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SECAP DEVELOPMENT GUIDE BOOK:

CASE IN TURKISH MUNICIPALITIES

AUGUST 2023

EU 4 ENERGY TRANSITION: Covenant of Mayors in Western Balkans and Türkiye

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ABBREVIATIONS

BAU	Business As Usual
BEI	Baseline Emission Inventory
CDP	CDP Global
CoM	European Covenant of Mayors for Climate and Energy
CO_2	Carbondioxide
CO_2 eq	Carbondioxide equivalent
CRF	Common Reporting Framework
GCoM	Global Covenant of Mayors for Climate and Energy
GHG	Greenhouse Gases
ICLEI	Local Governments for Sustainability
IPCC	Intergovernmental Panel on Climate Change
JRC	EU Joint Research Center
SECAP	Sustainable Energy and Climate Action Plan
SDGs	UN Sustainable Development Goals
RVA	Risk and Vulnerability Assessment
UN	United Nations

1. PREFACE

Cities contain more than half of the world's population and they consume more than two thirds of the world's energy. Local leaders around the world are pursuing ambitious climate initiatives in their communities. Cities are key to deliver on the Paris Agreement and the Sustainable Development Goals (SDGs) of the United Nations (UN) 2030 Agenda. All levels of government – cities, regions and central level – have a role to play when it comes to raising the bar and working hand-in-hand with the scientific community, financial institutions, and the private sector. The energy transition is changing the everyday life of politics and society. Policy must balance competing goals and values. Only if approaches are objective, comprehensible and sustainable, both environmentally, fiscally and socially, will the population support the energy transition. In addition, cities are extremely vulnerable to the impacts of climate change, as they concentrate people and assets. Strengthening cities' resilience, enhancing their adaptive capacity, and improving preparedness against climate change impacts is urgent. This change in paradigm requires an early, transparent dialogue with all stakeholders.

Although Türkiye has some level of preparation in environment and climate change area and there has been some progress, mainly in increasing capacity in waste management and wastewater treatment as well as legislative alignment, enforcement and implementation still remain weak. Furthermore, Türkiye's GHG emissions doubled over the last decade. More ambitious and better coordinated environment and climate policies need to be established and implemented. Concurrently, the country is located in one of the most vulnerable regions as for the impact of climate change.

Municipalities in Türkiye are in the position to play an essential role in establishing climate actions. Moreover, given the major challenge of urban growth in the coming decades, local governments' planning capacities on urban design, climate resilience and disaster preparedness, mobility and energy (power and heating/cooling systems) have to increase. These are key drivers for a successful climate action, both in mitigation and in adaptation, and lay at the core of the Covenant of Mayors (CoM) initiative.

To ensure long-lasting results of the climate action, Türkiye must not only have administrative and institutional capacity to draft the Sustainable Energy and Climate Action Plans (SECAPs) but should also ensure effective implementation of SECAPs. In addition, a climate and energy supporting structure will have to be able to provide coordination, and capacities to develop, implement and monitor SECAPs.

EU4 Energy Transition: Covenant of Mayors in the Western Balkans and Turkey (Project) is a multi-donor project that is jointly co-financed by the European Union and the German Federal Ministry for Economic Cooperation and Development and implemented by GIZ. This project will tackle climate change and support the energy transition in the Western Balkans and Turkey through an increased uptake of the Covenant of Mayors for Climate and Energy Initiative (CoM) in the region and support municipal authorities to translate their ambitions to reduce greenhouse gas (GHG) emissions into reality and enhance resilience to climate change impacts, while taking into account diversity on the ground.

Starting point of the Project is the "Covenant of Mayors in Europe" initiative. By joining the initiative, municipalities commit themselves to contribute to the EU's climate protection goals and to develop a SECAP. In this context, one of the key activities of this project is the provision of advisory services and technical and capacity support to selected municipalities in the Western Balkans and Turkey in the development of their first SECAPs. Municipalities that express their will to become part of the big CoM family, they commit themselves to achieving the set targets by 2030, as well as to develop and implement adaptation plans and actions.

In line with this, the overall objective of the Project is to deliver on the energy transition and tackle climate change in the Western Balkans and Türkiye.

2. INTRODUCTION

2.1. About Covenant of Mayors

Launched in 2008, the Covenant of Mayors is the world's largest movement for local climate and energy actions[1]. As of today, more than 10,000 local and regional governments have joined the Covenant of Mayors. The Covenant of Mayors (CoM) was launched in 2008 in order to gather local governments voluntarily committed to achieve and exceed the EU 2020 climate and energy targets. This meant mitigating CO_2 emissions through energy efficiency, renewable energies and clean transport.

Under the initiative cities commit to meet and exceed the European objectives in terms of CO2 emissions (at least 40% reduction by 2030), demonstrating a level of ambition often higher that on the national level in their respective countries. As signatories, they also sign up to a long-term 2050 vision of decarbonized and resilient cities with access to sustainable, secure and affordable energy. The Covenant of Mayors offers cities a robust but at the same time flexible framework for planning and monitoring their actions in climate mitigation and adaptation areas. In their local Sustainable Energy and Climate Action Plans (SECAPs) cities design and take actions in the building sector, transport and local energy production, and implement adaptation measures. Unlike in many other initiatives, cities get scientific advice and their actions are followed up and plans validated by the European Commission services. Addressing these key sectors and promoting an integrated approach, i.e. linking climate and energy action, the Covenant of Mayors aims also to increase sustainability in cities and communities[2].

2.2. About Global Covenant of Mayors

The Global Covenant of Mayors for Climate & Energy (GCoM) is an international alliance of cities and local governments with a shared long-term vision of promoting and supporting voluntary action to combat climate change and move to a low emission, resilient society. The Global Covenant of Mayors for Climate & Energy formally brings together the European Union's Covenant of Mayors and the Compact of Mayors – the world's two primary initiatives of cities and local governments – to advance city-level transition to a low emission and climate-resilient economy, and to demonstrate the global impact of local action[3].

GCoM is the largest global alliance for city climate leadership, built upon the commitment of over 11,500 cities and local governments. These cities hail from 6 continents and 142 countries[4]. GCoM envisions a world where committed mayors and local governments – in alliance with partners – accelerate ambitious, measurable climate and energy initiatives that lead to an

[1] https://eu-mayors.ec.europa.eu/en/about
[2] https://sdgs.un.org/partnerships/covenant-mayor-climate-and-energy
[3] https://www.globalcovenantofmayors.org/who-we-are/
[4] https://www.globalcovenantofmayors.org/

inclusive, just, low-emission and climate-resilient future, helping to meet and exceed the Paris Agreement objectives.

Focusing on three pillars: mitigation, adaptation and increased access to secure, affordable and sustainable energy, the GCoM supports implementation of ambitious, measurable and locally relevant solutions, captured through climate action plans developed, implemented and monitored by cities and local governments[5].

[5] https://iclei.org/gcom/

3. BECOME A SIGNATORY

Turkish municipalities can choose to become a signatory of EU CoM or GCoM. Both initiatives are open to Turkish municipalities and provide capacity building activities.

3.1. How to Join Covenant of Mayors

The Covenant of Mayors for Climate and Energy is open to all local authorities democratically constituted with/by elected representatives, whatever their size and whatever the stage of implementation of their energy and climate policies[6]. In order to join the initiative, local authorities can follow the process presented in Figure 1.

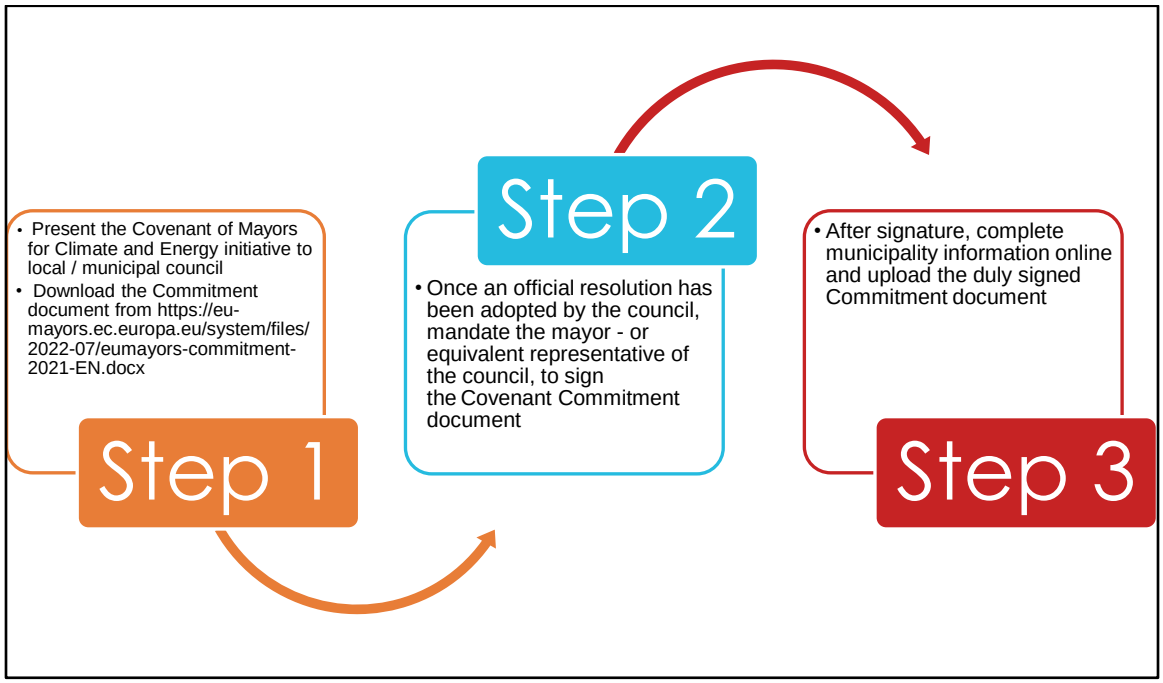

Figure 1. How to Join CoM (https://eu-mayors.ec.europa.eu/en/join/signatory)

3.2. How to Join Global Covenant of Mayors

Cities or local governments that want to formalize a commitment to GCoM should submit a commitment document, which must be signed by an appropriately mandated official according to

[6] https://eu-mayors.ec.europa.eu/en/join/signatory

local governmental procedures[7]. In order to join the initiative, local authorities can follow the process presented in Figure 2.

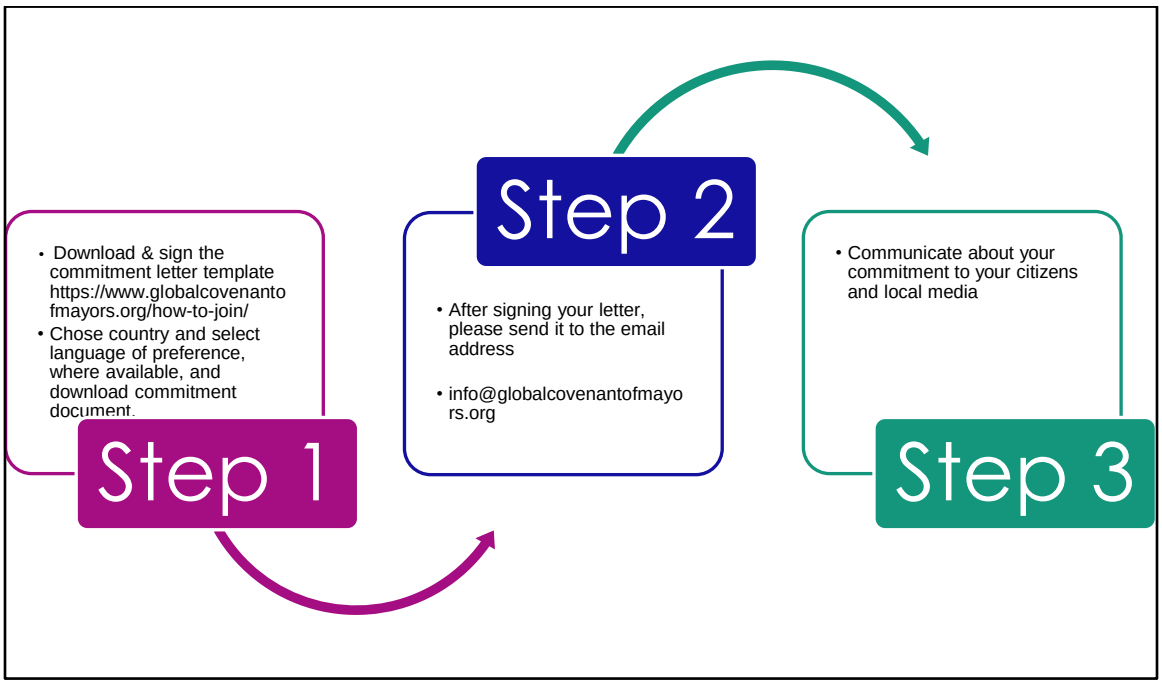

Figure 2. How to Join GCoM (https://www.globalcovenantofmayors.org/how-to-join/)

[7] https://www.globalcovenantofmayors.org/how-to-join/

4. REPORTING FRAMEWORKS

4.1. MyCovenant

Covenant of Mayors provides signatories with a data compilation and reporting framework which is unique in Europe. Covenant signatories are asked to use the Covenant of Mayors reporting platform – ***MyCovenant*** to report and monitor the data of their SECAP (further referred to as action plan), via the SECAP template[8]. MyCovenant has been developed by the Covenant of Mayors Europe Office in collaboration with the JRC.

MyCovenant is accessible from the Covenant of Mayors website or via mycovenant.eumayors.eu. To log in, municipalities need to use the email and password which received during registration stage.

The step-by-step reporting and monitoring process for all Covenant signatories is presented in Figure 3 below:

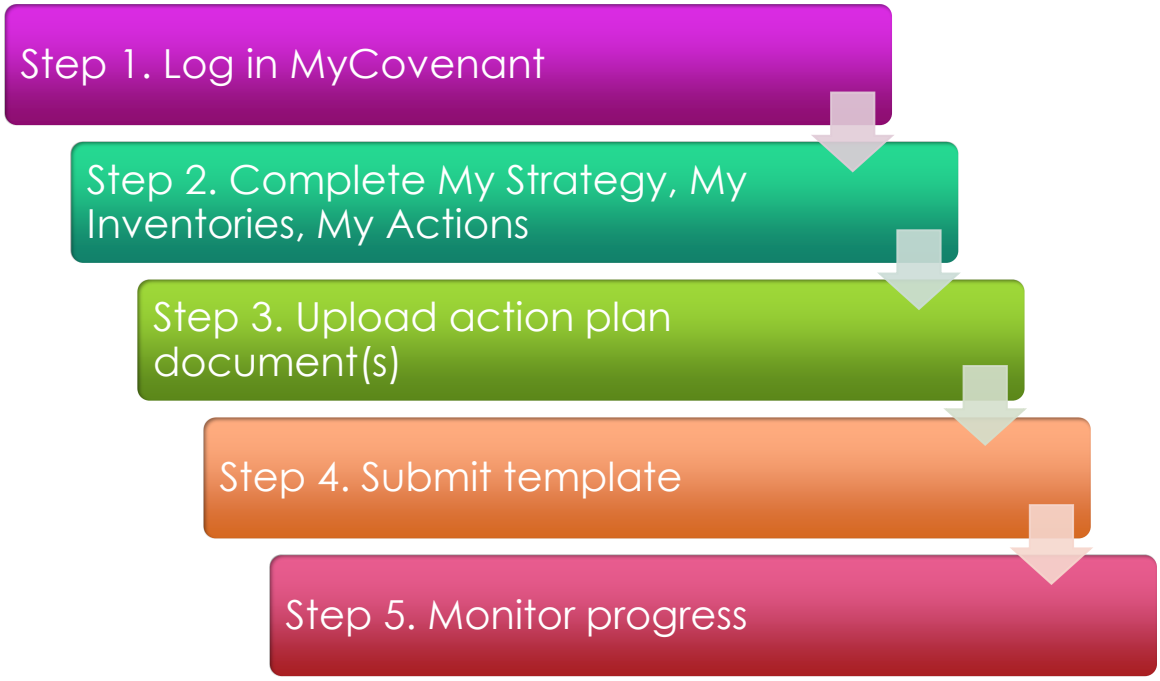

Figure 3. Step by Step Reporting [9]

The sections My Strategy, My Inventories, My Actions are the core of the Covenant reporting and monitoring framework. MyCovenant must be completed in English only. When the respective

[8] An offline version of the template in an Excel format, to be used as an internal working document only, is available at https://www.covenantofmayors.eu/support/library.html. The only official version of the template is available in MyCovenant.
[9] Reporting Guidelines, CoM, March 2020.

reporting sections of MyCovenant (Step 2) are completed and the action plan document(s) (Step 3) are uploaded, it is possible to submit action plan to the Covenant of Mayors.

All green-colored fields are mandatory fields. If not completed, an error message will appear at the end of the respective section. All white-colored fields are optional fields. My Overview indicates whether all required sections in MyCovenant have been properly completed.

All documents should be uploaded in a pdf format, in the national language, unless an English translation is available. The uploading of at least one action plan document (e.g. mitigation action plan/adaptation action plan/integrated mitigation and adaptation action plan) is mandatory. This plan(s) shall be duly approved by the municipal council or equivalent decision-making body. The upload of additional documents is optional.

In order to ensure that the submitted action plans align with the Covenant principles, the JRC[10] carries out an assessment of the action plans submitted in MyCovenant. The analysis is guided by a set of eligibility criteria, provided below. Unless these criteria are met, the action plan will not be accepted. In all cases JRC, carries out an assessment of the plan and provides a feedback report with recommendations for improvement of the action plan. The feedback report is shared with each signatory through a certified e-mail system within six months of submission.

Eligibility criteria – the minimum requirements are[11]:

- The action plan must be approved by the Municipal Council or an equivalent body.
- The action plan must clearly specify the Covenant mitigation target (i.e. at least 40% CO_2 emission reduction by 2030) and adaptation goal.
- The action plan must be based on and include the results of a comprehensive Baseline Emission Inventory (BEI) and Climate Risk & Vulnerability Assessment (RVA).
- MyCovenant must be completed correctly, and the data reported must be coherent and complete.
- The BEI must cover the key sectors of activity (at least three out of four key sectors).
    - For mitigation, the action plan must cover the key sectors of activity (Municipal buildings, Tertiary buildings, Residential buildings and Transport) (at least two out of three selected key sectors), including, at least 3 key actions.
- The RVA must identify the most relevant climate hazards and vulnerable sectors
    - For adaptation, the action plan must include a set of actions, including, at least 3 key actions.

The action plan must be submitted within two years following the adhesion date, i.e. the date when the Municipal Council (or equivalent decision-making body) formally decided to join the Covenant of Mayors. In practical terms, this means that you need to complete the following

[10] https://commission.europa.eu/about-european-commission/departments-and-executive-agencies/joint-research-centre_en

[11] Reporting Guidelines, CoM, March 2020.

sections of MyCovenant: (i) My strategy, (ii) Emission inventory, (iii) Risks & vulnerabilities, (iv) My Actions and *upload the officially adopted action plan*.

4.2. Common Reporting Framework (CRF)

GCoM Common Reporting Framework (CRF), allows for cities across the world to use one standardized approach to sharing information on their climate activities. It guides GCoM cities in assessing their greenhouse gas emissions, climate change risks and vulnerabilities, as well as planning and reporting in an integrated and coherent way.

As shown in the Figure 4, the SECAP process is not a linear one, and some steps may overlap with others.

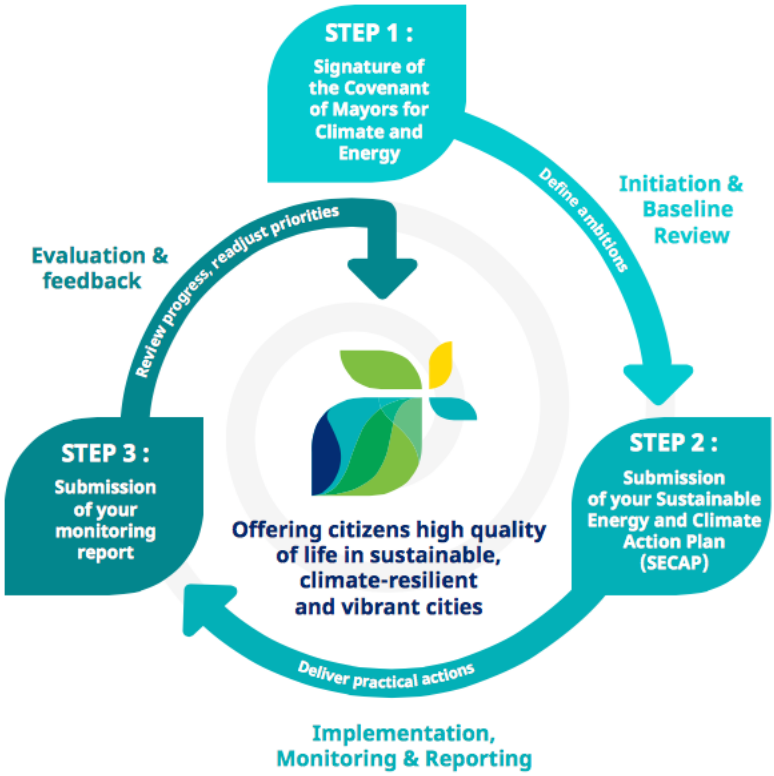

Figure 4. SECAP Steps

CRF outlines the requirements and timeframes for each of the steps a city takes under the initiative. It specifies[12]:

1) which elements have to be covered by a city-wide GHG emissions inventory
2) which aspects must be covered by a city-wide Climate Risk and Vulnerability Assessment

[12] Explanatory Note accompanying the Global Covenant of Mayors Common Reporting Framework, Guidance Note, GCoM, April 2019.

3) which requirements have to be met when setting city-wide emissions reduction targets, adaptation/climate resilience goals and access to secure, affordable and sustainable energy goals
4) which information has to be contained in climate action plans (covering the 3 GCoM pillars, i.e. mitigation, adaptation, energy access) adopted by GCoM cities
5) and what and how often cities have to report under the initiative

Submission of reports are done through one of the two officially recognized reporting platforms:

- CDP and ICLEI's unified reporting system[13]
- the SECAP reporting platform, available in MyCovenant (the European Covenant Extranet)[14]

Cities only need to report once. Both reporting platforms reflect the GCoM CRF and the submitted data is shared with GCoM. Cities that have been reporting through either system prior to 2020 are encouraged to continue using that system. From 2020 onwards, cities committing to the CoM or GCoM for the first time, or refreshing their commitments, may choose to report through either platform.

CoM signatories reporting through either platform will also benefit from technical support from the Joint Research Centre (JRC) of the European Commission, which provides an evaluation of their action plans with tailored recommendations for improvement within six months of submission. Data and action plans from EU Cities reporting through the CDP-ICLEI Unified Reporting System will be shared with the JRC for review through CDP's Open Data Portal.

Each of the platforms has aligned with the GCoM framework and allows cities and local governments to report on the GCoM requirements and their progress. Cities are required to update any relevant information related to:

- Basic information about the signatory (population, location, mayor, etc.)
- The target(s) and goal(s) set under the initiative
- GHG emissions in the sectors covered by the GCoM and a summary of the main methodological information related to the inventory (see chapter 3 for a detailed description of the requirements)
- The main results of the climate risk and vulnerability assessment
- A summary of the action plan, including a description of key actions

Once a city has submitted their data through the CDP-ICLEI Unified Reporting System, CDP-ICLEI staff will review the reported data and conduct what is called the **1st level validation** to assess the eligibility for GCoM badges based on the requirements of the Common reporting framework. For cities reporting through MyCovenant, their data is validated by the EU Covenant.

[13] https://www.cdp.net/en/cities
[14] https://mycovenant.eumayors.eu/signatory-registration

CDP-ICLEI provide feedback and recommendations on how the reported data can be improved and cities have the chance to amend their response based on this feedback – sometimes it might be a question that was left blank, a mitigation action that was not completed, other times it is longer term feedback and actions that can be taken to reach the next level in future years.

CDP sends the data to GCoM and cities will receive an official communication from their regional GCoM office awarding the badges. The process explained above is shown in Figure 5. European cities will undergo a more in-depth **2nd level validation** conducted by the EU JRC. This process is separate to the first-level validation conducted by CDP and ICLEI. CDP will share all reporting data to the European Covenant of Mayors for the second-round validation. CDP-ICLEI validation process for GCoM signatories is shown in Figure 5.

The badges are structured around the three pillars of the GCoM (mitigation, adaptation, and access to energy), and each is further broken down into three phases, shown as progress bars in the Figure 6.

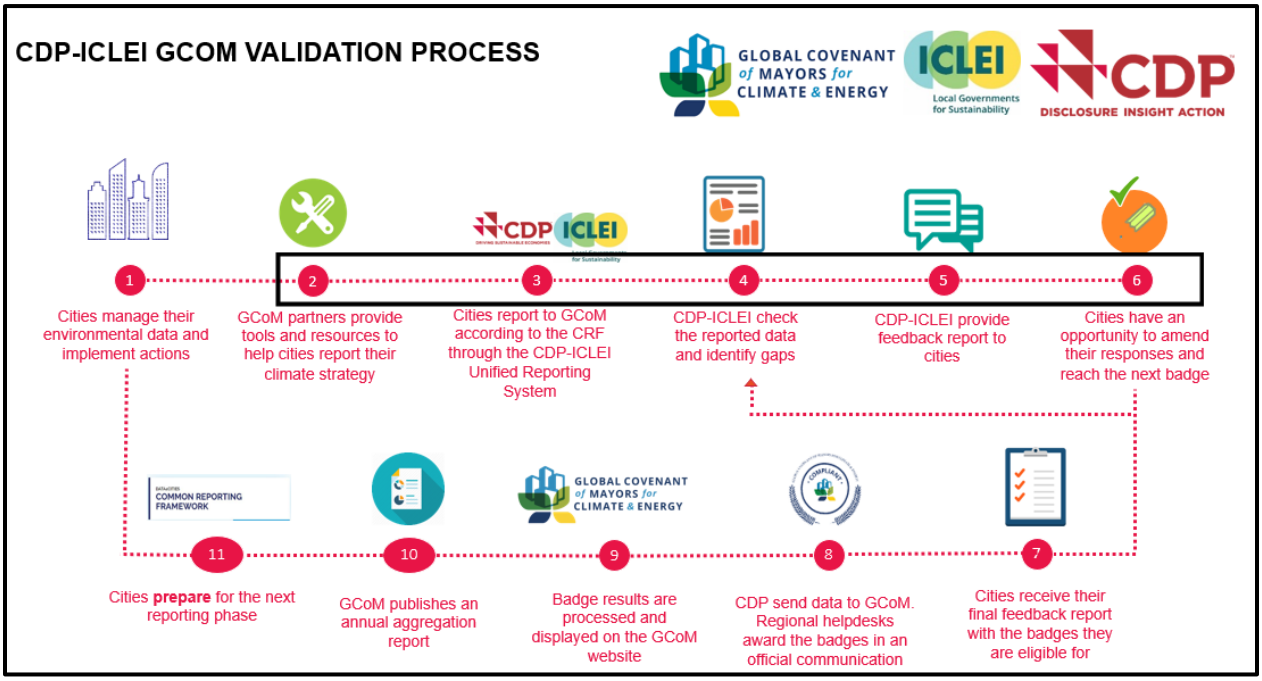

Figure 5. CDP-ICLEI GCOM Validation Process[15]

The progress of signatories as they advance under the initiative will be visually recognized by a system of badges[16] which are being displayed on the signatory's profile (city dashboard) on the GCoM website (Figure 7). The badges and progress bars will be awarded as soon as the city has

[15] https://www.gcom-oceania.org/report

[16] Explanatory Note accompanying the Global Covenant of Mayors Common Reporting Framework, Guidance Note, GCoM, April 2019.

accomplished and reported on a specific step and the compliance with the GCoM requirements has been confirmed.

Figure 6. Pillars and phases of the GCoM Common Reporting Framework[17].

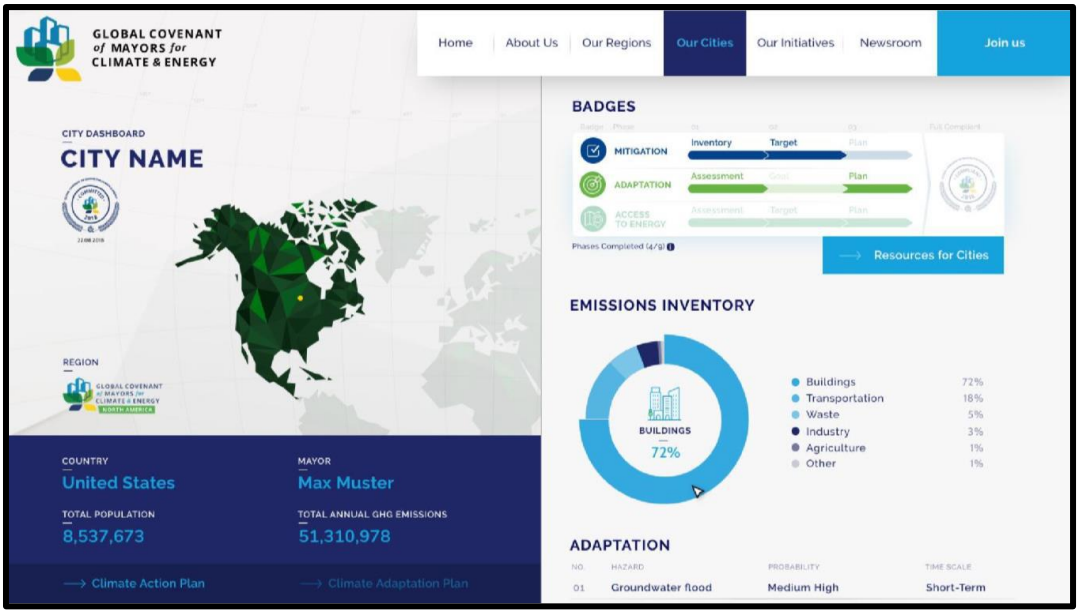

Figure 7. Badges displayed on the signatory's profile (city dashboard)

[17] Guidance for reporting to the Global Covenant of Mayors (GCoM) through CDP-ICLEI Track, 2022. https://cdn.cdp.net/cdp-production/cms/guidance_docs/pdfs/000/003/476/original/Reporting-Guidance-for-GCoM-EN.pdf?1649177827

5. SECAP STRUCTURE AND PROCESS

Signatories of the Covenant of Mayors commit to submitting a Sustainable Energy and Climate Action Plan (SECAP) within two years of joining the initiative. The SECAP serves to translate political commitment into tangible measures and projects. The development of a SECAP is not a linear process, and some steps may overlap with others.

Table 1 details the phases of the SECAP process and the key elements for elaborating and implementing a successful SECAP.

Table 1. Phases of SECAP Process

PHASE	STEPS
Commencement	Political commitment and signing of the Covenant Involvement of municipal departments required Building support from stakeholders
Plan preparation phase	Assessment of the current framework Establishment of the vision Elaboration of the plan Plan approval and submission
Implementation phase	Implementation
Monitoring and reporting phase	Monitoring Reporting and submission of the monitoring report Review

The Commencement phase marks the beginning of the journey towards the 2030 target. It involves the political commitment to the target and the adhesion to the Covenant of Mayors, as well as the involvement of all stakeholders in order to plan a coherent and integrated vision for the target year. This phase also includes the adaptation of the municipal structure to address the changes required for the SECAP elaboration and implementation.

In the Preparation phase, the evaluation of existing mitigation and adaptation measures is essential. A comprehensive strategy and action plan must be developed to reach the desired

objectives. Once these have been determined, they must be documented in a plan that is submitted for approval by the municipal council/assembly.

The Implementation phase of this project seeks to create a low carbon and resilient environment for citizens, providing a healthier, more sustainable lifestyle. By reducing carbon emissions and increasing resilience to climate-related events, it will help to ensure a better quality of life for all.

In the Monitoring and Reporting phase, progress is tracked and evaluated, and any necessary adjustments to strategies and actions are made to ensure that the desired outcomes are achieved.

Local authorities are advised to follow the recommended structure when preparing their SECAPs, with the following content[18]:

1. SECAP executive summary

2. Targets and vision

- Commitments both for mitigation and adaptation
  - For mitigation, the SECAP document should clearly indicate the emission reduction target by 2030 (and possibly beyond) clearly stating the BEI year and the reduction target type (absolute reduction or per capita reduction)
  - For adaptation, the SECAP should include a certain number of adaptation goals, coherent with the identified vulnerabilities, risks and hazards.
- Organizational structures created/assigned and capacity of local administration
- Involvement of stakeholders
- Budget allocated for implementation and financing sources,
- Implementation and monitoring process

3. Baseline Emission Inventory (BEI) and sectors

- Baseline/reference year
- Number of inhabitants in the inventory year
- Emission factors approach
- Emission reporting unit (CO_2 or CO_2-equivalent)
- Responsible body/department (main contact)
- Detailed BEI results in terms of final energy consumption and GHG emissions
- If relevant, please also specify:
  - Inclusion of optional sectors and sources
  - Assumptions made, references or tools used

[18] Rivas, S., El-Guindy, R., Palermo, V., Kona, A. and Bertoldi, P., Guidebook: How to develop a Sustainable Energy and Climate Action Plan (SECAP) in the MENA Region, European Commission, Ispra, 2018, JRC113188.

4. Climate Change Risk and Vulnerability Assessment (RVA)

- Expected weather and climate events particularly relevant for the local authority or region
- Vulnerabilities of the local authority or region
- Expected climate impacts in the local authority or region
- Assets and people at risk from climate change impacts

5. Mitigation actions and measures. For each measure/action, please specify (whenever possible):

- Description,
- Department, person and/or company in charge of the implementation
- Timeline (start, end, major milestones),
- Cost estimation (Investment and running costs),
- Estimated energy savings and/or increased renewable energy production by target year (MWh/year),
- Estimated CO_2 reduction by target year (tonnes/year)
- Indicators for monitoring

6. Adaptation actions and measures. The actions should be coherent with outcomes of the city risk and vulnerability assessment (RVA). For each measure/action, please specify (whenever possible):

- Sector
- Description
- Responsible body/department/ and contact point
- Timing (end-start, major milestones)
- Stakeholders involved/advisory group
- Impacts, vulnerabilities and risks foreseen
- Costs
- Indicators for monitoring

7. Energy poverty. Actions to provide citizens access to secure, affordable, and sustainable energy.

6. SECAP KEY POINTS AND TIPS

The Sustainable Energy and Climate Action Plan (SECAP) is an instrument that provides a comprehensive action plan for local governments to reduce their green-house gas emissions and transition to a low-carbon economy. SECAP outlines the steps that municipalities should take to reduce their emissions, including energy efficiency, renewable energy, and climate-friendly transportation. It also provides guidance on how to develop and implement sustainable energy and climate action plans, as well as how to monitor and report progress. Implementing SECAP, Turkish municipalities can help to reduce their emissions and contribute to a more sustaina-ble future.

In order to mitigate the effects of climate change, the SECAP document should clearly outline the emission reduction target by 2030 (and potentially beyond), specifying the Baseline Emission Inventory (BEI) year and the type of reduction target (absolute reduction or per capita reduction). Additionally, the SECAP should include a number of adaptation goals that are coherent with the identified vulnerabilities, risks and hazards. Furthermore, the SECAP should outline the organizational structures created/assigned and the capacity of local administration, the involvement of stakeholders, the budget allocated for implementation and financing sources, and the implementation and monitoring process.

The baseline/reference year is the year used as a point of comparison for the inventory year. The number of inhabitants in the inventory year should be specified. The emission factors approach should be outlined, as well as the emission reporting unit (CO_2 or CO_2-equivalent). The responsible body/department (main contact) should be identified. Detailed BEI results should be provided in terms of final energy consumption and GHG emissions. If relevant, the inclusion of optional sectors and sources should be specified, as well as any assumptions made, references or tools used.

The local authority or region is expected to experience a variety of weather and climate events that could have a significant impact on the area. These events could include extreme weather such as floods, droughts, heatwaves, and storms. It is important to understand the vulnerabilities of the local authority or region to anticipate and prepare for these events. Climate change is expected to have a range of impacts on the local authority or region. These could include changes in temperature, precipitation, and sea level, as well as increased frequency and intensity of extreme weather events. It is important to identify the assets and people at risk from these impacts in order to develop strategies to protect them. By understanding the expected weather and climate events, vulnerabilities, and climate impacts in the local authority or region, it is possible to develop effective strategies to reduce the risks posed by climate change.

In order to ensure that adaptation actions and measures are effective, they must be coherent with the outcomes of the city risk and vulnerability assessment (RVA). The RVA should provide a comprehensive understanding of the risks and vulnerabilities of the city, and the adaptation actions and measures should be tailored to address these risks and vulnerabilities. The adaptation actions and measures should also be tailored to the specific context of the city, taking

into account its unique characteristics and needs. This will ensure that the adaptation actions and measures are effective and appropriate for the city.

Mitigation actions and measures to reduce the impacts of climate change include increasing energy efficiency and transitioning to renewable energy sources. Increasing energy efficiency can be achieved through improved building design, energy-efficient appliances, and better insulation. Transitioning to renewable energy sources such as solar, wind, and geothermal can reduce emissions and provide clean, renewable energy. By taking these actions and measures, local administrations can reduce the impacts of climate change and create a more sustainable future.

Preparing SECAPs (Sustainable Energy and Climate Action Plans) can be a complex and challenging process. Preparing SECAPs requires significant resources, including personnel, data, and technology. Local administrations should ensure that these resources are available and adequate. SECAPs must be comprehensive, covering all aspects of energy efficiency and renewable energy. Many stakeholders must be consulted, and all relevant data must be gathered. SECAPs must include clear, measurable goals that are achievable and realistic. Securing funding for the implementation of SECAPs can be a challenge, as many governments and businesses may not be willing to invest in energy efficiency and climate adaptation actions.

From Turkish local administration perspective, it has been noticed that the SECAP development process is characterized by the following key challenges:

- The lack of multi-level governance between city departments has led to coordination challenges, resulting in a poor development of an integrated plan across different sectors and departments. This lack of coordination has hindered the development of an effective and efficient plan that would benefit the city as a whole.
- Municipal staff have shown a lack of engagement and interest in the project, which has hindered progress and made it difficult to move forward. It is essential that municipal staff become more involved and invested in the project in order to ensure its success.
- Despite having a clear vision for the city, the lack the knowledge and understanding of how to effectively engage key stakeholders and mobilize action across the city's geographical boundaries must be overcome to find ways to bridge the gaps between stakeholders and create a unified approach to achieving goals.
- Municipalities need a comprehensive data system to track energy consumption and other related data for multiple sectors, including municipal buildings and facilities, street lighting, municipal vehicles, and waste and wastewater. Such a system would provide valuable insights into energy consumption patterns and help municipalities to identify areas for improvement and cost savings. Additionally, it would enable municipalities to make more informed decisions about energy usage and to develop strategies for reducing energy consumption.
- The lack of efficient monitoring and appropriate fine tuning of the plan, coupled with the absence of an administrative unit to follow and/or implement the plan, may hinder the success of SECAP.

- Due to a lack of financial resources, it is not possible to implement the proposed SECAP measures. Without the necessary funds, the measures cannot be put into practice and the desired outcomes cannot be achieved.
- Municipal infrastructures are the primary focus of key actions. The city is not taking responsibility for the implementation of the plan.

Turkish municipalities need to consider the following points while elaborating their SECAPs:

- Securing the high-level management's support for the SECAP implementation
- Ensuring that the SECAP is tailored to the municipality's needs and objectives
- Defining the scope of the SECAP clearly, including the timeline and budget
- Including a comprehensive review of current energy usage and associated costs
- Identifying potential energy efficiency measures and renewable energy options
- Developing a plan to track and monitor energy usage and progress towards targets

Main resources:

More information about CoM/GcoM requirements and guidelines, in addition to examples, tools and case stuides can be found in the below main websites:

- eu-mayors.ec.europa.eu/en/home
- https://eu-mayors.ec.europa.eu/en/resources/reporting
- https://eu-mayors.ec.europa.eu/en/FAQs#:~:text=Where%20do%20I%20find%20guidance%20for%20the%20development%20of%20the%20action%20plan%3F
- globalcovenantofmayors.org/resource-library/
- globalcovenantofmayors.org/data-based-solutions/
- https://www.globalcovenantofmayors.org/our-initiatives/data4cities/common-global-reporting-framework/

7. GHG BASELINE EMISSION INVENTORY PRINCIPLES

In the compilation of the emission inventories and their on-line reporting in the frame of the CoM initiative, the following key concepts are of utmost importance:

- **Local territory**: Geographic jurisdiction/administrative territory of the signatory local authority;
- **Final energy consumption**: Final energy consumption covers all energy supplied to the final consumer (end-user) for all energy uses. It is disaggregated into the final end-use activity sectors;
- **Key sectors**: four key sectors shall be included in the emission inventories:
    - Municipal buildings, equipment/ facilities;
    - Tertiary (non-municipal) buildings, equipment/facilities;
    - Residential buildings;
    - Transport.
- **Energy carrier**: It refers to the form of energy input (electricity, heat/cold, fossil fuel, municipal waste or renewable energy) required by the energy-related activity sectors of the society to perform their functions;
- **Activity data**: Activity data quantifies the human activity occurring in the local territory. The main activity data in the CoM key sectors are related to Final energy consumption and are expressed in MWh per inventory year;
- **Emission factors (EF):** Emission factors [in tCO_2/MWh or tCO_2-eq/MWh] are coefficients which quantify the emissions per unit of activity;
- **Emission inventories**: Emission inventories quantify the amount of CO_2 or GHG emissions (reported in CO_2 equivalent) in the local territory in a given year. The emission inventories can be built up by multiplying the emission factors with corresponding activity data for each activity sector;
- **Baseline year:** The baseline year is the year against which the achievements of the emission reductions in 2030 shall be compared;
- **Baseline Emission Inventory**: The BEI quantifies the amount of CO_2 emitted in the key sectors and other activity sectors opted for reporting in the local territory for the baseline year. It allows to identify the principal anthropogenic sources of CO_2 (and other GHGs) emissions and to prioritise the reduction measures accordingly.
- **Monitoring Emission inventory**: In addition to the inventory of the baseline year (BEI), emission inventories will be compiled for the later years, at least every four years, to monitor the progress towards the reduction target. Such an emission inventory is called Monitoring Emission Inventory (MEI). The MEI shall follow the same methods and principles as the BEI. Moreover, every two years from the submission of the SECAP (emission inventories and climate and energy action plans), signatories are required to update the status of implementation of actions reported in the energy and climate action plans.

In line with the European Union Energy strategy, the new target for the reduction of CO_2 or GHG emissions proposed by the CoM is at least a 40% reduction by 2030. The reduction target, to be achieved through the implementation of the actions for those areas of activity relevant to the local authority's mandate, is defined in comparison to a baseline year, which is set by the local authority. While the emissions in the BEI/MEI and the reduction per action have to be calculated and reported as absolute emissions, the local authority can decide to set the overall CO2 emission reduction target either as „absolute“ or „per capita“ reduction.

The commitment taken by the signatories concerns the reduction of the CO_2 emissions in their respective territories. Therefore, the SECAP has to contain a coherent set of mitigation measures covering possibly all the Covenant key sectors of activity: not only the buildings and facilities that are managed by the local authority, but also the sectors of activity in the territory of the local authority: residential sector, tertiary sector, public and private transport. Before starting the elaboration of actions and measures, the establishment of a long-term vision with clear objectives is highly recommended.

Mitigation actions and measures should be prepared for the full duration of the plan (until 2030). For each measure/action, the following should be specified (whenever possible):

1. Description;
2. Responsible department, person or organisation;
3. Timing (end-start, major milestones);
4. Cost estimation (Investment and running costs);
5. Estimated energy saving/increased renewable energy production by target year;
6. Estimated GHG reduction by target year;
7. Indicators for monitoring.

Based on the data collected and on the different sets of hypotheses, it may be relevant to establish scenarios: how would energy consumption and CO_2 emissions evolve under current policies, what would be the impact of the projected actions, etc. It may be appropriate to build a Business as Usual (BAU) scenario, to forecast the level of energy consumption and CO_2 emissions during the target year(s) in a scenario without SECAP. If there is an increasing trend, the local authority will need to make a greater effort to counterbalance it. On the opposite, in case of a decreasing trend, the local authority should consider setting a more ambitious reduction target than the minimum set by the Covenant.

8. RISK AND VULNERABILITY ASSESSMENT

Due to the increase in extreme weather events and the low capacity of cities to adapt to these odds, losses, exposure, and fatalities arise with the events. Besides, traditional hazard mapping and risk planning techniques often fall behind when facing a climate crisis since extreme changes in quantity, frequency, and distribution of meteorological phenomena are observed. Specific and localized vulnerability mitigation strategies need to be stopped, particularly for settlements on coastal and sloppy areas with a high risk of stream accumulation, coastal erosion and inundation, biodiversity loss, and urban heat islands. One of the most challenging problems for the future is how to increase the resilience of socio-economic systems to adapt cities and territories to these new emerging conditions.

At the industrial/productive level, the general reduction of CO_2 emissions and the decarbonization of the construction sector is one of the primary targets of the near future. The ‘reduction’ (of emissions, energy waste, soil consumption) is also a new paradigm for territorial systems. One of the key aspects of the ‘reductionist’ theory is its measurability in time. Therefore, ‘monitoring’ the effects of reductionist policies is one of the most critical aspects to deliver during decision-making processes to define future territorial strategies. Acting to reduce CO_2 from a territorial perspective means adopting a twin strategy on the one hand, it is necessary to reduce emissions but, at the same time, it is equally important to increase absorption provided by natural ecosystems and conserve the stock of available Natural Capital.

Controlling climate change effects also requires an in-depth assessment of impacts, vulnerabilities, and solutions for disaster risk reduction, enhancing the resilience of human systems and ecosystems and developing nature-based solutions. From this perspective, two key concepts emerge the implementation of a circular economy and the increase of the resilience of cities and communities.

Adaptation to foster resilience requires measurable targets and means improving the efficiency and effectiveness of using resources, including energy. As mentioned above, the reduction is a crucial asset: reducing waste generated from environmental pollution, reducing greenhouse gas emissions, etc. Adopting a resilient approach in urban planning requires us to adopt a multidisciplinary perspective among different areas of expertise. Specifically, a resilient approach considers Vulnerability and multiple-risk assessment in cities to define spatial policies. Resilient solutions are designed to address Adaptation to climate change by using nature-based solutions to achieve a measurable benefit of socio-economic health. Therefore, specific action/urban design solutions should be gender-responsive, socially inclusive and support the needs of the most vulnerable groups (elderly and children) for whoever and wherever urban planning solutions are required. However, increasing the resilience of the system means developing an in-depth knowledge of the risks and vulnerabilities of cities.

The appropriate vulnerability and risk evaluation approaches selection depends on the decision-making context. Vulnerability and risk assessment methods range from global and national quantitative assessment to local-scale qualitative participatory approaches. The appropriateness of a specific method procedures on the Adaptation or risk management issue being addressed,

including, for instance, the time and geographic scale involved, the number and type of actors, and economic and governance aspects. Indicators, indices, and probabilistic metrics are important measures and techniques for vulnerability and risk analysis. However, quantitative approaches for assessing vulnerability need to be complemented with qualitative methods to capture the full complexity and the various tangible and intangible aspects of vulnerability in its different dimensions.

Adaptation and risk management policies and practices will be more successful if they consider the dynamic nature of vulnerability and exposure, including the explicit characterization of uncertainty and complexity at each stage of planning and practice. Attention to the temporal and spatial dynamics of vulnerability and exposure is particularly important given that the design and implementation of adaptation and risk management strategies and policies can reduce risk in the short term but may increase vulnerability and exposure in a long time.

The following suggestions can be considered for identifying risks and vulnerabilities associated with climate change, including vulnerable sectors and groups:

1. Understanding Climate Change Effects:

Before conducting a risk and vulnerability assessment, municipalities should have a general understanding of the potential climate change effects in their city. Common climate change impacts include:

- Extreme Weather Events: Increased frequency and intensity of extreme weather events, such as heatwaves, storms, floods, and droughts.
- Rising Sea Levels: Coastal cities face the risk of inundation and saltwater intrusion due to rising sea levels.
- Temperature Changes: Changes in average temperatures can impact health, infrastructure, and energy demand.
- Ecosystem Disruptions: Climate change can affect local ecosystems, leading to loss of biodiversity and changes in natural resources.
- Social and Economic Disparities: Climate change impacts can exacerbate existing social and economic disparities, affecting vulnerable populations disproportionately.

2. Identifying Vulnerable Sectors:

In order to identify sectors that are particularly vulnerable to climate change impacts, conduct a thorough analysis. At least one sector per each climate hazards identified should be selected. The pre-defined sectors within MyCovenant are buildings, transport, energy, water, waste, land use, agriculture, biodiversity, health, civil protection, tourism, education, ICT. Key sectors to consider include:

- Infrastructure: Assess the vulnerability of critical infrastructure, such as roads, bridges, water supply systems, and energy networks, to extreme weather events and rising sea levels.

- Health and Public Services: Identify health risks associated with climate change, such as heat-related illnesses and increased vector-borne diseases. Evaluate the resilience of public services, such as healthcare, emergency response, and disaster management.
- Water Resources: Examine the impact of climate change on water availability, quality, and distribution, especially in regions prone to droughts or water scarcity.
- Agriculture and Food Security: Assess the vulnerability of agricultural practices and food supply chains to changes in temperature, precipitation, and extreme weather events.
- Ecosystems and Biodiversity: Evaluate the potential effects of climate change on local ecosystems, wildlife habitats, and biodiversity.

3. Identifying Vulnerable Groups:

Consider the social aspects of vulnerability by identifying groups that may be disproportionately affected by climate change:

- Economically Disadvantaged Populations: Low-income communities may face challenges in accessing resources and adapting to climate change impacts.
- Elderly and Disabled Individuals: Vulnerable populations, such as the elderly and disabled, may have limited mobility and face additional health risks during extreme weather events.
- Marginalized Communities: Indigenous groups, ethnic minorities, and marginalized communities often experience higher vulnerability due to limited resources and social inequalities.

4. Climate Modeling and Data Analysis:

Climate modeling and data analysis can be used to project potential climate change impacts specific to the city. Climate models can provide valuable insights into future temperature changes, rainfall patterns, sea-level rise, and extreme weather events.

5. Stakeholder Engagement:

Engage with relevant stakeholders, including community representatives, local experts, NGOs, and other government agencies, to gather diverse perspectives and valuable insights during the risk and vulnerability assessment process.

6. Risk Prioritization:

Prioritize identified risks and vulnerabilities based on their severity, likelihood, and potential consequences. This will help allocate resources effectively and focus on high-impact areas.

9. ENERGY EFFICIENCY AND BUILDINGS

The stationary sources and buildings sector is a significant contributor to greenhouse gas (GHG) emissions in municipalities. It includes emissions from various sources, such as residential, commercial, and industrial buildings, as well as stationary equipment and facilities. By implementing targeted mitigation actions, municipalities can achieve substantial reductions in their carbon footprint and create more sustainable communities. In this regard, municipalities have to consider central government rules and regulations while describing their actions.

Among the many institutions and organizations in Türkiye, two stand out the most in energy efficiency and climate change actions, namely, Ministry of Energy and Natural Resources (MENR) and Climate Change Presidency, an affiliated institution of the Ministry of Environment, Urbanization and Climate Change (MoEUCC).

MENR is incharge of preparing the drafts of legislation, strategies and action plans related to energy efficiency together with regulatory impact analyses, monitoring and evaluating their implementation and planning remedial measures. It is also responsible for determining the energy saving potentials throughout the country and on the basis of sectors, carrying out the necessary studies, including the creation of alternative fuels, district heating and heat market, to make or have energy studies done.

Climate Change Presidency is responsible for determining policies, strategies, and actions at the national and international level, conducting negotiation processes, and ensuring coordination with institutions and organizations within the scope of Türkiye's climate change mitigation and adaptation efforts.In line with Türkiye's 2053 net zero emission and green development goals, it is in charge of carrying out all kinds of work necessary for adaptation and mitigation and raising awareness of climate change with a human and nature-friendly approach to all segments of society .

According to the 26th article of the Metropolitan Municipality Law No. 5216 published in the Official Gazette dated 23.07.2004 and numbered 24431, the Metropolitan Municipality can establish capital companies in the fields of duty and service assigned to it, in accordance with the procedures specified in the relevant legislation.

Again, within the scope of Law No. 5216, Metropolitan Municipalities have been given the following duties, powers and responsibilities, which are related to sustainable energy and climate change actions:

- To prepare, have it made and to approve and implement a master development plan in every scale between 1/5,000 and 1/25,000 within the boundaries of the metropolitan municipality, provided that it is in accordance with the environmental plan; to approve the implementation development plans to be prepared by the municipalities in the metropolitan area in accordance with the master plan, the changes to be made in these plans, the

parceling plans and the development improvement plans as they are or by changing them, and to supervise their implementation;

- To make or have and implement the metropolitan transportation master plan; planning and coordinating transportation and public transportation services;
- To ensure the protection of the environment, agricultural areas and water basins in accordance with the principle of sustainable development; afforestation; to gather unsanitary workplaces, entertainment venues, and other workplaces that have an impact on public health and the environment in certain parts of the city; determining construction materials, scrap storage areas and sales places, excavation soil, rubble, sand and gravel storage areas, wood and coal sales and storage areas, and taking measures that will not cause environmental pollution in their transportation; to make and have the metropolitan solid waste management plan made; to perform services related to the reuse, storage and disposal of solid wastes and excavations, except for the collection of solid wastes at the source and transportation to the transfer station, to establish facilities for this purpose, to have them installed, to operate or to have them operated; to carry out services related to industrial and medical wastes, to establish the necessary facilities for this, to have them installed, to operate or to have them operated; collecting, collecting, treating the wastes of marine vehicles and making the necessary arrangements
- To carry out public transportation services within the metropolitan area and to establish, have them set up, operate or have them operated for this purpose, to give licenses to public transportation vehicles, including taxis and service vehicles, in the land and sea within the metropolitan borders.
- Regarding the public transportation lines within the metropolitan area; To decide on the operation of public transportation services related to the lines to be determined based on the criteria of distance to the city center, population and number of people using the line.
- To carry out water and sewerage services, to establish dams and other facilities necessary, to have them installed and operated; reclamation of streams; marketing spring water or water produced at the end of treatment.
- To make plans and other preparations for natural disasters at the metropolitan scale in accordance with the plans made at the provincial level; providing tools, equipment and material support to other disaster areas when necessary; conducting fire and emergency services; to detect explosive and flammable material production and storage areas, to inspect residences, workplaces, entertainment venues, factories and industrial establishments and public institutions in terms of precautions to be taken against fire and other disasters, to issue permits and licenses required by the legislation in this regard.

Local governments are subject to the country's policies when it comes to energy resources such as electricity and natural gas consumed in the city. This is due to Law No 5216, which does not assign any duties to metropolitan municipalities in this regard.

The importance of the stationary sources and buildings sector cannot be overstated, as it constitutes a significant portion of greenhouse gas (GHG) emissions within municipalities. Emissions from residential, commercial, and industrial buildings, along with stationary equipment and facilities, are encompassed by this sector.

To effectively reduce emissions from this sector, the implementation of the following targeted mitigation actions is recommended:

Energy Efficiency Measures:

Energy-efficient practices within buildings and facilities should be promoted and adopted. Areas of improvement should be identified through energy audits, and retrofitting and weatherization projects should be prioritized. Stringent energy codes and standards for new constructions and renovations can be established and enforced. The use of energy-efficient lighting systems and appliances in both public and private establishments should be encouraged.

Renewable Energy Solutions:

Embrace renewable energy sources to diversify the energy mix and curtail dependence on fossil fuels. Consideration should be given to the installation of solar photovoltaic (PV) systems on suitable rooftops and locations. Collaboration with reputable energy companies should be explored for wind power projects. Biomass energy from locally sourced organic waste and geothermal energy options for heating and cooling applications should be investigated.

Incentive Programs and Public Awareness:

Adoption of energy-efficient and low-carbon technologies should be fostered through well-structured incentive programs, grants, and rebates. Additionally, public awareness about the benefits of emissions reduction and the available solutions should be raised to foster community engagement.

Here are some example suggestions for energy efficiency measures in buildings:

- Insulation Upgrades: Improve the thermal performance of buildings by adding or upgrading insulation in walls, roofs, and floors. This measure reduces heat loss in winter and heat gain in summer, leading to reduced heating and cooling demands.
- High-Efficiency Lighting: Replace traditional incandescent bulbs with energy-efficient LED lighting. LED bulbs consume significantly less energy, have a longer lifespan, and can be dimmed or controlled to optimize lighting levels.
- Smart HVAC Systems: Install smart heating, ventilation, and air conditioning (HVAC) systems that use advanced sensors and algorithms to optimize energy usage based on occupancy, outdoor temperature, and indoor comfort requirements.
- Energy-Efficient Windows and Doors: Upgrade to energy-efficient windows and doors with better insulation properties to prevent heat transfer and air leakage.
- Building Automation Systems: Implement Building Automation Systems (BAS) to control and optimize various building systems, including lighting, HVAC, and security. BAS can automatically adjust settings based on occupancy patterns and energy demand.
- Occupancy Sensors: Install occupancy sensors in rooms and common areas to automatically control lighting and HVAC systems based on real-time occupancy, reducing energy wastage in unoccupied spaces.

- Energy-Efficient Appliances: Encourage the use of energy-efficient appliances, such as refrigerators, washing machines, and air conditioners, in residential and commercial buildings.
- Daylighting and Natural Ventilation: Maximize the use of natural daylight and ventilation in buildings to reduce reliance on artificial lighting and mechanical ventilation.
- Energy Management Systems: Implement energy management systems that enable real-time monitoring of energy consumption and identify areas for improvement.
- Energy-Efficient Building Design: Promote energy-efficient building design practices, such as passive solar design, to optimize the use of natural energy sources and minimize the need for active heating and cooling.

Artificial Intelligence (AI) can play a transformative role in optimizing building energy efficiency through data-driven insights and intelligent control systems. Here are some AI-driven methodologies for building energy efficiency:

- Predictive Energy Analytics: AI algorithms can analyze historical energy consumption data and weather patterns to predict future energy demands. This allows building managers to plan energy usage efficiently and optimize energy distribution.
- Occupant Behavior Analysis: AI can analyze occupant behavior patterns and preferences to adjust HVAC and lighting systems automatically, ensuring comfort while minimizing energy wastage.
- Dynamic Load Management: AI-driven load management systems can balance energy demand in real-time by adjusting equipment operations based on grid conditions and energy pricing.
- Fault Detection and Diagnostics: AI-powered analytics can detect anomalies and faults in building systems, helping identify and rectify energy inefficiencies and equipment malfunctions promptly.
- Virtual Energy Audits: AI can conduct virtual energy audits by analyzing building data, identifying potential energy-saving opportunities, and suggesting tailored efficiency measures.
- Optimized Building Controls: AI can optimize HVAC and lighting controls based on real-time data, occupancy patterns, weather forecasts, and energy pricing, leading to significant energy savings.
- AI-Enhanced Building Simulation: AI can enhance building energy simulations, allowing for more accurate predictions of energy performance and testing various efficiency measures virtually.
- Energy-Efficient HVAC Scheduling: AI algorithms can optimize HVAC system scheduling to align with building occupancy patterns, reducing energy consumption during low-demand periods.

Municipal buildings, including administrative offices, public facilities, schools, and recreational centers, often represent significant energy consumers. Implementing energy efficiency measures in these buildings not only reduces operational costs but also demonstrates the municipality's commitment to environmental stewardship.

Here are some example suggestions for municipalities to enhance energy efficiency *in their own premises*:

- Energy Audits: Conduct comprehensive energy audits for all municipal buildings to assess current energy consumption patterns and identify areas for improvement. These audits will provide valuable data for creating an effective energy efficiency strategy.
- LED Lighting Upgrades: Replace conventional lighting fixtures with energy-efficient LED lighting throughout municipal buildings. LEDs are more durable, consume less energy, and have a longer lifespan, resulting in reduced maintenance and energy costs.
- Building Envelope Improvements: Enhance insulation in walls, roofs, and windows to minimize heat loss during winters and heat gain during summers. Proper sealing and weatherproofing will improve indoor comfort and reduce HVAC energy demands.
- HVAC System Optimization: Install programmable thermostats and HVAC control systems to adjust heating and cooling based on occupancy schedules and seasonal variations. Regular maintenance of HVAC equipment is crucial for optimal performance.
- Smart Building Management Systems: Implement intelligent building management systems that integrate data from various building systems, such as lighting, HVAC, and security. These systems can automate energy-saving measures and facilitate real-time monitoring.
- Renewable Energy Integration: Consider installing solar photovoltaic (PV) panels on municipal buildings' rooftops or in nearby suitable locations. On-site renewable energy generation can offset electricity consumption from the grid.
- Occupancy Sensors and Timers: Install occupancy sensors in rooms, hallways, and other communal areas to automatically control lighting and HVAC systems based on real-time occupancy. Timers can be used to turn off lights during non-operational hours.
- Energy-Efficient Appliances: Ensure that all appliances and equipment used in municipal buildings are energy-efficient and ENERGY STAR certified. This applies to computers, printers, copiers, refrigerators, and other electrical devices.
- Water Conservation Measures: Implement water-saving measures such as low-flow faucets, toilets, and water-efficient landscaping to reduce water consumption in municipal buildings.
- Awareness and Training Programs: Conduct energy efficiency awareness campaigns and training sessions for municipal staff to promote sustainable practices and encourage active participation in energy-saving initiatives.
- Benchmarking and Performance Tracking: Regularly monitor energy consumption and track energy performance in municipal buildings. Benchmarking against industry standards can provide insights into progress and areas that require further improvement.
- Green Building Certifications: Consider obtaining green building certifications, such as LEED or YES-TR, for new constructions or major renovations to ensure adherence to stringent energy efficiency standards.

10. TRANSPORTATION SECTOR

The transportation sector is a significant contributor to greenhouse gas (GHG) emissions in municipalities. Emissions from vehicles, both public and private, account for a substantial portion of the overall carbon footprint. As municipalities strive to develop SECAPs to combat climate change, emissions from the transportation sector, which often intersect with stationary sources, should be addressed.

By implementing targeted mitigation actions, municipalities can achieve substantial reductions in their transportation related GHG emissions and foster sustainable mobility solutions. Here are some suggestions for municipalities to reduce their GHG load from the transportation sector:

1. Promote Sustainable Mobility Options:

Encourage the use of sustainable transportation options that reduce dependency on single-occupancy vehicles and fossil fuel-based transport. Some strategies include:

- Public Transit Improvements: Invest in and expand public transportation services, such as buses and metro, to provide reliable, affordable, and convenient alternatives to private cars.
- Cycling Infrastructure: Develop and enhance cycling infrastructure, such as bike lanes, bike-sharing programs, and secure bicycle parking, to promote cycling as a green and healthy mode of transport.
- Pedestrian-Friendly Streets: Create pedestrian-friendly streets and walkable neighborhoods to encourage walking and reduce short car trips.
- Carpooling and Ridesharing: Promote carpooling and ridesharing initiatives to maximize vehicle occupancy and reduce the number of vehicles on the road.

2. Electrification of Transport:

Transitioning to electric vehicles (EVs) can significantly reduce GHG emissions from the transportation sector. Municipalities can take the following steps:

- Electric Vehicle Charging Infrastructure: Invest in public charging infrastructure to support EV adoption and alleviate range anxiety for EV owners.
- Fleet Electrification: Encourage the adoption of electric vehicles in municipal fleets, such as buses, garbage trucks, and administrative vehicles.
- Incentives for EVs: Offer financial incentives and benefits, such as tax credits and reduced registration fees, to encourage residents to purchase EVs.

3. Integrated Land Use and Transport Planning:

Municipalities can integrate land use and transport planning to reduce the need for long-distance commuting and support sustainable urban development:

- Transit-Oriented Development (TOD): Plan and develop housing and commercial areas around public transportation hubs to facilitate easy access to transit options.
- Mixed-Use Zoning: Encourage mixed-use zoning, allowing a mix of residential, commercial, and recreational spaces within neighborhoods, reducing the need for extensive travel.

4. Traffic Management and Congestion Reduction:

Efficient traffic management can lead to reduced GHG emissions and improved overall transportation:

- Traffic Signal Optimization: Optimize traffic signal timings to minimize congestion and reduce fuel consumption during stop-and-go traffic.
- Smart Traffic Systems: Implement smart traffic management systems that use data and AI algorithms to optimize traffic flow and reduce congestion.

5. Education and Awareness Campaigns:

The community should be engaged through education and awareness campaigns to encourage sustainable transportation choices:

- Public Awareness: Promote the benefits of sustainable transportation options and raise awareness of the environmental impacts of high-carbon travel.
- Commute Alternatives: Provide information and resources about sustainable commuting options and alternatives to single-occupancy vehicles.

11. WASTE AND WASTEWATER

Waste (including solid waste and wastewater) disposal and treatment produces GHG emissions through aerobic or anaerobic decomposition, or incineration. All GHG emissions from disposal and treatment of waste generated within the city boundary shall be reported and disaggregated by the following sub-sectors presented in the Table 2.

Table 2. Definitions for sub-sectors required under the Waste sector Sub-sectors Description

Sub-Sectors	Description
Solid waste disposal	All emissions from solid waste that are disposed of at managed sites (e.g., sanitary landfill and managed dumps) and unmanaged sites (e.g., open dumps, including above-ground piles, holes in the ground and dumping into natural features such as ravines).
Biological treatment	All emissions from biological treatment of waste, including composting and anaerobic digestion of organic waste.
Incineration and open burning	All emissions from waste that are burned either in a controlled, industrial process or in an uncontrolled, often illicit, process. The former is often referred to as incineration, and the latter as open burning. Note that this excludes emissions from waste incineration for the purposes of energy generation, also known as energy recovery.
Wastewater treatment and discharge	All emissions from the treatment process of wastewater, either aerobically or anaerobically, and direct discharge of wastewater into an open body of water.

Note that this sector excludes emissions resulted from the waste to energy process inside or outside the city boundary (e.g., energy recovery from waste incineration, energy generation using landfill/biogas/sludge produced by waste facilities, etc.). Where the energy generated from waste is connected to a grid, the resulting GHG emissions will have been included under the indirect emissions within the Stationary Energy sector. Additionally, these sources shall be disclosed in the Energy Generation section of the inventory. If the energy generated is not connected to the grid but used on-site, then the associated emissions should be reported as direct emissions under the Stationary Energy sector.

The inventory should quantify emissions released during the inventory year. In certain cases, the available or nationally consistent methodologies may also estimate the future emissions that

result from activities conducted within the inventory year. For instance, as it can take many years for waste to decompose, when reporting emissions from landfill sites, local governments may choose to report emissions released during the inventory year as a result of waste disposed during that year and previous years. Alternatively, they can report emissions that may be released during the inventory year and in future years as a result of the actual quantity of waste deposited during the inventory year.

The quantification of GHG emissions from disposal and treatment of waste should include the following steps:

1. Identify the quantity of waste generated, and how and where it is treated. This is the activity data. Local governments should identify the quantity of waste generated in the inventory year, categorized by different types of generation and treatment pathways where possible. How waste is generated affects the composition of waste, which determines the emission factors that need to be used. How waste is treated determines what GHGs are emitted as well as the emission factors. Activity data on quantities of waste generated and disposed/treated at managed sites can be calculated based on records from waste collection services, such as weigh-ins at the landfill sites. Waste disposed at unmanaged sites (e.g., solid waste sent to open dumps, wastewater discharged to open water) can be estimated by subtracting the amount of waste disposed/treated at managed sites from the total waste generated. Total waste generated can be calculated from the per capita waste generation rate and the population. More guidance on collecting this information is available in IPCC Guidelines.

2. Determine the emission factor. This is dependent on how waste is treated and the composition of the waste. Disposal of solid waste produces significant amounts of CH_4, which contributes approximately 3-4 % to the annual global anthropogenic GHG emissions. In addition, solid waste disposal sites also produce biogenic CO_2 and smaller amounts of N_2O as well as other non-methane volatile organic compounds, nitrogen oxides and carbon monoxide. As a minimum, local governments should quantify the CH_4 emissions. According to IPCC Guidelines, the emission factor of CH4 from SWDS is illustrated as methane generation potential, which is a function of degradable organic content (DOC). DOC varies between different types of waste and is therefore dependent on the waste composition.

Similarly, anaerobic digestion of organic waste also produces CH_4, biogenic CO_2 and trace of N_2O. In cases where waste is composted, the DOC in the waste material is converted into CO_2 which is of biogenic origin. CH_4 is also formed in anaerobic sections of the compost but is oxidised to a large extent in the aerobic sections of the compost. Composting can also produce a small amount of N_2O emissions. Like other types of combustion, incineration and open burning of waste emit CO_2, CH_4 and N_2O. Local governments should distinguish non-biogenic CO2 emissions from biogenic CO_2 by identifying the fossil carbon contained in the waste.

Wastewater can be a source of CH_4 when treated or disposed anaerobically, and the emission factor is largely dependent on the organic content and the methane generation capacity of the

wastewater, as well as the amount of organic component removed as sludge and the amount of CH_4 recovered. Wastewater treatment produces trace amounts of N_2O emissions through the nitrification and denitrification of sewage nitrogen, which can be considered negligible. N_2O emissions can also occur during disposal of wastewater effluent into waterways, which local governments should quantify where possible.

Further guidance for calculating emission factors from different waste disposal and treatment pathways, including equations and default data that local governments may use in absence of local or regional/national data, is available within the IPCC Guidelines and the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories.

The following suggestions are offered to municipalities to reduce their GHG load from the waste, wastewater, and water sector:

1. Waste Management and Mitigation Actions:

- Waste Reduction and Recycling Programs: Implement comprehensive waste reduction and recycling programs to minimize the amount of waste sent to landfills. Encourage residents and businesses to separate recyclables, organic waste, and hazardous materials for proper disposal and recycling.
- Organic Waste Management: Promote the collection and composting of organic waste, diverting it from landfills. Composting reduces GHG emissions by avoiding methane generation in anaerobic conditions.
- Waste-to-Energy (WtE) Systems: Explore waste-to-energy technologies, such as anaerobic digestion and waste incineration with energy recovery, to convert non-recyclable waste into renewable energy.
- Landfill Gas Management: Implement landfill gas collection systems to capture and utilize methane emissions from landfills. Methane can be used as a valuable energy source.

2. Wastewater Management and Mitigation Actions:

- Wastewater Treatment Upgrades: Upgrade wastewater treatment plants to improve energy efficiency and reduce GHG emissions. Consider energy-efficient technologies, such as biogas capture and utilization.
- Energy Recovery from Wastewater: Explore opportunities to recover energy from wastewater, such as using anaerobic digestion to produce biogas or installing hydroelectric turbines in wastewater flows.
- Water Conservation and Reuse: Implement water conservation measures and promote the reuse of treated wastewater for non-potable purposes like irrigation, industrial processes, and toilet flushing.

3. Water Management and Mitigation Actions:

- Leak Detection and Repair: Regularly monitor and maintain water distribution systems to detect and repair leaks promptly. Reducing water losses helps conserve energy associated with water treatment and distribution.
- Water-Efficient Infrastructure: Invest in water-efficient technologies, such as low-flow fixtures and smart irrigation systems, to optimize water use and reduce energy demands for water pumping and treatment.
- Stormwater Management: Implement sustainable stormwater management practices to reduce runoff, prevent pollution, and optimize water resource utilization.

4. Resource Recovery and Circular Economy:

- Material Recycling and Reuse: Encourage the recycling and reuse of materials, promoting a circular economy approach that minimizes waste generation and conserves resources.
- Biomass and Bioenergy Utilization: Explore the use of organic waste and wastewater sludge as feedstock for biomass and bioenergy production, which can replace fossil fuels.

5. Public Awareness and Education:

- Community Engagement: Engage the community through public awareness campaigns, educational programs, and workshops to promote waste reduction, water conservation, and sustainable practices.
- Behavioral Change Programs: Encourage residents and businesses to adopt sustainable behaviors, such as reducing food waste, using water responsibly, and participating in recycling programs.

12. SCENARIOS AND TARGETS

A greenhouse gas reduction target is a quantitative commitment to reduce or limit the increase of greenhouse gas emissions by a specified future date. Global Covenant of Mayors signatories requires cities to set a target to reduce greenhouse gas emissions and a goal for increased resilience. Cities joining GCoM pledge to set targets at least as ambitious as their country's Nationally Determined Contributions under the United Nations Framework Convention on Climate Change (UNFCCC)[19].

Cities which have signed up to the EU-CoM since 2015 commit to a reduction of at least 40% GHG emissions target by 2030. The commitment taken within the Covenant framework is linked to EU targets: CO2 emissions reduction of at least 40% by 2030. In December 2019, the European Commission published the European Green Deal, which is the 2030 sustainable growth strategy for Europe and sets a vision for 2050. This strategy foresees a transformational change of European society aimed at abating GHG emissions by at least 55% in 2030 and making Europe the first climate neutral continent in 2050[20].

For mitigation, the SECAP document should clearly indicate the emission reduction target by 2030 (and possibly beyond) and clearly state the BEI year and the target type of reduction.

Accurate GHG projections and scenarios are essential for municipalities preparing SECAPs. These projections help assess the current emission levels, set ambitious targets, and design effective strategies to achieve climate goals. By developing robust GHG projections and scenarios, municipalities can set ambitious yet achievable emission reduction targets in their SECAPs.

The following suggestions can be considered by municipalities for identifying GHG amounts at the target year and developing appropriate scenarios:

1. Business-as-Usual (BAU) Scenario:

A Business-as-Usual (BAU) scenario represents the expected GHG emissions trajectory without any additional mitigation efforts. Consider the following factors to estimate BAU emissions:

- Historical Emission Trends: Analyze past emission data to identify trends and project them into the future. Use historical data from sources like energy consumption, transportation, waste generation, and industrial activities.
- Population Growth and Urbanization: Consider projected population growth and urbanization rates in the municipality, as they directly impact energy demand and emissions.
- Economic Growth: Project economic growth based on GDP trends to estimate how it influences energy consumption and emission levels.

[19] https://www.globalcovenantofmayors.org/journey/#1594369253859-2c931b65-720e
[20] https://eu-mayors.ec.europa.eu/en/FAQs

- Energy Mix: Account for the expected changes in the energy mix, including the share of renewable energy sources, fossil fuels, and nuclear power.

2. Emission Per Capita and Emission Intensity:

Emission per capita and emission intensity (emissions per unit of GDP) can be calculated to gain insights into the efficiency of resource use and identify sectors with high emissions. This information will aid in understanding the drivers of emissions and setting specific targets:

- Emission Per Capita: Divide total GHG emissions by the projected population to estimate emission per capita.
- Emission Intensity: Divide total GHG emissions by the projected GDP to calculate emission intensity.

3. Greenhouse Gas Mitigation Scenarios:

Different mitigation scenarios should be developed to evaluate the potential impact of various strategies and actions on GHG emissions. Following types of mitigation scenarios can be considered:

- Technology-Based Scenarios: Assess the impact of adopting energy-efficient technologies, renewable energy sources, and low-carbon alternatives in different sectors.
- Policy-Driven Scenarios: Evaluate the effects of policy measures, such as carbon pricing, emission standards, and incentives, on emissions reduction.
- Behavioral Change Scenarios: Analyze the impact of promoting sustainable practices and behavioral changes in the community, such as increasing public transport use or reducing food waste.

4. Integrated Assessment Models:

Municipalities can utilize Integrated Assessment Models (IAMs) to simulate interactions between the economy, energy, and the environment, providing a systematic framework for analyzing different scenarios and identifying the most effective pathways for emissions reduction. For instance, considering the use of IPCC Shared Socioeconomic Pathways (SSPs) is recommended as they represent a set of plausible global development scenarios covering various demographic, economic, social, and technological pathways. Additionally, municipalities should explore user-friendly carbon accounting tools, which enable them to estimate emissions across sectors and evaluate different mitigation strategies.

5. Expert Collaboration and Validation:

To ensure the accuracy and reliability of the projections and scenarios, municipalities can collaborate with climate experts, researchers, and consultants. It is crucial to seek external validation of the methodologies and assumptions used for GHG estimations, thereby enhancing the credibility of the emission data and analysis in their SECAPs.

13. ENERGY POVERTY

In the pursuit of Sustainable Energy and Climate Action Plans (SECAPs), it is essential for cities and regions to recognize the existence of energy poverty and develop strategies to tackle this pressing issue. Energy poverty occurs when households or individuals struggle to afford adequate energy services, leaving them vulnerable to adverse impacts on their well-being and quality of life. As part of the SECAP development process, local authorities must assess whether energy poverty is prevalent in their municipality and, if so, take proactive measures to address it.

There are three key questions for municipal authorities to consider:

Assessing Energy Poverty - Is my municipality affected by energy poverty?

The first step in addressing energy poverty is to determine its presence and extent within the municipality. Municipalities can conduct comprehensive energy poverty assessments by analyzing data on energy consumption, household income levels, and energy-related spending patterns. The assessment should also consider the vulnerability of specific geographic areas or social groups to energy poverty. Understanding the scale and nature of energy poverty is crucial for tailoring effective and targeted interventions.

Identifying Vulnerable Groups - Who are the most vulnerable groups in my municipality?

Identifying the most vulnerable groups within the community is pivotal to designing tailored energy poverty actions. Vulnerable groups may include low-income households, elderly residents, single-parent families, people with disabilities, and marginalized communities. By pinpointing these groups, municipalities can ensure that their interventions are inclusive and equitable, addressing the specific needs and challenges faced by each group. Collaborating with local social services and community organizations can provide valuable insights into vulnerable populations.

Designing Actions - How can I design effective energy poverty actions?

Once the extent of energy poverty and the vulnerable groups have been identified, municipalities can develop targeted actions to alleviate the issue. Effective energy poverty actions may include a combination of short-term and long-term measures. Short-term interventions can include emergency energy assistance, energy-efficient appliances, and energy-saving advice. On the other hand, long-term strategies may involve improving housing energy efficiency, promoting renewable energy adoption, and providing financial support for energy transition projects. Integrating these actions into the broader SECAP ensures that energy poverty efforts are aligned with the overall climate and energy goals of the municipality.

14. FINANCING

Once the priority actions for the Sustainable Energy and Climate Action Plan (SECAP) have been identified, securing adequate funding is crucial for successful implementation. Financing considerations should not be limited to upfront costs but also encompass the long-term running costs of the proposed actions. Financing SECAP actions requires a strategic approach that leverages various funding mechanisms. Municipalities should consider a combination of local, regional, and national resources, while also exploring innovative financing models. By adopting a comprehensive funding strategy, municipalities can enhance the likelihood of successfully implementing their SECAP.

Municipalities have various funding mechanisms at their disposal, please find some below:

Municipal Budget:

The municipal budget is a primary source of funding for SECAP actions. Municipalities can allocate specific budget lines to fund individual actions or integrate them into broader work programs. This traditional approach offers direct control and flexibility over the allocation of resources. Municipalities can prioritize actions according to their urgency and the availability of funds.

Collaboration with Local Stakeholders:

Certain SECAP measures may be more effectively implemented by involving local stakeholders such as businesses, community organizations, or utilities. These stakeholders may have a vested interest in certain actions, and their participation can bring additional financial resources to the table.

Innovative Financing Options:

In addition to traditional funding methods, municipalities can explore innovative financing mechanisms to support their SECAP actions. One such example is funding energy-saving measures through consumers' utility bills. This approach allows the costs to be spread across a broader base, making it more manageable for individual residents or businesses to contribute to climate and energy initiatives.

Preferential Bank Loans:

To address upfront costs, municipalities can seek preferential loans from financial institutions. These loans may have lower interest rates or more favorable terms, making it easier for the city to fund its SECAP projects. Municipalities should approach banks or financial institutions with a strong case that demonstrates the potential long-term benefits and returns of the proposed actions.

EU-CoM's Interactive Funding Guide:

Cities can utilize the Interactive Funding Guide provided by the European Covenant of Mayors (EU-CoM) (https://eu-mayors.ec.europa.eu/en/resources/funding_guide). This guide serves as a valuable resource for identifying and exploring new financing opportunities. It offers insights into various funding options available at the European level, helping municipalities tap into regional and national funding mechanisms.

GCoM`s City Climate Finance:

Invest4Cities is GCoM's initiative to increase the flow of public and private-sector investment in support of urban climate change mitigation and resilience projects. Invest4Cities (https://www.globalcovenantofmayors.org/city-climate-finance/) focuses on creating better, more equitable access to finance for cities by advocating for regulatory shifts that support implementation and financing of cities' bold climate action commitments, accelerating city capacity and removing barriers to develop investor-oriented Climate Action Plans and projects, and unlocking large-scale financing instruments to support cites' actions.

Regional and National Funding Mechanisms:

Beyond local financing options, municipalities should also explore opportunities at the regional and national levels. Many countries have established funding mechanisms to support climate and energy actions. These mechanisms may provide grants, subsidies, or other financial incentives to encourage the implementation of sustainable projects. By collaborating with higher levels of government, city networks or platforms, municipalities can access additional financial resources and scale up their SECAP efforts.

15. MONITORING

Municipalities are in the position to play an essential role in establishing climate actions. Moreover, given the major challenge of urban growth in the coming decades, local governments' planning capacities on urban design, climate resilience and disaster preparedness, mobility, and energy (power and heating/cooling systems) have to increase.

Effective implementation of SECAPs has to be ensured for long-lasting results of climate action. Establishing a monitoring process is an important part of climate commitments. It enables to track the impacts of the actions included SECAPs plan and compare estimated impacts to what is actually achieved in terms of energy savings, renewable energy production, CO2 emissions reduction, and efforts to improve resilience to the impacts of climate change.

Why is monitoring important?

- Assess the progress made in actions' implementation
- Track the impacts of the actions
- Quantify the progress made in terms of GHG emission reduction
- Keep citizens and stakeholders engaged and motivated
- Engage new partners
- Take advantage of new opportunities / Re-set priorities
- Learn from experience / understanding the barriers to the implementation
- To showcase city's contribution to global initiatives

What are the requirements for monitoring?

Both signatories of CoM and GCoM commit to submit monitoring reports at least every second year after submission of the action plan(s). CoM signatories use My Covenant to upload required information about monitoring the actions. Uploading a monitoring report remains optional. The European Convention of Mayors Reporting Framework is presented in Figure 8 and the Global Convention of Mayors Reporting Framework is presented in Figure 9.

The monitoring reports shall provide information about the implementation status of each action/action area/sector contained in the action plan, helping to monitor progress made.

The local authority is encouraged to draft also a monitoring report (in national language) and have it approved by the Municipal Council to ensure transparency and accountability. This monitoring report could be used to reinforce communication towards citizens and stakeholders, keeping them informed on progress achieved, barriers encountered, opportunities, possible need for corrective measures, etc.

Monitoring process;

- should be designed already when developing the action plan.

- should be intended as a continuous process, going hand-in-hand with the implementation of the SECAP.

- should foresee some milestones (e.g. yearly progress reports).

Parts of the Reporting Template		Reporting Requirements		
		Within 2 years	Within 4 years	Within 6 years
	Strategy *Report any changes to the initial strategy as well as updated information on human and financial resources.*	✓	✓	✓
MITIGATION	**Emission Inventories** *Provide final energy consumption and CO_2 emissions data by energy carrier and by sector for a recent monitoring year.*	✓ (BEI)	✗	✓ (MEI
MITIGATION	**Mitigation Actions** *Provide information on and from a mitigation-related Action Plan, including individual actions.*	✓	✓ (min. 3 Key Actions)	✓
ADAPTATION	**Adaptation Scoreboard** *Provide an indication of the status of adaptation and the level of completeness of actions within the adaptation cycle.*	✓	✓	✓
ADAPTATION	**Risks & Vulnerabilities** *Report on climate hazards, vulnerabilities, and impacts faced by your city.*	✓	✓	✓
ADAPTATION	**Adaptation Actions** *Provide information on the adaptation-related Action Plans and individual adaptation actions.*	✗	✓ (min. 3 Key Actions)	✓

Figure 8. Covenant of Mayors Europe Reporting Framework

Reporting Elements	Commit to join GCoM (Year 0)	Year 1	Year 2	Year 3	Year 4	Year 5
GHG emissions inventory	submit by year 2 at the latest			*		
Risk and vulnerability assessment	submit by year 2 at the latest					
Targets and goals (mitigation and adaptation)	submit by year 2 at the latest					
Climate action plan(s) (mitigation and adaptation, or integrated plan)	submit by year 3 at the latest					
Energy access plan	To be defined					
Progress report					*	

* Every two years after submitting the climate action plan

Figure 9. Global Covenant of Mayors Reporting Framework

Main resources:

More information about CoM/GcoM requirements for monitoring can be found in the below main websites:

- https://eu-mayors.ec.europa.eu/sites/default/files/2022-10/Quick_ref_guide_monitoring.pdf
- https://www.globalcovenantofmayors.org/wp-content/uploads/2019/04/FINAL_Data-TWG_Reporting-Framework_website_FINAL-13-Sept-2018_for-translation.pdf

16. References

1. Rivas, S., El-Guindy, R., Palermo, V., Kona, A. and Bertoldi, P., Guidebook: How to develop a Sustainable Energy and Climate Action Plan (SECAP) in the MENA Region, European Commission, Ispra, 2018, JRC113188.

2. Reporting Guidelines, CoM, March 2020. Accessed from: https://eu-mayors.ec.europa.eu/sites/default/files/2022-10/Covenant-reporting-guidelines-EN-final.pdf

3. Explanatory Note accompanying the Global Covenant of Mayors Common Reporting Framework, Guidance Note, GCoM, April 2019. Accessed from https://www.globalcovenantofmayors.org/wp-content/uploads/2019/04/Data-TWG_Reporting-Framework_GUIDANCE-NOTE.pdf

4. Bertoldi P. (editor), Guidebook 'How to develop a Sustainable Energy and Climate Action Plan (SECAP) – Part 1 - The SECAP process, step-by-step towards low carbon and climate resilient cities by 2030, EUR 29412 EN, Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-96847-1, doi:10.2760/223399, JRC112986