope of the action.
Т.4	Low Emission Zone (LEZ) implementation in a selected area	This action proposes to discourage the use of motor vehicles by increasing the price of vehicles that do not meet the Euro 6 emission standards and imposing various restrictions on vehicle traffic, to be determined in the LEZ.
Smart City	,	
SC.1	SCADA, Smart Water Meter and IoT applications program that will ensure the supply, distribution and control of water in the city	 This action consists of three groups of sub-actions: 1. Development and expansion of a new SCADA for ASKI 2. Further instalment of smart water meters in the city and integration with Subscriber Management Software ⁴¹. 3. Monitoring critical flood points and sewerage system with IoT based sensors.
SC.2	Developing a Disaster Management System	In recent years, heavy rains and floods have been occurring more frequently and more effectively in Ankara. In addition, events such as fire, drought, air pollution, waste, earthquake, and landslide have occured. AMM requires a decision support system for planning resources, determining the number/location of incidents, estimating risk level, assigning tasks to departments, dispatching field teams, obtaining/interpreting/storing incident data, generating status reports. Basic requirements: • Management Process • Information • Infrastructure The main goal of a Disaster Management System is to develop plans to utilize resources of local that can respond to hydrological, climatic, chemical, biological, geological and disaster-related needs as quickly and effectively as possible, reduce operating costs, and develop a key structure that can be integrated with other smart city technologies, and most importantly, to enhance management capabilities.
Water and	Wastewater	
W.1	Planning to increase the capacity of Tatlar Wastewater Treatment Plant (WWTP) and stabilise the treatment sludge from treatment activities to be used in biogas, energy production and fertiliser production	Central (Tatlar) Wastewater Treatment Plant has a daily treatment capacity of 765,000 m3. The WWTP has an activated sludge system and only carbon removal is done in the system currently. The capacity of this plant will be increased to 1,377,000 m3/day in line with the increasing population. While designing the plant, the capacity and design of the extension should ensure that discharge quality meets the allowable limits by regulation as a minimum. The current discharge point is Ankara Creek. The water quality has been decreasing due to the industrial discharges. It is reported that water from Ankara Creek is used for irrigation for some farmlands around as well. Therefore, the extension should be designed to enable Nitrogen and Phosphorus removal through advanced biological treatment. While increasing the capacity at the existing plant, biogas production and electricity generation capacity should be extended as well. There are two gas engines, each has 1.65 MW installed capacity. The biogas plant capacity can be increased to 6 MW.
W.2	Reuse of treated water at Tatlar WWTP	 Water resources are limited in Ankara. Water recycling should be seen as priority while planning wastewater treatment plants given the effects of climate change. Türkiye General Directorate of Water Management carried out a study to determine the re-use potential and quality of effluent water of all wastewater treatment plants in Türkiye in 2020. All Ankara Wastewater Treatment Plants were reviewed, and Tatlar Wastewater Treatment Plant case has been studied as part of this project. It was determined that the wastewater treated at the facility could be used for industrial process water, cooling water and irrigation water at agriculture. The water quality standard of the treated wastewater was determined according to the purpose of recycling. The steps within the scope of the action are listed below: Advanced biological treatment as stated in the action W.1 Recycling plant and transmission lines including filtration with micro disc filter and then disinfection units with UV units.

41 Definition: A smart meter is a device that can read the consumption of electricity, natural gas or water in a building and reports it directly, using the communication networks to the supplier.

Code	Action	Description
W.3	Controlling and monitoring the drinking water supply system and increasing the efficiency of water distribution networks	Loss and leak management is important in the water supply system for resource efficiency and reducing carbon footprint. Ankara frequently experiences drought. In recent years, however, Ankara's water resources have been adversely affected by rapid population growth, improper land use, and pollution, as well as global climate change and thus drought. Priority should be given to studies on administrative losses for quick environmental and financial returns. The main goal of this action is to transform the water distribution networks with investments that increase efficiency at pipelines in their end of useful life. In this context, suggested sub-actions are defined below: • Transition to active physical loss control and pressure management • Hydraulic modelling of 500 km water supply system • Establishing 450 District Metered Areas (DMA) • Physical Leak Detection • Water Supply System Pressure Management • Replacing 30 km pipeline
Solid was	te	
SW.1	Conducting research activities on industrial symbiosis and urban metabolism applications	Industrial symbiosis is a union between two or more industrial plants or companies in which the by-product of one is turned into the raw material of another. Urban metabolism is a model that facilitates the identification and analysis of products and energy flows within the cities. This action considers of efficient use of resources through intersectoral synergetic activities (eg waste/energy/water etc. exchange). The action aims to create the preconditions for industrial symbiosis by building a platform for coordination among different industrial actors; generating supportive research and analysis; ensuring a conducive legal framework; overseeing pilot initiatives. Also, this study will search for an economic model that can deliver prosperity to people without constantly destroying precious natural resources.
SW.2	Establishment of a pellet plant for the recycling of municipal park, garden and forest waste	Pellet fuels or pellets are biofuels obtained by converting compressed organic matter or biomass. Examples of organic materials used in pellet conversion are industrial waste and by-products, food waste, agricultural and forestry waste. The aim of this action is the establishment of a pellet plant of 5,000 tonnes annual production capacity from wood and green wastes from municipal parks, gardens and forests.
SW.3	Establishment of biogas plant and using sediments resulting from the energy conversion process in fertilizer production	This action aims to collect cattle, ovine and poultry wastes and bring them to the biogas plant to produce energy and fertilizer. For better logistic arrangements and supply feasibility, it is recommended that the facility should be established close to the waste resources. In Çubuk and Akyurt districts, there are manure and poultry waste. Also, these waste resources are close to the water resources. The spatial data and the number of animals for these districts have been taken from Turkish Statistical Institute (TURKSTAT). The annual amount of biogas production is estimated as 9.5M m ³ . Based on the high-level available data, a biogas power plant of 3 MW can be established. The sediments of the plant will further be processed and pre-treated to get fertilizer for farms and gardens.
SW.4	Implementation of digital infrastructure and equipment investments as well as awareness-raising activities to encourage the separation of waste at source	This action consists of a reward and incentive system that enables valuable wastes to be collected especially from households and public institutions and converted into an weconomic value such as electronic money, social support or public transportation. Studies have shown that financial incentives trigger the separation of waste at source. The goal of this action is the dissemination of smart city applications and increasing resource efficiency. This will be achieved by creating a policy and system proposal similar to the environmental card applications carried out in some district municipalities of Türkiye (Muratpaşa-Antalya, Şişli-İstanbul and Selçuk-İzmir). Directing revenues to education, food, health and public transportation by municipalities will be in line with the "green city" approach. The realisation of this action will be done by district municipalities with the support of AMM. For the relevant digital infrastructure, Smart Vending Machines, Card Payment Systems infrastructure (Param, Troy, Visa, Mastercard) and Mobile/Web applications are required. Sub-Actions are: • Citizen information and card distribution fieldwork • Establishment of Electronic Payment system • Technical integration in Waste Receiving/Receiving Centers • Regulatory changes and establishing recycling market

Code	Action	Description
R.1	Transforming Ankara into a "Sponge City"	Cities around the world are facing more frequent and more extreme weather events. The power of nature to build resilience is universal and different climatic conditions require different approaches when it comes to deploying nature-based solutions. Natural infrastructure is not only extremely effective in managing flood water, but also brings far wider benefits than traditional engineered 'grey' infrastructure and can contribute positively to biodiversity and carbon reduction. The aim of the action is to understand how spongy the city is and prepare an urban drainage masterplanning by using nature-based solutions. This action will include the following studies; Using artificial intelligence and machine learning tools to measure the amount of green and blue space Accounting for soil types, vegetation and land use Calculating water run off potential for green areas Integrating blue, green and grey infrastructure in the city Urban Drainage Masterplanning by using nature-based solutions
Biodiversi	tv	
BD.1	Creation of urban nature parks and ensuring the connection of urban parks with natural habitats outside the city	New parks will be planned in suitable areas in the inner city of Ankara or existing parks will be renewed. These newly created areas will support the biodiversity where plants from local plant taxon are used, and they will be connected to each other through a natural vegetation line. Trees and shrubs suitable for Ankara's climate and combating air pollution will be selected. While designing and selecting the locations of these urban nature parks, accessibility and easy use of residents will be considered in accordance with the universal design criteria. The scope of the action is to create green corridors that connect the parks, which will be the continuation of the natural habitats in the city, in terms of the continuation of gene flow with each other.
Land use		
LU.1	Developing a green belt policy and creating open green corridors in the city	The aim of the action is to implement a green belt policy surrounding the existing macroform of the city in order to prevent the urban sprawl and protect the natural areas in the periphery. The design of the sub-parts of the green belt will consist of open and green areas of different qualities (urban forest, regional parks, recreation areas, sports areas, etc.), compatible with the region where they are located. The green corridors will connect the parks which will be the continuation of natural habitats through the inner city and gene flow with each other. The open green corridors passing through the city will be added to this green belt system. The presence of open green areas will be increased and blue and green infrastructure solutions will be used in the creation of this green corridor. Environmental benefits of this policy action are as follows: carbon reduction, flood control and regulation, water harvesting, food production, preservation of biodiversity, air pollution reduction, and mitigation of the urban heat island effect.
LU.2	Ensuring land use and transportation integration with rail based TOD (transit- oriented development) implementations	 For reducing private vehicle use and transportation -related emissions, public transportation is important as an active type of urban transportation. There is a need to improve the public transport system (particularly by means of new metro lines and extensions to the existing metro lines) in Ankara, both through developments and creation of new public transport lines. Furthermore, in the city there are urban areas with high density of residences and workplaces that cause a high demand of daily transportation. Therefore, it should be supported with new public transportation investments and such regions should be connected to the existing rail system with feeder lines. The action consists of: Preparation of 1/5000 scale Master Development Plan and 1/1000 scale Implementation Development Plan for an area of approximately 3,000 hectares for the Bağlıca sub-region. M2-M3 lines to be connected to the Çayyolu and Eryaman metro lines.
LU.3	Prioritising climate friendly and sustainable urban regeneration for future urban development	 Preventing urban sprawl is important to control the urban form and protect the natural areas around the city. At the same time, encouraging the use of mass and non-motorized modes of transportation by shortening the transportation distances and times is crucial. Ankara is a city with the potential for transformation. Therefore, priority should be given to the urban development projects in the city instead of new development projects in the periphery. In this context, the aim is primarily to finalise the transformation projects. Housing areas that have been started and then to start new urban transformation projects. Housing areas important disaster risk areas. River floods, sudden floods, city floods and landslides are the leading disasters. Renewal of such regions should be prioritised. Urban infrastructure and superstructures should be renewed in accordance with the disaster risk management and resource efficiency principles. The steps that will form the scope of this action are given below: Within the scope of urban transformation and development projects, realisation of modern housing projects in the neighborhoods with slums and/or old buildings and dissemination of green areas. During the construction of houses, wind corridors will be opened for the transmission and spread of pollution by designing low-rise houses instead of high ones that prevent ventilation in the direction of the prevailing wind. Reducing emissions by using natural gas and/or renewable resources instead of using solid fuel for heating. Aiming to increase the thermal efficiency with insulated new buildings.

Code	Action	Description
Buildings		
B.1	Establishing a regularly updated urban building inventory that includes information such as age, type, energy performance and function of buildings	The aim is to create a building inventory based on EPC (Energy Performance Certificate) information. This would involve identifying a building's missing EPC data and collecting information about the condition of the building, such as function, status, age, type, energy performance, etc. and updating the periodic registration by transferring them to a database (software) system. With this action, a building information-recording system will be created in a digital environment throughout the city. By keeping these records up to date, the instant building stock will also be monitored up to date. In addition, the digital building intentory system planned to be created within the scope of this action is intended to support issues such as identifying places where building transformation is urgent throughout the city, identifying surplus buildings in the region, active use status of buildings, evaluating newly planned buildings based on the current state of the regions, determining priority target points throughout the city in decisions related to the buildings.
B.2	Effective transformation of the building envelope and building energy systems with improvements in the existing municipal buildings	The scope of the action is to ensure necessary transformations (facade insulation performance, window performance, and electromechanical systems such as lighting, heating-cooling-air conditioning, automation) in the prioritised/pilot municipal buildings to increase energy efficiency and/or integration of renewable energy systems according to their applicability. In this action, the vision is to renovate the building envelope, windows and electromechanical systems (pump, fan coils, boilers, chillers, ahu's, lighting, etc.) of an existing building with an area of approximately 10,000 m2. In addition, electricity generated by PV (photovoltaic) panels on the roof of the building will be used for the electricity needs as renewable resources. Finally, the building management (automation) system will also be integrated into this system.
Soil		
S.1	Soil and groundwater improvement of dumpsites no longer in use	There are 15 disused dumpsites that need rehabilitation with the range of 1-16 hectares in various locations of Ankara. Soil pollution, ground and surface water pollution, visual impacts, dust, and odour have been caused by dumping of the municipal solid wastes. The aim of this action is to carry out site rehabilitation studies to prevent adverse effects. Some of the rehabilitated lands can be re-used for other purposes such as parks and social facilities.
GESI		
GS.1	Preparing a comprehensive, multi- sectoral social policy action plan for vulnerable populations	The plan will assess user experience of city services, based on income, gender, age, disability, and citizenship, and develop relevant social inclusion strategies to foster cooperation and engagement across municipality departments and companies.
GS.2	Creation of an initiative that will provide technical employment (such as maintenance) in the transportation industry for women	The municipality can play a leadership position in the green jobs sector by planning skills transfer processes. The pilot sector is proposed to be the transportation sector, since there is already an ongoing micro-mobility transition and bus conversion project. The aim is to establish an initiative (in the form of a company and/or a cooperative) where technical, repair staff and women engineers will work together, and to ensure skill transfer management through trainings. The unemployment rate for women in Ankara is relatively high. This action will lead to establishing a women's employment transportation initiative, where technical, repair personnel and engineer women will work together, and skill transfer management will be ensured.
GS.3	Assessing energy poverty and creating an energy poverty action plan	Assessment of energy poverty in rural and urban Ankara, based on income, gender, age, disability and citizenship will be carried out within this action. An energy poverty action plan will be prepared with the strategies and roadmaps to tackle partnerships between the AMM, citizens and the energy sector actors. There will be a knowledge dissemination of the energy poverty action plan with the stakeholders. Public communication will be established via municipality apps, billboards, social media accounts on energy poverty and clean energy resources will be designed for vulnerable groups, especially for women. Financial and institutional incentives will be encorporated for low-income groups' access to new energy infrastructures, within the framework of coal reduction actions of the Ankara GCAP and Ankara climate action plan. Networking events between companies, energy entrepreneurs and citizens to establish an energy initiative for solar energy will be organized in the framework of this action.
GS.4	Organising public education and awareness campaigns on green city practices, targeting social inclusion of vulnerable groups	The action includes campaign design and organization in pilot high schools and universities, especially targeting students of STEM (Science, Technology, Engineering, Mathematics) subjects. Public communication will be developed via municipality apps, billboards, and social media accounts about the new GCAP actions and initiatives. With the GCAP actions and practices, it is aimed to be given specific consideration on gender- based violence and sexual harassment, and development of women and child friendly practices in public spaces and transportation system (metro, parks, etc.).

6.2 Scope of the Actions

This section presents the context, time frame, budget, and benefit frameworks that construct the baseline of the GCAP actions. The relationship of actions to the strategic objectives, funding and timelines, benefits and financial assessments are explained.



Figure 17: The matrix for the Pillars - Strategic Objectives and Actions

6.2.1 Linking Actions to Pillars and Strategic Objectives

The Ankara GCAP has four pillars. 'Environmental Protection, Decarbonisation, Resource Efficiency and, the Circular Economy and Resilience' emerged as priority Action Areas. Strategic Objectives are determined within the scope of each pillar, and the actions associated with them define what needs to be done to succeed in overcoming the prioritised challenges. Section 5.2, Pillars and Strategic Objectives explains this process in detail. The matrix in **Figure 17** shows the relation of each action with the strategic objectives and how these actions will provide success regarding the pillars and objectives.



6.2.2 Action Funding and Timeline

The actions involved in the Ankara GCAP are broken into short (0-2 years), medium (2-5 years) and long (5 years and above) term projects based on their descriptions. **Figure 18** shows the timeline of the actions, and their gross costs.

Costs are divided into three main groups:

Low: 0-1 Million Euros, Medium: 1-10 Million Euro, High: 10 and above Million Euros.

Figure 18: The Timeline of the Actions

	CODE	ACTION
AQ.1	Air quality monitoring, emis	sion inventory and air pollution modelling
E.1	Meeting the ener gy needs amounts of electricity, with	of municipal affliates that consume lar ge rene wable ener gy (SPP, HPP etc.)
E.2	Establishing a solar power	plant to meet the wastewater treatment electricity need of ASKI
	Development of the rail sys	stem netw ork
	A2 Ankaray Dikimevi-Nato	Road Extension and Söğüt özü-AŞTİ Signalling System
T.1	M2 Çayyolu-Kızılay Metro E	extension
	M4 Keçiören- AKM Metro E	rtension
	M5 Kızılay-Dikmen Metr o L	ine
	Prioritising conversion of for buses and/ or replacement	sil fueled buses t o electric with electric buses
T.2	Phase 1 - 6 months	
	Phase 2 - 6 months	
	Phase 3 -84 months	
	Development of a cycle fe	eder network and dissemination of cycling
Т.3		
	Phase 2 - 45 km	
τ.4	- Low Emission Zono (LEZ) in	ndomentation in a calent od area
SC.1	SCADA, Smart Wa ter Meter ensure the supply, distribut	and IoT applications program that will ion and control of water in the city
SC.2	Developing a Disast er Man	agement S ystem
W.1	Planning to increase the ca treatment activities to be us	pacity of Tatlar WWTP and stabilise the treatment sludge from
W2	Reuse of treated water at 1	atlar WWTP
W3	Controlling and monit oring and increasing the efficience	the drinking water supply system
SW.	1 Conducting r esearch activi	ties on industrial symbiosis and urban metabolism applications
SW.2	2 Establishment of a pellet p	ant f or the recycling of municipal park, garden and f orest waste
SW.3	³ from the ener gy conversio	ant and using sediments r esulting
SW.4	Implementation of digital in awareness-raising activities	Ifrastructure and equipment in vestments as well as
R.1	Transforming Ankara into a	"sponge city"
BD.1	Creation of urban natur e pa of urban parks with natural	rks and ensuring the connection
LU.1	Developing a gr een belt po	licy and creating open green corridors in the city
LU.2	Ensuring land use and trans (transit-oriented developme	portation int egration with rail based TOD
LU.3	Prioritising climate friendly	and sustainable urban r egeneration f or future urban de velopmen t
B.1	Establishing a regularly up such as age, type, ener gy Effective transformation of	Jated urban building in ventory that includes information performance and function of buildings the building envelope and building envelope
B.2	systems with improvement	s in existing municipal buildings
S.1	Soil and groundw ater impr	ovement of dumpsites no longer in use
GS.1	Preparing a compr ehensiv	e, multi-sect oral social policy action plan for vulnerable populations
GS.2	, Creation of an initiative tha (such as maintenance) in t	t will provide technical employment he transportation industry for women
GS.3	Assessing energy poverty	and creating an ener gy poverty action plan
GS.4	city practices, targeting so	rial awareness campaigns on green



6.2.3 Benefit Assessment of the Actions

This section presents the benefits of adopting the GCAP actions. Benefits cover green benefits, benefits to resilience, economic benefits, and social benefits.

Green benefits are the primary benefit of the Ankara GCAP. They include reducing emissions, improving energy efficiency, improving climate resilience, increasing green and recreational areas, improving air, water, and soil quality, reducing pollution, improving and maintaining ecosystems. The GCAP actions also deliver resilience, economic and social benefits, and all these benefits are also central to the broader vision for the Ankara GCAP.

According to the vision, the actions of GCAP should deliver:

- Sustainable development and a balanced use of resources, addressing planning and transport with sensitivity to the environment and climate policies, along with mitigation and adaptation to climate change,
- · Being inclusive, fair and accessible, taking into account the GESI Principles,
- · Increased quality of life with a "green" emphasis.

Green Benefits

In line with the components of the Ankara GCAP vision, how actions contribute to the green, resilient, economic and social aspects are summarised in the following sections. In the *Action Fact Sheets* presented in *Appendix 1* of this report, icons are used to symbolise which action contributes to which benefit along with the related explanations. The legend of the Benefit Icons is presented below in **Table 19**.

Reduced GHG emissions Improved energy efficiency Improved climate resilience Improved climate resilience Increased green and recreational spaces	 Improved air, water and/or soil quality. Reduction of air, water, soil, noise, etc. pollution Improved or maintained ecosystem services
Resilience Benefits	
 Improved public health Improved access to sustainable food Improved access to sustainable energy Improved access to sustainable and safe mobility Improved access to education services 	 Improved supply chain security Increased access to sustainable housing Improving access to clean water, improved sewerage system Prevention or mitigation of possible future pandemics
Economic Benefits	
Job creation Increased local business opportunities	Revenue generation Cost savings
Social Benefits	
Enhanced gender equality, ensured equal opportunities in employment Improved social equality Reduced poverty Improved community engagement	Improved safety (e.g. road safety, GBVH, crime, etc) Training/ education opportunities for women, elderly, youth and minorities Barrier free access/ improved access to services Vulnerable population addressed

Table 19: Icons and Explanations of Benefits

6.2.3.1 Green Benefits

There is a notable revelation in the contributions which the GCAP actions have given to green benefits in showing how successful the city is expected to be in terms of increasing its green areas, developing the ecosystem, in energy efficiency, in decreasing the effects of greenhouse gas emissions and decreasing the noise, water, soil and air pollution.

Regional or city scale plans are the basis of urban land use decisions, policies and changes which relate to them. Therefore, serving the sustainable future of Ankara with green benefits begins with a comprehensive plan. In this respect, in every action of land use, a baseline study is proposed that includes an integration of upper scale plans of Ankara, with the plans or policy documents which relate to the sustainable development of the city, such as the Ankara GCAP or the Climate Change Action Plan. With this, any strategy or action for the green future of Ankara needs to begin with a comprehensive urban and regional planning decision as the legal and legitimate basis.

Energy and Resource Efficiency

Energy efficiency is consuming less energy to get the same output (production or services) or consuming the same amount of energy but with more output.

The target is to reduce Türkiye's Energy Intensity (energy consumed per national income) by at least 20% by 2023 compared to 2011's levels, with the energy efficiency actions presented in **Table 20**.⁴²

Sector	Code	Action
Smart City	SC.1	SCADA, Smart Water Meter and IoT applications program that will ensure the supply, distribution and control of water in the city
Water and Wastewater	W.3	Controlling and monitoring the drinking water supply system and increasing the efficiency of water distribution networks
Buildings	B.2	Effective transformation of the building envelope and building energy systems with improvements in existing municipal buildings

The main benefit of the transport actions in terms of the efficient use of energy and resources, is expressed in the reduction of fuel consumption from modes of road transportation, and the projections for these gains in fuel consumption efficiency are presented in **Table 21**. The gains are determined separately for each action.

Table 21:

Table 20

Energy efficiency actions

Transport related actions which reduce fuel consumption

Code	Action	Gasoline (1000 lt)	Diesel (1000 lt)	LPG (1000 lt)	CNG (1000 m ³)	Electricity (increase) MWh
Т.1	Development of the rail system network	5,423	40,587	11,497	49,326	154,8
Т.2	Prioritising conversion of fossil fueled buses to electric buses and/or replacement with electric buses	-	3,034	-	30,703	49,644
Т.З	Development of a cycle feeder network and dissemination of cycling	2,454	30,311	5,203	8,504	-
T.4	Low Emission Zone (LEZ) implementation in a selected area	Yok	Yok	Yok	Yok	Yok
LU.2	Ensuring land use and transportation integration with rail based TOD (transit-oriented development) type implementations	841.5	6,299	1,784	7,655	317
	Code T.1 T.2 T.3 T.4 LU.2	CodeActionT.1Development of the rail system networkT.2Prioritising conversion of fossil fueled buses to electric buses and/or replacement with electric busesT.3Development of a cycle feeder network and dissemination of cyclingT.4Low Emission Zone (LEZ) implementation in a selected areaLU.2Ensuring land use and transportation integration with rail based TOD (transit-oriented development) type implementations	CodeActionGasoline (1000 lt)T.1Development of the rail system network5,423T.2Prioritising conversion of fossil fueled buses to electric buses and/or replacement with electric buses-T.3Development of a cycle feeder network and dissemination of cycling2,454T.4Low Emission Zone (LEZ) implementation in a selected areaYokLU.2Ensuring land use and transportation integration with rail based TOD (transit-oriented development) type implementations841.5	CodeActionGasoline (1000 lt)Diesel (1000 lt)T.1Development of the rail system network5,42340,587T.2Prioritising conversion of fossil 	CodeActionGasoline (1000 lt)Diesel (1000 lt)LPG (1000 lt)T.1Development of the rail system network5,42340,58711,497T.2Prioritising conversion of fossil fueled buses to electric buses and/or replacement with electric buses-3,034-T.3Development of a cycle feeder network and dissemination of cycling2,45430,3115,203T.4Low Emission Zone (LEZ) implementation in a selected areaYokYokYokLU.2Ensuring land use and transportation integration with rail based TOD (transit-oriented development) type implementations841.56,2991,784	CodeActionGasoline (1000 lt)Diesel (1000 lt)LPG (1000 lt)CNG (1000 m3)T.1Development of the rail system network5,42340,58711,49749,326T.2Prioritising conversion of fossil fueled buses to electric buses and/or replacement with electric buses-3,034-30,703T.3Development of a cycle feeder network and dissemination of cycling2,45430,3115,2038,504T.4Low Emission Zone (LEZ) implementation in a selected areaYokYokYokYokLU.2Ensuring land use and transportation integration with rail based TOD (transit-oriented development) type implementations841.56,2991,7847,655

Air quality

The expansion of green spaces will provide natural cooling and reduce air pollution. The green corridors are expected to cover 4 km² and reduce air pollution by 300 kgPM2.5 annually and 918 kgNO2 annually per km².

In Türkiye, an average of 1.3 kg of coal is used for 1 kWh of energy production. The total energy production from coal is 104.20 billion kWh and the total coal consumption is 80 billion kg.43 When looking at Türkiye's electricity production, the share of coal in production is at 30.9%44. This means, this value should be considered for an approximation in the calculations of the emissions from pollutants due to the electricity usage in Ankara. The electricity consumption reduced as a result of implementing these actions is calculated in kWh. Afterwards, the coal equivalent of the energy calculated can be determined. Since 30.9% of the electricity produced is from coal, banning the use of that percent of coal could lead to significant reductions in pollutant emissions. The AP-42 Emission Factors specified by the EPA⁴⁵ can be used to calculate the reduction rates in air pollutants from the coal consumption via the following method:

Pollutant Emission Reduction Rate (kg/year) = Reduction in Coal Use Rate (ton/year) x Emission Factor (kg/ton)

Here, the 'Reduction in Coal Use Rate' is the activity rate, and the emission factors of AP-42 can be used to do the estimates of the emissions. In order to estimate sulphur dioxide and particulate matter emissions, the sulphur and ash content of the fuel used should be known. In the Ankara Clean Air Action Plan 2020-2024 (THEP), the sulphur (S) content of domestic coal used in Ankara Province is given as a maximum of 2%, and the S content in imported coal used in Ankara Province is at most 0.9%. So, for an approximate calculation, coal S content is used as 1% in this project. Similarly, it is necessary to know the ash content (A) for the particulate matter emissions calculation. The average ash (A) content of domestic and foreign coal used in Ankara Province, as in the 2020-2024 Ankara Clean Air Action Plan, is given as 10.29%. Therefore, this percentage is used as A for the estimate of particulate matter emissions. Air quality emission factors are presented in Table 22.

Furnace type	Emission factor, lb/ton of coal burned						
r under type	All particles	PM ₁₀	SO _x	NO _x	CO		
PC wall fired, dry bottom	10A	2.3A	38S	22	0.5		
PC wall fired, wet bottom	7A	2.6A	38S	31	0.5		
PC tangential fired, dry bottom	10A	2.3A	38S	14	0.5		
Cyclone	2A	0.26A	38S	33	0.5		
Spreader stoker	66	13.2	38S	11	5		
Hand - fired	15	6.2	31S	9.1	275		

Table 22: Air quality emission factors

Reductions in the emission rates of specific conventional pollutants are estimated by the same methodology explained above. The action providing the largest amount of reduction in emissions is E.2 'Establishing a solar power plant to meet the wastewater treatment electricity need of ASKI'. The installation of a renewable energy system at ASKI as a mitigation measure is expected to lower the dependence on fossil fuels, especially on coal. The consequence of decarbonising energy generation is expected to improve air quality by decreasing PM10 emissions by approximately 91,510 tons annually. Similar reductions will take place for NOx, SO2 and CO as 85,065, 146,930 and 1933 tonnes annually, 43 Coal Sector Report (lignite), 2022 respectively.

44 Electricity - Energy and Natural Resources Ministry

45 https://www.epa.gov/ air-emissions-factors-andguantification/ap-42-compilationair-emissions-factors

The implementation of the transport actions will provide positive outcomes for air quality as well as for energy, resource efficiency and climate change mitigation. The transport actions' benefits on air quality will be observed after reducing the use of modes of road transport and, accordingly reducing fuel consumption, as will other benefits appear. The benefits towards air quality caused by the transport actions given in **Table 23** are stated as net benefits. With the implementation of T.1 and T.2 actions, there will be a decrease in fuel consumption as well as an increase in electric energy consumption. It was seen that SO₂ emissions would increase, as stated in **Table 23**, if the additional electric energy required for these actions is supplied from the grid. This is due to the high use of coal in generating electricity for Türkiye.

Table 23: Mitigation actions related to air quality

Sector	Code	Action	PM ₁₀ kg/a	PM _{2.5} kg/a	NO _x kg/a	SO ₂ kg/a	CO kg/a
Energy	E.1	Meeting the energy needs of municipal affiliates that consume large amounts of electricity from renewable energy (SPP, HPP etc.)	581,596	-	540,631	933,818	12,287
Energy	E.2	Establishment of a solar power plant to meet the wastewater treatment electricity need of ASKI	282,995.80	_	263,062.80	454,381.20	5,978.70
Transport	Т.1	Development of the rail system network.	9,905*	49,586	1,247,074	-141,078	1,336,057
Transport	T.2	Prioritising conversion of fossil fuel buses to electric buses and/ or replacement with electric buses	-	2,625	371,683	-45,285	149,555
Transport	Т.3	Development of a cycle feeder network and dissemination of cycling	5,015*	30,690	826,338	112	625,238
Buildings	B.1	Establishing a regularly updated urban building inventory that includes information such as age, type, energy performance and function of buildings	2,714	-	2,523	4,358	57
Water and Wastewater	W.1	Planning to increase the capacity of Tatlar Wastewater Treatment Plant (WWTP) and stabilise the treatment sludge from treatment activities to be used in biogas, energy production and fertiliser production	16,786.66	-	15,604.28	26,952.85	354,64
Water and Wastewater	W.2	Reuse of treated water at Tatlar WWTP	14,496	-	13,475	23,274	30
Water and Wastewater	W.3	Controlling and monitoring the drinking water supply system and increasing the efficiency of water distribution networks	2,744	-	2,548	4,402	58
Solid Waste	SW.2	Conducting research activities on industrial symbiosis and urban metabolism applicationsEstablishment of a pellet plant for the recycling of municipal park, garden and forest waste	110,758	-	102,957	177,835	2,340
Solid Waste	SW.3	Establishment of biogas plant and using sediments resulting from the energy conversion process in fertilizer production	96,916	-	90,090	55,610	2,047
Land Use	LU.2	Ensuring land use and transportation integration with rail based TOD (transit- oriented development) type implementations	1,464*	7,658	190,934	-28,883	206,907
Biodiversity	BD.1	Creation of urban nature parks and ensuring the connection of urban parks with natural habitats outside the city	1,200	-	3,672	-	-

* The figures are representing the emissions caused by only tire wear and brake wear.

Climate change mitigation

The actions presented in the GCAP are expected to contribute to substantial reduction in the amount of greenhouse gas emissions, across several sectors. **Table 24** shows the potential carbon reduction values of the actions.

Sector	Code	Action	Value	Unit
Energy	E.1	Meeting the energy needs of municipal affiliates that consume large amounts of electricity from renewable energy (SPP, HPP etc.)	55,450	tCO ₂ /annual
Energy	E.2	Establishment of a solar power plant to meet the wastewater treatment electricity need of ASKI.	26,980	tCO ₂ /a
Transport	Т.1	Development of the rail system network.	228,583	tCO ₂ /a
Transport	T.2	Prioritising conversion of fossil fueled buses to electric buses and/or replacement by electric buses	45,569	tCO ₂ /a
TransportT.3TransportT.4Water and WastewaterW.1		Development of a cycle feeder network and dissemination of cycling	115,700	tCO ₂ /a
		Low Emission Zone (LEZ) implementation in a selected area	N/A	N/A
		Planning to increase the capacity of Tatlar Wastewater Treatment Plant (WWTP) and stabilise the treatment sludge from treatment activities to be used in biogas, energy production and fertiliser production	1,600	tCO ₂ /a
Water and Wastewater	and W.2 Reuse of treated water at Tatlar WWTP		1,382	tCO ₂ /a
Water and Wastewater	W.3	Controlling and monitoring the drinking water supply system and increasing the efficiency of water distribution networks	261	tCO ₂ /a
Solid waste SW.2		Establishment of a pellet plant for the recycling of municipal park, garden, and forest waste	5,350	tCO ₂ /a
Solid waste	SW.3	Establishment of biogas plant and using sediments resulting from the energy conversion process in fertilizer production	9,240	tCO ₂ /a
Land use	LU.2	Ensuring land use and transportation integration with rail based TOD (transit-oriented development) type implementations	31,973	tCO ₂ /a
Land use	LU.3 Prioritising climate friendly and sustainable urban regeneration for future urban development		2,183	tCO ₂ /a
Buildings B.2		Effective transformation of the building envelope and building energy systems with improvements in existing municipal buildings	259	tCO ₂ /a
Biodiversity	BD.1	Creation of urban nature parks and ensuring the connection of urban parks with natural habitats outside the city	750	tCO ₂ /a

Table 24:Climate change mitigationactions

In carbon reduction calculations, the emission factor announced by the Ministry of Energy and Natural Resources is used for electricity. These factors are specific to electricity; however, they can be used in various fields such as carbon footprint calculations and calculations of greenhouse gas reductions provided by improvements in energy efficiency. According to the calculations, an average of 0,440 tons of CO2-equivalent greenhouse gas emissions per 1 MWh (unit) net electricity generation is emitted throughout Türkiye.⁴⁶

46 Turkey Electricity Production and Electricity Consumption Point Emission Factors - Department of Energy Efficiency and Environment - Environment and Climate - T.R. Energy and Natural Resources Ministry

Water saving

One of the important indicators in the approach of sustainability and sustainable resilient cities is water saving and effective use of water. Water saving and efficient water use will provide significant environmental, public health and economic benefits by helping to improve water quality, protect aquatic ecosystems and conserve drinking water resources. For this reason, it is important to evaluate and contribute to the defined actions in terms of water saving and water efficiency. Actions that will create water savings are listed in **Table 25**.

Table 25: Water saving actions

Sector	Code	Action
Smart City	SC.1	SCADA, Smart Water Meter and IoT applications program that will ensure the supply, distribution and control of water in the city
Water and Wastewater	W.2	Reuse of treated water at Tatlar WWTP
Water and Wastewater	W.3	Controlling and monitoring the drinking water supply system and increasing the efficiency of water distribution networks
Land use	LU.1	Developing a green belt policy and creating open green corridors in the city
Land use	LU.3	Prioritising climate friendly and sustainable urban regeneration for future urban development
Biodiversity	BD.1	Creation of urban nature parks and ensuring the connection of urban parks with natural habitats outside the city
Risk	R.1	Transforming Ankara into a "sponge city"
Soil	S.1	Soil and groundwater improvement of dumpsites no longer in use

6.2.3.2 Resilience Benefits

Resilience is the capacity of any urban system, community, or society to absorb various shocks and pressures, recover, and maintain continuity of urban services. A resilient city sustains its harmony and development in the face of changes, while keeping its fundamental functions, structures, and identity, and is prepared to resist any incoming shock or stress. In terms of assessment of the benefits, resilience benefits include improving public health, access to sustainable food and sustainable energy, improving access to educational services, providing security of the supply chain, access to sustainable housing and water services, and preventing or mitigating the effects of natural disasters and future pandemics. For the analysis of how Ankara GCAP actions benefit in terms of the resilience of the city, this is explained over actions with a specific emphasis on resilience to natural disasters, and the resilience factors related to the sectors of energy, transport, land use, and GESI.

Flood and Cooling Effect

The capacity of all actions within the scope of the Ankara GCAP to prevent flood events that could occur in the city were reviewed. Actions were evaluated and rated in their effectiveness. The most effective actions regarding preventing flooding are ranked as low, medium, and high respectively and are indicated in blue colour from light to dark. Flood prevention values of all actions are given in **Table 27**. The cooling capacity of related actions were examined similarly and given in **Table 28** by indicating with colours darkening from yellow to orange. The meaning of colour transitions can be derived from the legend in **Table 26**.







Table 26:Legend of flood protectionand cooling capacityrankings

Table 27: Flood protection benefit of actions

Code	Action	Rank
SC.1	SCADA, Smart Meter and IoT applications program that will ensure the supply, distribution, and control of water in the city	
SC.2	Developing a Disaster Management System	
W.1	Planning to increase the capacity of Tatlar Wastewater Treatment Plant (WWTP) and stabilise the treatment sludge from treatment activities to be used in biogas, energy production and fertiliser production	
W.3	Controlling and monitoring the drinking water supply system and increasing the efficiency of water distribution networks	
SW.1	Conducting research activities on industrial symbiosis and urban metabolism applications	
SW.2	Establishing a pellet plant for recycling of municipal park, garden and forest waste	
SW.4	Implementation of infrastructure and equipment investments (containers, trucks, etc.) as well as awareness-raising activities to encourage the separation of waste at source	
R.1	Transformation of Ankara into a "sponge city"	
BD.1	Creation of urban nature parks and ensuring the connection of urban parks with natural habitats outside the city	
LU.1	Developing a green belt policy and creating open and green corridors in the city	
LU.2	Ensuring land use and transportation integration with rail based TOD (transit-oriented development) type implementations	
LU.3	Prioritising climate friendly and sustainable urban regeneration for future urban development	
B.1	Establishing a regularly updated urban building inventory that includes information such as age, type, energy performance and function of buildings.	
S.1	Soil and groundwater improvement of dumpsites no longer in use	
GS.4	Organising public education and awareness campaigns on green city practices, targeting social inclusion of vulnerable groups	

Table 28:Cooling benefit of actions

Code	Action	Rank
E.1	Meeting the energy needs of municipal affiliates that consume large amounts of electricity with renewable energy (SPP, HPP etc.)	
E.2	Establishment of a solar power plant to meet the wastewater treatment electricity need of ASKI	
Т.1	Development of the rail system network	
T.2	Prioritising conversion of fossil fueled buses to electric buses and/or replacement by new electric buses	
Т.3	Development of a feeder bike network	
T.4	Low Emission Zone (LEZ) implementation in the areas to be determined	
SC.1	SCADA, Smart Meter and IoT applications program that will ensure the supply, distribution, and control of water in the city	
SC.2	Developing a Disaster Management System	
W.1	Planning to increase the capacity of Tatlar Wastewater Treatment Plant (WWTP) and stabilise the treatment sludge from treatment activities to be used in biogas, energy production and fertiliser production	
W.2	Reuse of treated water at Tatlar WWTP	
W.3	Controlling and monitoring the drinking water supply system and increasing the efficiency of water distribution networks	
SW.1	Conducting research activities on industrial symbiosis and urban metabolism applications	
SW.2	Establishment of a pellet plant for the recycling of municipal park, garden and forest waste	
SW.3	Establishment of a biogas plant and using sediment resulting from the energy conversion process in fertilizer production	
SW.4	Implementation of infrastructure and equipment investments (containers, trucks, etc.) as well as awareness-raising activities to encourage the separation of waste at source	
R.1	Transforming Ankara into a "sponge city"	
BD.1	Creation of urban nature parks and ensuring the connection of urban parks with natural habitats outside the city	
LU.1	Developing a green belt policy and creating open and green corridors in the city	
LU.2	Ensuring land use and transportation integration with rail based TOD (transit-oriented development) type implementations	
LU.3	Prioritising climate friendly and sustainable urban regeneration for future urban development	
B.1	Establishing a regularly updated urban building inventory that includes information such as age, type, energy performance and function of buildings	
B.2	Effective transformation of building envelopes (such as building envelope sheathing) and building energy systems through improvements in existing municipal buildings	
S.1	Soil and groundwater improvement of dumpsites no longer in use	

6.2.3.3 Economic Benefits

The economic benefits of actions are analysed with the considerations of job creation, increasing local business opportunities, revenue generation, and cost savings. Increasing local business and job opportunities is an an economic benefit of proposed actions since it implies setting grounds for new businesses to take part in the action planning, development and implementation processes. The sectors and their related actions in the Ankara GCAP which contribute to the increase of local business and job opportunities are: Smart city (SC.1), Transportation (T.1 and T.2), Land use (LU.2, LU.3), Water-wastewater (W.1 and W.2), Risk (R.1), Biodiversity (BD.1), and GESI (GS.1, GS.2, GS.3, and GS.4). The range of how many job opportunities the actions create is given in *Table 29 in Section 6.2.3.6*.

6.2.3.4 Social and GESI Benefits

The social benefits depend mainly on the consideration of actions towards Gender Equality and Social Inclusion (GESI). The components of social benefits are framed around: enhanced gender equality, improved social justice, reduced poverty, improved community engagement, improved safety, training and educational opportunities for groups with different vulnerabilities, such as women, elderly, and youth barrier free access and improved access to services by sensitively addressing vulnerable groups. For the social sustainability and resilience of Ankara GCAP's actions, an assessment of social benefits is significant to ensure an enhancement of the social and GESI dimension of strategies and actions.

A lack of information on the mobility of vulnerable groups, and the user experience in Ankara could result in problems in urban mobility and eventually cause mobility injustices. The need for gender-disaggregated data, together with the lack of gender-based policy development needed in municipal service planning, can lead to gaps in urban mobility policies. In addition, fragmented service systems foster social exclusion risks, and affect urban resilience targets negatively. In line with the GESI assessment, some sub-actions are planned to be integrated in related actions and described under *Appendix 1 Action Fact Sheets*.

6.2.3.5 Smart Benefits

Global smart city index studies show that there is a direct positive relationship between the smart maturity and the sustainability level of cities. In short, it is important both to have actions that can be included as separate smart city actions, and to define the smart measures that will increase the strength of actions of other sectors. For the city to benefit more from smart technologies and further integrate them into its existing and new operations; the policies, initiatives and investments proposed for the next 5 years were examined and sub-steps were added to the appropriate ones to increase the impact of smart potential gains. In addition to actions SC.1, SC.2, SW.4, which already contain "smart city" attributes, smart potentials in other actions are described under *Appendix 1, Action Fact Sheets*.

6.2.3.6 Concluding Remarks for Benefit Assessment

Green, resilient, economic, social and smart benefits of actions primarily aim to fulfil the necessary steps towards achieving the Ankara GCAP vision for a more sustainable future for the city. This is in terms of the environmental setting, the economic and innovative capability, and social equality and inclusion. The ultimate goal of these benefits of actions is to reach the green city vision of Ankara;

"Green capital city Ankara, prioritising sustainable development and a balanced use of natural resources, being sensitive to the environment and climate, inclusive, fair, innovative, accessible and having a high quality of life".

General evaluation of the actions developed in the Ankara GCAP is given in Table 29.

Table 29: Generalevaluation of the actionsdeveloped in the AnkaraGreen City Action Plan

Sector	Nb of actions	Job creation potential	Total reduction of CO2 (tCO2/a)	Possible Financial Sources	
Air Quality	1	5-12	-	International Financing Institutions, National resource, AMM	
Energy	2	8-12	82,430	Export Credit Agencies, International financing institutions, Türkiye Bank of Provinces, Local banks and leasing companies, Financing facilities, AMM	
Transportation	4	1500-2000	389,852	AMM, EGO, BELKA, Related Ministry, PPP Projects, Loans, Tax Benefits and Purchase Incentives, Grant Programmes	
Smart City	2	40-45	-	International financing institutions, National resource, AMM, Private organisations, Development Agencies	
Water and Wastewater	3	15-20	3,243	Export Credit Agencies, International financing institutions, Türkiye Bank of Provinces, Local banks and leasing companies, Financing facilities, AMM, ASKI	
Solid Waste	4	25-35	14,590	European Union Funds, United Nations Development Programme, Export Credit Agencies, International financing institution, Türkiye Bank of Provinces, Türkiye Sustainable Energy Financing Facility, AMM, District Municipality, Ankara Chamber of Industry, Development Agencies	
Risk	1	5-10	-	European Union Funds, United Nations Development Programme, Export Credit Agencies, International financing institutions, Türkiye Bank of Provinces, Ankara Chamber of Industry, Development Agencies	
Biodiversity	1	15-20	750	International financing institutions, AMM, Municipal resource, Private organisations, Development Agencies	
Land use	3	400-500	34,156	European Union Funds,International financing institutions, National resource, AMM, EGO, Related Ministry, PPP Projects, Loans, Private construction companies, Developers, Private organisations, Development Agencies	
Buildings	2	70-100	259	International financing institutions, National resource, AMM	
Soil	Soil 1 250-300		-	European Union Funds, United Nations Development Programme, International financing institutions, Türkiye Bank of Provinces, Ankara Chamber of Industry, Development Agencies	
GESI	4	50-100	_	International financing institutions, EU, National resource, AMM, Private organisations	
Total	28	2383-3154	525,280		





Monitoring, Evaluation and Verification

One of the key elements of the GCAP implementation process is monitoring, evaluation, and verification of activities and actions. This chapter provides an overview of the GCAP's Monitoring, Evaluation, and Verification (MEV) strategy. The implementation process of the GCAP and the impact of its actions need to be consistently assessed. This chapter outlines the governance and the processes required to achieve each of these components, and with regard to the strategic objectives and vision, the evaluation of the process.



7.1 Implementation Monitoring

The monitoring of the implementation of the GCAP actions is used to track the status and progress of the GCAP project as a whole. This process needs to be integrated into the fundamental organisational structure and processes of related AMM departments. The monitoring of action implementation is undertaken as follows:

- The first step for an effective process of implementation is to define the lead unit within AMM, who are responsible for overseeing all the Green City actions, they are the Climate Change and Zero Waste Department, Climate Change and Clean Air Branch Directorate.
- Each GCAP action will have a designated department in charge of implementation. The Director
 within each municipal department is responsible for managing internal staff. With tasks such
 as: overseeing the action's implementation, reporting on the action's implementation process,
 and collecting the needed impact data.
- Each department, assigned for the related action(s), needs to set a framework for the budget and timescale needed to deliver the action(s), and reports about the implementation progress, along with the environmental impact. Accordingly, the planning of the subsequent stages of each action, including amendments to timescales, resources, and the budget, will be re-considered.
- Related departments are expected to consider the alignment of the GCAP monitoring with other plans, policies and projects (i.e., urban development plans, risk resilience and sustainability related plans) within the city to eliminate duplication and increase efficiency.

7.2 Impact Monitoring

Impact monitoring will measure the impact of the objectives and actions on Ankara's environmental performance. The aim is to analyse the results of actions in accordance with targets and to draw conclusions from successful performances. The process of impact monitoring's is detailed as:

- Monitoring the implementation of the GCAP actions and progress, defining the related stakeholders of the action(s) for data collection and review, and approving and analysing reports which relate to the action(s). Each responsible department/unit is expected to determine the responsible staff/experts.
- During the impact monitoring process, the main reference document is the Ankara GCAP indicator database, which enabled the baseline analysis and technical assessment of Ankara across State, Pressure, and Response indicators.
- For each action, its related strategic objectives and targets need to be considered as the ultimate achievement for the action, for monitoring the impact in the most effective manner.
- The responsibility for monitoring each indicator needs to be delegated to the relevant department/ unit. The experts selected for this task need to review all gathered data for accuracy, reliability, and traceability. This review process should be supported by AMM in terms of eliminating information gaps and enhancing the comprehension of indicators and actions.
- Progress reports on implementing the monitoring of indicators should follow the same format as the baseline analysis specified by the EBRD. At the end of the first year, the progress of each plan needs to be re-evaluated and any required changes should be made.
- AMM will evaluate each action based on the data obtained with consideration to the indicators. The analysis involves a review of the targets for each action, an analysis of the data acquired, and a comparison of the data with the established benchmarks for each action.

7.3 Monitoring Roadmap

The monitoring plan consists of elements that both complement and provide feedback for each other. To perform the correct monitoring task and increase how effective the results are, the monitoring steps are tested and reformulated after the necessary steps are completed. On the basis of reviews and analysis for each action, remedial measures should be developed and implemented, and monitoring should continue. Whether the objectives are met or not, it is necessary to convey progress to the stakeholders and the public in an open and transparent manner.

Figure 19 presents a flowchart that summarizes the key stages of the Monitoring Process for AMM. The process begins with ensuring that the early preparation tasks for each indicator are accomplished. This step needs to be performed before any monitoring activities may begin. Once the initial tasks are finished, monitoring can begin. If the goals are not accomplished, it is crucial to understand the underlying causes for the objectives not being reached.



Figure 19: Monitoring Roadmap

7.3.1 Monitoring Framework

Guidance

This section presents a monitoring framework example for a green city action to act as a guide for measuring the GCAP's implementation and impact. Pressure-State-Response indicators of the indicator database and the technical assessment process of the Ankara GCAP constitute the basis of the monitoring process. It is worth noting that some indicators are processed with different actions, emphasizing the significance of coordination amongst departments or units responsible for their respective indicators to prevent duplication of the data collection process. Within this framework, the implementation and impact indicators will be used for other Green Cities under the EBRD framework to determine progress and success.

This section relates to the Annex 2 of the EBRD GCAP Methodology, which describes the traffic lights benchmarking for pressure, state, and response indicators.

Sample monitoring framework

The sample monitoring assessment shows how every action planned as part of the Ankara GCAP could be measured considering action indicators and targets and analysed as an impact assessment process considering strategic objective indicators and targets. This exercise in **Table 30** is open to developing for each action during the implementation process.

Name of the action	Related Pillars & Strategic Objectives	Targets	Monitoring scale	Impacts	Coordination
T3: Development of a cycle feeder network and dissemination of cycling	P1: Environmental Protection S01: Conserve and efficiently use natural resources P2: Decarbonisation S01: Develop sustainable plans and policies S02: Develop sustainable transport systems	 Number of cycle lane km built to total planned - the target is 100%. Number of cycle parking facilities introduced to total planned - the target is 100%. Number of cycle parking spaces introduced to total planned - the target is 100%. Number of districts with feeder cycle network implemented to total planned - the target is 100%. Amount of funds spent on total implementation budget - the target is 100% or less, if possible at all. Number of cycle parking spaces or to keep it stable. 	Can be calculated per district or for the entire city or both	 Share of cycle trips to a station / transfer centre - expected increase Level of cycle parking use - expected a reasonable level of occupancy throughout a day Operating cost per cycle trip-expected decrease Number of cyclists satisfied with the network and overall experience - expected increase 	 Calculation should be done within the affected area. It should be calculated and monitored monthly by project owners and reported to the AMM

 Table 30: An example of monitoring assessment table



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Appendices



Appendix 1: Action Fact Sheets

The Actions of the Ankara GCAP are presented as project cards in the following pages.

The reference information given in the Action Cards was collected until November 2022.

Suggested pilot areas for actions should be considered as expert selections. These selections were made according to the principles considered throughout the entire GCAP process. During the implementation phase, changes can be made in these area selections depending on the feasibility studies.

The icons representing the benefits are listed in Table 31.



Scope of the actions, pilot areas, process, implementation steps, timeline, financial assessments and cost calculations were prepared with estimated approaches according to the information obtained from various resources. These are the plans and project lists shared by AMM units in May 2022, the opinions of the representatives of AMM units in the focus group meetings held in April, August, October and November 2022, the experiences of industry experts and similar local and international studies.

The action planning phase is the determination of the approaches that will guide the investment planning before the feasibility and project preparation studies. Forward-looking projections, forecasts, or estimates are based upon interpretations or assessments of available information at the time of writing. The realisation of the prospective information is dependent upon the continued validity of the assumptions on which it is based. Actual events and assumptions may not occur as expected, and there may be significant differences due to the seasonal conjuncture.



Air quality monitoring, emission inventory and air pollution modelling

It is important to establish air quality monitoring stations in the city centre, traffic dense regions, organized industrial zones and background areas. Air quality monitoring stations should measure CO, NOx (NO and NO₂), SO₂, O₃, NMVOCs, PM_{2.5}, PM₁₀ air quality parameters and meteorological data. Air pollution emission inventories serve for trend analyses, regional and local scale air quality modelling projects, regulatory impact assessments and human exposure studies. Air quality modelling is a mathematical, physical and chemical simulation of how air pollutants transport, disperse and react in the atmosphere to affect ambient air quality. Within the scope of the action of establishing the Air Quality and Meteorology Measurement Stations and determining the air pollution composition, ICP-MS (inductively coupled plasma mass spectrometry) and element-based (partly heavy metal) particulate matter (PM₁₀ and/or PM_{2.5}) will be collected on the filter with high-volume samplers and detailed content and composition studies will be carried out. With SEM (Scanning electron microscope), studies for the particulate visualisation, number, shape and size determination will also be realised.

Action Type

Investment

Prioritised Challenges

Currently there are 18 air quality monitoring stations already active in Ankara (National Air Quality Monitoring Network) operated by the Ministry of Environment, Urbanisation and Climate Change. There is a need to complete the missing data of some stations and to further improve their quality. Some stations do not monitor PM_{2.5}, which is responsible for many health-related problems. Most of the stations do not have O₃ analysers. O₃ is an important chemical in photochemical smog. None of the stations currently measures non-methane volatile organic compounds (NMVOCs). Non-methane volatile organic compounds are a set of organic compounds that are typically photochemically reactive in the atmosphere. NMVOCs include a large variety of chemically different compounds, such as benzene, ethanol, formaldehyde, cyclohexane, 1,1,1-trichloroethane and acetone. There is no holistic and detailed air quality emission inventory developed for Ankara and sophisticated air quality modelling done for the province, putting forward the shares of traffic, industry, residential heating, and power generation in the deteriorating air quality of the region. These stations are mainly located in the central districts of Ankara, but more data quality measures are needed to monitor the situation in the north, west and south of the Ankara metropolitan area as well.

Location / Pilot Area

Possible station locations:

- 3 stations in the city centre,
- 3 stations in the traffic dense regions,
- 2 stations in the organized industrial zones,
- · 2 stations in the background areas,
- 50 passive smart sensor kits in the background areas

Air Quality

Pillars and Strategic Objectives

Pillar 1 Environmental Protection	 SO2. Improve air quality Carrying out applications to increase air quality Monitoring and analysing air quality in more innovative ways
Pillar 4 Resilience	SO3. Plan urban development in line with environment and climatic conditions
Preparatory Tasks:	 Financial and economic feasibility studies for planning air quality monitoring, emission inventory development and air pollution modelling studies Elaborate a master plan to include every detail of monitoring air quality, determining the data collection locations, setting up technical infrastructure for the stations, emission inventory development and air quality model project to be done in the upcoming years
Follow up Tasks:	 Analysing air quality data obtained from the stations Identifying necessary actions to improve air quality Organising campaigns for the citywide awareness on air quality

Project Process		
Duration		
60 months		
Preparation Time	Implementation Time	Investment Operational Lifetime
24 months	36 months	25 years

Action Implementation Steps	5		Timeline
	12 months	24 months	24 months
Feasibility studies and masterplan preparation			
Development of a comprehensive air quality emission inventory			
Establishment of air quality and meteorology measurement stations			
Modelling the air quality of Ankara via a Chemical Transport Model			



Air quality monitoring, emission inventory and air pollution modeling

Estimated Budget

High, 10 million Euros and above

Financial Source

International Financing Institutions, National resource, Municipal resource

Beneficiaries

Owner/Responsible

Citizens, especially those living in areas AMM with poor air quality, city centres, heavy traffic areas and slums

Ministry of Environment, Urbanisation and Climate Change

Third Parties Involved



Existing Air Quality Monitoring Stations in Ankara

Air Quality

Benefits

Green Benefits

- Improved air quality
- Reduction of air pollution

Resilience Benefits

• Improved public health

Social Benefits

- Improved community engegament
- Barrier free access/improved access to services

Social and GESI Benefits

- Developing digital applications that enable citizen participation in air quality measurement, and/or citizens will gain awareness by using air quality measurements
- Organising campaigns citywide to raise awareness on air quality
- Prioritizing women, children and elderly who are the most impacted by air quality changes in the city, and monitoring the health of those that live in the neighbourhoods with poor air quality

Smart Benefits

- Increasing the capacity to produce meaningful data by blending the obtained air quality data with the others
- Enriching the city's data sensing portfolio by increasing the number of Air Quality sensing devices
- Publishing the data as both numerical and spatial on AMM's Open Data Portal
- Enabling AMM to expand their smart city ecosystem by leveraging the capacity of local private sector or technoparks in the development of passive devices











Meeting the energy needs of municipal affiliates that consume large amounts of electricity, with renewable energy (SPP, HPP etc.)

The aim is to meet the energy needs of affiliates that consume high amounts of electricity, such as wastewater treatment plants, metro stations, and production facilities, with renewable energy sources as part of the Municipality's decarbonization efforts.

As a pilot project, the plan is to establish a utility-scale solar power plant with an installed capacity of 80 MW for EGO Rail Systems. This action will be initiated by studying the energy efficiency of metro stations and main buildings.

Action Type

Investment

Prioritised Challenges

Türkiye's energy demand is mostly supplied by fossil fuels such as natural gas, coal, and fuel oil which emit carbon dioxide into the atmosphere and cause air pollution. In Türkiye, most of the buildings do not have sufficient energy efficiency applications. In line with the Climate Action Plan for Ankara, the use of renewable energy and energy efficiency should be increased in the buildings and the facilities.

Location / Pilot Area

Bala, Ankara



Bala, Ankara

Energy

Pillars and Strategic Objectives

Pillar 2. Decarbonisation	 SO4: Stimulate the use of Disseminating practices for Expanding the use of solar 	f renewable energy or increasing energy o r energy	y sources efficiency and energy p	performance
Preparatory Tasks:	 Energy efficiency audits for which consume high elect Selection of site Obtaining permits and ap Preparation of the planning Preparation of tender dess Preparation of the Turn-kor Contractor tender organization 	or the pilot metro sta ricity provals ig, technical and ecor ign, BoQs and specific ey Engineering Procu ration	tions and for the main nomic feasibility studies cations rement and Constructio	buildings of EGO s on (EPC)
Follow up Tasks:	Selection of the operationPreparation of the operation	and maintenance (C onal monitoring repo	&M) Contractor rts and audits	
Project Process				
Duration				
20 months				
Preparation Time	Implemer	ntation Time	Investment Ope	rational Lifetime
10 months	10 months	;	20 years	
Action Implementation St	eps			Timeline
	4 months	6 months	10	months
Energy Efficiency Study				
Preliminary Design and EF selection	с			
Permit and Detailed Desig studies by selected EPC	n 			
Construction				
Estimated Budget				
High, 10 million Euros and	l above			

Financial Source

ECAs (Export Credit Agencies) such as Citi Bank, UK Export Finance depending upon the exporting country, IFIs (International financing institutions) such as EBRD, World Bank, JICA (Japan International Cooperation Agency), Türkiye Bank of Provinces (Investment bank and IFI loans), Local banks and leasing companies, Financing facilities such as GEFF (Green Economy Financing Facility), the Municipality's own resources

Beneficiaries	Owner / Responsible	Third Parties Involved
Citizens, public transport users	EGO	Distribution Network Operators and Turkish Electricity Transmission Operator

Benefits

Green Benefits

- Improved or maintained ecosystem services
- Improved energy efficiency
- Reduced GHG emissions

Climate Change Mitigation

In carbon reduction calculations, the emission factor announced by the Ministry of Energy and Natural Resources is used for electricity. According to the calculations, an average of 0.440 tons of CO2-equivalent greenhouse gas emissions per 1 MWh (unit) net electricity generation is emitted throughout Türkiye.

Solar power plant capacity: 80 MW SPP annual generation: 126,021.29 MWh/year Emission factor for electricity end users: 0.44 tCO2e/MWh

Electricity generation x Grid Factor (average 0.440 tons CO2-eq per 1 MWh (unit) net electricity generation)

Air Quality			
PM10 kg/a	NOx kg/a	SO2 kg/a	CO kg/a
581,596	540,631	933,818	122,87
Resilience Benefits			Ø,
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Improved access to sustainable energy

Economic Benefits

- Cost savings
- Job creation
- Revenue generation

Social Benefits

• Enhanced gender equality, ensured equal opportunities in employement

GESI Benefits

• In energy related procurement, especially in public-private partnership tenders; employment of women, youth and disabled should be prioritised

• In order to build the local upskilling and reskilling training programs, AMM may promote a city-wide assessment of the energy transition-related job opportunities and energy losses

Smart Benefits

• Periodically, the amount of the green energy produced, and/or the total public benefit from this energy could be published simultaneously in the BaşkentMobile and on AMM's Open Data platform.



55,450 tCO₂/annual







Establishment of a solar power plant to meet the wastewater treatment electricity need of ASKI

This action aims to build a solar power plant for the decarbonisation of ASKI operations. A solar power plant (SPP) with a capacity of 35 MW will be constructed for 19 wastewater treatment plants, with a total 920,000 m³/day capacity. Tatlar WWTPs consume a large portion of total electricity consumption in Ankara. There are other existing studies by AMM to prepare SPPs such as floating SPP with a capacity of 1 MW, 8 MW SPP in Tatlar WWTP and 5 MW SPP in İvedik WTP. ASKI operations are reported to be energy efficient by the officials.

Action Type

Investment

Prioritised Challenges

Türkiye's energy demand is mostly supplied by fossil fuels such as natural gas, coal, and fuel oils which emit carbon dioxide into the atmosphere and cause air pollution. In line with the current Climate Action Plan in Ankara, the use of the renewable energy should be increased.

Location / Pilot Area

Bala, Ankara





Pillars and Strategic Objectives

Pillar 2. Decarbonisation	 SO4: Stimulate the use of renewable energy sources Disseminating the practices for increasing energy efficiency and energy performance Giving importance to R&D studies on renewable energy sources Expanding the use of solar energy
Preparatory Tasks:	 Selection of site Obtaining permits and approvals Preparation of planning, technical and economic feasibility studies Preparation of the tender designs, BoQs and specificationsPreparation of the Turn-key Engineering Procurement and Construction (EPC) Contractor tender organization
Follow up Tasks:	 Selection of the Operation and Maintenance (O&M) Contractor Preparation of the operational monitoring reports and audits

Project Process

Duration		
20 months		
Preparation Time	Implementation Time	Investment Operational Lifetime
10 months	10 months	20 years

Action
Implementation StepsTimeline4 months6 months10 monthsPreliminary Design and EPC
selectionImplementation StepsImplementation StepsObtaining Permit and
Detailed Design Studies by
selected EPCImplementation StepsImplementation Steps

Construction

Estimated Budget

High, 10 million Euros and above

Financial Source

ECAs (Export Credit Agencies) such as Citi Bank, UK Export Finance depending upon exporting country, IFIs (International financing institutions) such as EBRD, World Bank, JICA (Japan International Cooperation Agency), Türkiye Bank of Provinces (Investment bank and IFI loans), Local banks and leasing companies, Financing facilities such as GEFF (Green Economy Financing Facility), Municipality's own resources.

Beneficiaries	Owner / Responsible	Third Parties Involved
Citizens, public transport users	ASKI	Distribution Network Operators and
		Turkish Electricity Transmission Operator

Benefits

Green Benefits

- Reduction of air, water, soil, etc. pollution
- Improved or maintained ecosystem services
- Improved energy efficiency
- Reduced GHG emissions

Climate Change Mitigation 26,980 tCO,/annual

In carbon reduction calculations, the emission factor announced by the Ministry of Energy and Natural Resources is used for electricity. According to the calculations, an average of 0.440 tons of CO2-equivalent greenhouse gas emissions per 1 MWh (unit) net electricity generation is emitted throughout Türkiye.

61,320 MWh annual production

- Solar power plant capacity: 35 MW
- Hours per year: 8,760 h/year
- SPP installed capacity utilisation rate: 20%

Carbon saving: Electricity generation x Grid Factor (average 0.440 tons CO2-eq per 1 MWh (unit) net electricity generation)

Air Quality

PM10 kg/a	NOx kg∕a	SO2 kg/a	CO kg∕a
282,995.80	263,062.80	454,381.20	5,978.70

Improved access to sustainable energy

Economic Benefits				
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- Cost savings
- Job creation
- Revenue generation

Social Benefits

٠	Enhanced gender	equality,	ensured equa	al opportunities	in employement

Smart Benefits

• Monitoring of energy production with LoraWan and IoT technologies and remote controlling of the system efficiency



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Development of the rail system network

The planned rail system projects implemented within this action will be a strong step to decarbonise the public transportation system and promote the transition to public transport and active modes of transport (walking and cycling).

Action Type

Investment

Prioritised Challenges

The major source of transport-related air pollution in Ankara is road-based transport as the vehicles are old and typically diesel-powered. Currently, the rail system network is not city-wide and the public transport system is predominantly road-based. There may be consideration towards switching from road-based public transport to rail-based public transport as the main type of city-wide public transport.

Location / Pilot Area

A2 Ankaray Dikimevi-Nato Yolu Extension – 7.40 km

Söğütözü-AŞTİ Signalling System Renewal - 0.788 km

M2 Çayyolu-Kızılay Metro Extension - 7.72 km

- M4 Keçiören-AKM Metro Extension 5.50 km
- M5 Kızılay-Dikmen Metro 13.00 km



Rail system lines operated/under construction/planned in Ankara

Transportation

Pillars and Strategic Objectives

Pillar 1. Environmental Protection	 SO2: Improve air quality Carrying out applications for increasing air quality Prioritising environmental values in city plans 	ality and urban construction	
	SO1: Develop sustainable plans and policiePlanning rail system lines to the existing denseEnsuring public transport oriented urban deve	s e residential and commercial areas lopment	
Pillar 2. SO2: Develop sustainable transport systems Decarbonisation • Reducing dependency on cars and promoting the transition to public transport a active modes of transport (walking and cycling) • Decarbonising the public transport system and moving towards energy efficient vehicl • Creating an integrated, accessible and inclusive transport system			
Pillar 4. Resilience	 SO3: Plan urban development in line with environment and climatic conditions Prioritising environment and climate sensitive urban transformation, to ensure compact urban growth and curb urban sprawl. 		
Preparatory Tasks:	Financial and economic feasibility studies withDetailed designs of the lines to be constructed	planning I in the coming years	
Follow up Tasks:	 Monitoring and evaluation of the impact of changes of trips Regular monitoring of work in progress Carrying out evaluations for passenger satisfactories 	the newly opened lines on the modal	
Project Process			
Duration			
72 months per rail line / p	roject		
Preparation Time	Implementation Time	Investment Operational Lifetime	
12 months per rail line / p	roject 60 months per rail line / project	23 years per rail line / project	

Action

Implementation Steps		Timeline			
Feasibility Study	12 months	60 months			
Stakeholder Engagement activities					
Detailed Design Studies					
Construction					

Estimated Budged

High, 10 million and above

Financial Source

AMM, EGO, Related Ministry, PPP Projects, Loans

Beneficiaries	Owner / Responsible	Third Parties Involved		
Citizens, public transport users	AMM, EGO, Ministry of Transport and Infrastructure	Citizens, public transport operators		



Benefits

Green Benefits

- Reduction of air, noise, etc. pollution
- Improved energy efficiency
- Reduced GHG emissions

Energy and Resource efficiency

A decrease in vehicle-km and a reduction in fuel consumption are observed in road transport modes. There will be reductions in fuel consumption in this action, however, electricity consumption will increase.

Climate	limate Change Mitigation 228,583 tCO ₂ /a			
A2 line extension	An annual average of 47,935 tCO_2e Total 1,102,511 tCO_2e (during the operational lifetime)	Population growth: TURKSTAT projections Passenger increase: • Case without a project: The elasticity of the rail system passenger traffic		
M2 line extension	An annual average of $44,179 \text{ tCO}_2\text{e}$ Total 1,016,118 tCO ₂ e (during the operational lifetime)	for the period of 2017-2019, which is included in the EGO Annual Reports, is calculated according to the population. According to the obtained value, the expected number of rail system passengers in the future was determined. • Status with project: The number of passengers without a project was increased		
M4 line extension	An annual average of 2,482 tCO ₂ e Total 57,096 tCO ₂ e (during the operational lifetime)	in proportion to the increase in line length. Rail system passenger, distance and energy consumption data: EGO Annual Reports Road transport data:		
M5 line	An annual average of 133,987 tCO ₂ e Total 3,081,708 tCO ₂ e (during the operational lifetime)	Distribution of cars by fuel type: TURKSTAT data EGO buses fleet information: Data obtained from EGO within the scope of EGO Annual Reports and the Ankara GCAP TAR Report Emission factors by fuel type: Ankara Local Climate Change Action Plan		

Air Quality

PM₁₀ kg/a	PM _{2.5} kg/a	NOx kg∕a	SO₂ kg/a	CO kg/a
9,905	49,586	1,247,074	-141,078	1,336,057

Resilience Benefits

- Improved public health
- Improved access to sustainable and safe mobility

Economic Benefits

- Cost savings
- Job creation
- Increased local business opportunities

Social Benefits

- Improved safety (especially road safety)
- Barrier free access/ improved access to services

GESI Benefits

- Dynamic planning and implementation of cost-effective ticketing and transfer applications to expand the use of the public transport system especially among low-income groups
- Designing the rail system network to make it accessible for disabled and elderly people
- Determining quotas for women, youth and disabled people, who are among the most vulnerable groups in Ankara in rail system tenders, and ensuring that this issue is transferred to public-private sector infrastructure investments

Smart Benefits

• The expansion of the rail system can feed the content of smart applications (such as navigation, BaşkentMobile, EGOcepte) offered to users in the city, and provide a digital environment for the provision of applications such as Mobility-as-a-Service (MaaS) as it generates more data (of both businesses and passengers). It is feasible that this can create more opportunities for the development of private digital service providers.





Prioritising conversion of fosil fueled buses to electric buses and/or replacement with electric buses

It is aimed to prioritise the conversion and/or replacement of all fossil fuel buses with electric buses and to operate electric buses, with the purpose of decarbonising the public transport system.

Depending on the age of the fleet and the condition of the engine and body of the bus, bus conversion can be much less costly than purchasing a purpose-built electric bus, so both options (conversion / new purchase) should be considered.

Action Type

Investment

Prioritised Challenges

The major source of transport-related air pollution in Ankara is road transport as the vehicles are old and mainly use diesel fuel. This situation reduces the quality of life of residents and adversely affects public health. Implementation of legal regulations and financial incentives for switching to energy efficient vehicles is insufficient. It is critical that road public transport systems are purified from fossil fuel usage.

Location / Pilot Case

Business as usual: The distribution of buses according to their length are; 67% of buses are solo buses (12 m), 30% of buses are articulated buses (18 m), 3% of buses are midibuses.

.....

The elasticity of the municipal bus passenger traffic for the period of 2016-2019, which is included in the EGO Annual Reports, is calculated according to the population. Depending on the obtained value, the expected number of municipal bus passengers in the future, and the increase in the number of passengers, the number of buses that should be included in the fleet in the future is foreseen as 253. It is assumed that the distribution of bus lengths in the fleet will be similar to the current situation.

In line with the 40% emission reduction target for 2030:

• Project 1: Conversion of all 1463 buses of model year 2013 and earlier to electric buses.

• Project 2: Transforming model year 2013 and earlier buses into 310 electric buses according to the annual conversion capacity and meeting the excess capacity need with 1153 newly purchased electric buses.

• In both projects, the number of new electric buses to be purchased is 253.





Pillars and Strategic Objectives

Pillar 1 Environmental Protection	SO2: Improve air qualityCarrying out applications to increase air quality
Pillar 2 Decarbonisation	SO2: Develop sustainable transport systemsDecarbonising the public transport system and transforming to the energy efficient vehicles
	Determining targets compatible with other policy documents and action plans
Preparatory	 Encouraging the public transportation system to switch to low-carbon options
10383.	 Preparation of studies for planning and feasibility
Follow up Tasks:	Preparation of an air quality monitoring plan
Project Process	
Duration	
96 months	

Preparation Time	Implementation Time	Investment Operational Lifetime	
Phase 1: 6 months	Phase 2: 6 months Phase 3: 84 months	Operational lifetime of a bus is considered as 15 years.	
		Regular monitoring is required during and after the investment duration to replace the buses	

which will complete their operational lifetime.

Timeline

Action Implementation Steps

	6 months	6 months	84 months
Completion of the Feasibility Studies			
Review of the Feasibility Study and Deciding on the EV Strategy			
Assessing and Determining the Funding Packages			
Pilot Study according to the Model Year of Buses			
Implementation Plan and Purchase or Conversion of Vehicles			

Estimated Budget

High, 10 million Euros and above

Financial Source

AMM, EGO, BELKA, Related Ministries, Tax Benefits, Purchase Incentives				
Beneficiaries	Owner / Responsible	Third Parties Involved		
Citizens, public transport users,	AMM, EGO and BELKA	Citizens, public transport operators		

Citizens, public transport users, groups living near major arterial roads that run buses

Transportation

Benefits

Green Benefits

- Reduction of air, noise, etc. pollution
- Improved energy efficiency
- Reduced GHG emissions

Energy and Resource efficiency

A decrease in vehicle-km and a reduction in fuel consumption are observed in road transport modes. There will be reductions in fuel consumption in this action, however, electricity consumption will increase.

Climate Change Mitigation

An annual average of 45,569 tCO₂e

Total 410,119 tCO₂e (during the operational lifetime)

Population growth: TURKSTAT projections

Passenger increase: The elasticity of the bus passenger traffic for the period of 2016-2019, which is included in the EGO Annual Reports, is calculated according to the population. According to the obtained value, the expected number of bus passengers in the future was determined.

Bus operator passenger, distance and fuel consumption data: EGO Annual Reports

Fleet information: Number of vehicles by fuel type and model year-Data obtained from EGO within the scope of EGO Annual Reports and the Ankara GCAP TAR Report

Emission factors by fuel type: Ankara Local Climate Change Action Plan

Air Quality

PM _{₂.5} kg∕a	NO _x kg∕a	SO₂ kg∕a	CO kg/a	
2,625	371,683	-45,285	149,555	

Resilience Benefits

- Improved public health
- Improved access to sustainable energy
- Improved access to sustainable and safe mobility

Economic Benefits	₽₽₹	
Cost savings		
Job creation		
 Increased local business opportunities 		

Social Benefits

- Improved safety
- · Barrier free access/ improved access to services

Smart Benefits

• The new electric buses will be "smarter". The types of smart buses that meet the V2V, V2X, and V2I specifications can support the smart applications such as those which show passenger information.

• Interactive content which will increase the performance of the vehicles and businesses with external smart applications can be created.

• The potential developments such as "Open Data" and "entrepreneurship" in the city, as sources which generate data can be supported.









45,569 tCO₂/a



Development of a cycle feeder network and dissemination of cycling

It is targeted to construct cycle feeder routes integrated with the rail system and main bus lines to promote the use of bicycles as a means of transport.

In addition, activities will be conducted to disseminate sustainable means of transport (e-scooters, bicycles, etc.) among women, children, youth and disabled people, within the scope of the action.

Action Type

Investment and Policy

Prioritised Challenges

Social perception of cycling is not at a sufficient level and cycling is not considered as a mode of transport. The existing bicycle infrastructure with public transport is in low integration.

Location / Pilot Area

Phase 1: 17 km

Phase 2: 45 km

Phase 3: 148 km

Primarily the lines connected to the city center and the rail system



Bicycle system network proposed in AMM Bicycle Masterplan

Transportation

Pillars and Strategic Objectives

	-			
Pillar 1 Environmental Protection	SO2: Improve air of • Carrying out applic	quality cations to increase the a	r quality	
Pillar 2 Decarbonisation	 SO1: Develop sust Developing particip SO2: Develop sust Reducing depende active modes of tra- creating an integra 	ainable plans and pole batory planning practices ainable transport system ncy on cars and promoti ansport (walking and cystem ated, accessible, and inc	cies eems ng the transition to the public transport and cling) lusive transport system	
Preparatory Tasks:	Detailed design ofPreparation of stud	routes dies for planning and fea	sibility	
Follow up Tasks:	 Monitoring the effe Monitoring of the a Informing resident Monitoring the characteristic 	Monitoring the effective use of cycling infrastructure Monitoring of the air quality Informing residents of Ankara Monitoring the change in the modal distribution		
Project Process				
Duration				
228 months				
Preparation Time	Imple	mentation Time	Investment Operational Lifetime	
There is already a bicycle masterplan	Phase Phase Phase	 24 months 60 months 144 months 	Completing the selected routes will take 19 years Regular maintenance and repair will be required during and after the investment	
Action	ens		Timeline	
Implementation of	24 months	60 months	144 months	
Phase 1 of Implementatio Plan from Ankara Bicycle Masterplan	n []]]]			
Phase 2 of Implementatio Plan from Ankara Bicycle Masterplan	n			
Phase 3 of Implementatio Plan from Ankara Bicycle Masterplan	n 			
Estimated Budget				
High, 10 million Euros and	d above			
Financial Source AMM, Related Ministries				

Beneficiaries	Owner / Responsible	Third Parties Involved
Citizens, AMM, district municipalities	AMM, EGO	Public, CSOs advocating cycling, district municipalities

Benefits

Green Benefits

- Reduction of air, noise, etc. pollution
- Reduced GHG emissions

Energy and Resource efficiency

A decrease in the vehicle-km and a reduction in the fuel consumption are observed in the road transport modes. With the modal shift from road transport to bicycle, there will be decreases in gasoline, diesel, LPG and CNG consumption.

Climate Change Mitigation

An annual average of $115,700 \text{ tCO}_2\text{e}$ Total 2,198,306 tCO₂e (during the operational lifetime)

Population growth: TURKSTAT projections Passenger increase:

Total passenger increase in road transportation types: Ankara Local Climate Change Action Plan data was used as the starting value. The number of passengers over the years has increased in proportion to the population growth. EGO buses passenger increase: Forecasts made within the scope of the T.2 action were used.

Passenger increase in road transportation types other than EGO buses: Road transportation types were determined according to the difference between the total number of passengers and the number of passengers of EGO buses. The share of bicycles in journeys: Ankara Bicycle Masterplan

Emission factors by fuel type: Ankara Local Climate Change Action Plan

Air Quality

PM ₁₀ kg∕a	PM _{₂.5} kg∕a	NO _x kg∕a	SO ₂ kg/a	CO kg∕a
5,015	30,690	826,338	112	625,328

Resilience Benefits

- Improved public health
- Improved access to sustainable and safe mobility

Economic Benefits

Cost savings

Social Benefits

- Improved safety (espically road safety)
- Barrier free access/ improved access to services

GESI Benefits

• Encouraging the cycling as an economic means of transport by ensuring continuity of use between cycling and public transport. Introducing price regulations for including micro mobility or bicycle vehicles in public transport, similar to the discounted price for taking the ferry as in Izmir

• Establishing repair and bicycle rental stations on the cycle path routes, organising rent discount campaigns for vulnerable groups at rental stations

Organising free cycling trainings for all vulnerable groups of Ankara

Smart Benefits

• Further development of digital infrastructure for bicycle and e-scooter rental/sharing systems





115,700 tCO₂/a







Low Emission Zone (LEZ) implementation in a selected area

In an area to be determined as Low Emission Zone (LEZ), this action proposes to discourage the use of motor vehicles by increasing the price of vehicles that do not meet the Euro 6 emission standards and imposing various restrictions on vehicle traffic.

Action Type

Investment

Prioritised Challenges

The major source of transport-related air pollution in Ankara is road transport as the vehicles are old and mainly use diesel fuel. This situation reduces the quality of life of Ankara citizens and adversely affects public health. Although the contribution of the LEZ to the city-wide emission reduction is low, it will have significant local benefits as air quality will improve in the project area.

Location / Pilot Area

Kızılay Region (1.38 km2 area with 5.72 km perimeter)



Proposed Low Emission Zone in Kızılay, Ankara



Pillars and Strategic Objectives

Pillar 1 Environmental Protection	SO2: Improve air qualitCarrying out applicationMonitoring and analysing	ty is to increase th ig air quality in	e air quality more innovative v	vays	
Pillar 2 Decarbonisation	 SO2: Develop sustainat Reducing dependency or modes of transport (wal Decarbonising the public 	ble transport s n cars and prom lking and cyclin c transport syst	systems noting the transition g) em and transform	on to public trans ning to energy ef	port and active ficient vehicles
Preparatory Tasks:	 Feasibility studies Analysing and evaluati possibilities Reviewing the institution Plan for Ankara 	ing the existin	g legislation in t AMM in line with t	erms of AMM's he Local Climate	fee collection Change Action
Follow up Tasks:	Making an air quality mo	onitoring plan			
Project Process					
Duration					
60 months					
Preparation Time	Implementation 1	Time	Investment Op	erational Lifeti	me
24 months	36 months		Completing the p Expanding the in duration Regular mainten required during a	bilot project in 5 nplementation af ance and repair v and after investm	years' time 'ter investment will be nent duration
Action					Timolino
Implementation St	eps				Imeime
	24 months	36 mont	ns	Following y	ears
Feasibility Study					
Functional Design					
Preparation of Legal Framework (including legislation)					
Consultation and					
Procurement					
Installment and Organisa	tion				

Expansion of the project

Estimated Budget

High, 10 million Euros and above

Transportation

Financial Source

AMM, Grant Programmes and Loans

Benefits

Green Benefits

- Reduced GHG emissions
- Improved climate resilience
- Reduction of air, noise, etc. pollution

Climate Change Mitigation

Due to the lack of the required data, this action's climate change benefit has not been determined. There is a need to conduct a detailed study for the selected zone to determine the effect of implementing a low emission zone. The contribution of this action to the overall mitigation in GHG emissions in the city will be low, and mainly the local area will benefit. On the other hand, the selected area for this action can be expanded in the future to increase its overall benefit.

Resilience Benefits	Ŵ	Ĭ ,
Improved public health		
Improved access to sustainable and safe mobility		
Economic Benefits		
Revenue generation		
Cost savings		
Social Benefits	ė 🖻	r.
Improved social equality		
 Improved safety (e.g. road safety, GBVH, crime) 		

• Barrier free access/ improved access to services

Smart Benefits

• Continuous measurement of LEZs with LoraWan sensors such as PM, and CO etc. and planning on how to intervene in case of sudden changes

• Encouraging walking in the low emission zones. For example, preparing a list by counting the steps of the citizens of Ankara who walk a lot.





SCADA, Smart Water Meter and IoT applications program that will ensure the supply, distribution and control of water in the city

This action consists of three groups of sub-actions:

1. Development and expansion of a new SCADA for ASKI

• Scattered Area SCADA: The new SCADA will provide flow readings in the network, controlling and scheduling the operating times of the pumps, controlling the occupancy rates of the water tanks, and remote monitoring and analysis of the unusual data in the network. In addition, it will be possible to control and adjust the pressure, which is an important factor in water losses and leakage, by supporting electromagnetic flow meters. Thus, new control software and hardware will reduce water loss and leakage in the city, reduce operating costs, indirectly reduce the organization's emissions (such as fuel consumption of field crews) and effectively monitor. For example, 24/7 monitoring of Kesikköprü Dam Basin with IoT devices to be connected to the SCADA system is expected to expand the database.

• Facility Process SCADA: The SCADA system that provides the control of the processes of the main elements such as treatment plants in the water management will be developed. Thus, it is expected that the process will operate more sustainably, increase managerial efficiency, eliminate human-factor operating difficulties, prevent accidents, and reduce equipment costs (including installation and operation).

2. Further deployment of smart water meters in the city and integration with Subscriber Management Software

• It will be ensured that the meters in especially high-consumption domestic, industrial and agricultural areas are replaced, and a renewed subscription system based on the ERP (Enterprise Resource Planning) will be established. Thus, by positively changing the subscriber's behaviour in the water consumption and ensuring the integration between SCADA-GIS (Ankabis)-Meter systems, AMM will be able to focus on the innovative development areas such as strategic management of water, savings and efficient use of water.

3. Monitoring critical flood points and sewerage system with IoT based sensors.

• Planning activities within this sub-action are; installation and remote monitoring of the IoT-based sensors connected to the communication network, modelling between these sensors and precipitation time-flow rate-occupancy-flood, receiving warnings before reaching critical thresholds in the basins, streams and/or sewerage pipes-manholes and actively sending support to those areas, marking critical flood points, determining the critical level, and sharing the generated data with the stakeholders, and the relevant departments of AMM.

Action Type

Investment

Prioritised Challenges

The loss-leakage problem that water supply systems are exposed to creating waste of water by giving more water to the system than needed and causing the problem of non revenue water.

Location / Pilot Area

Approximately 80 flood points in Ankara, 30,000 water meters in ASKİ's plan and ASKİ facilities

Smart City

Pillars and Strategic Objectives

Pillar 3 Resource Efficiency and Circular Economy	 SO1: Use resources efficiently Developing innovative control and monitoring n leakage water rate of the drinking water supply 	nethods in order to reduce the loss- system		
Pillar 4 Resilience	 SO2: Enhance resilience of the city Updating the adaptation capacity of the city acc Monitoring the risk factors of the city with digitation evaluated by the relevant stakeholders 	cording to the changing conditions al methods and ensuring that they are		
Preparatory Tasks:	 Analysis and road mapping of project processes Reporting the competencies of the existing syst working features Gathering stakeholder expectations and sugges Hardware purchasing and installation (approxin 30,000 smart meters and enough (400) IoT-base The review of the existing communication systef A redundant communication infrastructure to su link supported) Construction of software and system development management, water management, environmen software development team) The system should be implemented in automat cybersecurity standards (for example, the NIST 62443 automation and control systems cyberse series Information Security standards) 	ting the implementation points nately 2,000 Gateways, 132 flowmeters, sed sensors at 80 points) mused by the existing SCADA upport SCADA (radio, GSM and radio ent capacity in AMM disaster tal control units (eg ASKI SCADA control ion, control, information, and high-level cybersecurity framework, ISA/IEC ecurity standards series, and ISO 27000		
Follow up Tasks:	 GIS (Ankabis)-SCADA-ERP integration Integrated monitoring of systems after implementation Creation of new extreme precipitation situation graphics (location based) Periodic reporting (performance analysis) System maintenance, identification and solution of new needs Enlarging the system in scale and dissemination of it at more points 			
Project Process				
Duration				
36 months				
Preparation Time	Implementation Time	Investment Operational Lifetime		
6 months	30 months	20 years		
Action Implementation St	teps	Timeline		
Scoping, design and plan (purchasing and delivery	6 months 12 months ning plan)	12 months 6 months		
Platform development (software)				
Site infrastructure constru (implementation of field devices-IoT, meters, flowmeters etc)	uction			
Integration and management				
Supervision and commissioning				

SCADA, Smart Water Meter and IoT applications program that will ensure the supply, distribution and control of water in the city

Estimated Budget

High, 10 million Euros and above

Financial Source

International financing institutions, National resource, Municipal resource, Private organisations and Development Agencies

Beneficiaries

Users of transport and water infrastructure (e.g. passengers, households, industrial producers, rural producers), those living in flooded areas (partially low-income), AMM departments dealing with facility management, floods and disasters; IT Department units, Earthquake Risk Management and Urban Improvement Department units and ASKI

Benefits

Green Benefits

- Improved climate resilience
- Improved energy efficiency
- · Improved air, water and/or soil quality

Energy and Resource efficiency

The aim is to provide 100% monitoring with smart systems in drinking water networks. As a result of this followup, areas with loss, leakage or excess energy consumption will be determined and improvements/retrofits can be planned and realised. This will reduce unnecessary energy consumption and therefore energy savings will be achieved.

Resilience Benefits

- Improving access to clean water, improved sewerage
- · Improved access to sustainable food

Economic Benefits

- · Cost savings
- Increased local business opportunies

Social Benefits

Improved safety (e.g. road safety, crime)

GESI Benefits

Digitalization of water infrastructure services will boost social and economic benefits, especially in the development of new economic and social programmes directed for the populations, such as informal water consumers in rural parts of Ankara's metropolitan area, and monitoring of the current water demand, access, and distribution.

Smart meter suppliers and developers, private SCADA-automation development companies, IoT developers (flood detectors and communication network planning companies (especially in LoRaWan and NB-IoT standards), gateway suppliers, universities, TTOs and science and technology parks













Third Parties Involved

Owner/Res.



Developing a Disaster Management System

In recent years, heavy rains and floods have been occurring more frequently in Ankara. In addition, events such as fire, drought, air pollution, waste, earthquakes, and landslides are also experienced. AMM needs a decision support system for planning resources, determining the number/location of incidents, estimating risk level, assigning tasks to departments, dispatching field teams, obtaining/interpreting/storing incident data, and generating status reports.

Basic requirements:

Management Process

Procedures according to the disaster prevention, preparation, response, and recovery processes

Information

Integrated disaster identification, reporting, and dissemination system

Integrated disaster monitoring and mass notification system (MNS)

Disaster-related data and an integrated database for systematic disaster management

IoT-based disaster identification system to quickly understand the situation on site

• Infrastructure

Integrated disaster management centre

Integrated GIS and disaster main system for disaster management

Digital-based communication system and cooperation for the dissemination of the disaster

The main goal of the Disaster Management System is to develop plans to utilize local resources that can respond to the hydrological, climatic, chemical, biological, geological and disaster-related needs as quickly and effectively as possible. This will reduce the operating costs, and develop a key structure that can be integrated with other smart city technologies, and most importantly, enhance management capabilities.

Action Type

Investment

Prioritised Challenges

In case of disasters and emergencies, high technology and data are not used extensively and smart city projects are not developed for this purpose.

Location / Pilot Area

Ankara wide



Pillars and Strategic Objectives

Pillar 4 Resilience	 SO2: Enhance resilience of the city Updating the adaptation capacity of the city according to the changing conditions Developing preventive risk management against natural disasters Monitoring the risk factors of the city with digital methods and ensuring that they are evaluated by the relevant stakeholders
Preparatory Tasks:	 Development of an Integrated Disaster Management Platform Establishment of a Flood Monitoring System Establishment of a Road Icing Monitoring System This action should be compatible with the establishment of the Traffic Control Centre in the AMM Strategic Plan. For example, a common centre that provides two functions can be developed, thanks to a better use of resources (communication infrastructure, building, data storage, software and personnel)
Follow up Tasks:	 Sharing (data and output sharing) System development (software and hardware add-ons that meet new needs) Maintenance (technology support)
Project Process	
Duration	
44 months	

Preparation Time	Implementation Time	Investment Operational Lifetime
8 months	36 months	30 years

Action Implementation Steps							Tin	neline
	8 months	12 mont	hs	12	2 month	S	12 n	nonths
Planning								
Infrastructure and platform								
Integration of field devices								
Data analysis sharing								
Capacity building								
Commissioning and maintenance								

Estimated Budget

High, 10 million Euros and above

Smart City

Financial Source

International financing institutions, National resource, Municipal resource, Private organisations and Development Agencies

Beneficiaries	Owner/Responsible	Third Parties Involved
People living in disaster risk settlements, AMM's disaster coordination units	AMM Department of Earthquake Risk Management and Urban Improvement, Department of Fire Brigade	City, AFAD
Benefits		
Green Benefits		L.
Improved climate resilience		Č.
Resilience Benefits		W
Improved public health		
Economic Benefits		
Cost savings		
Social Benefits		ttė 🕏

- Improved social equality
- Improved safety (e.g. road safety, GBVH, crime)





Planning to increase the capacity of Tatlar Wastewater Treatment Plant (WWTP) and stabilize treatment sludge from treatment activities to be used in biogas, energy production and fertilizer production

Central (Tatlar) Wastewater Treatment Plant has a daily treatment capacity of 765,000 m³. The WWTP has an activated sludge system and only carbon removal is done in the system currently. The capacity of this plant will be increased to 1,350,000 m³/day in line with the increasing population.

While designing the plant, the capacity and design of the extension should ensure that discharge quality meets the allowable limits by regulation as a minimum. The current discharge point is the Ankara Creek. The water quality has been decreasing due to the industrial discharges. It is reported that the water from the Ankara Creek is also used for irrigation in some of the farmlands. Therefore, the extension should be designed to enable the Nitrogen and Phosphorus removal through an advanced biological treatment.

While increasing the capacity at the existing plant, biogas production and electricity generation capacity should also be extended. There are two gas engines, each has 1.65 MW installed capacity. The biogas plant capacity can be increased to 6 MW.

Sludge treatment typically comprises of two key steps: i) sludge thickening followed by ii) sludge dewatering. The differentiation between thickening (4-6% dry solids content) or dewatering (usually >20% dry solids content) depends on the amount of water removed.

Sludge thickening predominantly happens through mechanical means such as gravity thickening, centrifugal thickening, or using a gravity belt.

• Gravity thickening allows sludge particles to settle to the base of a tank, producing a concentrated thickened sludge stream. Thickened sludge is removed from the tank.

• Centrifugal thickening allows sludge particles to migrate to the sides of a rotating container

Gravity thickening allows sludge streams to drain under gravity through a permeable belt which the sludge sits on
Sludge dewatering usually happens through mechanical means to further increase the water removal. The used processes include:

Belt filter press where sludge is pressed to force the water through a permeable belt.

Rotary press where sludge travels through a narrow, rotating parallel-flow channel with porous walls. Water is
removed through the porous surfaces.

Sludge could also be dewatered under ambient conditions (through evaporation and gravity draining) using sludge drying beds. This technology has low power requirements but a large land footprint and potentially high odour emissions.

Action Type

Investment

Prioritised Challenges

In line with the population growth, the capacity of this plant should be increased. Combined stormwater and wastewater pipelines constructed as a result of the rapid urbanisation and irregular construction were separated in some of the districts by the renovation works. Energy consumption is high for the wastewater treatment plants in Ankara. Unit energy consumption for wastewater collection and treatment is 0.21 kWh/m³.

Current status of Tatlar WWTP;

Only carbon removal is available
The current capacity is 765,000 m³/d.
Treatment processes;

Pre-Treatment Unit
Aeration Pools
Settlement Pools
Activated Sludge Process

There is no nitrogen and phosphorus removal.

Location / Pilot Area

Tatlar Wastewater Treatment Plant

Water and Wastewater

Pillars and Strategic Objectives

Pillar 1. Environmental Protection	SO1: Conserve and efficiently use natural resourcesIncreasing the number/capacity of wastewater treatment plants				
Pillar 2. Decarbonisation	SO4: Stimulate the use of renewable energy sourcesDisseminating the practices for increasing energy efficiency and energy performance				
Pillar 3. Resource Efficiency and Circular Economy	 SO1: Use resources efficiently Improving the circular performance of the city and reducing the amount of waste accumulated in landfills SO2: Ensure the recovery of resources Segregation wastes at the source Developing institutional and social capacity in waste reduction and recycling 				
Preparatory Tasks:	 Technical and economic feasibility studies (clarification of standards regarding the water body, understanding of water quality standards for irrigation requirement, calculation of wastewater treatment plant capacity, calculation of biogas and electricity generation potential, technology selection and willingness to pay studies) Preparation of tender designs, unit price lists and specifications Preparing detailed designed projects 				
Follow up Tasks:	 Monitoring the WWTP inlet water quality and quantity and outlet water quality Monitoring the water quality of the Ankara Creek and public health after the rehabilitation and capacity increase of the facility 				

Project Process		
Duration		
48 months		
Preparation Time	Implementation Time	Investment Operational Lifetime
12 months	36 months	24 years

Action Implementation Sto	eps		Timelin	е
	3 months	9 months	36 months	
Feasibility Study				
Detailed Design Studies				
Construction				



Planning to increase the capacity of Tatlar Wastewater Treatment Plant (WWTP) and stabilize treatment sludge from treatment activities to be used in biogas, energy production and fertilizer production

Estimated Budget

High, 10 million Euros and above

Financial Source

ECAs (Export Credit Agencies) such as Citi Bank, UK Export Finance depending upon exporting country, IFIs (International financing institutions) such as EBRD, World Bank, JICA (Japan International Cooperation Agency), Türkiye Bank of Provinces (Investment bank and IFI Ioans), Municipality and ASKI's own resources.

Beneficiaries

All sectors in Ankara, especially the public health and the potential water users of the Ankara Creek will benefit from this action as the pressure on the clean water resources will decrease.

Owner/Responsible

AMM, ASKİ, State Hydraulic Works (DSI), Ministry of Agriculture and Forestry, Ministry of Environment, Urbanisation and Climate Change

Third Parties Involved

Citizens, Farmland owners



Tatlar WWTP, Ankara

Water and Wastewater

Benefits

Green Benefits

- Reduced GHG emissions
- · Improved energy efficiency
- Improved climate resilience
- · Improved air, water and soil quality
- · Improved or maintained ecosystem services

Climate Change Mitigation

In carbon reduction calculations, the emission factor announced by the Ministry of Energy and Natural Resources is used for electricity. According to the calculations, an average of 0,440 tons of CO2-equivalent greenhouse gas emissions per 1 MWh (unit) net electricity generation is emitted throughout Türkiye. Annual energy savings will be 3,637.361 MWh until 2030.

Air Quality

PM ₁₀ kg∕a	NO _x kg∕a	SO ₂ kg/a	CO kg/a
16,786.66	15,604.28	26,952.85	354,64

Resilience Benefits	Ð	()	÷
 Improved access to sustainable food Improved access to sustainable energy Improving access to clean water, improved sewerage 			
Economic Benefits	₽₽₽		
 Job creation Increased local business opportunities Revenue generation Cost savings 			

Social Benefits

• Enhanced gender equality, ensured equal opportunities in employement

GESI Benefits

Adding quotas for women, youth and disabled people in the tender or service procurement engagement in relation
to the labour procurement

• Adding quotas for women, youth and disabled people when the facility is transferred to the municipality for operation or selecting staff with these characteristics for the skills transfer programmes

Smart Benefits

• Preparation of a digital twin of the wastewater system to use RF technology for minimising loss and leakage rates on the city water network

1,600 tCO₂/a



Reuse of treated water at Tatlar WWTP

Water resources are limited in Ankara. Water recycling should be seen as priority while planning wastewater treatment plants given the effects of the climate change.

Türkiye General Directorate of Water Management carried out a study to determine the re-use potential and quality of effluent water from all wastewater treatment plants in Türkiye in 2020. All Ankara Wastewater Treatment Plants were reviewed, and Tatlar Wastewater Treatment Plant was studied as part of this project. It was determined that the wastewater treated at the facility could be used for industrial process water, cooling water and irrigation water at agriculture. The water quality standard of the treated wastewater was determined according to the purpose of recycling. According to the study, 420,000 m3/day treated water can be used at irrigation and industries.

The steps within the scope of the action are listed below:

· Advanced biological treatment as stated in the action W1

• Recycling plant and transmission lines including filtration with micro disc filter followed by the disinfection units with UV units.

Action Type

Investment

Prioritised Challenges

Fresh water resources in Ankara are decreasing day by day due to the increase in population growth which put pressure on water resources and network lines. 20% of the daily amount of water supplied to the drinking water network is for usage purposes. Additional units will be installed for recycling by considering the product and soil requirements of the areas to be irrigated. The water quality demanded by the industries will determine the appropriate type of wastewater treatment. The location of the industries and the elevation difference should also be considered during the detailed design stage.

Location / Pilot Area

Tatlar Wastewater Treatment Plant



Tatlar WWTP treated water reuse areas

Water and Wastewater

Pillars and Strategic Objectives

Pillar 1. Environmental Protection	SO1: Conserve and efficiently use natureIncreasing the number/capacity of the way	ral resources stewater treatment plants		
Pillar 3. Resource Efficiency and Circular Economy	SO1: Use resources efficientlyReducing the pressure on natural water resources by developing alternative resources			
Preparatory Tasks:	 Preliminary assessments should be analysed considering the recent groundwater quality and soil analyses Determination of the population projections of agricultural development areas close to the WWTP Calculation of the surface water and groundwater utilizations for irrigation considering the climate change factor Identification of the regions where agricultural irrigation is done with groundwater Preparation of the irrigation transmission lines and network projects by prioritizing suitable routes Design of a recycling plant and transmission lines including filtration with micro disc filter, and disinfection units with UV units Identifying appropriate level of treatment and effluent quality that will be desired by the industries Preparation of tender designs, BoQs and specifications for Turnkey Engineering, Procurement and Construction (EPC) Contractor selection tender 			
Follow up Tasks:	 Monitoring the water quality of the treatment plants together with the water consumption data. Measuring of the agricultural, industrial and recreational usage areas and quantities 			
Project Process Duration				
28 months				
Preparation Time	Implementation Time	Investment Operational Lifetime		
16 months	12 months	15 years		
Action Implementation St	eps	Timeline		

	6 months	4 months	6 months	12 months
Feasibility Study, Concept Designs				
Tender Documents and EPC Selection				
Detailed Design Studies				
Construction				


Reuse of treated water at Tatlar WWTP

Estimated Budget

High, 10 million Euros and above

Financial Source

ECAs (Export Credit Agencies) such as Citi Bank, UK Export Finance depending upon exporting country, IFIs (International financing institutions) such as EBRD, World Bank, JICA (Japan International Cooperation Agency), Türkiye Bank of Provinces (Investment bank and IFI loans), Municipality and ASKI's own resources.

Beneficiaries	Owner/Responsible
Industries, farmland owners	AMM, ASKI, MoUECC

Third Parties Involved State Hydraulic Works, Ministry of Agriculture and Forestry



Tatlar WWTP, Ankara

Water and Wastewater

1,382 tCO₂/a

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Benefits

Green Benefits

- Reduced GHG emissions
- Improved energy efficiency
- Improved climate resilience
- · Improved air, water and soil quality
- · Improved or maintained ecosystem services

Climate Change Mitigation

The aim is to reduce carbon emissions by irrigating green areas or reusing treated water in agriculture where logistically appropriate. For this purpose, the amount of the energy to be spent in the supply of the drinking water ($661,943m^3$ daily) will be reduced with the water to be recovered from the Tatlar Wastewater Treatment Plant. This will provide an annual CO₂ reduction of 1,382 t. (The energy consumption of the Drinking Water Treatment Plant is taken as 0.013 kWh/m³.)

Air Quality

PM ₁₀ kg∕a	NO _x kg∕a	SO ₂ kg/a	CO kg/a
14,496	13,475	23,274	30

Water Saving

Reducing fresh water usage by reusing treated wastewater in agriculture and industry will provide water saving

Resilience Benefits	D	Ø,	÷
 Improved access to sustainable food Improved access to sustainable energy Improving access to clean water, improved sewerage 			
Economic Benefits	₽₽₹		
 Job creation Increased local business opportunities Revenue generation Cost savings 			

Social Benefits

- Improved community engegament
- Enhanced gender equality, ensured equal opportunities in employment

GESI Benefits

• With brochures and on-site demonstrations informing the farmers about the water which can be used in agricultural irrigation

• Implementation of quotas for women, youth and disabled people in the tender or service procurement for conversion to the advanced treatment

- Monitoring the agricultural productivity and publishing good examples through the media
- Encouraging drip irrigation by engaging with other stakeholders



Controlling and monitoring the drinking water supply system and increasing the efficiency of water distribution networks

Loss and leakage management is important in water supply systems for the resource efficiency and reducing the carbon footprint. Ankara frequently experiences drought. In recent years, Ankara's water resources have also been adversely affected by the rapid population growth, improper use of land and pollution, on top of the global climate change and thus the drought. Priority should be given to the studies on administrative losses for quick environmental and financial returns. The main goal of this action is to transform the water distribution networks with investments that increase efficiency at pipelines in their end of useful life.

In this context, suggested sub-actions are defined below:

- Transition to the active physical loss control and pressure management
- Hydraulic modelling of 500 km water supply system
- Establishing 450 District Metered Areas (DMA)
- Physical Leakage Detection
- Water Supply System Pressure Management
- Replacing 30 km pipeline

Action Type

Investment

Prioritised Challenges

In Türkiye, loss-leakage is a major problem that the water supply systems are exposed to. This causes high nonrevenue water amounts, more electricity utilisation and higher carbon emissions within the water distribution network. Ankara's water loss rate is around 37%. It should be reduced to 25% by 2030 according to the water legislation in Türkiye.

Location / Pilot Area

Ankara wide



Water and Wastewater

Pillars and Strategic Objectives

Pillar 1. Environmental Protection	 SO1: Conserve and efficiently use n Protecting wetlands Ensuring the protection of water basin basins in planning 	natural resources
Pillar 2. Decarbonisation	SO3: Develop energy efficient practReducing the carbon footprint of waster	tices in built environment tewater and drinking water infrastructure
Pillar 3. Resource Efficiency and Circular Economy	SO1: Use resources efficientlyDeveloping innovative control and mo leakage water rate of the drinking water	onitoring methods in order to reduce the loss- iter supply system
Preparatory Tasks:	 Evaluation of the existing lines and cu Determination of the loss and leakage Establishment of a current water balant Evaluation of the current monitoring statement 	urrent water consumption data e rates ance table systems and their effects
Follow up Tasks:	Monitoring of all water loss KPIs and e	energy use
Project Process		
Duration		
42 months		
Preparation Time	Implementation Tim	ne Investment Operational Lifetime
30 months	12 months	15 years
Action Implementation S	teps	Timeline
	18 months 6 r	months 6 months 12 months
Physical Leakage Detection	on []]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]	
Preparation of tender designs, BoQs and specifications		
EPC selection and detaile designs	ed	
Construction		
Estimated Budge	t	
High, 10 million Euros an	nd above	



Benefits

Green Benefits

- Reduced GHG emissions
- Improved energy efficiency
- Improved climate resilience
- · Improved air, water and soil quality

Energy and Resource Efficiency

This action focuses on the retrofitting of the drinking water distribution network, where there are currently high loss and leakage rates in the drinking water networks. Through this action, there will be a reduction in the energy consumption and an increase in the energy saving from reducing the loss and leakage for the same amount of water demand.

Climate Change Mitigation

261 tCO₂/a

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Amount of water entering the system in 2020: $507.518.352 \text{ m}^3/\text{year}$ Energy spent for 34% loss: $507.518.352 \text{m}^3/\text{year} \times 0.34 \times 0.013 \text{kWh/m}^3=2243 \text{MWh/year}$ Energy spent for 25% loss: $507.518.352 \text{m}^3/\text{year} \times 0.25 \times 0.013 \text{kWh/m}^3=1649 \text{MWh/year}$ Difference: 2243-1649=594 MWh/yearCO₂: $594 \text{MWh/year} \times 0.44 \text{ tonsCO}_2/1 \text{MWh}=261 \text{ton/year}$

Air Quality

·····			
PM ₁₀ kg∕a	NO _x kg∕a	SO ₂ kg/a	CO kg/a
2,744	2,548	4,402	58

Water Saving

Replacing the pipelines will reduce water leakage and loss in the drinking water system. This action will also save freshwater resources.

Resilience Benefits			÷
Improved supply chain securityIncreased access to sustainable housingImproving access to clean water, improved sewerage			
Economic Benefits			
Job creationRevenue generationCost savings			
Social Benefits	4	i i i.	ė,
Improved social equalityBarrier free access/ improved access to services			

Smart Benefits

- Integrating controllers (valves) with next-generation SCADA
- Preparing a digital model of the district-based network can increase the utility of DMA



Conducting research activities on industrial symbiosis and urban metabolism applications

Industrial symbiosis is a union between two or more industrial plants or companies in which the by-product of one is turned into the raw material of another. Urban metabolism is a model that facilitates the identification and analysis of products and energy flows within cities.

This action considers the efficient use of resources through intersectoral synergetic activities (e.g. waste/energy/ water etc. exchange). The action aims to create the preconditions for the industrial symbiosis by building a platform for coordination among different industrial actors; generating supportive research and analysis; ensuring a conducive legal framework; and overseeing pilot initiatives. This study will also search for an economic model that can deliver prosperity to people without constantly destroying precious natural resources.

Action Type

Other initiatives

Prioritised Challenges

Data and academic studies are lacking in this field. This action should be supported by site works in collaboration with industries across Ankara.

Location / Pilot Area

Ankara Central Districts: Çankaya, Altındağ, Etimesgut, Gölbaşı, Keçiören, Mamak, Pursaklar, Sincan, Yenimahalle





Pillars and Strategic Objectives

Pillar 3. Resource Efficiency and Circular Economy	 SO1: Use resources efficiently Improving the circular performance of the city and reducing the amount of waste accumulated in landfills
	 SO2: Ensure the recovery of resources Waste segregation at source Developing institutional and social capacity in waste reduction and recycling Expanding the industrial symbiosis and urban metabolism applications
Preparatory Tasks:	 Preparation of RfP for Consultancy works tender Experience and examples from other regions and countries The scope includes identifying the key stakeholders in the industrial sector and in municipal activities (including production/manufacturing) Realization of the partnership mechanisms with key stakeholders Evaluation of the financial resources for the implementation of the determined industrial symbiosis and urban metabolism implementations, capacity development activities, field studies etc.
Follow up Tasks:	 Impact monitoring studies through the realization of the implementations Investments required for realising the actions decided in the report

Project Process

Duration	
24 months	
Preparation Time	Implementation Time
3 months	21 months

Action	
Implementation Steps	Timeline

	3 months	21 months
Tender documentation and consultant selection		
Preparation of the study		

Estimated Budget

Medium, 1-10 million Euros.

Solid Waste

Conducting research activities on industrial symbiosis and urban metabolism applications

Financial Source

European Union Funds, United Nations Development Programme, ECAs (Export Credit Agencies) such as Citi Bank, UK Export Finance depending upon exporting country, IFIs (International financing institutions) such as EBRD, World Bank, JICA (Japan International Cooperation Agency), Türkiye Bank of Provinces (Investment bank and IFI Ioans), Ankara Chamber of Industry, Development Agencies

Beneficiaries

Industrial facilities operating in Ankara, AMM, Affiliates of AMM, Organised Industrial Zones in Ankara Owner/Responsible
Development Agencies and
UNDP

Third Parties Involved

Waste Management and Disposal Companies



Districts with industrial symbiosis potential in Ankara



Benefits

Green Benefits	讨	₽. ¥	\otimes
 Reduced GHG emissions Improved energy efficiency Improved air, water and/or soil quality Reduction of air, water, soil etc. pollution 			
Resilience Benefits		Ø,	
Improved access to sustainable energyImproved supply chain security			
Economic Benefits			
Revenue generationCost savings			
Social Benefits			A
Vulnerable population is addressed			

GESI Benefits

• Determining the industrial symbiosis business model and accordingly the business development potential and planning for the regions (these are also the districts where low- and middle-income households live) where skill transfer activities (on-the-job training, or using a municipal digital training platform, etc.) will be carried out.

Smart Benefits

• Creating a Digital Twin of critical industrial facilities could enable analysis of the symbiosis and trigger new technological add-ons to increase efficiency.



Establishment of a pellet plant for the recycling of municipal park, garden and forest waste

Pellet fuels or pellets are biofuels obtained by converting the compressed organic matter or biomass.

Examples of organic materials used in the pellet conversion are industrial waste and by-products, food waste, agricultural and forestry waste. The aim of this action is the establishment of a pellet plant of 5,000 tonnes annual production capacity from wood and green wastes from municipal parks, gardens, and forests.

Action Type

Investment

Prioritised Challenges

The biomass potential, the demand of the industries and other stakeholders for their energy transition should be identified. Recyclable organic wastes are sent to landfill areas without being recycled. According to the landfill regulation, the amount of the biological waste to be stored in landfills should be reduced to 35% within 15 years.

Location / Pilot Area

To be determined at the feasibility stage.





Pillars and Strategic Objectives

Pillar 2. Decarbonisation	SO4: Stimulate the use ofDisseminating the practiceGiving importance to R&DEnsuring the recovery of w	f renewable energy is for increasing ener studies on renewable aste heat energies	sources gy efficiency and energy performate energy sources	ince
Pillar 3. Resource Efficiency and Circular Economy	 SO1: Use resources efficient Improving the circular per accumulated in the landfill SO2: Ensure the recovery Waste segregation at source Developing institutional ar 	ently formance of the city of resources ce id social capacity in v	and reducing the amount of waste vaste reduction and recycling	ž
Preparatory Tasks:	 Carrying out inventory and Conducting detailed feasibility demand estimation EPC tender designs, BoQs 	typology studies of ility study for pellet p and specifications	green wastes Iant including biomass potential a	ind
Follow up Tasks:	 Regular maintenance of th activities/investments Monitoring the amount and making capacity increase in 	e pellet plant and pe d composition of the investments dependi	riodic realization of improvement wastes supplied to the pellet plan ng on the needs	t and
Project Process				
Duration 18 months				
Preparation Time	Implementa	ition Time	Investment Operational Life	etime
8 months	10 months		15 years	
Action Implementation S	teps		Tim	eline
	4 months	4 months	10 months	
Inventory, feasibility, and demand estimation	t			
EPC tender and detailed				

Estimated Budget

Construction of the facility

Medium, 1-10 million Euros.

Financial Source

ECAs (Export Credit Agencies) such as Citi Bank, UK Export Finance depending upon exporting country, IFIs (International financing institutions) such as EBRD, World Bank, JICA (Japan International Cooperation Agency), Türkiye Bank of Provinces (Investment bank and IFI loans), Local banks and leasing companies, Financing facilities such as GEFF (Green Economy Financing Facility) and TURSEFF (Türkiye Sustainable Energy Financing Facility), Municipality's own resources, Development agencies.

designs

Solid Waste

Benef	iciari	es	
<u></u>			

Owner/Responsible

Third Parties Involved

Citizens, AMM, Industries

Benefits

AMM, BELKA

District Municipalities, Provision Directorate of Forestry and Water Affairs, ITC

				•
Green Benefits		L)		
 Reduced GHG emissions Reduction of air, water, soil, etc. pollution Improved or maintained ecosystem services 				
Climate Change Mitigatio	on		5,350 tC	CO₂/a
Monthly production capacity: 400 to Annual amount of heat generated fr pellet facility: 86,640,000 MJ	nnes om the wood			
Annual amount of natural gas replace Annual CO2 emission from natural g	ced with pellet: 2,432 as: 5,350 t CO ₂	2,122 m³		
Air Quality				
PM ₁₀ kg∕a	NO _x kg∕a	SO ₂ kg/a	CO kg∕a	
110,758	102,957	177,835	2,340	
Resilience Benefits			ę	
 Improved public health 				
Economic Benefits			Į	
Cost savings				
Social Benefits				*
Reduced povertyVulnerable population is addressed	ł			
Smart Benefits				
• In the BaskentMobile, publishing t	he produced pellets t	hat will be delivered to the co	al-heated dwellings.	



Establishment of biogas plant and using sediments resulting from the energy conversion process in fertilizer production

This action aims to collect cattle, ovine and poultry wastes and bring them to the biogas plant to produce energy and fertilizer. For better logistic arrangements and supply feasibility, it is recommended that the facility should be established close to the waste resources. Çubuk and Akyurt districts are reported to have manure and poultry waste production by the municipality. Also, these waste resources are close to the water resources. The spatial data and the number of animals for these districts were taken from Turkish Statistical Institute (TURKSTAT). The annual amount of biogas production is estimated as 9.5M m³. Based on the high-level available data, a biogas power plant of 3 MW can be established.

The sediments of the plant will further be processed and pre-treated to create fertilizer for farms and gardens.

Action Type

Investment

Prioritised Challenges

The biogas and energy potential of high organic loaded animal wastes are not used. While determining the location of the biomass power plant, the amount of biomass that can be obtained from the farms should be determined correctly and the location should be selected accordingly.

Location / Pilot Area

Çubuk and Akyurt



Biogas Storage Tank and Conditioning

Solid Waste

Pillars and Strategic Objectives

Pillar 1 Environmental Protection	SO2: Improve air qualityEncouraging the use of renewable energy	/ sources
Pillar 2. Decarbonisation	SO4: Stimulate the use of renewable eGiving importance to R&D studies on renEnsuring the recovery of waste heat energy	mergy sources ewable energy sources rgies
Pillar 3. Resource Efficiency and Circular Economy	 SO1: Use resources efficiently Improving the circular performance of the accumulated in the landfills SO2: Ensure the recovery of resources Waste segregation at source Developing institutional and social capacity 	e city and reducing the amount of waste ty in waste reduction and recycling
Preparatory Tasks:	Feasibility studyTurnkey EPC tender designs, BoQ and sp	ecs
Follow up Tasks:	 Operation and maintenance Monitoring of technical and environmental	al performance in the plant
Project Process		
Duration		
21 months		
Preparation Time	Implementation Time	Investment Operational Lifetime
9 months	12 months	15 years
Action Implementa	ation Steps	Timeline
Feasibility Study, Concept Designs	3 months 3 months 3 mo	onths 12 months
Tender Documents and El Selection		
Detailed Design Studies		
Construction		
Estimated Budge	t	

Medium, 1-10 million Euros.

Financial Source

ECAs (Export Credit Agencies) such as Citi Bank, UK Export Finance depending upon exporting country, IFIs (International financing institutions) such as EBRD, World Bank, JICA (Japan International Cooperation Agency), Türkiye Bank of Provinces (Investment bank and IFI loans), Local banks and leasing companies, Financing facilities such as GEFF (Green Economy Financing Facility) and TURSEFF (Türkiye Sustainable Energy Financing Facility), Municipality's own resources, Development agencies.



Beneficiaries

State Hydraulic Works, Waste Generators

Benefits

Green Benefits

- Reduced GHG emissions
- Improved air, water and/or soil quality
- · Reduction of air, water, soil, etc. pollution

Climate Change Mitigation

In this action the aim is to establish a biogas facility where ovine and poultry manure is collected, and energy is produced. In this context, the waste potential of Ankara was examined and the amount of energy produced annually was estimated as approximately 21,000 MWh.

Owner/Responsible

ASKI

For every 1 MWh (unit) of net electricity production, an average of 0,440 tons of CO2 equivalent greenhouse gas emissions occur.

The carbon reduction value was obtained by multiplying the amount of energy produced by the energy equivalent.

Air Quality

PM ₁₀ kg∕a	NO _x kg∕a	SO₂ kg∕a	CO kg/a
96,916	90,090	155,610	2,047.50

Water Saving

Collecting these wastes and utilising their potential to generate electricity will help to protect water resources of Çubuk Dam.

Resilience Benefits	()	\$
Improved access to sustainable energyPrevention or mitigation of possible future pandemics		
Economic Benefits		
Revenue generation Cost savings		
Social Benefits		*
Reduced povertyVulnerable population is addressed		
GESI Benefits		
 Adding quotas for women, youth and disabled people in the tender or service procurement engager relation to labour procurement 	nent in	

• Adding quotas for women, youth and disabled people when the facility is transferred to the municipality for operation or selecting staff with these characteristics for skills transfer programmes.

Smart Benefits

• Preparation of a Digital Twin of the biogas plant

- Improved energy efficiency

- Improved or maintained ecosystem services

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Third Parties Involved

and Climate Change, Waste

Ministry of Environment, Urbanization

Management and Disposal Companies

158



9,240 tCO₂/a



Implementation of digital infrastructure and equipment investments as well as awareness-raising activities to encourage the separation of waste at source

This action consists of a reward and incentive system that enables valuable wastes to be collected from households and public institutions and converted into an economic value such as electronic money, social support or public transportation. Studies have shown that financial incentives trigger the separation of waste at source. The goal of this action is the dissemination of smart city applications and increasing resource efficiency. This will be achieved by creating a policy and system proposal similar to the environmental card applications carried out in some district municipalities of Türkiye (Muratpaşa-Antalya, Şişli-İstanbul and Selçuk-İzmir). Directing revenues to education, food, health and public transportation by municipalities will be in line with the "green city" approach.

This action will be realised by district municipalities with the support of AMM.

For the relevant digital infrastructure, Smart Vending Machines, Card Payment Systems infrastructure (Param, Troy, Visa, Mastercard) and Mobile/Web applications are required.

Sub-Actions are:

- Citizen information and card distribution fieldwork
- Establishment of an Electronic Payment system
- Technical integration in Waste Receiving Centers
- Regulatory changes and establishing a recycling market

Action Type

Other initiatives

Prioritised Challenges

Contamination of recyclable wastes with organic materials due to the inability to separate the wastes efficiently at their source (households). The solid waste recycling activities will be realised at the expected level.

Location / Pilot Area

Çankaya





Pillars and Strategic Objectives

Pillar 3. Resource Efficiency and Circular Economy	 SO1: Use resources efficiently Improving the circular performance of the city and reducing the amount of waste accumulated in landfills SO2: Ensure the recovery of resources Waste segregation at source Developing institutional and social capacity in waste reduction and recycling SO3: Create plans and policies for efficient use of resources Pursuing social justice while developing circular economy practices Using smart and innovative technologies and planning a "Data and Technology Architecture" for the efficient use of resources 				
Preparatory Tasks:	 Gap analysis s Detailed feasil etc.) 	study to determine the bility study for infrastru	scope of awareness acture and equipme	s and capacity building a nt investments (contain	activities ers, trucks,
Follow up Tasks:	 Organising aw separation at Ensuring regu Performing im 	vareness raising and cap source lar maintenance of infra provement activities/in	pacity building activ astructure and equ vestments periodic	vities to ensure the cont ipment ally	inuity of waste
Project Proce	ess				
Duration 24 months					
Preparation Tim	le	Implementation	Time	Investment Operati	onal Lifetime
12 months		12 months		10 years	
Action Imple	mentation S	teps			Timeline
 Development pha Determination of Area (district an Demand Resport (staff, vehicle, staff, vehicle,	se: of the Application od neighborhood) ose Analysis omart card of Center is	6 months	6 months	12 mon	ths
User-side prepara • Distribution of S Machines • Distribution of S Residents	tion phase: Smart Vending Smart Cards to				
Implementation p • Collection, impr work schedule, experience	hase: ovement of improvement of				
Estimated B Medium, 1-10 mil	udget lion Euros.				

Medium, 1-10 minor Euros

Financial Source

European Union Funds, IFIs (International financing institutions) such as EBRD, World Bank, JICA (Japan International Cooperation Agency), Türkiye Bank of Provinces (Investment bank and IFI loans), Financing facilities such as GEFF (Green Economy Financing Facility) and TURSEFF (Türkiye Sustainable Energy Financing Facility), Municipality's and district municipality's own resources, Development agencies.

Beneficiaries

Owner/Responsible

Third Parties Involved

Citizens, AMM, District Municipalities District Municipalities

AMM, Other Municipalities and District Municipalities of Türkiye, ITC

Solid Waste

Benefits

Green Benefits

- Reduced GHG emissions
- · Improved air, water and/or soil quality
- · Reduction of air, water, soil, etc. pollution
- · Improved or maintained ecosystem services

Energy and Resource efficiency

• Reusing valuable waste supports the circular economy in the city

Resilience Benefits

- Improved public health
- · Prevention or mitigaiton of possible future pandemics

Economic Benefits

• Revenue generation

Social Benefits

· Improved community engegament

GESI Benefits

• Enables city dwellers to profit from valuable waste (such as public transport, tax exemption and daily household expenses, etc.)

• The waste picker community faces health risks due to the informal circumstances. Inclusion of this vulnerable group is critical, especially when implementing a community waste management plan focused on separation at the source

Smart Benefits

- Increasing the usage volume and number of users of the city smart card.
- · Increasing the amount of data collected in the city with customised information















Transforming Ankara into a "Sponge City"

Increasing rate of concrete and loss of green space in cities constitute an important risk factor. Green areas, forests, lake and soil as a whole form a vital infrastructure. Cities around the world are facing more frequent, and more extreme weather events. Different climatic conditions require different approaches when it comes to implementing nature-based solutions. Natural infrastructure is not only extremely effective in managing flood water, but also brings far wider benefits than traditionally designed 'gray' infrastructure and can contribute positively to biodiversity and carbon reduction.

The aim of the action is to understand how spongy the city is and to prepare an urban drainage masterplan using nature-based solutions. This action will include the following studies:

- Using artificial intelligence and machine learning tools to measure the amount of green and blue space
- · Accounting for soil types, vegetation, and land use
- · Calculating water runoff potential for green areas
- · Integrating blue, green, and gray infrastructure in the city
- Urban Drainage master planning using nature-based solutions

Action Type

Policy

Prioritised Challenges

Climate projections show that Ankara has been warming since the 1950s and that this trend will continue to the end of the century. Floods, heat waves and drought are significant risks Ankara is facing. The number of heavy rains and floods have increased in the last 10 years. The city's stormwater infrastructure, water supply system and agricultural activities are vulnerable to adverse climate impacts.

Location / Pilot Area

City wide



Dikmen Valley, Ankara

Risk

Pillars and Strategic Objectives

Pillar 1	 SO1: Conserve and efficiently use natural resources Developing the blue and green infrastructure and ensuring its integration with the grav. 			
Environmental Protection	infrastructure			
	SO3: Conserve and enrich ecology and biodiversity			
	Increasing the presence of open and green spaces in the city			
Pillar 3	SO1: Use resources efficientlyReducing the pressure on natural water resources by developing alternative resources			
Efficiency and	SO2: Ensure the recovery of resources			
Circular Economy	Using sustainable and recovery supporting methods for flood management and surface drainage and developing practices that comply with sponge city requirements			
	SO2: Enhance resilience of the city			
Dillor 4	 Updating the adaptation capacity of the city according to the changing conditions Developing preventive risk management against natural disasters 			
Pillar 4 Resilience	Regaining the streams within the city where possible			
Resilience	 SO3: Plan urban development in line with environment and climatic conditions Developing designs resistant to changing conditions in city planning (infrastructure and superstructure) 			
	Determination of the characteristic features of the city with satellite imagery			
	• Examining and evaluating the current legislation for rainwater harvesting in rural areas			
Preparatory Taaka	in terms of the sanctioning power of AMM			
TASKS:	Determination of parks, gardens and trees in order to harvest rainwater suitable for rural areas			
	Preparation of RfP for Sponge City consultancy study			
	Outcomes of this study should be integrated with all infrastructure plans and			
Follow up Tasks:	investments.			
	• sponge city principles should be considered by other city-wide maps and plans as well			
Project Process Duration				
15 months				
Preparation Time 3 months	Implementation Time 12 months			
Action Implementation St	eps Timeline			
	3 months 12 months			
Baseline assessment and selection of the consultant				
Analysis of the city's sponginess, defining nature-based solutions an preparing an urban draina masterplan	d ge			



Estimated Budget

Low, 0-1 million Euros.

Financial Source

European Union Funds, United Nations Development Programme, ECAs (Export Credit Agencies) such as Citi Bank, UK Export Finance depending upon exporting country, IFIs (International financing institutions) such as EBRD, World Bank, JICA (Japan International Cooperation Agency), Türkiye Bank of Provinces (Investment bank and IFI Ioans), Ankara Chamber of Industry, Development Agencies

Beneficiaries	Owner / Responsible	Third Parties Involved
Citizens, companies that provide services related to public, water, park and garden works.	AMM and ASKI	DSI (State Hydraulic Works), Ministry of Agriculture and Forestry
Benefits		

N

Y

Green Benefits

- Improved air, water and/or soil quality
- Increased green and recreational spaces
- Improved climate resilience

Flood Protection

By replacing impermeable surfaces with permeable surfaces, the runoff and flooding events decrease. Natural infrastructure is not only extremely effective in managing flood water, but also brings far wider benefits than traditional engineered 'gray' infrastructure and can contribute positively to the biodiversity and carbon reduction.

Water Saving

Instead of using concrete channels for the disposal of rain water, it could be absorbed by nature. This will support the recovery of the groundwater in the city.

Resilience Benefits

- Improving access to clean water, improved sewerage system
- Resilience against disasters

Economic Benefits

- Cost savings
- Job creation
- Increased local business opportunities

Social Benefits

- Improved social equality
- Reduced poverty

GESI Benefits

• Flood, heat wave and drought risks will be minimized for risky areas where vulnerable groups generally live

Smart Benefits

• IoT-based sensors and GIS can be used for baseline analysis and to monitor Ankara's transformation into a sponge city



Creation of urban nature parks and ensuring the connection of urban parks with natural habitats outside the city

New parks in harmony with the natural landscape will be planned in suitable areas in the inner city of Ankara or existing parks will be renewed on this basis. These newly created areas will support biodiversity where plants from local plant taxon are used, and will be connected to each other through a natural vegetation line. Trees and shrubs suitable for Ankara climate and combating air pollution will be selected. While designing and selecting the locations of these urban nature parks, easy accessibility and easy use of residents will be taken into account in accordance with the universal design criteria. The scope of the action is to create green corridors that connect the parks, which will be the continuation of the natural habitats in the city, in terms of the continuation of gene flow with each other.

Action Type

Investment

Prioritised Challenges

Damage to the ecosystem due to the excessive use of natural resources is an important challenge for the city. Insufficient consideration for the impact of new investments on biodiversity is another challenge. Other factors putting pressure on, or causing damage to the ecosystem include: urbanisation of natural wetlands, lack of natural or artificial green areas to support biodiversity in the city, lack of connectivity of green areas within the city centre and with the biodiversity reserve areas outside the city, not using local plant species in the urban green areas, covered streams in the city centre which result in the absence of a riparian cover on the edges of the streams, and stray pets feeding on biodiversity.

Location / Pilot Area

Around Çubuk 1 Dam / 4 km² area



Proposed natural park area in Çubuk, Ankara



Pillars and Strategic Objectives

S(•	D2: Improve air quality Prioritising environmental valu	ies in city plans and	urban construction	
Pillar 1 Environmental Protection i bi	 SO3: Conserve and enrich ecology and biodiversity Increasing the presence of open and green spaces in the city Restoring the destroyed natural areas and ecosystems and assisting with their refunctioning Protecting the biodiversity in the new investments and projects Ensuring the connection of green areas inside the city with each other and with the biodiversity reserve areas outside the city is addressed in urban plans, actions and policies Prioritising the local plant species that are resistant to drought and climate change 			
Preparatory Tasks:	Feasibility study for the location selection of parks.			
Follow up Tasks: •	Maintaining the maintenance a	and vitality of parks.		
Project Process				
Duration				
30 months				
Preparation Time	Implementa	tion Time	Investment Operation	onal Lifetime
6 months	24 months		Unlimited	
Action Implementa	ition Steps			Timeline
	6 months	18 months	24 mor	nths
Area selection				
Project (Concept, Schematic, Implementation)				
Construction				
Estimated Budget				
Medium, 1-10 million Euro	ſS			
Financial Source				
International financing in Agencies	stitutions, National resource,	Municipal resource	e, Private organisations,	Development
Beneficiaries	Owner / Res	sponsible	Third Parties Inv	volved
Citizens, natural life individ	duals AMM		General regional director	ate of nature

Citizens, natural life individuals

General regional directorate of nature conservation national parks, MoEUCC natural assets protection directorate, DSI (State Hydraulic Works)

Biodiversity

750 tCO₂/a

2à

(002)

Benefits

Green Benefits

- Improved or maintained ecosystem services
- Reduced GHG emissions
- Improved air, water and/or soil quality
- Increased green and recreational spaces
- Improved climate resilience

Climate Change Mitigation

In this action, the creation of urban parks, afforestation is planned around Çubuk 1 Dam. In this context, it is envisaged to plant 30,000 trees on an area of 4 km2. An average tree captures 25 kg of CO₂ per year. Therefore, it is foreseen that this action will lead to the reduction of 750 ton CO₂ emissions annually.

Air Quality

PM10 kg∕a	NOx kg∕a	
1,200	3,672	
Water Saving		

This action aims to increase green spaces in Ankara. The increase in green areas will also increase groundwater. This underground water increase will feed the city's river sources. Therefore, water saving will be provided.

Resilience Benefits	\$	
Improved public health		
Economic Benefits	▶ 飛 妙	
 Revenue generation Job creation Increased local business opportunities 		
Social Benefits	前常选 选	
Improved social equalityBarrier free access/ improved access to services		
GESI Benefits		

- Integration of park equipment and design that meets the care and access needs of women, the elderly and disabled people
- Incorporating biodiversity information into the design of parks in order to develop nature literacy among young people and children
- Counting species using digital tools (such as digital applications that can be developed), increasing the use of parks and raising awareness

Smart Benefits

- Afforestation in park areas using the Miyawaki method
- Announcing concerts and sports activities to be held in these areas on the BaşkentMobile
- Publishing the list of citizens of Ankara who visit the areas, attend to these activities, etc through gamification apps.



Developing a green belt policy and creating open green corridors in the city

The aim of this action is to implement a green belt policy surrounding the existing macroform of the city in order to prevent the urban sprawl and to protect the natural areas and values in the periphery.

The design of the sub-parts of the green belt will consist of open and green areas of different qualities (urban forest, regional parks, recreation areas, sports areas, etc.), compatible with the region where they are located.

The green corridors will connect the parks which will be the continuation of natural habitats through the inner city. The open green corridors passing through the city will be added to this green belt system. The presence of open green areas will be increased and blue and green infrastructure solutions will be used in the creation of these green corridors.

Environmental benefits of this policy action are as follows: carbon reduction, flood control and regulation, water harvesting, food production, preservation of the biodiversity, air pollution reduction, and mitigation of the urban heat island effect.

Action Type

Policy

Prioritised Challenges

The city is spreading in various directions through various urban development projects. This situation brings serious sustainability problems.

Location / Pilot Area

Ankara wide



Green Belt example for Ankara

Land Use

Pillars and Strategic Objectives

	SO1: Cons	serve and efficiently use natura	l resources		
	Protecting wetlands				
	Developii infrastructi	ing the blue and green intrastructur	e and ensuring its integration with the gray		
Pillar 1	SO2: Imp	rove air quality			
Environmental	Carrying	out applications to increase air qua	ality		
Protection	• Prioritisir	ng environmental values in city plar	ns and urban construction		
	• Increasin	serve and enrich ecology and bi	odiversity		
	Protectin	a biodiversity in new investments a	and projects		
	• Ensuring	the connection of green areas insid	de the city with each other and with the		
	biodiversity	y reserve areas outside the city is a	addressed in urban plans, actions and policies		
Pillar 2	SO1: Deve	For sustainable plans and police of the sustainable plans and p	cies		
Decarbonisation	• Controllin	ig urban spraw with green ben and			
Pillar 4	Consider	ing accessibility and security in ter	ms of gender while developing green		
Resilience	infrastruc	ctures			
Preparatory	Carrying	out a comprehensive analysis of th	ne open green space systematic of the city		
Tasks:	and mak	ing a green space master plan and	study in line with this analysis		
Follow up	• Developing the implementation in stages and realisation of green areas of different types				
Tasks:	 and scales within the target year of the green area master plan Maintenance and protection of existing and newly created green areas 				
Project Process					
Duration	• • • • • • • • • • • • • • • • • • • •				
72 months					
Preparation Time		Implementation Time	Investment Operational Lifetime		
12 months		60 months	50 years		
Action Implemen	ntation St	teps	Timeline		
Project design (identific	ration	12 months	60 months		
of the area and the ger	neral				
framework)		_			
Implementation of gree spaces	en III				
Estimated Budg	et				
Low, 0-1 million Euros					
Financial Source	е				
European Union Funds,	IFIs (Interi	national financing institutions), Nat	ional resource, Municipal resource		
Beneficiaries		Owner / Responsible	Third Parties Involved		
All living creatures in th	ne city	AMM, district municipalities, relev central institutions and organisat	vant City residents ions,		

non-governmental organisations



Benefits

Green Benefits

- Improved air, water and/or soil quality
- Increased green and recreational spaces
- Reduction of air, water, soil, noise, etc. pollution
- Improved or maintained ecosystem services
- Improved climate resilience
- Reduced GHG emissions

Water Saving

This action aims to increase green spaces in Ankara. The increase in green areas will also increase the groundwater. The underground water increase will feed the city's river sources. Therefore, water saving will be provided.

Resilience Benefits

- Improved public health
- Improved access to clean water, improved sewerage

Economic Benefits

- Revenue generation
- Job creation
- Increased local business opportunities

Social Benefits

- Improved social equality
- Barrier free access/ improved access to services

GESI Benefits

• In accordance with the municipality's contribution to the provision of fair housing, the risk of displacement of low-income and other disadvantaged groups residing in the green belt region will be minimized.

Smart Benefits

• Digital applications that support this policy will produce successful results, such as, slowing down the traffic with enforcement systems on the roads passing through the green belt

• Monitoring the risk factors in green areas with sensors and cameras.





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Ensuring land use and transportation integration with rail based TOD (transit-oriented development) type implementations

For reducing private vehicle use and transportation-related emissions, public transportation is important as an active type of urban transportation. There is a need to improve the public transport system (particularly by means of new metro lines and extensions to the existing metro lines) in Ankara, both through the development and creation of new public transport lines. Furthermore, in the city there are urban areas with high density of residences and workplaces that cause a high demand of daily transportation. Therefore, it should be supported with new public transportation investments and such regions should be connected to the existing rail system with feeder lines.

The action consists of:

- Preparation of 1/5000 scale Master Development Plan and 1/1000 scale Implementation Development Plan for an area of approximately 3,000 hectares for the Bağlıca sub-region
- M2-M3 lines to be connected to the Çayyolu and Eryaman metro lines

Action Type

Investment

Prioritised Challenges

The city sprawls in several directions by means of a range of urban development projects. Ankara's rapid urban sprawl increases travel distances and car dependency. Integration of land use and transport plans should be the highest priority for future action plans.

Location / Pilot Area

Bağlıca housing development zone. The area between Çayyolu and Eryaman metro lines is planned to be developed as a TOD area with an additional metro line (M2-M3 connection) that will connect them both.



Proposed TOD area and Metro extension



Pillars and Strategic Objectives

Pillar 1 Environmental Protection	 SO2: Improve air quality Carrying out applications to increase air quality Prioritising environmental values in city plans and urban construction 				
Pillar 2 Decarbonisation	 SO1: Develop sustainable plans and policies Ensuring public transport oriented urban development Planning rail system lines to the existing dense residential and commercial areas 				
	 SO2: Develop sustainable transport system Reducing dependence on cars and promoting the transition to public transport and active modes of transport (walking and cycling) Creating an integrated, accessible and inclusive transport system 				
Pillar 4 Resilience	 SO3: Plan urban Developing designation superstructure) Prioritising social 	development gns resistant to I justice in envir	in line with env changing condition onmental and clin	ironment and climatic c ons in city planning (infras mate policies	onditions tructure and
Preparatory Tasks:	 Reviewing the master and implementation plans of the region and revision of the masterplan considering the new metro line route and stations Developing a holistic strategy, reviewing AMM's other strategic planning documents on 				
Follow up Tasks:	 Following the implementation process meticulously Taking the necessary steps for increasing the use of public transportation systems and increasing the occupancy in residential areas 				
Project Process Duration					
Preparation Time	Imr	plementation 1	ïme	Investment Operation	al Lifetime
3 months (masterplan) 12 months (metro)	18 n 60 n	nonths (masterp nonths (metro li	olan) ne)	25 years (masterplan) 23 years (metro line)	
Action Implement	ation Steps				Timeline
	3 months	12 months	6 months	60 months	
Preliminary studies (feas terms of reference)	ibility,				
Preparation of the Plan					
Metro project preparation	۱				
Metro construction					
Estimated Budge High, 10 million Euros an	t nd above				

Land Use

Financial Source

AMM, EGO, Related ministry, PPP Projects, Loans, Private construction companies, Developers

Beneficiaries	Owner / Responsible	Third Partie	es Involv	ed		
Citizens, especially those living in Etimesgut and Bağlıca region	AMM, District Municipalities and Ministry of Transport and Infrastructure	TOKİ, NGOs				
Benefits						
Green Benefits	e		۲ ۱			
	Ŷ		l (i)			
• Improved air, water and/or soil qu	Jality					
• Increased green and recreational	spaces					
Improved energy efficiency						
Improved climate resilience						
Reduced GHG emissions						
Climate Change Mitigati	on		31,97	3 tCO ₂		
M2-M3 connection An annual average of 31,973 tCO ₂ e Total 735,376 tCO ₂ e (during the operational lifetime)						
Air Quality						
PM10 kg/a PM2.5	kg/a NOx kg/a S	602 kg∕a	CO kg/	'a		
1,464 7,65	58 190,934	-28,883	206,90	7		
Resilience Benefits						
 Increased access to sustainable h 	ousing					
Economic Benefits			₽₽₹			
Job creation						
Increased local business opportur	nities					
Social Benefits			<u>↑</u> †			

- Improved social equality
- Reduced poverty

GESI Benefits

- Increased accessibility and affordability in urban transportation directed towards vulnerable communities
- The enhanced air quality will improve population health, specifically the health of vulnerable communities

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Prioritising climate friendly and sustainable urban regeneration for future urban development

Preventing urban sprawl is important to control the urban form and to protect the natural areas around the city. At the same time, encouraging the use of mass and non-motorized modes of transportation by shortening the transportation distances and times is crucial. Ankara is a city with the potential to transform. Therefore, priority should be given to the urban development projects in the city instead of new development projects in the periphery. In this context, the aim is primarily to finalise the transformation projects that have been started, before starting new urban transformation projects. Housing areas that completed their economic and physical life and slum areas in the city appear as important disaster risk areas. River floods, sudden floods, city floods and landslides are the leading disasters. Renewal of such regions should be prioritised. Urban infrastructure and superstructures should be renewed in accordance with disaster risk management and resource efficiency principles. The steps that will form the scope of this action are given below:

- Within the scope of urban transformation and development projects, realisation of modern housing projects in the neighborhoods with slums and/or old buildings and dissemination of green areas
- During the construction of houses, wind corridors will be opened, allowing for increased air flow. This will be achieved through designing low-rise houses, as opposed to high rises which prevent ventilation in the direction of the prevailing wind
- Reducing emissions by using natural gas and/or renewable resources instead of using solid fuel for heating
- · Aiming to increase thermal efficiency with insulated new buildings

Implementations of the action can be carried out in Çankaya District Dikmen District, Altındağ and Mamak Districts. The Ankara City Urban Transformation Strategy Document prepared by the AMM Special Projects and Transformation Department should also be taken into account.

Action Type

Investment

Prioritised Challenges

Land use development has become an important driver of urban and environmental challenges in Ankara in the recent decades. This is due to the lack of consideration of current environmental challenges in shaping and controlling urban development. In addition, the uncontrolled development of construction investments in Ankara has contributed to the problems related to land use decisions. Therefore, the city sprawls in different directions by means of a range of urban development projects. There are competing hotspots of residential and commercial development within the city. This gives a rise to issues like increased travel times and distances and high vacancy rates in residential and commercial building stock.

Location / Pilot Area

New Mamak urban transformation and development area

Land Use

Pillars and Strateg	ic Objectives				
Pillar 1	SO2: Improve air quality				
Protection	plans and urban construction				
	SO1: Develop sustainable plans and p • Developing participatory planning pract	SO1: Develop sustainable plans and policies • Developing participatory planning practices			
Pillar 2 Decarbonisation	 SO2: Develop sustainable transport s Reducing dependence on cars and pronactive modes of transport (walking and Decarbonising the public transport syst vehicles Creating an integrated, accessible and 	2: Develop sustainable transport systems educing dependence on cars and promoting the transition to public transport and ctive modes of transport (walking and cycling) recarbonising the public transport system and transforming to the energy efficient ehicles reating an integrated, accessible and inclusive transport system			
Pillar 4 Resilience	 SO3: Plan urban development in line with environment and climatic conditions Prioritising environment and climate sensitive urban transformation, to ensure controlled internal growth instead of growth at the periphery Developing designs resistant to changing conditions in city planning (infrastructure and superstructure) 				
Preparatory Tasks:	Updating/preparing a master plan in this regard Identification of areas with low air quality Determining which regions will be prioritised using scientific evaluation criteria				
Follow up Tasks:	Monitoring of air quality in urban renew	val areas			
Project Process					
Duration					
48 months					
Preparation Time	Implementation Time	Investment Operational Lifetime			
12 months	36 months	50 years			
Action Implementa	ition Steps	Timeline			
Preparation of the Plan ar Project design	12 months 3 months	24 months 9 months			
Initial preparation for construction					
Construction					
Landscaping and distribut of housing to beneficiaries	ion s				
Estimated Budget High, 10 and above millio	: n Euros.				
Financial Source					

International financing institutions, National resource, Municipal resource, Private organisations, and Development Agencies.

Beneficiaries	Owner / Responsible	Third Parties Involved
Citizens, especially residents living in slum areas	АММ	TOKİ (Housing Development Administration), Citizens

Resilience Benefits Improved public health · Increased access to sustainable housing **Economic Benefits** • Increased local business opportunities • Revenue generation Job creation **Social Benefits** • Improved social equality Reduced poverty Improved community engagement • Barrier free access/ improved access to services • Improved safety (e.g. road safety, GBVH, crime) **GESI Benefits** Minimize the risk of displacement of low-income and other disadvantaged groups from the green belt by undertaking an projects.

Green Benefits

Benefits

- Improved air, water and/or soil quality
- Increased green and recreational spaces
- Improved energy efficiency
- Improved climate resilience
- ons

Climate Change Mitigation

It is accepted that electricity consumption will decrease by 25% after urban transformation. Average 0,440 tons of CO2-eq. per 1 MWh (unit) net electricity generation. Greenhouse gas emissions are released

Due to the electricity consumption:

480 households x 3.036 MWh x 0.44 tons of CO2/1MWh= 641 tons of CO2 x 0.25= 160 tons of CO2 Assuming that there is 2.85 tons of CO2 emissions for 1 ton of coal consumption due to the heating Coal: 480 households x 2.5 tons of coal/year x 2.85 tons of CO2/1 tonne of coal = 3420 tons of CO2 Natural gas: 480 households x 1500m3 natural gas/year x 1.94kgC02/m3=1397 tons CO2 Coal - Natural Gas = 3420-1397 = 2023 tons of CO2 Total CO2 Reduction=160+2023=2183 tons of CO2

Water Saving

• This action aims to increase green space in Ankara. The increase in green areas will also increase the groundwater. The underground water increase will feed the city's river sources. Therefore, water saving will be provided.

•	Reduced	GHG	emissio

assessment whereby the municipality can develop fair housing precaution in conjunction with the urban regeneration

Smart Benefits

• Urban transformation and renewal areas can be designed in accordance with the principles of "Climate Neutral and Smart Neighbourhood".



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Establishing a regularly updated urban building inventory that includes information such as age, type, energy performance and function of buildings

The aim is to create a building inventory based on EPC (Energy Performance Certificate) information. This involves identifying a building's missing EPC data and collecting information about the condition of the building, such as function, status, age, type, energy performance, etc. and updating the periodic registration by transferring them to a database (software) system. With this action, a building information-recording system will be created in a digital platform throughout the city. By keeping these records up to date, the instant building stock will also be monitored accordingly. In addition, the digital building inventory system of this action is intended to support issues such as identifying places where building transformation is urgent throughout the city, identifying surplus buildings in the region and active status for the use of buildings, evaluating newly planned buildings based on the current state of the regions, and determining priority target points throughout the city in decisions related to the buildings.

Action Type

Policy

Prioritised Challenges

The rate of the vacant (not in use) stock is high in office and residential buildings in Ankara. As such, newly built office and housing investments will result in enlarging the existing stock beyond requirements. In order to realise the development of the built environment in a rational way and in line with the requirements, it is important to determine the total stock in the city and the buildings that are vacant within this stock. In addition, it is an important area of challenge that the rate of buildings with energy performance certificates is low, compared to the number of all buildings.

Location / Pilot Area

Settlements under the responsibility of AMM





Pillars and Strategic Objectives

Pillar 2. Decarbonisation	 SO3: Develop energy efficient practices in built environment Prioritising energy efficiency in new buildings Ensuring energy efficient transformation of existing buildings Ensuring the integration of renewable energy systems into buildings Increasing the number of buildings with green certificates SO4: Stimulate the use of renewable energy sources Disseminating practices for increasing energy efficiency and energy performance
Pillar 4 Resilience	SO2: Enhance resilience of the cityUpdating the adaption capacity of the city according to changing conditions
Preparatory Tasks:	 Identification of buildings without EPC Identification and collection of raw data Determination of the sources from which the raw data will be supplied Setting up the database or software system to obtain results from the data Registration of the buildings with EPC in the inventory system
Follow up Tasks:	 Keeping the records of buildings with EPC up to date Holding activities for the completion of documents for buildings without a certificate Updating the inventory regularly

Project Process		
Duration		
24 months		
Preparation Time	Implementation Time	Investment Operational Lifetime
2 months	22 months	Unlimited

Action Implementation Steps Timeline			
Software and inventory system development	2 months	21 months	1 month
Team build-up and mobilisation			
Identification of buildings without EPC and collection of raw data			
Registration of the building data in the inventory system			
Updating and controlling of data in the inventory system			

Buildings

Estimated Budget

Medium, 1-10 million Euros.

Financial Source

International financing institutions, National resource, Municipal resource.

BeneficiariesOwner / ResponsibleThird Parties InvolvedCitizens, AMM, Private
SectorAMMMinistry of Environment,
Urbanisation and Climate Change,
Experts

Benefits

Green Benefits

- Improved energy efficiency
- Reduced GHG emissions

Resilience Benefits

- Increased access to sustainable housing
- Improved access to sustainable energy

Social Benefits

• Improved community engegament

GESI Benefits

Addition of social and economic vulnerability data in the inventory

Smart Benefits

During the inventory establishment surveys, GIS-based smart data collection techniques can be used, inventory can be produced according to the "national GIS" principles, time and cost savings can be achieved by using the "city digital twin" produced by MoEUCC. For this action, to support the private sector and researchers, datasets can be designed in accordance with the "open data" and a web application can be developed that can make the dataset accessible to non-GIS specialists. Alternatively, a 3D based GIS can also be used for managing the data.










Effective transformation of the building envelope and building energy systems with improvements in the existing municipal buildings

The scope of the action is to ensure necessary transformations (façade insulation performance, window performance, and electromechanical systems such as lighting, heating-cooling-air conditioning, automation) in the prioritised/pilot municipal buildings to increase energy efficiency and/or integration of renewable energy systems according to their applicability.

In this action, it is envisaged to renovate the building envelope, windows, and electromechanical systems (pumpsfan coils-boilers-chillers-ahu's-lighting, etc.) of an existing building with an area of approximately 10,000 m2. In addition, electricity generated by PV (photovoltaic) panels on the roof of the building will be used for electricity needs as renewable resources. Finally, a building management (automation) system will also be integrated into this system.

Action Type

Investment

Prioritised Challenges

Energy efficiency of existing and new buildings and adaptation to climate change are among the important issues that need improvement in Ankara. Financial incentives and funding mechanisms for rehabilitation of existing buildings, increasing energy efficiency to reduce energy needs and improving the performance of buildings remain insufficient.

Location / Pilot Area

Municipal buildings with priority will be determined together with AMM



Buildings

Pillars and Strategic Objectives

Pillar 2. Decarbonisation	 SO3: Develop energy efficient practic Ensuring energy efficient transformation Ensuring the integration of renewable energy SO4: Stimulate the use of renewable Disseminating the practices for increasing 	es in built environment of existing buildings nergy systems into buildings energy sources ng energy efficiency and energy performance
Pillar 4 Resilience	SO2: Enhance resilience of the city Updating the adaption capacity of the city 	ty according to changing conditions
Preparatory Tasks:	 Selection of the AMM building and asses Preparation of renovation projects Carrying out the necessary survey studi Engaging with the AMM technical staff for consumed and/or produced by the mun 	esment of the current status es or planning the efficient operation of the energy icipal buildings
Follow up Tasks:	 Monitoring and recording the building's AMM technical staff will play an active reoperating stage Providing technical maintenance-repair systems in the building and in the operation of this action is relabuildings, in case of new buildings to be Turkish regulation on parking area in building should also be considered. Article 3-j: "In building permit application mandatory parking lots, there must be at least 1 charging unit for electric vehicles. 	energy measurement values ole to increase the energy efficiency at the guarantee during the installation of renewable ation of these systems ted to the transformation of existing municipal built after the action, one of the articles in the ildings (Parking Regulation: 25 March 2021) ons for new buildings with 20 or more at least 5% of the mandatory parking areas and cles in compliance with the relevant standards."
Project Process		
36 months		
Preparation Time	Implementation Time	Investment Operational Lifetime
7 months	29 months	25 years
Action Implement	ation Steps	Timeline
Selection of the building energy audit	and 3 m 4 m	26 months 3 months
Preparation of renovation project	n	
Implementation		
Test and Commissioning		

Estimated Budget

Low, 0-1 million Euros.

Financial Source

International financing institutions, National resource, Municipal resource

Beneficiaries	Owner / Responsible	Third Parties Involved
АММ	AMM	Project companies, Technical support companies

Benefits

Green Benefits

- Improved energy efficiency
- Reduced GHG emissions

Energy and Resource efficiency

Within the scope of this action, energy saving is targeted through diversified retrofitting applications in municipal buildings

Climate Change Mitigation

Ministry of Energy and Natural Resources website (https://enerji.gov.tr/evced-cevre-ve-iklim-elektrik-uretim-tuketim-emisyon-faktorleri) states that "According to calculations, an average of 0.440 tCO2 equivalent greenhouse gas emissions are emitted per 1 MWh of net electricity production throughout Türkiye."

In the analysis, the annual electricity consumption saving is approximately 328 MWh and the electricity generated by renewable energy (photovoltaic panels) is approximately 260 kWh per year. This means a total annual electricity saving of 588 MWh. The GHG saving value is calculated by multiplying this number by the reference value of 0.44 tons of CO2. As a result, approximately 259 tons of CO2 GHG saving was obtained."

Resilience Benefits

- Increased access to sustainable housing
- Improved access to sustainable energy

Economic Benefits

Cost savings

Social Benefits

• Improved community engegament







259 tCO2/a











Soil and groundwater improvement of dumpsites no longer in use

There are 15 disused dumpsites that need rehabilitation with the range of 1-16 hectares in various locations of Ankara. Soil pollution, ground and surface water pollution, visual impacts, dust and odour are caused by dumping of the municipal solid wastes. The aim of this action is to carry out site rehabilitation studies to prevent the side effects. Some of the rehabilitated lands can be re-used for other purposes such as parks and social facilities.

Action Type

Investment

Prioritised Challenges

There is no site study available to understand the extent of contamination

Location / Pilot Area

Dumpsites in Akyurt, Ayaş, Bala, Beypazarı, Çamlıdere, Çubuk, Elmadağ, Güdül, Haymana, Kalecik, Kızılcahamam, Nallıhan, Polatlı, Evren and Şereflikoçhisar districts



15 dumpsite locations in Ankara



Pillars and Strategic Objectives

P1. Environmental Protection	 SO2: Improve air quality Ensuring the implementation of preventive measures against soil pollution and prioritising the cleaning of contaminated sites SO3: Conserve and enrich ecology and biodiversity Restoring the destroyed natural areas, ecosystems and refunctioning of them 	
Preparatory Tasks:	 Mapping studies before EPC tender waste to be rehabilitated Preparation of Phase I and Phase II Measuring the volume of uncontrolle Preliminary designs of park and oth Preparation of BoQs, tender docume 	to understand the topography and amount of soil and groundwater contamination studies ed gas production from dumpsites er social facilities for the selected sites ents and specifications for EPC tender
Follow up Tasks:	Monitoring site soil and groundwate	r after the construction
Project Process		
Duration		
18 months		
Preparation Time	Implementation Time	e
6 months	12 months	
Action Implementati	on Steps	Timeline
	6 months	12 months
Preliminary design and tender		
Rehabilitation work		
Estimated Budget		

High, 10 and above million Euros.

Financial Source

European Union Funds, United Nations Development Programme, IFIs (International financing institutions) such as EBRD, World Bank, JICA (Japan International Cooperation Agency), Türkiye Bank of Provinces (Investment bank and IFI Ioans), Ankara Chamber of Industry, Development Agencies

Beneficiaries	Owner / Responsible	Third Parties Involved
Citizens	AMM	DSI (State Hydraulic Works), Ministry of Environment Urbanization and Climate Change

Some of the dumpsites are close to low income regions. Rehabilitation of dumpsites and establishing social facilities









Preparing a comprehensive, multi-sectoral social policy action plan for vulnerable populations

The plan will assess user experience of city services, based on income, gender, age, disability, and citizenship and develop relevant social inclusion strategies to foster cooperation and engagement across municipality departments and companies.

The implementation of the plan will be carried out in the following stages:

- Plan is implemented for the relevant departments and companies of the Ankara Metropolitan Municipality.
- Solidarity municipalities are formed by matching district municipalities with similar needs under the leadership of Ankara Metropolitan Municipality.
- Social inclusion mechanisms are developed within the plan, both between sectors and between different district municipalities, and practical lessons are learned. (As in the examples of "solidarity cities for green cities" in Eurocities).
- Establishing a social inclusion laboratory within the municipality, serving as the innovation and monitoring center of the district municipalities and companies, especially for the metropolitan municipality. The laboratory will develop upskilling and reskilling labor and leadership policies specifically tailored for the green sectors. The main aim of the laboratory at this stage is increasing the social and economic capacity of the Municipality and the associated companies to implement greening strategies with a social inclusion vision.

Action Type

Policy

Prioritised Challenges

There is a lack of information on mobility of vulnerable groups, and user experience may cause problems in urban mobility and eventually cause mobility injustices.

The lack of gender disaggregated data leads to gender blind policies in the planning of municipal services.

Fragmented service systems foster social exclusion risks and have a negative impact on urban resilience targets (i.e., fragmented transportation systems foster private car culture and car dependency).

Location / Pilot Area

Ankara wide; target sectors: urban transportation, water and wastewater, land use and buildings, energy and smart city



GESI

Pillars and Strategic Objectives

Pillar 4. Resilience	 SO3: Plan urban development in line with environment and climatic conditions Prioritising social justice in environmental and climate policies Considering accessibility and security in terms of gender while developing green infrastructures
Preparatory Tasks:	 Data driven realistic and comprehensive analysis of the sectors required for plan development Participatory trainings and seminars on social inclusion strategies across municipality departments and companies Establishing a network of solidarity municipalities -modelled on the solidarity cities in the Eurocities- is recommended to be formed to help to tackle the implementation of the action plan
Follow up Tasks:	 Knowledge dissemination of the social policy action plan with stakeholders Establishment of a digital database to monitor and publish publicly social action plan targets

Project Process	
Duration	
36 months	

Preparation Time	Implementation Time
12 months	24 months

Action Implementation Steps Timeline			
Data based analysis and implementation of the plan for AMM	6 months	14 months	4 months
Forming the solidarity municipalities			
Developing social inclusion mechanisms			
Establishing a social inclusion laboratory within AMM			

Improved community engegament

• Barrier free access/ improved access to services

Smart Benefits

User experience can be enhanced with smart applications to support this policy action; appropriate Inclusive Data Management policy can be established for the collection and interpretation of GESI-sensitive data. AMM's smart applications, such as BaskentMobile, can be used in policy-supporting collaboration and expansion of the participation efforts.

Low, 0-1 million Euros.

Financial Source

International financing institutions, EU, National resource, Municipal resource, Private organisations

Beneficiaries

Owner / Responsible AMM, District municipalities

AMM, District municipalities, residents of Ankara (particularly those who experience social and economic exclusion)

Benefits

Resilience Benefits

- Improved access to sustainable energy
- Improved access to sustainable and safe mobility
- Improved access to education services
- Improved access to clean water, improved sewerage

Economic Benefits

- Revenue generation
- Job creation
- Increased local business opportunities

Job Opportunity

The percentage of women within each target climate adaptation sector employed in the AMM, the district municipalities, and associated companies can be doubled

Social Benefits

- Enhanced gender quality, ensured equal opportunities in employement
- Improved social equality
- Training/ education opportunities for women elderly, youth and minorities







Third Parties Involved

NGOs

Universities, consultancy companies,





Creation of an initiative that will provide technical employment (such as maintenance) in the transportation industry for women

The municipality can play a leadership position in the green jobs sector by planning skills transfer processes. The pilot sector to start with is proposed to be the transportation sector, since there is already an ongoing micro-mobility transition and bus conversion projects. The aim is to establish an initiative (in the form of a company and/or a cooperative) where technical, maintenance staff and women engineers will work together, and ensure skill transfer through trainings. The unemployment rate for women in Ankara is quite high. This action will lead to establish a women's employment transportation initiative.

The implementation of the action will be carried out in the following stages:

- Negotiation of public- private procurement deals in the sector of transportation, in favour of the newly established initiative (i.e., putting an employment quota for any of the vulnerable groups, in the procurement agreement, etc.)
- Design of a digital e-learning portal. This will provide training, specifically to female students and the unemployed ones. Potential partners could be universities with STEM departments, software and digital education companies and women's NGOs and Professional chambers

Action Type

Policy

Prioritised Challenges

- Unemployment rate for women in Ankara is quite high
- All sectors are male dominated
- Ongoing bus conversion project by BELKA is an opportunity

Location / Pilot Area

Ankara wide





Pillars and Strategic Objectives

Pillar 4. Resilience	 SO1: Recognise risks associated with climate change Developing actions for the disadvantaged and vulnerable groups that are expected to be most affected by the climate change SO3: Plan urban development in line with the environment and climatic conditions Prioritising social justice in environmental and climate policies
Preparatory Tasks:	 Assessment of a potential green jobs sector in Ankara. There will be continuous training and networking opportunities with the private industry An e-learning strategy will be prepared
Follow up Tasks:	 Announcement of the Ankara green and ethical jobs assessment report with the relevant stakeholders Annually evaluating the digital portal and organised face-to-face trainings Evaluation of the content of the training material Evaluation of the employment rates of the course attendees
Project Proces	S
Duration	
24 months	

Preparation Time	Implementation Time
12 months	12 months

Action Implementation	Steps	Timeline
	12 months	12 months
Negotiation of public- private procurement deals		
Design of a digital e-learning portal		

Estimated Budget

Low, 0-1 million Euros.

Financial Source

International financing institutions, EU, National resource, Municipal resource, Private organisations

Beneficiaries	Owner / Responsible	Third Parties Involved
Groups of women from different disadvantaged positions and women with STEM related high school and university diplomas	AMM, Companies of AMM, District municipalities	Universities, consultancy companies, NGOs

Benefits

Resilience Benefits

- Improved access to sustainable and safe mobility
- Improved access to education services

Economic Benefits

- Revenue generation
- Increased local business opportunities
- Job creation

Job Opportunity

Reaching 50 percent employment rate at the end of a two-year period, for those receiving training from the digital portal. Female students from vocational high schools and all other unemployed women must be prioritized.

A 50 percent standard employment quota of vulnerable groups (the disabled, women and youth), for each publicprivate procurement deal will be set. The quota will also support target rates in Action 1.

Social Benefits

- Reduced poverty
- Enhanced gender quality, ensured equal opportunities in employment
- Improved social equality
- Improved community engegament
- Training/ education opportunities for women elderly, youth and minorities
- Barrier free access/ improved access to services
- Vulnerable population adressed

Smart Benefits

• Planning "repair workshop trainings" for women in an online training or e-learning programme, ensuring that science and technology-related training is narrated by engineers and mechanics who are women.



GESI











Assessing energy poverty and creating an energy poverty action plan

Assessment of energy poverty in rural and urban Ankara, based on income, gender, age, disability and citizenship will be carried out within this action. An energy poverty action plan will be prepared with strategies and roadmaps to tackle partnerships between AMM, citizens and the energy sector actors.

There will be a knowledge dissemination of the energy poverty action plan with the stakeholders. Public communication will be established via municipality apps, billboards, social media accounts on energy poverty. Clean energy resources will be designed for vulnerable groups, especially for women. Financial and institutional incentives will be encorporated for low-income groups' access to new energy infrastructures, within the framework of coal reduction actions of the Ankara GCAP and Ankara Climate Action Plan.

Networking events between companies, energy entrepreneurs and citizens to establish an energy initiative for solar energy will be organized in the framework of this action.

Action Type

Policy

Prioritised Challenges

- Energy prices are rising
- The sector is male dominated
- There is no detailed data collection on district heating systems and/or renewable energy sources and their usage by vulnerable groups
- There is no comprehensive study on the extent of energy poverty at a local level

Location / Pilot Area

Ankara wide



GESI

Pillars and Stra	tegic Objectives		
Pillar 4. Resilience	O1: Recognise risks associated with climate change Developing actions for the disadvantaged and vulnerable groups that are expected to be nost affected by climate change		
	 SO3: Plan urban development in line with environment and climatic conditions Prioritising social justice in environmental and climate policies 		
Preparatory Tasks:	Developing detailed and collaborative technological, economic and social analyses and an action plan for making a comprehensive determination of energy poverty in the Ankara metropolitan region		
Follow up Tasks:	 Establishment of energy initiatives, monitoring energy poverty and progress of solar energy in Ankara Preparing a renovation plan and pilot projects in urban regeneration neighbourhoods 		
Project Process	5		
Duration			
24 months			
Preparation Time 6 months	Implementation Time 18 months		
Action Implementatio	n Steps Timeline		
	6 months 18 months		
Baseline assessment			
Setting the pilot proj in urban regeneratio neighbourhoods	ects n		

Preparing a renovation

plan for the rest of the neighbourhoods



Estimated Budget

Low, 0-1 million Euros.

Financial Source

International financing institutions, EU, National resource, Municipal resource, Private organisations

Beneficiaries	Owner / Responsible	Third Parties Involved
All vulnerable groups of Ankara, also middle-class citizens and energy consultancy firms	AMM, Companies of AMM, District municipalities	Universities, consultancy companies, NGOs

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Benefits

Resilience Benefits

- Improved access to sustainable and safe mobility
- Improved access to education services

Economic Benefits

- Revenue generation
- Job creation
- Increased local business opportunities

Social Benefits

- Reduced poverty
- Enhanced gender quality, ensured equal opportunities in employment
- Improved social equality
- Improved community engegament
- Training/ education opportunities for women elderly, youth and minorities
- Barrier free access/ improved access to services
- Vulnerable population adressed

Smart Benefits

• This assessment can generate and accumulate disaggregated, GESI-sensitive data. Numeric and spatial values of the evaluation study can be shared as Open Data on AMM's platforms

Target co Benefits

• Planning and implementing 10 renovation pilot projects at the end of a two-year period in each priority district of Mamak, Hıdırlıktepe, Dikmen, where non-insulation and coal/wood heating are highly common





Organizing public education and awareness campaigns on green city practices, targeting social inclusion of vulnerable groups

This action includes campaign design and organization in pilot high schools and universities, especially targeting students of STEM (Science, Technology, Engineering, Mathematics) subjects. Public communication will be developed via municipality apps, billboards, social media accounts about the new GCAP actions and initiatives. With the GCAP actions and practices, the aim is to give specific consideration on gender-based violence and sexual harassment, and development of women and child friendly practices in public spaces and transportation system (metro, parks, etc.).

Action Type

Policy

Prioritised Challenges

- Gender-based violence and sexual harassment are important issues to be considered in all of the GCAP actions
- There is not enough care giving spaces in public spaces

Location / Pilot Area

Ankara wide





Pillars and Strategic Objectives

Pillar 4. Resilience	 SO1: Recognise risks associated with climate change Developing actions for the disadvantaged and vulnerable groups that are expected to be most affected by climate change SO3: Plan urban development in line with environment and climatic conditions Prioritising social justice in environmental and climate policies 		
Preparatory Tasks:	Baseline assessment for developing a communication strategy on green city actions of Ankara		
Follow up Tasks:	Monthly campaign assessments to be done by independent initiatives and/or NGOs		
Project Process			
Duration			
12 months			
Preparation Time	Implementation Time		
2 months	10 months		
Action Implementation	n Steps Timeline		
Communication and Plan	2 months 10 months		
Social media manage	ement		

Visual identity design

PR events and other campaigns

197

Estimated Budget

Low, 0-1 million Euros.

Financial Source

International financing institutions, EU, National resource, Municipal resource, Private organisations

Beneficiaries	Owner / Responsible	Third Parties Involved
All vulnerable groups of Ankara, also middle-class citizens and energy consultancy firms	AMM, Companies of AMM, District municipalities	Universities, consultancy compa- nies, NGOs

Benefits

Green Benefits

• Improved or maintained ecosystem services

Resilience Benefits

Improved access to sustainable energy

Economic Benefits

Job creation

Social Benefits

- Enhanced gender quality, ensured equal opportunities in employment
- Improved social equality
- Improved safety (e.g. GBVH, crime, etc)
- Training/ education opportunities for women elderly, youth and minorities
- Barrier free access/ improved access to services
- Vulnerable population adressed

Smart Benefits

This assessment can generate and accumulate disaggregated GESI-sensitive data. Numeric and spatial values of the evaluation study can be shared as Open Data on AMM's platforms. Digital tools can be used to improve the User Experience (UX) of campaign design. AMM's smart applications can support this action, and these applications can be used for feedback and voting on campaigns.

Target co Benefit

At least one public campaign for each of the GCAP sectors will be organized

At least 50 public education sessions (that is 2 education sessions for each of the 25 districts) which may take place in schools, universities and other municipal centres will be given





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Appendix 2: Existing Plans, Programmes, Legislative Measures and Strategies

The rules and arrangements, plans, programmes and the strategies related to the Ankara GCAP were reviewed to constitute an initial basis. These were classified in accordance with their relationship with the GCAP sectors, along with each item's related institutional bodies. This evaluation was also taken into account during the action development phase of the Ankara GCAP. The reviewed topics are presented in **Table 32**.

 Table 32: Existing plans, programmes and strategies with related sector, institutional body, purpose and objectives

Related sector	Existing plans, programmes and strategies	Institution	Purpose and objectives of the plan /programme/ strategy
All sectors	National Climate Change Strategy Paper	Ministry of Environment, Urbanisation and Climate Change	Paper was prepared by MoEUCC to contribute to global efforts to reduce the impacts of climate change. With this strategy document, Türkiye contributes to climate action with a goal of "common but differentiated responsibilities", which is one of the basic principles of the United Nations Framework Convention on Climate Change
	National Basin Management Strategy	Ministry of Agriculture and Forestry, Ministry of Environment, Urbanisation and Climate Change General Directorate of Combating Desertification and Erosion	Provides guidance to medium and long-term decisions and investment programs regarding the protection, development and sustainable use of the country's water basins and their natural resources. It is to ensure the needs and expectations of the society regarding the ecological, economic, social and cultural benefits and services of the basins at a sufficient level to meet them in a sustainable way. It aims to facilitate the integrity and implementation of the strategy documents prepared
	Regional Development National Strategy	Ministry of Development - General Directorate of Regional Development and Structural Adjustment	Forms the basis for the development and implementation of sectoral and thematic strategies concerning regional development. It was prepared in order to accelerate regional development and increase its contribution to national development.
	Drinking Water, Wastewater and Stormwater Management Master Plan (2024-2054)	ASKI	The Master Plan studies to meet Ankara's future 30-year water supply and wastewater management started in 2020 and will continue for 42 months. In the protocol, in which it's envisaged that the capital's future 30-year water management will be planned and protected, there will be many goals such as changing consumption habits and producing innovative solutions in water management, especially the effects of possible climate changes and droughts on water resources. ASKI will also determine short-, medium- and long-term investment and business policies with the new master plan. It aims to create an effective infrastructure system in the management of water loss and leakage in accordance with the concept of efficient energy and smart city.
	Regulation on Control of Water Losses in Drinking Water Supply and Distribution Systems	Ministry of Agriculture and Forestry	The purpose of this regulation is to regulate the procedures and principles regarding the control of water losses in drinking and utility water supply and distribution systems, in order to protect water resources and increase efficiency, and use potable water effectively, preventing losses.
	National Water Plan	Ministry of Agriculture and Forestry - General Directorate of Water Management	The plan gives a general outline of Türkiye's water policy and its implementation. It offers a holistic perspective for the sustainable management of national water resources in terms of quantity and quality, taking into account the balance of protection and use
	Ankara Climate Change Action Plan	АММ	In the climate change action plan of Ankara Province, information about our current situation was obtained by creating the greenhouse gas emission inventory of the city. In light of the information obtained, models have been made and various actions have been determined in order to be more resistant to natural events awaiting the city in the future and to reduce our greenhouse gas emissions.

Related sector	Existing plans, programmes and strategies	Institution	Purpose and objectives of the plan /programme/ strategy
Transportation	Ankara Transportation Master Plan 2038 (not approved)	Gazi University and AMM	The plan focuses on people and accessibility rather than vehicles, promoting a public transport oriented compact urban development, and efficient, safe and reliable transport services in the city. 12 rail projects with a total of 313.8 km and several road projects with a total of 160.5 km were proposed by 2038.
	Transport and Urban Planning Regulations	Ministry of Internal Affairs	Accessible Transportation Strategy and Action Plan (2021-2025), Ministry of Transportation and Infrastructure
	Ankara Cycling Strategy and Masterplan	АММ	Aims to support AMM to develop a citywide integrated cycle network that connects with public transportation, as well as assisting the pilot implementation and development in a prioritised area of the city. Alongside this, a modular bicycle parking facility design is to be implemented across Ankara as a complementary of the system.
	Cycleways Regulation	Ministry of Environment, Urbanisation and Climate Change	General principles, covering the fundamentals of design for cycle routes and networks, include consideration of topography, network integrity, safety, interactions with pedestrians and motorised vehicles, inclusion of disabled people, guidance on managing the interaction between cyclists and other street users at bus stops, road crossings, and signalised junctions.
	Ankara Climate Change Action Plan	АММ	In the climate change action plan of Ankara Province, information about our current situation was obtained by creating the greenhouse gas emission inventory of the city. In light of the information obtained, models have been made and various actions have been determined in order to be more resistant to natural events endangering the city in the future, and to reduce our greenhouse gas emissions.
	National Energy Efficiency Action Plan	Ministry of Energy and Natural Resources	Includes 55 actions in buildings and services, energy, transport, industry and technology, agriculture and cross-cutting (horizontal) areas. Covers the technological, economic, social and environmental dimensions; considering innovation and best practices; prioritizing stakeholder management; and have been prepared in line with the principle of effectiveness and efficiency
	National Renewable Energy Action Plan	Ministry of Energy and Natural Resources	Ensure the share of renewable energy in electricity production increases to 30% of total demand by 2023. Objective to establish strategies to promote the development of renewable energy in Türkiye.
	The Energy Efficiency Law No. 5627 enforced	Ministry of Environment, Urbanization and Climate Change	Fundamental purpose is to use energy effectively, avoid waste, ease the burden of energy costs on the economy, and improve efficiency in using energy resources and energy to protect the environment.
	National Climate Change Strategy of 2010 - 2023	Ministry of Environment, Urbanisation and Climate Change	Recognition of the importance of international cooperation to reduce greenhouse gas emissions leading to climate change, and to combat climate change.
Energy	11th Development Plan of 2019-2023	Presidency of the Republic of Türkiye Strategy and Budget Department	Defines sustainable urban development measures that will be taken in the period in line with "2.4 Liveable Cities, Sustainable Environment" Avoided CO2 Emissions by Newly Established Renewable Power Plants; 18,0 Million Tons, cumulative by 2023.
	Law on Energy Performance of Buildings	Ministry of Environment, Urbanization and Climate Change	Aims to regulate the procedures and principles regarding the effective and efficient use of energy and energy resources in buildings, the prevention of energy waste and the protection of the environment.
	Ankara Climate Change Action Plan	АММ	With the preparation of the Ankara Province Local Climate Change Action Plan, it is aimed to increase the capacity of the province in combating and adapting to climate change and to raise awareness at the provincial level.
	Energy Efficiency Regulation	Ministry of Energy and Natural Resources	Aims to regulate the principles and procedures for increasing efficiency in the use of energy resources and to use energy effectively, to prevent energy waste, to alleviate the burden of energy costs on the economy and to protect the environment.
	Energy Efficiency Strategy	Ministry of Energy and Natural Resources	Prepared to enable the public sector, private sector and non- governmental organisations to act with a participatory approach and cooperation, to determine a result-oriented and supported policy set with concrete goals, to determine the actions that must be taken to achieve these goals, and to define the responsibilities that organisations will undertake in the process.

Related sector	Existing plans, programmes and strategies	Institution	Purpose and objectives of the plan /programme/ strategy
Buildings	The Energy Efficiency Law No. 5627		Defines the regulations to use energy effectively, avoid waste, ease the burden of energy costs on the economy, and improve efficiency in using energy resources and energy to protect the environment.
	By-Law on Energy Performance of Buildings	Ministry of Environment, Urbanization and Climate Change	The purpose of the regulation is to regulate the procedures and principles regarding the effective and efficient use of energy and energy resources in buildings, the prevention of energy waste and the protection of the environment.
	Thermal Insulation in Buildings Regulation	Ministry of Environment, Urbanization and Climate Change	The purpose of this Regulation is to manage the procedures and principles regarding the reduction of heat losses in buildings, energy saving and implementation.
	Energy Efficiency Regulation	Regulation of Ministry of Energy and Natural Resources	The purpose of this Regulation is to control the principles and procedures for increasing efficiency in the use of energy resources and energy in order to use energy effectively, to prevent energy waste, to alleviate the burden of energy costs on the economy, and to protect the environment.
	Climate Change Action Plan	Ministry of Environment, Urbanisation and Climate Change	Establish heat insulation and energy-efficient systems meeting standards in commercial and public buildings with usable areas larger than 10 thousand square meters and in at least 1 million residential buildings by 2023.
	National Climate Change Strategy of 2010-2023	Ministry of Environment, Urbanisation and Climate Change	Prepared in order to contribute to Türkiye's global efforts to reduce the effects of climate change, within the framework of its own special conditions and possibilities.
	Ankara Climate Change Action Plan	АММ	In the climate change action plan of Ankara Province, information about our current situation was obtained by creating the greenhouse gas emission inventory of the city. In light of the information obtained, models have been made and various actions have been determined in order to be more resistant to natural events awaiting the city in the future, and to reduce our greenhouse gas emissions.
Solid waste	National Waste Management and Action Plan: 2016-2023	Ministry of Environment, Urbanisation and Climate Change	This plan appears as a report prepared for the purpose of creating clean areas and making them sustainable. In this way, it will be ensured that a society model that will contribute to its environment in every sense and that always follows new developments closely will be created.
	Strategic Plan of Ankara Metropolitan Municipality: 2020-2024	АММ	With the Municipality Strategic Plan studies, the aim is to use the municipal resources effectively, efficiently and economically. For this purpose, the stages of the planning process were determined and the activities to be carried out in this process were revealed. In this framework, a preparatory program including the time frame covering all activities was created, and the training program required for the strategic plan was prepared for the units.
	Ankara Climate Change Action Plan 2021	АММ	In the prepared Ankara Province local climate change action plan, information about the current situation was obtained by creating the greenhouse gas emission inventory of the city. From the information we have obtained, models have been made and various actions have been determined in order to be more resistant to natural events awaiting our city in the future and reduce our greenhouse gas emissions.
	Zero Waste Regulation Official Gazette Date: 12.07.2019 Number: 30829	Ministry of Environment, Urbanisation and Climate Change	The purpose of this Regulation is to establish the general principles and principles regarding the establishment, dissemination, development, monitoring, financing, recording and documentation of the zero waste management system, which aims to protect the environment and human health and all resources in waste management processes in line with the effective management of raw materials and natural resources and sustainable development principles.
	Regulation on the Incineration of Wastes Official Gazette Date: 06.10.2010 Number: 27721	Ministry of Environment, Urbanisation and Climate Change	The purpose of this Regulation is to prevent and limit the negative effects of incineration on the environment by using applicable methods, especially the pollution caused by emissions in air, soil, surface waters and groundwater, and the risks that may arise for human health.
	Landfill Regulation Official Gazette Date: 26.03.2010 Number: 27533	Ministry of Environment, Urbanisation and Climate Change	This Regulation covers the technical principles regarding the sanitary landfills, the procedures and principles regarding the acceptance of the wastes to the landfills and the landfilling of the wastes, the measures to be taken, the inspections to be made and the responsibilities to be subject to.
	Communiqué on Refuse Derived Fuel, Additional Fuel and Alternative Raw Materials Official Gazette Date: 20.06.2014 Number: 29036	Ministry of Environment, Urbanisation and Climate Change	The purpose of the Communiqué is to determine the technical, administrative and general rules regarding the use of wastes as alternative raw materials, the preparation of waste-derived fuel and the minimum requirements to be found in these preparation facilities, as well as the principles regarding the use of waste-derived fuel and the wastes to be used as additional fuel in co-incineration facilities.

Related sector	Existing plans, programmes and strategies	Institution	Purpose and objectives of the plan /programme/ strategy
Air quality	Air Quality Assessment and Management Regulation	Ministry of Environment, Urbanisation and Climate Change	The purpose of this Regulation is to define and establish air quality targets to prevent or reduce the harmful effects of air pollution on the environment and human health, to evaluate air quality based on defined methods and criteria, to maintain and otherwise improve the current situation where air quality is good, to collect sufficient information about air quality and is to ensure that the public is informed through warning thresholds.
	Plan of the Ministry of Environment	Ministry of Environment, Urbanisation and Climate Change	
	Regulation on Control of Industrial Air Pollution Official Gazette Date: 03.07.2009 Number: 27277	Ministry of Environment, Urbanisation and Climate Change	The purpose of this Regulation is to control the emissions in the form of soot, smoke, dust, gas, steam and aerosol emitted to the atmosphere as a result of the activities of industrial and power generation facilities; to protect people and their environment from the dangers that may arise from pollution in the air-receiving environment.
	Regulation on Control of Air Pollution Caused by Heating Official Gazette Date: 13.01.2005 Number: 25699	Ministry of Environment, Urbanisation and Climate Change	The purpose of this Regulation is to control pollutants emitted to the outside air in the form of soot, smoke, dust, gas, steam and aerosols originating from incineration plants used for heating purposes in housing, mass housing, cooperative, site, school, university, hospital, government offices, workplaces, social recreation facilities, industry and similar places. to reduce and control the negative effects on air quality.
	Exhaust Gas Emission Control Regulation Official Gazette Date: 11.03.2017 Number: 30004	Ministry of Environment, Urbanisation and Climate Change	The purpose of this Regulation is to protect living things and the rest of the environment from the effects of air pollution caused by exhaust gases from motor vehicles traveling in traffic, to reduce exhaust gas pollutants, to control through making measurements and to determine the procedures and principles regarding implementation.
	Ankara Province Clean Air Action Plan 2020	Ministry of Environment, Urbanisation and Climate Change	This report presents the results of the air quality assessment, the compliance rate with the Air Quality Assessment and Management Regulation (HKDYY) obligations, the proposed action plans to reduce the emission of the main sources and the projections for the next ten years
Soil	Soil Protection and Land Use Law No. 5403 (Official Gazette Date/Number 19 July 2005/25880)	Ministry of Agriculture and Forestry	Soil protection and development, classification of agricultural lands, determination of agricultural lands and agricultural land sizes bring income and set environmental priority and procedures to ensure that lands are planned to be used in accordance with the sustainable development principles
	Regulation on Control of Soil Pollution and Point Source Contaminated Sites (Official Gazette Date/Number: 8.6.2020/27605)	Ministry of Environment, Urbanisation and Climate Change	Pursuant to Article 7 of the Regulation, the facilities listed in the annexes of the regulation are required to submit the "Activity Preliminary Information Forms" through the Contaminated Sites Information System. Facilities which have submitted this notice are included in the list of Potentially Contaminated Sites.
	Environmental Status Report	Environment, Urbanisation and Climate Change	This report includes information about contaminated sites and their status in Ankara.
	Identification and Remediation of Contaminated Sites with Persistent Organic Pollutants (POPs)	Ministry of Environment, Urbanisation and Climate Change	This study started in 2019 and will last 36 months. The objective of this study is protecting human health and environment from adverse effects of Persistent Organic Pollutants and other hazardous substances especially in contaminated sites through enhancing the implementing capacity of EU POPs Regulation and Soil Contamination Strategy.

Related sector	Existing plans, programmes and strategies	Institution	Purpose and objectives of the plan /programme/ strategy
	The UN Convention on Biological Diversity (1997)		Aims to develop national strategies for the conservation and sustainable use of biological diversity and it is often seen as the key document regarding sustainable development.
	The Convention on Wetlands of International Importance especially as Waterfowl Habitat (RAMSAR)	International agreement for the conservation and sustainable use of wetlands	Every three years, representatives of the contracting parties meet in the Conference of the Contracting Parties (COP), the policy-making organ of the convention which adopts decisions (resolutions and recommendations) to administer the work of the convention and improve how the parties can implement its objectives.
	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	An international agreement between 164 nations (including Türkiye)	Have principles on the sustainable trade fundamental that is significant for the protection of the ecologic resources (a vast array of wildlife products derived from a great number of live animals and plants, products additive to the food, exotic leather goods, etc.) in the future.
	The Convention on the Conservation of European Wildlife and Natural Habitats (BERN) (1984);		Established for the conservation of European wildlife and natural habitats.
Biodiversity	National Biodiversity Strategy and Action Plan 2007-2017	Ministry of Agriculture and Forestry	Prepared by the Ministry of Agriculture and Forestry in 2006. Recently updated for the years 2018-2028. Includes five-year strategic goals to reduce biodiversity loss, reduce pressures and ensure sustainability. Data on vascular plants, mammals, birds, reptiles, amphibians and inland fish were collected from the Noah's Ark National Biological, recorded and monitored with the Diversity Database.
	National Wetland Strategy and Action Plan	Ministry of Environment, Urbanisation and Climate Change	The Ministry of Environment has prepared a strategy plan covering the years 2011-2015 for the protection and rational use of wetlands. According to the plan, 34 actions have been defined, gathered under 8 headings: Inventory, Assessment and Monitoring in Wetlands; Policies and Management Tools; Sectoral Pressures; Communication, Education, Participation and Awareness on Wetlands (Cepa); Restoration and Rehabilitation (Healing and Recovery); Climate Change and Wetlands; Corporate Capacity; Implementation, Monitoring and Evaluation of the Strategy.
	National Forestry Program of Türkiye	Ministry of Agriculture and Forestry	Program (TCP/TUR/0066 (A))" supported by the United Nations Food and Agriculture Organisation (FAO) and was completed at the end of 2003. Coordination services of the works; Ministry of Forestry Foreign Relations-EU It has been carried out by the Department of Research and Development since the establishment of the Ministry of Environment and Forestry in 2003. The actions were mainly prepared in the general framework for the five-year short-term (2004-2008) and the twenty-year long-term (2004-2023).
	National Science and Technology Policies 2003- 2023 Strategy Certificate (2004)	Supreme Council of Science and Technology	Its December 2000 meeting, the Supreme Council of Science and Technology (BTYK) commissioned TÜBİTAK to determine new science and technology policies for a 20-year period extending to 2023, when we will commemorate the 100th anniversary of the Turkish Republic, based on the fact that the latest science and technology policy study was carried out in 1993.
	National Action Program of Türkiye to Combat Desertification (2013-2023)	Ministry of Agriculture and Forestry	At the Eighth Conference of the Parties of the United Nations Convention to Combat Desertification in 2007, the "10-Year Strategy Document" was adopted, and it was decided that 195 party countries should prepare a national strategy document based on this document. In this context, Türkiye and Spain were asked to lead other countries. In this context, Türkiye drafted the National Strategy Document for Combating Desertification in 2012.
	Lakes and Wetlands Action Plan (2017-2023)	Ministry of Agriculture and Forestry	The inventory of lakes in Türkiye country has been completed with the Wetland Inventory, Management Plan Preparation and National Wetland Inventory Sub-Project conducted by Nature Conservation and National Parks. In the Lake and Wetlands Action Plan, the lakes and wetlands list to be studied were determined by taking into account the lakes within the scope of the Project and the lakes within the scope of the "Identification of Sensitive Areas and Water Quality Objectives Project on Basin Basis in Türkiye".

Related sector	Existing plans, programmes and strategies	Institution	Purpose and objectives of the plan /programme/ strategy
Land-use and Urban Planning	Ankara 2023 Master Development Plan	АММ	Aims to ensure a balanced urban development that protects natural, historical and cultural assets of the city while providing the citizens with healthy and high-quality living environments.
	Ankara 2038 Transportation Master Plan (not approved)	АММ	The major transportation plan aiming to coordinate the land use with the transport system to achieve a compact city served primarily with public transit systems.
	Urban Development Plans at 1/5000 and 1/1000 scales	AMM	Based on the 1/25000 master development plan, the municipality has developed numerous urban development plans at lower scales as master and implementation development plans. There are also plans of this sort prepared by central agencies.
	Ankara Climate Change Action Plan	АММ	The plan focuses on both mitigation and adaptation targets of the climate policy and includes evaluations on the existing emission sources and climate risks in the city as well as recommendations for mitigation and adaptation concerning key sectors of urban land use development.
	Ankara 2038 Territorial Development Plan, 2017 (not approved)	Ministry of Environment, Urbanisation and Climate Change	The plan guides the urban land use development in Ankara Province from a wider perspective that takes into account the settlements around the metropolitan core.
	2020-2023 Türkiye National Smart Cities Strategy and Action Plan	Ministry of Environment, Urbanisation and Climate Change	This is the first Smart City strategy and action plan, and the fourth in the World, drawn up on a national level, and which is shaped with logic and scientific perspective, in which the central government institutions and organisations, local governments, private sector, nongovernmental organisations (NGOs) and universities.
			This plan is the current strategic plan prepared by the administration of Mayor Mansur Yavaş. In the PESTLE analysis of the plan, it has been suggested to participate in international technology fairs, allocate a budget especially for smart city applications, establish a project team, and save energy through smart buildings.Strategic areas that the AMM Strategic Plan focuses on:
Smart City	AMM Strategic Plans for 2020- 2024	АММ	 Quality of Life: Pollution, noise and new zoning plan Transportation: Traffic safety, accessibility, traffic technologies, new Traffic Control Centre
			• Environment: Per capita green space, cleanliness, stray animals and sustainable urban infrastructure, flora and fauna
			 Economy: Rural development, supporting producers, women's employment
			• Inclusion: Promoting a healthy life, facilitating the lives of disadvantaged citizens, support for households with low-income
			Culture: Cultural properties, international recognition
			• Governance: Fast and effective response to incidents, capacity building (AMM staff), GIS
			• Resource Planning: Innovative technologies, open communication with citizens, transparency in service delivery, smart cities vision
City Resilience based on Risks and Vulnerabilities	National Climate Change Action Plan 2011 - 2023	Ministry of Environment, Urbanization and Climate Change	Provides for a road map that covers all sectors and identifies short, medium and long-term targets for combating climate change. Aims to integrate Türkiye's future development and environmental plans and to proceed seamlessly, and without losing pace. One of the Plan's objectives is to "identify threats and risks for management of natural disasters caused by climate change".
	10th Development Plan (2014-2018) - Effectiveness in Disaster Management - Specialised report	Presidency Strategy and Budget Department	It is expected to contribute to the determination of policies to reduce disaster risks and to be a document that can be a source for studies on disasters and emergencies.
	11th Development Plan (2019 - 2023)	Presidency Strategy and Budget Department	A roadmap to improve the country's position in the international arena and enhance its welfare. Specifies that climate change accelerates due to high greenhouse gas emissions, which may increase the frequency of natural disasters and therefore poses a serious threat to humanity.
	Türkiye's Disaster Response Plan (TAMP)		Defines the roles & responsibilities of all service groups and coordination units; and sets the principles of response planning before, during and after disasters/emergencies. Identifies the responsible government bodies to supervise the development of emergency plans in their relevant sectors
	Ankara Disaster Response Plan	Ankara Governorship	Defines the roles and responsibilities of the Service Groups and coordination units, and the basic principles of Ankara's response planning before, during, and after the disaster.

Appendix 3: Vulnerable Groups and Current Policy Assessment

Table 33: Vulnerable groups, their demographic, geographical and socio-economic aspects, and current policy assessment

Vulnerable Group	Demographic, Geographical and Socio-Economic Aspects of the Vulnerable Group	Policy Assessment
		Women have been identified to be the most significant vulnerable group that are subjected to informality and unemployment. The gender pay gap is high. In STEM jobs, women's participation in jobs is low, and it rather limited their presence in all of the GCAP sectors and in the AMM. AMM offers vocational training to women, through BELMEK (Ankara Metropolitan Municipality Vocational Training Courses) and BELTEK (Ankara Metropolitan Municipality Technical Training Courses).
	Low representation rate of women in the City Council (10 %). Female unemployment rate (20.2%) is high. Employment rates of women are low (28 70%)	There are not enough kindergartens and elementary schools and elderly care homes, which increase the work that falls onto women. AMM has women's clubs and centers for family centers that compensate for the much-needed services.
Women	compared to men (65.60%). Because of the traditional division of labor and perception of female and male roles in the households, the demands of care are often	Women are under threat from gender-based violence and harassment in public spaces and in urban transport. They mostly travel alone, without dependence on public transportation, due to difficulties in accessibility.
	seen as the responsibility of women.	Türkiye unfortunately withdrew from the Council of Europe Convention on preventing and combating violence against women and domestic violence known as the Istanbul Convention. The Convention serves as a legally binding agreement that aims for a comprehensive legal framework to combat violence against women. AMM Works with the women's Non-Governmental Organizations (NGO) gender policy of Ankara specifically under Local Gender Equality Plan. The city has a candidacy to UN Women Friendly Cities program.
		There is no gender disaggregated data at any level of urban services.
	Elderly population compose 7.6% of the city and 1%	Elderly friendly design in urban transportation vehicles, public spaces (i.e., parks, avenues, and large streets), metro stations and public toilets are needed.
Eldorby	of this dempgraphic live in nursing homes. Çankaya households have the highest incomes compared to	Not enough elderly care homes exist in the city.
Lideny	other districts. It is home to a relatively large elderly population (14%), higher than the national average	Elderly can use the mobile services to manage their water accounts.
	(7.6%).	levels. Rising energy prices, use of coal in the household and air pollution as a result, has severe repercussions for the elderly health.
People with Disabilities	Disabled people compose 1.6% of the population.	There are not enough urban services developed for people with disabilities. For example, design to make buses accessible for the disabled is a significant need.
Youth	Youth unemployment rate (15-24 age) is 30.2%, much higher than in the EU (15%). Young women are more at risk for unemployment.	One of the most important co-benefits of the GCAP actions is in its potential to improve youth employment opportunities. There are special tariffs for students to increase accessibility and affordability to urban transportation system.
	Children population ages 0-4 compose 13.4% of the population.	70% of children of Ankara, between the ages of 3-6 years old, stay at home under their mothers' care. There is a need for better care facilities specifically for the age groups below 6 years old to improve employment opportunities for women in the city. AMM has daycare centers that are not entirely sufficient to meet the needed services for children.
Children		Keçiören and Mamak are at the highest risk of violence and need safer spaces. These districts have the highest numbers of women and children.
		Public transportation currently does not have extra measures in place to increase the access and comfort of women with children in the public transportation system.
Low-income groups and people with poverty risk	Low-income households account for 17.1% of Ankara's population. This potentially arose in the aftermath of COVID-19 and currency crisis in Türkiye.	Unemployment rate is 15%; higher than EU (%b) and OECD countries (%5). Households experiencing poverty generally live in the northern and north-eastern districts of Ankara, as well as in the city's historical, old settlements often on vacant land, where urban renewal projects are undergoing. These communities have lower levels of educational attainment. People living in squatter housing with low-incomes in valley-like geographic areas are more open to flood risks. Looking at the flood disasters between 2018-2020, Mamak is the most exposed district to flood events. These groups are also more prone to transportation and energy poverty despite special tariffs put in place by AMM. Housing is a significant problem for low-income groups.
		AMM should carry out an economic and social risk assessment of low income and high- risk communities, for dispossession and displacement as far as the GCAP innovations in such neighborhoods are concerned
	Ankara welcomes immigrants and foreign nationals	
Refugees	(Inci. Expats), and nas the second highest immigration rate in Turkey, after Istanbul. Immigrants compose (3.01%) of Ankara's total population (including both Turkish Republic citizens and foreign nationals who are immigrating to Ankara from other cities or countries). Immigrants from Iraq, Afghanistan, Iran, and Somalia are the most common. Syrian refugees under temporary protection account for 1,71% of Ankara's total population. The highest numbers of Syrian refugees live in Altindağ, Mamak, Yenimahalle, Polatli and Bevoazari)	Immigrants from the Middle East informally work in the solid waste sector under unsecure conditions. There is no policy by the AMM in the urban transportation sector and in public spaces, to improve accessibility and affordability.

Appendix 4: Regulatory Perspective for the Financing of Actions

The legal perspective for the financing of actions is given in the following sections.

Applicable Legislation:

- Municipality Law No. 5393 ("Law No. 5393")
- Metropolitan Municipality Law No. 5216 ("Law No. 5216")
- Tax Procedure Law No. 213 ("TPL")
- · Law on Regulation on Public Finance and Debt Management No. 4749 ("Law No. 4749")
- Regulation on the Procedures and Principles Regarding the Provision of Foreign Financing within the Scope of the Law on the Regulation of Public Finance and Debt Management No. 4749 ("Regulation")

Overview

Municipalities are local government institutions with public legal personality and autonomy. They have independent budgets which determine revenues and expenditures.

Approval of Municipal Projects

According to Article 18/1(a) of the Law No. 5393, discussing and adopting the municipality's strategic plan, investment and work programs and projects of the municipality are among the main duties of the municipal council. (belediye meclisi)

Article 34(a) of the same states that the municipal committee (*belediye encümeni*) have the duty and authority to review and share their opinion in relation to the municipality strategic plan and annual work program and budget and final account.

Financing of Municipal Projects

Budget

Pursuant to Article 25/1 of the Law No. 5216, the metropolitan municipality budget and the budgets of the district municipalities shall be submitted to the metropolitan municipality council and shall be adopted by the metropolitan municipality council as is or upon making amendments to ensure unity among investments and services.

Borrowing

As per Article 61 of Law No. 5393, municipalities cannot make extra-budgetary expenditures.

Article 68 ⁴⁷ of Law No. 5393 regulates the rules in relation to borrowing. Internal borrowing is under the powers of the municipal council. However, the provision of resources through internal borrowing is limited to 10% of the budget, and requests for internal borrowing of more than 10% are subject to the approval of the Ministry of Environment, Urbanization and Climate Change.

In addition, the domestic and external debt stock cannot exceed the amount of the most recent final budget revenues for municipalities and special provincial administrations after revaluation with the revaluation rate specified in TPL.

47 Article 68- In order to meet the expenses required by its duties and services, the municipality may borrow and issue bonds in accordance with the following procedures and principles:
a) External borrowing can only be made for the purpose of financing of the projects included in the investment program of the municipality within the framework of Law No. 4749.

b) The municipality, which uses investment loan and cash loan from "Iller" Bank, has to submit its payment plan to this bank. "İller Bank rejects the loan requests of the municipality, which it does not consider the repayment plan prepared to be sufficient. c) Bond issuance is made in accordance with the provisions of the relevant legislation for the financing of the projects included in the investment program. d) The amount of internal and external debt stock, including interest, of the municipality and its subsidiaries and the companies in which they own more than 50 percent of the capital, cannot exceed the amount of the most recent final budget revenues, which has been increased by the revaluation rate to be determined in accordance with the Tax Procedure Law No. 213. This rate is calculated as one and a half times for metropolitan municipalities

e) The municipality and their subsidiaries and the companies in which they own more than fifty percent of the capital can make internal borrowing not exceeding ten percent of the total amount of the most recent final budget, which is increased by the revaluation rate to be determined in accordance with the Tax Procedure Law No. 213, by the decision of the municipal council; internal borrowing exceeding ten percent can be made with the decision of the absolute majority of the total number of council members and the approval of the Ministry of Environment and **Urbanization**

f) Borrowings to be made for projects approved by the President in infrastructure investments of municipalities that require advanced technology and large amounts of financial resources are not considered in calculating the amount in (d). The opinion of the Ministry of Treasury and Finance is taken for projects that require external resources. This rate is calculated as 1.5 times for metropolitan municipalities. In the calculation of the debt stock, not only the loan amounts used from the banks are included, but also the accrued interest expenses related to said loans, financial debts and tax debts to public administrations, SSI (Social Security Institution) premium debts, and debts to the market.

According to Article 68/f of the Law No. 5393, there is no restriction on external borrowings approved by the President to be made by municipalities in relation to infrastructure investments requiring advanced technology and large amounts of material resources.

External Borrowing Procedures

Procedures for external borrowing is explained in more detail in Article 5 of the Regulation.

- i. Accordingly, municipality that will carry out the external borrowing must first apply to the Ministry of Treasury and Finance ("Ministry").
- **ii**. The Ministry shall ask the Presidential Strategy and Budget Department for the appropriate opinion on the project's place in the investment program, its need, priority, and the appropriations to be transferred to the relevant project in terms of years.
 - **a.** After permission to be given by the Ministry based on the approval of the Presidential Strategy and Budget Department, the local government is allowed to use foreign financing.

Even though it is essential that foreign financing is obtained directly by the Ministry it is also possible that the financing is undertaken by the contractor or by the municipality by way of bond offering. Treasury guarantees can also be included into the conditions of arrangement.

Next Steps from Regulatory Perspective

The actions to be included in the plan are within the power and authority of the municipality. The municipality should include the actions into the strategic plans, investment and work programs upon the approval of the municipal committee. For the realisation of the actions, an allocation could be made from the municipal budget. If the project financing is required and external borrowing is utilized, these actions may be financed with permission from the Ministry, based on the review and approval of the Presidency of Strategy and Budget.

Appendix 5: Internal and External Stakeholder Engagement

First Internal and External Stakeholder Engagement – Workshop

The challenges that arise as a result of the environmental state and sector-based pressures on the environment were identified during the baseline assessment and technical assessment processes. They were then discussed with the stakeholders in the first Internal and External Stakeholder Engagement Workshop under the theme "Discover". In this workshop, the strengths and weaknesses of Ankara by means of the GCAP environmental state, and sectors putting pressure on the environment were analysed to constitute a set of challenges to create the vision and objectives.

Second Internal and External Stakeholder Engagement – Workshop Series

The purpose of the second stakeholder engagement with the theme "Determine" was to evaluate the environmental performance and challenges of the city together with the stakeholders, to discuss the main challenges in tackling sustainable development and climate change, and to identify specific problems. These identified problems will form the basis of the third stakeholder engagement activity, which will focus on determining the vision and strategic objectives of Ankara GCAP.

While air quality and green areas were the most prioritised and the most discussed topics in Ankara's climate change and environmental state assessment in all sessions of the workshops; environment; transportation, land use and buildings were the sectors that received the highest number of opinions. In addition, the intersection point of all the discussions in the groups was the 'problems about planning'.

The main output developed from the external stakeholder workshops was the prioritisation of challenges, which have been established through a mixture of quantitative data and expert judgements. The aim of the internal workshops was to identify the current plans and projects of the relevant units of AMM regarding challenges and difficulties that are primarily stated in the external stakeholder workshops. The outcomes of the series of internal and external workshops were reviewed and the specific challenges were identified for prioritisation.

The process of prioritisation of the challenges, in line with the emphasis on stakeholder engagement. is presented in **Figure 20**.



Figure 20: Prioritisation of challenges process

Third Internal and External Stakeholder Engagement – Vision and Objectives Survey

The purpose of the third stakeholder engagement with the theme "Develop", was to know what future both internal and external stakeholders within the framework of Ankara green city wished for, and to define both the vision and the strategic objectives. 483 stakeholders consisting of representatives from various public institutions and organisations, universities, NGOs and professional chambers participated in the survey. The subject that the participants contributed the most to was environmental protection. This issue is discussed in the context of air quality, green areas, wetlands, biodiversity, and agricultural areas. Another contribution was to increase decarbonization practices. In this context, practices related to sustainable planning and transportation systems and approaches to using renewable and alternative energy are discussed. Practices to reduce the effects of climate change and increase the city's adaptation to disasters and risks are other matters of contribution. The participants also commented on the efficient use and recovery of resources. In addition, social inclusion and the implementation of innovative and smart practices in all areas of the city were among the topics emphasised by the participants. All consulted stakeholders have a critical position in determining the strategic objectives and actions of the Ankara GCAP as well as in the implementation of the actions.

Fourth Internal and External Stakeholder Engagement – Actions Survey

For the transition from the long list to the short list of actions, a survey was prepared as the fourth stakeholder engagement "Obtain". This was created to receive the review and opinions of internal and external stakeholders. In the survey, 54 actions were matched with the most related Pillar ('Environmental Protection, Decarbonisation, Resource Efficiency and Circular Economy, Resilience') and presented to the review of participants. Six actions were prioritised and chosen by the participants for each pillar. A description of each action was also linked to the survey. For the Environmental Protection Pillar; the protection and proliferation of green spaces and parks, taking precautions against floods caused by heavy rainfall and actions on the transition to renewable energy were taken into consideration by the participants. For the Decarbonization Pillar; in city plans, climate sensitivity and green city practices, sustainable transportation systems and actions for renewable energy sources have come to the forefront. Within the Resource Efficiency and Circular Economy Pillar; actions aimed at water saving, separation and reuse of solid waste and wastewater at source were prioritized by the participants. Finally, for the Resilience Pillar, actions aimed at resilience to the risks arising from climate change and the development of applications for the needs of vulnerable groups have come to the forefront. After the result of the survey was evaluated by experts, a shortlist of actions was defined.







Ankara Metropolitan Municipality

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