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Zaragoza Climate City Contract

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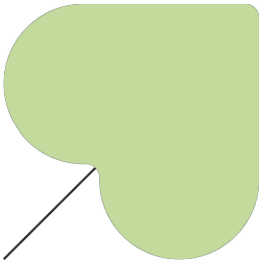

Zaragoza

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Abbreviations

CCC - Climate City Contract
CAP - Climate Action Plan
CIP - Climate Investment Plan
ZEI 2019 - Monitoring Emissions Inventory 2019
BEI 2005 - Baseline Emission Inventory 2005
BAU 2030 - Business as Usual scenario 2030
EMCD - Economic Model for Cities' Decarbonisation
SECAP - Sustainable Energy and Climate Action Plan
SUMP - Sustainable Urban Mobility Plan
PNIEC - Spanish integrated Energy and Climate Plan
ECAZ 3.0 - Zaragoza Climate Change, Air Quality and Health Strategy
EACC - Aragonese Climate Change Strategy 2030
PACCZ - Zaragoza Climate Change Adaptation Action Plan
CitiES 2030 - Collaborative Platform for the Climate Neutrality of Spanish Cities
GHG - Greenhouse Gases

Introduction

At a crucial moment in the global response to climate-related emergencies, the EU is committed to lead climate action and has set the targets and legislation to achieve it. Thus, the EU must reduce its emissions by at least 55% by 2030 and achieve climate neutrality by mid-century. In this context, cities have a key role to play, both to accelerate the decarbonisation process and to ensure a fair and equitable transformation that contributes to the well-being of society as a whole.

Despite occupying only about 3% of the Earth's surface, cities generate more than 70% of greenhouse gas emissions and consume more than 65% of global energy. And it is important that they act as hubs of experimentation and innovation in the transition to climate neutrality.

The EU Mission "100 Climate Neutral and Smart Cities by 2030" aims to support the transformation of cities to accelerate the implementation of the Paris Agreement, and to be both catalyst and driver for the implementation of the European Green Deal, and a demonstrator that it is possible to achieve climate neutrality by 2050.

In Spain, on September 8th 2021, the Government of Spain and the City Councils of Barcelona, Madrid, Seville and Valencia signed the Declaration "Climate Neutral Cities in 2030" (annexed to this Contract), as a boost to the commitments and initiatives of the signatory cities and as governmental support for the transformation of these cities to achieve climate neutrality and improve their resilience. Following the path opened, the City Councils of Soria, Valladolid, Vitoria-Gasteiz and Zaragoza adhered to the Declaration on December 13th.

In addition, on September 15th 2021, the Plenary of the Senate approved a motion urging the Government to push for climate neutrality of cities in the framework of the European Cities Mission. The motion recognises the fundamental role of cities in the response to the climate emergency and highlights the opportunity to accelerate the necessary and cross-cutting changes to make cities climate neutral by 2030. It also values that the different territorial administrations promote and facilitate the climate neutrality of Spanish cities through their incorporation into the Mission of Cities and through the development of transformation projects.

In this regard, on November 25th 2021, the Cities Mission launched a call for expression of interest addressed to European cities with more than 50,000 inhabitants interested in participating. Of the 377 that applied, 100 were selected from the EU-27, including the Spanish cities of Barcelona, Madrid, Sevilla, Valencia, Valladolid, Vitoria-Gasteiz and Zaragoza.

The Mission Implementation Plan foresees that each of the 100 selected cities will develop a Climate City Contract adapted to its own reality, through a process of co-creation and in close collaboration with the whole of civil society and citizens, detailing the strategy for the deployment and monitoring of innovative and digital solutions to achieve climate neutrality; enabling other cities to follow their example by 2050. This document thus constitutes a clear political commitment, not only towards the European Commission and national, regional and local authorities, but also towards the EU citizens, and includes a comprehensive climate action plan in the different sectors, such as energy, buildings, waste management and transport, together with their corresponding investment plans.

In this way, this document answers to the requirements of the European Cities Mission. It has been prepared by the city, with the participation of other public and private actors, and sets out plans to achieve climate neutrality.
In particular, it recognises that the Mission cannot succeed without being firmly anchored in the local community and gathers broad support. It therefore involves civil society, youth groups, cultural institutions and creative sectors, foundations, local media, small and medium-sized enterprises, private industry, trade unions, academia and research and innovation agents, and the public sector, among others, in their respective roles as decision-makers, users, consumers, producers and owners.

Furthermore, it integrates the city's own qualities and heritage, which guarantee the local dimension of the transition to climate neutrality, but also its inclusive character, in line with the values of the New European Bauhaus (art/culture, sustainability and society). It fosters a sense of ownership by the city's inhabitants and professional actors, showing that their unique contributions are relevant and that the fulfilment of this contract will result in a better quality of life and a better environment for all.
On the other hand, it is configured in the framework of an iterative process, as a document that will be subject to monitoring and updating, both through the signing of addenda and other accession documents, thus bringing together other actors necessary for the city to achieve the established goal of climate neutrality. In particular,

the commitments contained therein may be expanded or updated to effectively contribute to the achievement of climate neutrality in the city.

The document is divided into several parts: one concerning the cities' commitment to achieve climate neutrality in the city; another concerning the institutional support and coordination of the different public administrations; another part concerning its monitoring and updating; and a final part comprising the annexes corresponding to the Climate Action Plan, the Climate Investment Plan and the City Stakeholders' Commitments, which follow the models elaborated by NetZeroCities[1] .

[1] The NetZeroCities project is part of the Horizon 2020 Research and Innovation Programme and provides the necessary technical, regulatory and financial assistance to the cities of the European Cities Mission (https://netzerocities.eu/the-nzc-project/).

Zaragoza's commitment to climate neutrality

Introduction

In Apil 2022, Zaragoza was selected by the European Commission as one of the **'100 Climate Neutral and Smart Cities',** a recognition that opens the door to new European collaborations and support to reach the goal climate neutrality by 2030. The Aragonese capital competed with 377 European municipalities, 24 of them Spanish, to be part of this ambitious initiative that turns the selected cities into centres of experimentation and innovation to guide the rest of European cities until 2050.

This European candidature has been very well received by citizens and local authorities, as more than **115 letters of support** were received from companies, financial institutions, universities, foundations, groups, professional associations and consumer associations, among others.

Zaragoza thus becomes a European benchmark for its **sustainable mobility, energy efficiency, renaturalisation and circular economy projects**, while at the same time committing to further develop these action policies with the objective of achieving climate neutrality by 2030.

This is a challenge for the transformation of the city in the coming years, but also an incentive to accelerate and continue implementing an action plan set by the city's governing bodies to reduce its emissions. In this way, it also seeks to **improve the quality of life of the citizens** and turn the Aragonese capital into a beacon of investment in sustainability and innovation.

Thanks to the work done in recent years, the city of Zaragoza is on its path to become more sustainable and has strived to reduce its emissions significantly over the last decade. In this sense, this Climate City Contract builds on the strong foundations that the city has been building for sustainability, with strategies and plans in the implementation phase that have been key to reach this point.

Among these policies, we can highlight *the Zaragoza Climate Change, Air Quality and Health Strategy* (ECAZ 3.0), *the Aragonese Climate Change Strategy 2030 (EACC), the Action Plan for Climate and Sustainable Energy (SECAP) of the Municipality of Zaragoza 2030, the Zaragoza Sustainable Urban Mobility Plan (SUMP), the Zaragoza Green Infrastructure Master Plan, the Zaragoza Sustainable and Healthy Food Strategy,* as well as the recent *Zaragoza Urban Agenda*, among others.

The image below shows a brief overview of the main achievements of the city's roadmap towards climate neutrality by 2030:

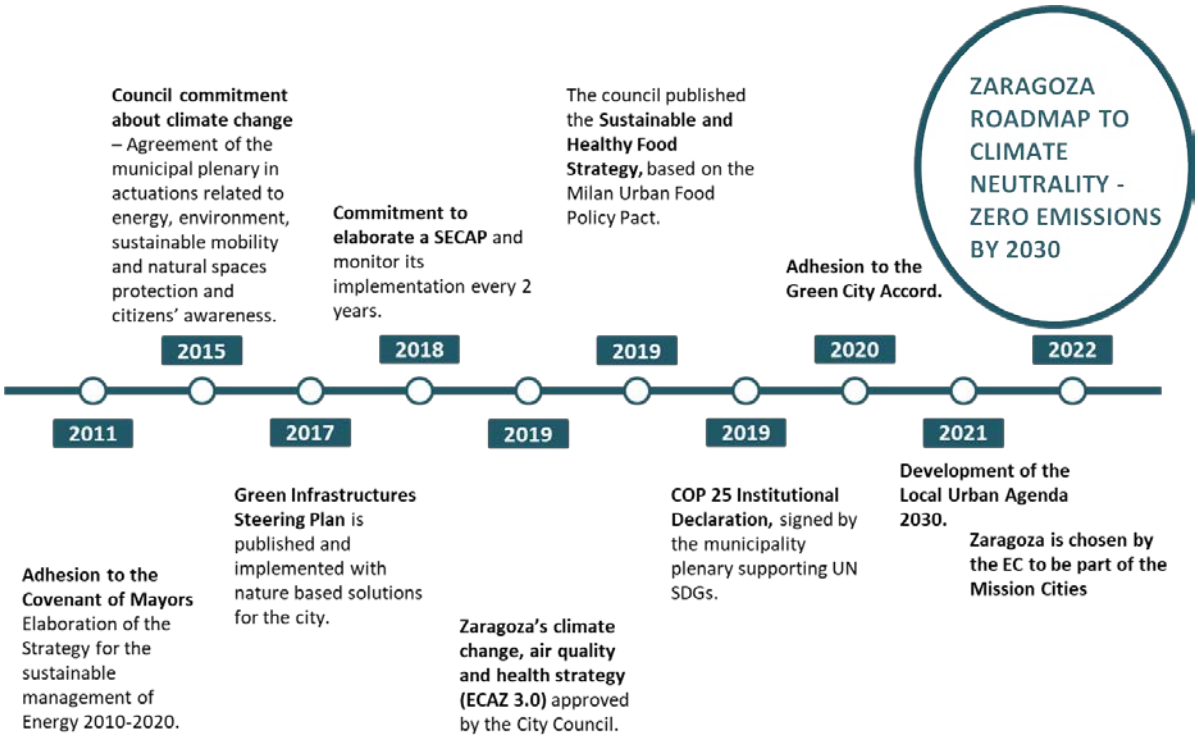


Figure 1. Zaragoza's roadmap to climate neutrality.

It is also important to highlight that Zaragoza is an active member of numerous key associations and agreements at a European level that support sustainable cities. These include the Covenant of Mayors, EuroCities, EIT Climate-KIC, ICLEI, ERRIN and the Green City Accord, to highlight some of the most relevant ones.

At a national level, Zaragoza is also present in the FEMP's Spanish Network of Cities for Climate, in the Mirror Group of the Mission of Cities in Spain, as well as in the recently created **Collaborative Platform for the Climate Neutrality of Spanish Cities (citiES 2030).** The city is also exploring synergies with regional initiatives such as the Aragon

Circular Strategy, with the aim of creating a political, economic and social framework to enable the transition to an innovative circular economy, or the EU Mission on Adaptation to Climate Change where Aragon Region is taking place.

However, working towards climate neutrality is a long road that requires the implementation of a series of **transformative actions** that can only be carried out with the involvement and close collaboration of citizens and key industrial, academic and governmental actors.

This Climate City Contract is a city-wide effort, pursuing a common goal that benefits all stakeholders and is only achievable through the collaboration of all city actors.

This journey is enhanced by the implementation of the Mission, making use of the new frameworks created for multi-stakeholder and multi-level collaboration. Thanks to the possibility of peer-to-peer collaboration provided by platforms such as **NetZeroCities (NZC) and citiES 2030**, both at European and national level, synergies and exchange with other European cities that are also, like Zaragoza, pioneers in sustainability will be facilitated.

Likewise, thanks to the active connection between the main national platform (Collaborative Platform for the Climate Neutrality of Spanish Cities) and the European platform of the Climate Neutral and Smart Cities Mission, Zaragoza will make use of the main instruments available at European level to put innovation at the service of the ecological and digital transition of cities.

To this end, this Climate City Contract is a living and evolving document. Although it suffers from some uncertainty inherent to the very process and concept of this Mission, its intention is to establish the main objectives, priorities and key principles to achieve climate neutrality in Zaragoza by 2030. This is therefore the first iteration of a document that will be updated on a regular basis to reflect the city's cycle of actions, to flesh out aspects of both the Action and Investment Plans with new information, as well as to respond to possible changes in a constantly evolving socio-economic ecosystem.

Goal: Climate neutrality by 2030

The urgency to accelerate emission reduction processes has led to increase the level of ambition in terms of decarbonisation targets and shorten the timeframe for achieving carbon neutrality.

In this context, Zaragoza's goal is to achieve climate neutrality by the end of this decade. The city has defined a target of **80% emission reductions by 2030** (compared to its business-as-usual expected progression) in the main sectors that will lead to a systemic transformation of the city. Natural sinks such as urban forests or renaturalization of spaces will offset the remaining residual emissions.

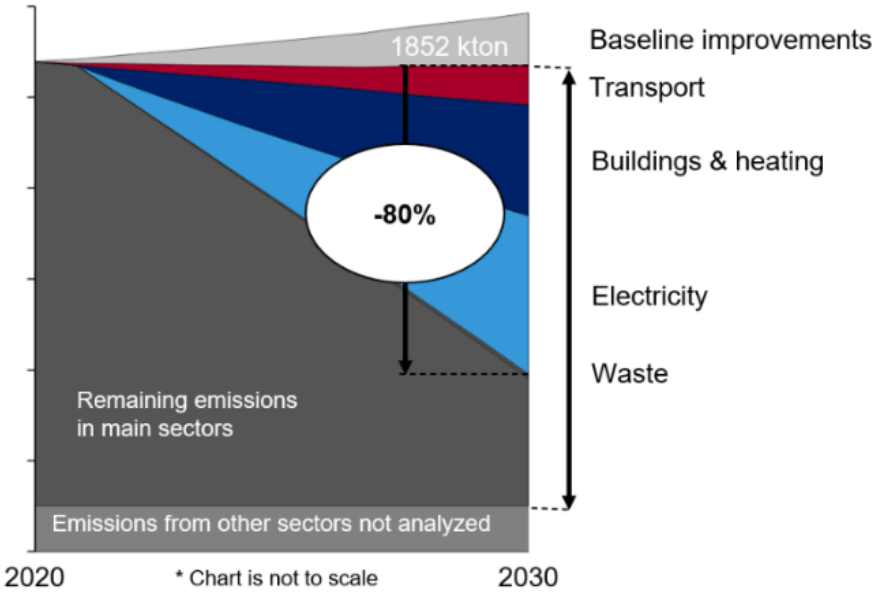


Figure 2. Main decarbonisation sectors.

The geographical boundary that corresponds to Zaragoza's climate neutrality target for 2030 is the same as the administrative boundary of the city, covering an area of 974 km^2, corresponding to the whole municipal area.

For proper implementation and monitoring, the Climate Action Plan (CAP) of this Contract breaks down these actions with a defined focus, into concrete and achievable objectives that have a measurable impact for the city.

In this regard, a number of sectors, also shown in *Figure 2*, are identified as having the greatest decarbonisation potential:

+ transport;
+ buildings and their heating;
+ electricity generation; and
+ waste.

It is estimated that these four sectors together can reduce **80% of total emissions**. Based on the economic case developed for the city under this Contract, the actions planned in the city, primarily targeting these four sectors, would result in an annual reduction of 1,474,000 tonnes of carbon dioxide emissions by 2030.

These total emissions are calculated by aggregating the expected reductions across a number of levers of action. The graph in *Figure 3* breaks down the **expected emissions savings for the different levers**. In particular, actions aimed at decarbonising heat generation in buildings and electricity generation are those with the highest projected emission reduction estimates.

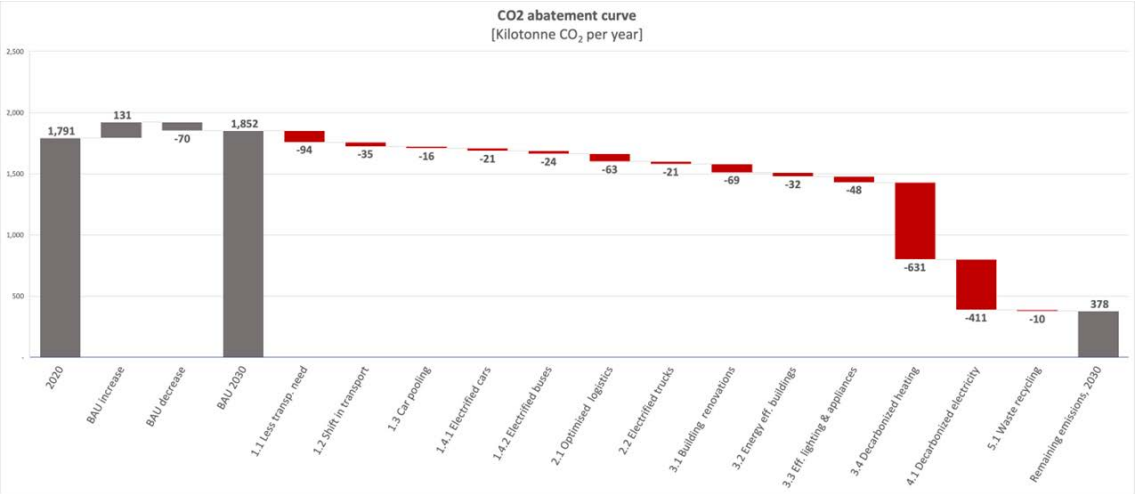


Figure 3. CO_2 emission reductions (in ktons of CO_2 per year) distributed by sub-sectors of action.

With an **initial investment estimated at €3,925 million between 2020 and 2030** (corresponding to €6,887 per capita), benefits of €6,223 million are projected between 2020 and 2050. Specifically, the economic case analysed yields a return on investment (ROI) of 59%.

The expected benefits up to 2050 are distributed as follows: 82% direct benefits (5,127 million euros) and 18% (1,097 million euros) co-benefits, including improvements in

employment, welfare, health and time savings, among others. *Figure 4* shows the return on investment and its distribution.

It is envisaged that the reduction in these sectors with the levers for action, which are described in more detail in the following section and throughout the Action Plan, will achieve the ambitious target within the set timeframe. At the same time, the city is committed to making this transition in a fair way and leaving no one behind.

Complementarily, part of the city's residual emissions will be captured by a natural sink consisting of existing urban and peri-urban forests, together with other nature-based initiatives that will be enhanced or implemented between now and 2030.

Finally, although the main priorities identified for the city's transformation towards climate neutrality are focused on **energy use and efficiency**, it is worth noting that additional related issues such as circularity, sustainable food chains, and health, among others, will also be considered.

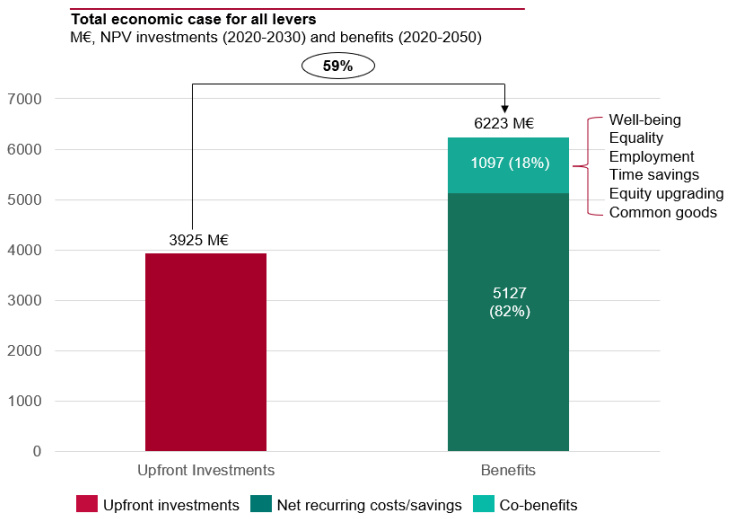


Figure 4. Conclusions of the economic case for the city of Zaragoza.

In short, the diversity and complementarity of Zaragoza's initiatives make the city an ideal centre of experimentation and innovation to develop solutions that can be easily replicated in other cities, contributing to make all cities in the European Union climate neutral by 2050.

Key priorities and strategic interventions

Zaragoza has analysed the current state of play regarding the city's emissions and has identified three priority pillars for action, around which the systemic changes and strategic interventions that need to be addressed in order to reach the goal of climate neutrality by 2030 are articulated.

These three priority pillars are as follows:

1. sustainable and intelligent mobility
2. renaturalisation and circular economy
3. energy and efficiency

With these overall sustainability priorities for the city, the CAP defines a series of actions towards climate neutrality that aim to tackle the city's main emitting sectors and thus achieve the city's objectives described in the previous section.

Specifically, in the model study prepared for Zaragoza, these priorities have been researched and reflected in the actions planned in the Climate Action Plan, proposing specific measures aimed especially at the most polluting sectors, such as transport, residential heating and electricity generation. *Figure 5* below shows the **main reduction levers** studied, as well as their associated emission reduction percentage.

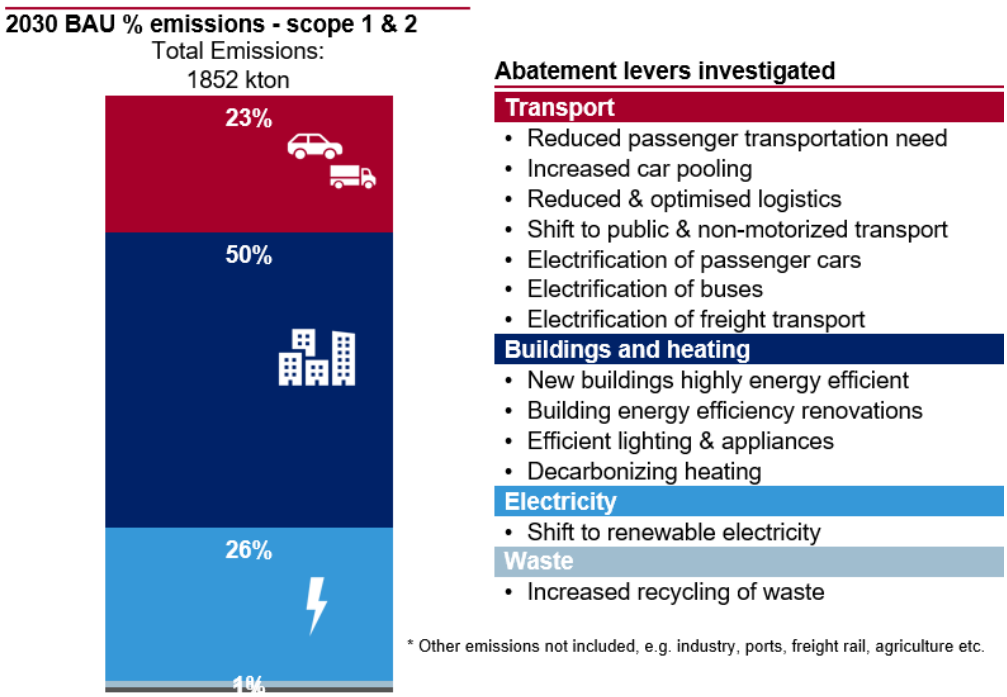


Figure 5. The Action Plan's action sub-sectors address 99% of the total Scope 1 and 2 emissions.

For example, in the **mobility and transport sectors**, which represents one of the highest percentages of emissions, the city aims to reduce an average of 274,000 tonnes of CO_2 annually, thanks to a set of interventions that include, among other measures from Zaragoza's Sustainable Urban Mobility Plan:

+ electrification of urban transport with the transformation of the public bus fleet to electric vehicles and support for taxi services (SECAP 2030 aims to achieve zero emission public transport);
+ the installation of recharging points in bus depots;
+ optimisation of city logistics
+ the implementation of financial support schemes for the electric transformation of taxis to a zero-emission fleet; the installation of public charging points in the city.

In terms of **energy and energy efficiency in buildings**, a significant annual average reduction of 780,000 tonnes of CO_2 is foreseen. This sector includes key interventions such as the following:

+ the refurbishment of 25,000 dwellings to reduce their thermal consumption;
+ the replacement of fossil fuel boilers for heating buildings;
+ the design and promotion of renewable energy communities and solar parks such as the one already implemented in the Actur neighbourhood through the installation of roofs on social rental buildings, public and private housing;
+ creation of a business-oriented energy community in an industrial park with the same cadastral reference in the MercaEnergy project;
+ "Balsas Positivo", an urban regeneration project supported by two recently funded Horizon Europe initiatives (INCUBE and CHRONICLE) aims to accelerate the pace of social housing rehabilitation and promote a replicable strategy for other types of buildings;
+ The development of "energy positive districts", such as the one that will be carried out thanks to the NEUTRALPATH project, financed through Horizon Europe, where Zaragoza is a lighthouse city that will develop a neighbourhood with positive energy generation on an annual basis thanks to the incorporation of low temperature district heating that covers the thermal demands with geothermal

exploitation and photovoltaic solar contribution. In addition, the use of electric vehicles as energy consumers and storers is foreseen.

Furthermore, the "**El Bosque de los Zaragozanos**" initiative focuses on **nature-based solutions** and is conceived as a space of opportunity to coexist in harmony with the territory, aligned with a global Green Infrastructure strategy in which urban areas merge with their territory, committed to a sustainable, healthy and resilient city.

This initiative, already underway, aims to improve health and biodiversity, reducing the carbon footprint and greening the city and its territory. At the same time, it is expected to promote circularity through the generation of organic waste that can be used as compost or biomass. It will extend to a total of 1,000 hectares, planting 700,000 new trees and shrubs, and creating a natural sink to capture the city's residual CO_2 emissions.

On the other hand, **"Circular Biocarbon"** will be the first industrial-scale biorefinery in Europe, with an investment of 23 million euros (15 million provided by the European Commission) and the creation of 700 jobs. This represents a breakthrough for Zaragoza in the **circular economy**, treating a third of all organic waste generated, and fostering synergies with other initiatives such as El Bosque de los Zaragozanos.

By its nature and taking into account a wide range of factors, this Contract seeks to set in motion a multi-stakeholder process involving all stakeholders. Therefore, in addition to the technical interventions and emissions savings mentioned above, achieving climate neutrality will entail both a social and economic transformation, as well as an evolution of many of the current urban models. On this path, the magnitude of the co-benefits that the city of Zaragoza will see as a result, all associated with the planned decarbonisation actions, must be emphasised.

In the previous section *Figure 4*, reference was made to the 59% return on the initial investment (estimated at 3,925 million euros), which will generate benefits of approximately 6,223 million euros by 2050. Specifically, 18% of this total (1,097 million euros) will revert as co-benefits, including improvements in employment, welfare, health and time savings, among others.

For example, energy efficiency actions on the building stock will have the associated effect of improving the quality of housing, especially in the most vulnerable buildings

and areas of the city, and will also improve the conditions of access to energy, reducing situations of energy poverty.

On the other hand, the evolution in mobility will have a direct effect on the city's air quality and acoustic impact, due to the reduction in demand and the penetration of new technologies. The incorporation of new behaviours such as teleworking or the development of proximity urbanism will lead to a reduction in travel demand and will increase the presence of non-motorised modes such as pedestrians and cyclists.

Furthermore, the development of **mitigation mechanisms**, such as the creation of carbon sinks like El Bosque de los Zaragozanos, will significantly increase the existence of biodiversity and nature in Zaragoza, including the associated benefits.

Also noteworthy are the actions to restore the river Huerva, which will improve its fluvial ecosystem, as well as mitigate and adapt to climate change and protect against flood risks, increasing biodiversity in urban environments and their conservation.

Finally, in addition to the mitigation actions outlined above, which focus on reducing CO_2 emissions, it is also important to consider those dedicated to adaptation, i.e. those that act on the consequences and include all actions aimed at avoiding or reducing the potential impacts and risks derived from climate change, reducing vulnerability and exposure to them and increasing the resilience of societies and ecosystems. These actions are included in the Zaragoza Climate Change Adaptation Action Plan (PACCZ) 2022-2030.

The Climate Neutrality Action Plan 2030 then describes these interventions along with all those that are foreseen to be necessary to reach the goal of neutrality by 2030. Finally, the Contract also includes a corresponding Investment Plan which sets out the broad outlines of how the necessary funding will be secured to achieve the ambitious targets set for the city.

Principles and process

The **Climate Action Plan and its subsequent Climate Investment Plan** have been carried out following the preparation of a diagnosis of the city's emissions situation, in which the main challenges posed by the different policies, plans, programmes and actions with an impact on Zaragoza's urban model, presented throughout the different sections of this Contract, were identified and analysed.

The CAP identifies and proposes the articulation of a series of actions in a planning that integrates financing, governance, citizen participation and exchange and dissemination in relation to urban phenomena within the framework proposed by the national and European platforms of Climate Neutral and Smart Cities. The CAP is therefore a genuine medium-term framework for action, not just a sum of specific, short-term projects and actions. The integrated approach pursued by this Contract and its different dimensions, as well as a strategic vision based on the participation and cooperation of the citizens of Zaragoza, are the key to achieving the sustainable development of the city as a whole.

As a consequence, the Climate City Contract is based on the reality of the city of Zaragoza, starting from it to establish the main challenges and opportunities that the city will face in the coming years, and also serves as a roadmap for the development of different plans and policies related to sustainability and climate neutrality.

In this sense, Zaragoza has developed structural processes that aim to involve citizens in decision-making and in the implementation of public policies in order to achieve a fairer and more sustainable city. In the area of citizen participation, Zaragoza has promoted the creation of various mechanisms for consultation and dialogue with citizens, through the creation of sectoral councils and the holding of popular consultations. For example, the city will support the Mission process in other advances already achieved, such as those of the Data Government, having as a direct consequence the promotion of a common space for the exchange of data between public and private administrations and social agents. In this way, it seeks to foster citizen co-responsibility in the management of the city, and to promote transparency and accountability.

The search for **cooperation at regional, national and international levels** also remains a key element in Zaragoza's principles within the scope of this Contract. In this sense, the city has worked on the implementation of a multi-level governance that allows for a

more effective and coordinated management of resources and public policies. In addition, shared learning and co-creation has been promoted, with special emphasis on active participation in working platforms directly related to the implementation of the European Mission for Smart and Climate Neutral Cities such as NetZeroCities and citiES 2030.
Internal capacity building has also been a priority for the city of Zaragoza. To this end, training and capacity building spaces have been created for public employees to improve their skills and knowledge in environmental management and citizen participation.

Also within the framework of this Contract, Zaragoza considers **climate justice** an important factor in its political agenda and will encourage the creation of spaces for citizen participation and deliberation in order to promote participatory and sustainable environmental management. Multi-stakeholder collaboration has been a key element in the preparation of the Zaragoza Action Plan, encouraging the creation of local platforms that work together with relevant bodies such as NetZeroCities and citiES 2030 for the implementation of the Mission, thus enabling the active participation of diverse social actors, such as businesses, universities and civil organisations, in the construction of a more just, sustainable and participatory Zaragoza.

The measures proposed in the CAP have the **consensus of different public and private actors** and are endorsed by the whole of Zaragozan society through a broad participatory process and with an exercise of transversal and multilevel governance. The processes and public policies for adaptation and mitigation to climate change set out in this Contract are constructed in such a way as to enable the effective participation of all public and private actors. This not only affects decision-making, which pursues a participatory model for citizens and civil society, but also the management of potential conflicts and the reaching of consensus on the basis of clearly defined responsibilities, goals and objectives at the different levels of government involved in the Action Plan.

This process represents an important **improvement in governance as it involves the work of all areas of the City Council with a holistic and transversal approach**. With this objective in mind, the City Council has established an interdepartmental working group for the preparation of this Contract, under the leadership of the Directorate General for European Funds, as a key integrating and energising element of the Mission. Its functions also include the identification of opportunities and strategic advice on fundraising, the leadership and coordination of cross-cutting initiatives related to the

Mission, as well as the coordination of knowledge and dissemination of city projects. It is flexible and open, so it can be modified, renewed and completed whenever it is considered necessary, always from a strategic and comprehensive vision.

The process for the implementation of the Action Plan of this Contract will be developed in several work blocks that basically comprise the following elements: an initial diagnosis, the design of strategic actions, their implementation, as well as their monitoring and possible correction, all of them accompanied by a communication and awareness-raising and training plan for citizens and the agents involved.

In this regard, the Contract's commitments **include strengthening existing co-creation and participation mechanisms, as** well as ensuring structured citizen participation in the decision-making process and access to justice in environmental matters.

In addition, in order to **strengthen communication and citizen participation in decision-making** on issues that affect the Climate City Contract, the City Council will include a dedicated section on its website, which will serve as a public reference point for the progress achieved so far in the framework of the Mission, as well as relevant news for citizens.

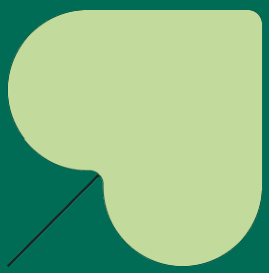
Likewise, the implementation of this Contract seeks to be based on **a principle of transparency**, whereby the plans, programmes, strategies, initiatives and instruments adopted to achieve climate neutrality and the energy transition towards a low-carbon economy are carried out through open formulas and accessible channels that guarantee the participation of the social and economic agents concerned as well as the general public, through the relevant channels of communication, information and dissemination of the city of Zaragoza.

On the other hand, the process will also follow a series of measures related to **monitoring and tracking progress**, which will be mainly based on measurable and verifiable climate action planning based on Zaragoza's baseline inventory of greenhouse gas emissions. A clear identification of the main actions and their descriptions within each action sector will be set and carried out, including interim indicators in line with their investment and capital needs, which will serve as a preliminary step to the creation and implementation of additional fundraising and financing measures in addition to the Investment Plan. In other words, all climate neutral action planning in Zaragoza will be based on co-creation processes: mobilising key

stakeholders, involving citizens in decisions that affect them and aligning actions to bring about a systemic change that leads to the rapid decarbonisation of the city. To this end, the Environment Sector Council will also be involved as it is a participatory, consultative, informative and advisory body. Its purpose and objectives are to facilitate the participation of citizens and to channel the information of associative entities in municipal matters relating to the environment.

The degree of implementation of the challenges set out in this Climate City Contract will necessarily be associated with possible variations in the **social and economic context** accompanying the process. The full implementation and fulfilment of most of the proposed actions will require a high investment of economic and financial resources, both in the public and private spheres, as well as an explicit objective of social cohesion and inclusive development.

Finally, it is worth noting that this is a completely open process, in which **regular revisions will** have to be made **according to the reality and conditions of the continuously evolving city**. To this end, Zaragoza will articulate its strategic approach based on the integral theory of change, following the general guidelines of the Mission Platform, NetZeroCities, to take advantage of social innovation and governance as horizontal factors to achieve success in all the city's climate neutral transformations.



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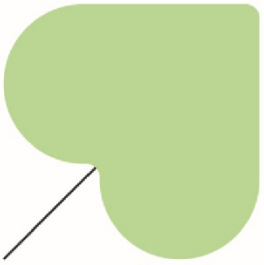


ANNEX 1:
Climate Neutrality Action Plan

Annex I: Zaragoza City Climate Action Plan

Introduction

The climate crisis is the greatest socio-environmental challenge facing human societies. Zaragoza and the rest of the cities in Europe and the world have a crucial role to play in mitigating climate change (reduction of greenhouse gas emissions) and in adapting to the effects and impacts of climate change. The climate crisis is closely related to the way we produce and manage energy for different human activities.

Therefore, Zaragoza seeks to develop its Action Plan in line with other existing plans and strategies, as part of the commitments made by Zaragoza City Council within the European Covenant of Mayors for Climate and Energy.

Within this framework, it also drew up the Zaragoza Municipal Climate and Sustainable Energy Action Plan 2030 in 2021, in which a first analysis of risks and vulnerabilities has already been carried out. Likewise, and given that mitigation and adaptation are closely related, the current plan is complemented by the actions of the Zaragoza Climate Change Adaptation Action Plan (PACCZ) 2022-2030 and is integrated into the "Zaragoza Zero Emissions 2030" brand.

Similarly, the Action Plan seeks to assist in the Zaragoza Climate Change, Air Quality and Health Strategy (ECAZ 3.0) of 2019, which focuses primarily on mitigation objectives, which have been regularly updated until now, when the objective of a climate neutral city by 2030 is proposed. It is also coordinated with the adaptation aspects of the Aragon Climate Change Strategy (EACC) Horizon 2030.

In addition, Zaragoza will rely on the Collaborative Platform for the Climate Neutrality of Spanish Cities (citiES 2030), a recently launched initiative to help Spanish cities become climate neutral by 2030. This platform is conceived as a public action infrastructure and is aimed at providing services to cities like Zaragoza to facilitate and accelerate their transition towards decarbonisation and climate neutrality.

With the support of this Collaboration Platform, Zaragoza will develop training, learning and capacity building initiatives and facilitate citizen participation and activation processes. The city will receive support and accompaniment in the search for financing formulas and attraction of financial resources in their territories, also receiving support in the design of portfolios of transformative projects for mitigation and adaptation to climate change.

Work process

Overall, the Action Plan will build on and build upon the city's existing key climate action plans, seeking to expand and complement them with the goal of achieving climate neutrality by 2030.

To ensure the participation of all the city's key stakeholders, the Action Plan will seek to be updated and adapted to the contributions received. To this end, Zaragoza will focus on the following objectives:

- Improve and develop functionalities in the Open Government Platform that adapt to new needs.
- Inform to all participating entities on the evolution of the Action Plan, its objectives and indicative development deadlines.
- Work by and for the network of actors involved in the Mission, encouraging the adhesion of new organisations to the city's ecosystem and gathering their real and concrete commitments for their active involvement.
- Participatory review, correct and validate relevant documents, and in particular those that require the mobilisation of local entities, ensuring that the opinion of the actors in the process is taken into account and that adequate feedback is obtained.
- Identificate relevant resources and projects to position them as strategic vectors of progress that can be leveraged and complemented alongside the CAP.

On the other hand, thanks to the connection of the Collaboration Platform for the Climate Neutrality of Spanish Cities (citiES 2030) with the European platform of the Mission for Climate Neutral and Smart Cities (NetZeroCities), which is one of the main instruments to put innovation at the service of the ecological and digital transition of cities, synergies and exchange with other pioneering European cities in the field will be facilitated.

Likewise, Zaragoza will support the process of this Action Plan in its advances already achieved in the Data Government, conceiving data as a public good and strengthening an ecosystem of quality, georeferenced, interoperable and reusable data in the city. The direct consequence is the promotion of a common space for data exchange between public and private administrations and social agents.

In this context, the work process sets the objective that results can be presented and collected following the principles of single data, structured, shared, accessible, geo-

referenced, open, semantically described and with information on limitations for its use and always in full respect of privacy rules and anonymisation processes.

This is an Climate Action Plan that will focus on continuous development, with a strong adaptation to a constantly changing socio-economic environment. Further details of the process of the work (including timing and milestones) will therefore be included in subsequent iterations of this Climate City Contract.

PART A - Current State of Climate Action

This module contains the city's starting point towards climate neutrality and informs subsequent modules and outlined pathways to accelerate climate action.

By way of introduction, the **Figure 1** summarises Zaragoza City Council's track record on climate change mitigation and adaptation.

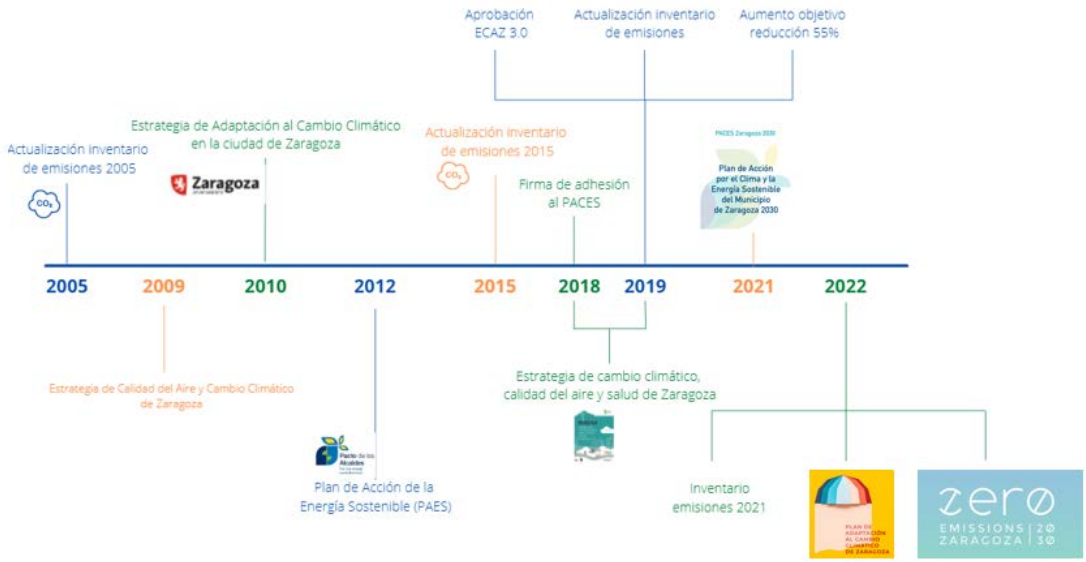


Figure 1 Evolution of initiatives carried out by Zaragoza City Council

The city has six emission inventories for the years 1991, 1996, 2005, 2015, 2018 and 2019. Within the Sustainable Energy and Climate Action Plan 2020-2030 (SECAP 2030), the 2005 Zaragoza's emissions inventory was adopted as the Baseline Emission Inventory (BEI). In addition, the 2019 Zaragoza's Emission Inventory (ZEI 2019) was the basis for checking the achievement of the mitigation target against the Covenant of Mayors' target for 2020.

In terms of climate planning, Zaragoza has, on the one hand, the Zaragoza Climate Change, Air Quality and Health Strategy (ECAZ 3.0) of 2019, which establishes a mitigation target of 40% for all sectors by 2030 and, on the other hand, the SECAP 2030, which increases this target to 55% for the key sectors of the Covenant of Mayors. Zaragoza is currently progressing with the updating of the 2021 emissions inventory and the Climate Change Adaptation Plan (PACCZ).

In January 2022, the 2019 IES values and mitigation measures of the ECAZ 3.0 and SECAP 2030 served as the basis for Zaragoza's application to the ***EU Mission: Climate-Neutral and Smart Cities***. The information presented below comes from two complementary sources. On the one hand, the ZEI 2019 as presented to the mission and, on the other hand, the results of the Economic Model for Cities' Decarbonisation built within the citiES2030 Platform.

Although the Climate City Contract is based on the results of the Economic Model, each section will briefly discuss the differences with the ZEI 2019, Zaragoza's official emissions inventory. The relationship between the two sources and their usefulness within this document is then described.

Relationship between the SECAP Emission Inventory and the Economic Model for Cities' Decarbonisation

Covenant of Mayors	Zaragoza has been a signatory of the Covenant of Mayors since 2011. In 2018, Zaragoza renewed its signature of the European Covenant of Mayors for Climate and Energy, taking on new commitments for 2030. The Covenant of Mayors is a European initiative that promotes the commitment of cities to reduce their carbon emissions and improve their resilience to the effects of climate change.
SECAP	The SECAP is a key element of the Covenant of Mayors' commitment, as it describes a city's strategies and actions to reduce its greenhouse gas (GHG) emissions and improve its energy efficiency. In Zaragoza's SECAP 2030, the 2005 inventory is adopted as the Baseline Emission Inventory (BEI). However, the most recent inventory corresponds to the Zaragoza's Emission Inventory (ZEI) of 2019. Both the 2005 BEI and the 2019 BEI include emissions data from key sectors such as (specific sectors included in the SECAP per city, i.e. buildings, transport, industry, waste emissions and other sources). The SECAP relies on the emission inventory to set targets and develop emission reduction strategies in these key sectors over time.
Economic Model for Cities' Decarbonisation (EMCD)	In addition, as part of the EIT Climate-KIC Deep Demonstration programme carried out in Madrid in 2020, an economic model was developed to identify the most cost-effective decarbonisation strategies for the city. This model developed by Material Economics has served as the basis for the development of a common tool for the 7 cities of the Spanish Platform for Climate Neutrality, citiES2030. Adapted in order to be used to complete different tables of the Climate City Contract, this model uses a life-cycle approach to assess the economic viability of different decarbonisation strategies. This means that not only upfront costs are taken into account, but also the recurring costs and benefits of each option over its entire lifetime. In addition, the model takes into account the various costs associated with decarbonisation, such as the cost of renewable energy deployment, the cost of energy efficiency measures and the cost of changes in transport systems, among others.

Relationship between SECAP and the Economic Model	The Economic Model for Cities' Decarbonisation (EMCD) is a useful tool for cities to develop strategies to reduce their emissions. By combining the SECAP emissions inventory with the costs and benefits provided by the Economic Model associated with different decarbonisation actions and strategies, cities can develop a comprehensive understanding of their emissions profile and identify the most cost-effective and efficient ways to reduce their carbon footprint. Both the economic model and the SECAP emissions inventory aim to provide cities with the information they need to develop effective strategies and actions to reduce GHG emissions and improve energy efficiency. While they use different approaches to calculating emissions, both tools are useful for cities to make the transition to a sustainable, low-carbon future.
Different approaches to emissions calculation between the SECAP and the EMCD	Thus, although both instruments share certain similarities, the EMCD and the SECAP inventory estimate GHG emissions differently. These different approaches in calculating emissions result in a different quantification of the city's emissions between the two calculation methodologies. Although the final results are similar, the different approaches of the 2 methodologies result in two different emission inventories. In the case of Zaragoza, both the EMCD and the ZEI 2019 account for Scope 1 emissions (such as emissions from combustion in boilers, furnaces, vehicles, etc.) and Scope 2 emissions (i.e. electricity purchased and consumed). Scope 3 emissions from waste management are not considered when waste management takes place outside the boundaries of the municipality, as this is not the case for Zaragoza. But in the waste sector there is a big difference between the activity factors selected by the EMCD and those considered in the ZEI 2019 of the SECAP 2030. Other notable discrepancies are, on the one hand, the selection of a different Emission Factor for electricity, despite using values reported by Red Eléctrica España. On the other hand, **the ZEI 2019 differs from the ME when considering the GHG absorption of urban trees.** Another difference between the two approaches is the level of detail. The Economic Model for Cities' Decarbonisation is more detailed and granular, providing a complete picture of the urban system and how emissions are generated and flow through it. The ZEI 2019 focuses more on specific sectors and follows a standardised format, making it easier to compare emissions between cities.
BAU 2030	The Economic Model uses a Business as Usual 2030 (BAU 2030) scenario as a reference to estimate the potential emission reductions that can be achieved through different decarbonisation strategies and actions. This scenario represents a projection of what the city's emissions trajectory would look like if no additional decarbonisation measures beyond those already planned or underway were implemented. The BAU 2030 scenario provides a baseline against which to compare the cost-effectiveness of different decarbonisation strategies and actions. By comparing the costs and benefits of different decarbonisation pathways with the BAU 2030 scenario, the model can estimate the potential ROI (Return on Investment) of each strategy and action. By considering the potential return of investment of different decarbonisation strategies and actions, the Economic Model for Cities' Decarbonisation can help cities identify the most cost-effective ways to achieve their emission reduction targets by ensuring that limited resources

	are allocated to strategies and actions that provide maximum value for the city and its residents.
How we fill in the Climate City Contract	In order to develop a comprehensive understanding of the city's emissions profile and identify the most cost-effective and efficient ways to reduce GHG emissions, Zaragoza's Climate City Contract makes extensive use of the emissions data provided by the Economic Model, so that the investments, costs and benefits presented in the model are consistent with the emissions resulting from the model. It has been considered appropriate to comment on the differences between the EMCD and the ZEI 2019 in the first 3 tables of Annex I (Climate Action Plan) in order to present the emissions inventory data of the SECAP. These are: A-1.1, A-1.2 and A-1.3. In addition, table A-1.4 is used to present the emissions resulting from the two calculation methodologies used. **The ZEI 2019 results are also presented in the same format as requested for Zaragoza's application to the *EU Mission: Climate-Neutral and Smart Cities*.** The rest of the quantitative tables of the model from table A-2.3 onwards present the data provided by the Economic Model for Cities' Decarbonisation.

Module A-1: Greenhouse Gas Emissions Baseline Inventory

A-1.1: Final energy use by source sectors

Regarding energy consumption, there are no differences between the ZEI 2019 and the input data of the Economic Model for Cities' Decarbonisation.

Base year	2019			
Unit	MWh/year			
Issuing sector	**Scope 1**	**Scope 2**	**Scope 3**	**Total**
Transport	1,852,999.32	6,814.93	NO	1,859,814.25
(Fuel type/energy used)	Diesel, Petrol, GLP, Natural Gas	Electricity	-	-
Buildings and heating	4,240,419.17	1,528,179.46	NO	
(Fuel type/energy used)	Gasoil, Natural Gas, Biomass	Electricity	-	
Electricity	NO	IE	NO	IE
(Fuel type/energy used)				
Waste and reforestation	NO	NO	NO	NO
(Fuel type/energy used)	-	-	-	-
Other	NE	NE	NO	NE
(Fuel type/energy used)	-	-	-	-

Note: NE = Not Estimated; NO = Not Occurring, IE = Included elsewhere.

A-1.2: Emission factors applied

For the ZEI 2019 of the Zaragoza SECAP 2030, emissions of Carbon Dioxide (CO_2), Methane (CH4) and Nitrous Oxide (N2O) were calculated according to the following sources:

- IPCC Fifth Assessment Report (2013)
- EMEP/EEA air pollutant emission inventory guidebook 2019. Technical guidance to prepare national emission inventories. EEA Report No 13/2019
- JCR/CoM. Guidebook How to develop a Sustainable Energy and Climate Action Plan (SECAP). 2018.
- Red Eléctrica de España reports the emission factor directly in CO_2-eq.
- In 2019, public sector electricity purchases had a Renewable Guarantee of Origin.

Some differences to highlight from the EMCD with respect to ZEI 2019:

- For the transport sector, emission factors for heavy duty vehicles will be equal to those reported by Madrid.
- In the ZEI 2019, the emission factor reported by Red Electica España for the 2019 national electricity mix (0.19 T/MWh) was used. However, the Economic Model adopts the value reported for the 2018 mainland electricity mix as the same value (0.22 T/MWh) for all Spanish NZC cities.

EMISIONES Y FACTOR DE EMISIÓN DE CO2 EQ. DE LA GENERACIÓN (tCO2 eq. | tCO2 eq./MWh) | SISTEMA ELÉCTRICO: Peninsular

Del 2018 al 2020

	2018	2019	2020
Carbón	33.485.793	10.284.336	4.635.399
Fuel + Gas	0	0	0
Ciclo combinado	9.769.082	18.923.005	14.191.886
Cogeneración	11.009.277	11.240.670	10.055.670
Residuos no renovables	550.526	497.185	683.343
Emisiones totales	54.814.678	40.945.196	29.566.297
tCO2 eq./MWh	0,22	0,17	0,12

Estado de los datos

Datos definitivos*: hasta el 31/12/20 *Nota: las fechas sin subrayado presentan datos definitivos

EMISIONES Y FACTOR DE EMISIÓN DE CO2 EQ. DE LA GENERACIÓN (tCO2 eq. | tCO2 eq./MWh) | SISTEMA ELÉCTRICO: Nacional

Del 2018 al 2020

	2018	2019	2020
Carbón	36.001.786	12.384.273	4.884.685
Fuel + Gas	0	0	0
Motores diésel	2.234.468	1.998.445	1.641.040
Turbina de gas	1.045.096	675.945	430.930
Turbina de vapor	2.209.889	1.970.362	1.259.999
Ciclo combinado	11.841.921	21.183.920	17.133.424
Cogeneración	11.022.568	11.253.753	10.068.746
Residuos no renovables	584.391	533.391	712.029
Emisiones totales	64.940.120	50.000.090	36.130.855
tCO2 eq./MWh	0,25	0,19	0,15

Estado de los datos

Datos definitivos*: hasta el 31/12/20 *Nota: las fechas sin subrayado presentan datos definitivos

The Emission Factors (EF) used by the Economic Model are reported below. Although the EF of CO_2 is required by the EM, the results are reported in $CO_{2\text{-eq}}$. The EM does this conversion internally.

Issuing sector	Primary energy/ source of energy	Carbon dioxide (CO_2)	Methane (CH_4)	Nitrous oxide (N_2O)	Hydrofluorocarbons and Perfluorocarbons	Sulphur hexafluoride (SF_6)	Nitrogen trifluoride (NF_3)
Transport	Private Transport (g/km)	153	-	-	-	-	-
	Transport Buses (g/km)	796	-	-	-	-	-
	Commercial transport (<3.5 t) (g/km)	260	-	-	-	-	-
	Commercial transport (>3.5 t) (g/km)	374	-	-	-	-	-
Buildings and heating	Heating Production (District Heating)(g/kWh)	200	-	-	-	-	-
	Heating Production (Local Heating)(g/kWh)	212	-	-	-	-	-
Electricity	(Emission factor of the national mix 2019)(g/kWh)	222	-	-	-	-	-

A-1.3: Activity by source sectors (source: input data from the Economic Model for Cities' Decarbonisation)

Regarding energy consumption, there are no differences between the ZEI 2019 and the input data of the Economic Model.

For transport, the Economic Model uses the same activity factor calculated in the ZEI 2019 for private vehicles, buses and the Zaragoza tram (values in km-veh/year). However, the activity factor for freight vehicles is based on that reported in the ZEI 2019 (165 M km-veh/year for light goods vehicles and 189 km-veh/year for heavy goods vehicles) to calculate the activity factor in Mton-km/year by assuming a maximum load of 1.5 ton/veh and an occupancy of 23% for light goods vehicles, and 7.2 and 45% for heavy goods vehicles. These values are adopted by reviewing the data reported by Madrid.

Total waste collected is reported according to the document "Zaragoza 2020 Sustainability Indicators".

Base year		2019	
	Scope 1	Scope 2	Scope 3
Transport			
Private vehicle demand (M km/year)	1921	-	-
Bus demand (M km/year)	24	-	-
Train/metro demand (M km/year)	1	-	-
Commercial transport demand (<3.5 t) (M km/year)	64	-	-
Commercial transport demand (>3.5 t) (M km/year)	1023	-	-
Buildings and heating			
Heating and DHW demand (GWh/year)	4240	-	-
Electricity			
Electricity demand (GWh/year)	-	1528	-
Waste			

Total, collected within the city (tonnes)	231022	-	-
Other			

A-1.4a: GHG emissions by source sector (data source: Economic Case)

The ZEI 2019 as presented in the ***EU Mission: Climate-Neutral and Smart Cities*** application is presented below.

Sector/sources	CO2	CH4	N2O	**CO2eq**
Stationary energy This should cover direct and indirect emissions.	1,133,285.03	1,860.02	62.50	1,198,410.42
Transport This should cover direct and indirect emissions.	459,871.34	24.15	16.70	465,452.31
Waste/wastewater This should cover direct emissions as well as out-of-boundary emissions (i.e. emissions from all waste/wastewater generated within the city, whether	16,146.04	36.09	10.98	20,320.69
Industrial Processes and Product Use (IPPU) This should cover direct emissions.				0.00
Agriculture, Forestry, and Other Land Use (AFOLU) This should cover direct emissions.	397.63	251.80	13.41	10,688.81
Other (please specify in the additional question below)	-24,530.00			-24,530.00
TOTAL EMISSIONS (excluding generation of grid-supplied energy)	1,585,170.04	2,172.05	103.59	1,670,342.23

Compared to the Economic Model data, there is a difference of 120,640 tonnes CO_2 (7.22%) equivalent/year, which is explained below:

- **Sinks:** The ZEI 2019 includes CO_2 absorption from urban trees. This is 24530 tonnes of CO_2 absorbed annually by 135,575 trees. With regard to the 2030 horizon, it should be considered that Zaragoza is making firm progress in terms of renaturalisation with strategic projects such as the "Bosque de los Zaragozanos" and the "Renaturalisation of the Huerva River", among others.
- **Electricity:** As mentioned in table A-1.2, there is a disparity between the emission factor considered in the ZEI 2019 and in the economic model. This difference assigns an additional 56,542 tonnes CO_2-eq to the Zaragoza ZEI 2019. In this case, it is also worth noting that Aragon is one of the Autonomous Communities that produces the most energy from renewable sources. In 2020, Aragon generated 12,333 GWh (around 9% of the national total), making it the fifth Autonomous Region with the highest renewable generation. Assuming the same emission factor for all cities may detract from the importance and weight of this fact.
- **Transport:** 15,215 tonnes CO_2-eq additional to the 2019 IES attributed to the assumptions considered for freight vehicles.
- **Waste:** 25,416 ton CO_2-eq additional to the ZEI 2019 attributed to differences in the technical approach of the calculation. While the model is based on the total waste collected, the ZEI 2019 takes into account emission values reported directly by the CTRUZ (landfill), the city's WWTPs and the cremation of bodies.

Base year	2019				
Unit	ton CO_2 equivalent/year				
	Scope 1	Scope 2	Scope 3	Total	% of Total
Transport	480667			480667	27%
Buildings and heating	900419			900419	50%
Electricity		354160		354160	20%
Waste*	45736			45736	3%

Other	10000			10000	1%
Total	1391086	354160	45736	1790982	100%

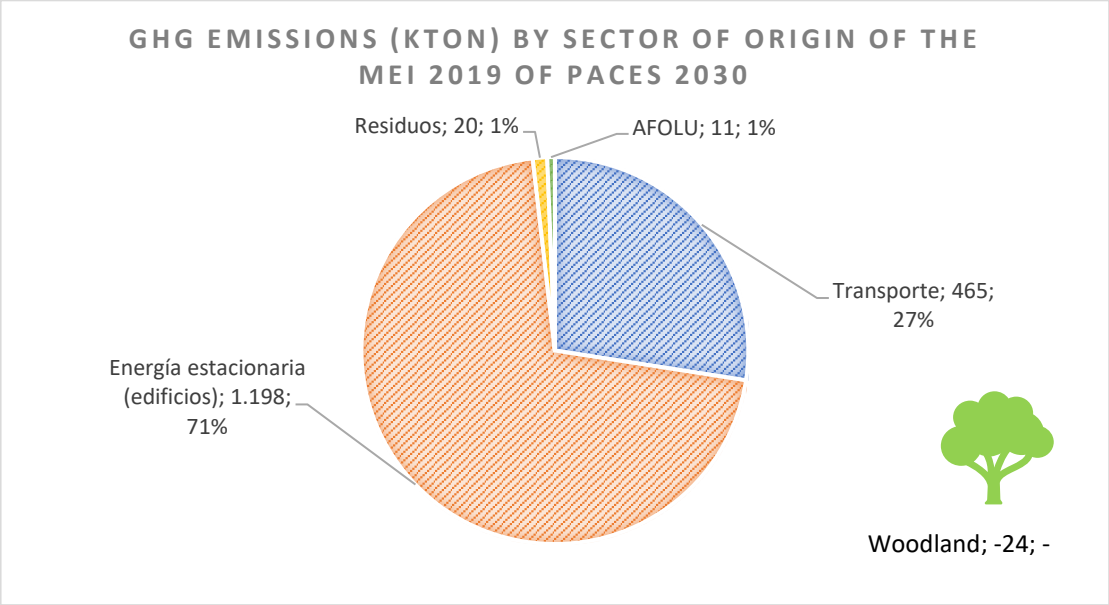
* Includes Scope 1 Waste (produced and processed in the city) and Scope 3 Waste (produced by the city, but processed outside) emissions.

A-1.4b: GHG emissions by source sector (data source: Economic Case)					
Base year	2030				
Unit	ton CO_2 equivalent/year				
	Scope 1	Scope 2	Scope 3	Total	% of Total
Transport	421633			421633	23%
Buildings and heating	920268			920268	50%
Electricity		484061		484061	26%
Waste*	16201			16201	1%
Other	10000			10000	1%
Total	1351901	484061	16201	1852164	100%

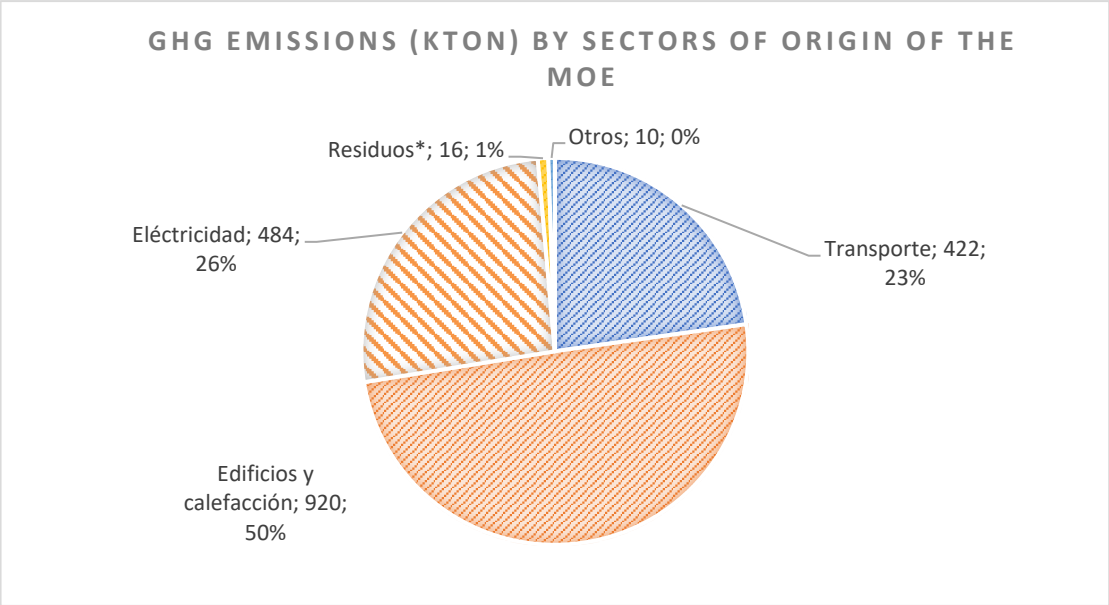
* Includes Scope 1 Waste (produced and processed in the city) and Scope 3 Waste (produced by the city, but processed outside) emissions.

A-1.5: Graphics and charts

ZEI 2019 of the Zaragoza SECAP 2030.



Economic Model for Cities' Decarbonisation.



A-1.6: Description and assessment of the GHG baseline inventory

To develop a comprehensive understanding of the city's emissions profile and identify the most cost-effective and efficient ways to reduce GHG emissions, Zaragoza's Climate City Contract makes extensive use of the emissions data provided by the Economic Model, so that the investments, costs and benefits presented in the model are consistent with the emissions resulting from the model.

It has been considered appropriate to comment on the differences between the EM and the ZEI 2019 in the first 3 tables of Annex I (Climate Action Plan) in order to present the emissions inventory data of the SECAP. These are: A-1.1, A-1.2 and A-1.3.

In addition, table A-1.4 is used to present the emissions resulting from the two calculation methodologies used. **The ZEI 2019 results are also presented in the same format as requested for Zaragoza's application to the *EU Mission: Climate-Neutral and Smart Cities***. The rest of the quantitative tables of the model from table A-2.3 present the data provided by the Economic Model.

Module A-2: Current Policies and Strategies Assessment

Relevant policies, strategies or initiatives or regulations at local, regional and national level relevant to the city's transition to climate neutrality.

A-2.1: List of relevant policies, strategies & regulations				
Type	**Level**	**Name and/or title**	**Description**	**Relevance**
Strategy	Local	ECAZ 3.0	Strategic tool of the city of Zaragoza	Define sustainability objectives
Strategy	Regional	EACC Horizon 2030	The Government of Aragon firmly adheres to the Climate Agreement	Targets for 40% reduction of GHG emissions, 26% of emissions from the diffuse sector, and increase of renewables to 32%.
Action plan	Local	SECAP Municipality of Zaragoza 2030	Key actions to support the implementation of Europe's 40% GHG reduction target by 2030	Common approach to climate change mitigation and adaptation. Includes Emission Inventory
Strategy	Regional	Zaragoza Sustainable and Healthy Eating Strategy (2019)	The City Council's framework for moving towards a more sustainable and healthy food system for the city	It guides municipal food policies, in line with the Milan Pact.
Plan	Local	Zaragoza Climate Change Adaptation Plan 2030	Addresses adaptation actions that are necessary and complementary to the mitigation actions of the SECAP.	It will enable the city to be better prepared for the consequences of climate change.
Action plan	National	PNACC 2021-2030	National planning tool for coordinated action on climate change	81 lines of action across 18 areas of work
Action plan	Local	Zaragoza SUMP	Improving the transport system and increasing the quality of the transport system	14 strategies covering all aspects of urban mobility

Strategy	Local	Zaragoza Green Infrastructure Master Plan	Integration of natural processes into the urban environment	Vocation to become a municipal management tool for the next 20 years
Strategy	Local	Zaragoza Urban Agenda	Urban SDG implementation pathway	Planning integrating financing, governance, citizen participation (etc.) for urban phenomena
Strategy	National	Spanish Urban Agenda	A strategy paper for sustainability in urban development policies	A working method and a process for all actors, public and private
Policy	EU	European Covenant of Mayors	Commitment to implement climate and energy targets	Supporting the achievement of the 50% GHG reduction target by 2030
Strategy	EU	European Green Pact	Growth strategy for the EU	Reducing the Union's net GHG emissions by 55% by 2030
Mission	EU	100 Cities Mission	Commitment to solving important societal problems.	Transforming cities towards climate neutrality
Policy	EU / World	Paris Agreement	Agreement to combat climate change and achieve a sustainable low-emission future	Limiting global temperature rise to below 2°C
Action Plan	National	PNIEC – Spanish Integrated Energy and Climate Plan 2021-2030	Nationa strategy coherent with the Paris Agreement and the EU Green Deal	Reduction of Spanish's net GHG emissions by 23% by 2030 in reference to 1990

A-2.2: Description & assessment of policies

Zaragoza Climate Change, Air Quality and Health Strategy (ECAZ 3.0): Zaragoza's strategic tool for action in the face of the climate crisis, the improvement of air quality and the protection and promotion of the health of people and communities in the face of these challenges. It defines major sustainability objectives.

Aragon Climate Change Strategy (EACC) Horizon 2030: Firm adherence of the Government of Aragon to the Climate Agreement reached at the Paris Summit, as well as to the European and national political priorities derived from it and the SDGs of the 2030 Agenda. Among others, it sets targets for a 40% reduction in GHG emissions, a 26% reduction in emissions from the diffuse sector, and an increase in the minimum contribution of renewable energies to 32% of total energy consumption. It should also be noted that in June 2022 the Aragon Region was selected by the European Commission within the Climate Change Adaptation Mission to be a resilient region by 2030.

Climate and Sustainable Energy Action Plan (SECAP) of the Municipality of Zaragoza 2030: Plan describing the key actions to support the implementation of the European target of 40% GHG reduction by 2030 and the adoption of a common approach to boost climate change mitigation and adaptation. It includes a Baseline Emission Inventory to monitor mitigation actions and a Climate Risk and Vulnerability Assessment. Commitment to monitor the implementation of the plan every two years.

Zaragoza Sustainable and Healthy Food Strategy (2019): Planning document that constitutes Zaragoza City Council's reference framework for moving towards a more sustainable and healthy food system for the city.
This strategy guides municipal food policies, in line with the Milan Pact signed by Zaragoza City Council in October 2015, and includes objectives, key concepts and specific measures and actions, as well as a proposal for food governance for the city of Zaragoza.

Zaragoza Climate Change Adaptation Plan 2030 (PACCZ): This is drawn up as part of the commitments made by Zaragoza City Council within the European Covenant of Mayors for Climate and Energy. Within this framework, the Zaragoza 2030 Sustainable Energy and Climate Action Plan was drawn up in 2021, in which a first analysis of risks and vulnerabilities has already been carried out. The PACCZ will allow the city to be better prepared for the consequences and impacts of climate change. Likewise, and given that mitigation and adaptation are deeply related, the PACCZ is integrated into the mitigation actions of the 'Mission 100 Climate Neutral Cities for 2030: By and For the Citizens' designated by the European Commission in 2022 and which are integrated into the Zero Emissions Zaragoza 2030 brand. It also complements and extends Zaragoza's Climate Change, Air Quality and Health Strategy (ECAZ 3.0) of 2019, which focused mainly on mitigation targets, which were subsequently updated, until the current objective of a climate neutral city by 2030. It is currently undergoing a public consultation process and will be approved during 2023.

National Plan for Adaptation to Climate Change (PNACC) 2021-2030: Basic planning instrument to promote coordinated and coherent action against the effects of climate change in Spain. It sets out a series of guiding principles that should guide adaptation policies and measures. It also describes 81 lines of action to be developed in the different sectors through 18 areas of work.

Sustainable Urban Mobility Plan (SUMP) of Zaragoza: Improvement of the transport system and the increase of its quality, updating the role of public and private, collective and individual modes of transport, taking into consideration the singularities of the city itself and its surroundings. In order to achieve safe, healthy, accessible, intermodal,

efficient and more environmentally friendly mobility in Zaragoza, 14 strategies have been defined to cover all aspects of urban mobility.

Green Infrastructure Master Plan for Zaragoza: A strategy that aims to strengthen the existing lines of work for the conservation and recovery of sensitive environments (river territories, island forests, ravines in the steppe, etc.), and on the other hand to take a step forward in terms of the integration of natural processes within the urban environment, with the ambition of improving the quality of life of citizens and minimising the impacts that the city has on the territory of Zaragoza. Its vocation is to become a municipal management tool for the next 20 years.

Zaragoza Urban Agenda: Following the line set by the EUA and aligned with other international agendas, it is a way to fulfil the SDGs in the urban sphere. Zaragoza is one of the cities chosen as a pilot project by the Ministry, to serve as an example for localities that want to implement their Urban Agenda. It identifies and proposes the articulation of a series of actions in a planning that integrates financing, governance, citizen participation and exchange and dissemination in relation to urban phenomena.

Spanish Urban Agenda: A non-regulatory strategic document which, in accordance with the criteria established by the 2030 Agenda, the New Urban Agenda of the United Nations and the Urban Agenda for the EU, seeks to achieve sustainability in urban development policies. It constitutes a working method and a process for all public and private actors involved in cities that seek equitable, fair and sustainable development from their different fields of action.

European Covenant of Mayors for Climate and Energy: An initiative that brings together thousands of local governments that voluntarily commit to implement the European Union's climate and energy targets. It supports the achievement of the European target of reducing GHGs by 50% by 2030 and the adoption of a common approach to boost climate change mitigation and adaptation.

European Green Pact: A growth strategy for the EU to transform it into a climate-neutral, equitable and prosperous society with a modern, resource-efficient and competitive economy. In December 2020, the European Council endorsed the EU's binding target to reduce the EU's net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels.

100 Climate Neutral and Smart Cities by 2030 Mission: This is a commitment to solve major societal challenges, such as adaptation to climate change. The Mission will support, promote and showcase the transformation of 100 European cities towards climate neutrality by 2030.

Paris Agreement: Reached in the framework of COP21, it establishes, in accordance with the conclusions of the scientific community (IPCC), the objective of limiting the increase in global temperature to below 2ºC, recommending that this increase be kept below 1.5ºC in order to avoid irreversible consequences and that, in terms of emissions reductions, it should be translated into the specification of nationally determined contributions.

PNIEC 2021-20230: Spain's National Integrated Energy and Climate Plan (PNIEC) aims for a 23% reduction in greenhouse gas (GHG) emissions compared to 1990 levels. This reduction target implies eliminating one out of every three tons of greenhouse gases currently emitted. This effort is consistent with an increase in ambition at the European level for 2030, as well as with the Paris Agreement.

A-2.3: Emissions Gap								
	Reference/Baseline Emissions (percentage)		Residual emissions1		Emission reduction target2		Emissions gap (to achieve net zero emissions)4	
	(absolute value)	(%)	(absolute value)	(%)	(absolute value)	(%)	(absolute value)	(%)
Transport	422	23%	149	35%	273	65%	0	0%
Buildings and heating	920	50%	140	15%	780	85%	0	0%
Energy	484	26%	73	15%	411	85%	0	0%
Waste and reforestation	16	1%	6	38%	10	62%	0	0%
Other	10	1%	2	20%	8	80%	0	0%
Total	1852	100%	370	20%	1483	80%	0	0%

[1] Residual emissions are those that cannot be reduced through climate action and are offset. Residual emissions can amount to a maximum of 20%, as indicated in the Mission Info Kit.

[2] the target for emission reductions in the "Others" sector is assumed to be the same as for the other 4 sectors

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

A-3.1: Systems & stakeholder mapping				
Description of the system	**Main actors involved**	**Web**	**Influence**	**Interests**
Social	Citizens, City Council, large resource-consuming companies, electricity companies.	- Mission Working Group - Multi-actor platform - Business networks (CEPYME, CEOE)	Public awareness and information	Improving communication and early warning systems
Behavioural			Raising awareness among the public and large consumers	Reduction of consumption
Economic	City Council and private entities		Efficient resource management and investment attraction	Economic assessment of the impacts to be achieved
Organisation	City Council		Creating spaces and instruments for inter-sectoral coordination	Improvements in coordination systems
Green infrastructure	City Council and citizenship		Advances in planting and renaturation techniques	Establishment, progress and maintenance of green infrastructure
Nature	All		Creation of biodiversity nodes and connectors.	Promoting and enhancing the value of the city's natural capital

A-3.2: Description of systemic barriers

Today's climate emergency is characterised by a high degree of complexity and interrelation between many factors in seemingly distant areas. For this reason, different barriers can arise in the same way from different places. In the case of the city of Zaragoza, the main uncertainty lies in the pace and timing that are feasible given the current socio-economic context to achieve the objectives.

Technically, the degree of developments achieved seems to allow access to neutral city scenarios in the time horizons proposed by this Climate City Contract and, although there is no certainty about the future scope of some innovations (for example, evolution in the development of battery energy storage, the adaptation of distribution networks, the development of hydrogen as a technology, advances in waste classification and treatment, etc.) as well as the costs required for their implementation in the coming years, it is not foreseeable that technology is the factor with the greatest potential risk for Zaragoza's climate objective.

Within this area, part of the success in achieving neutrality will depend to a large extent on the decarbonisation of the electricity mix, which, if the planned pace and milestones are not met, will slow down the whole process. On the other hand, the adaptation of infrastructures, the transformation of the city's traffic fleet, the improvement of the energy efficiency of buildings, the extension of air conditioning systems based on clean energies or the improvement of waste collection and treatment processes must incorporate technical improvements and require extensive development periods that could alter the expected pace.

Generally speaking, Zaragoza's path towards climate neutrality will require a profound urban transformation, socially, economically and environmentally. The main challenge will be to overcome the inertias and immobile positions that hold back this evolution until new paradigms and inertias are reached that naturally lead to a climate neutral, economically prosperous and socially inclusive city.

Following a preliminary analysis of the city, the main systemic barriers identified that could condition the necessary climate action are listed below, together with possible corrective actions:

Social: There is a need for greater awareness of the real and noticeable impacts of climate change among the population, such as those resulting from heat or the concentration of potentially harmful gases in the air. To overcome this barrier, the city of Zaragoza will seek to work on public information activities, as well as improving communication and early warning systems for potential health hazards.

Behavioural: Mainly in terms of high resource demand habits (e.g. energy, water, etc.). An improvement in this area could be achieved by raising awareness among the population and large resource-consuming sectors, both in terms of energy and water.

Economic: Due to Zaragoza's ambitious climate target, very high investment needs are foreseen, especially in some sectors (e.g. urban planning, where comprehensive housing refurbishments require a high initial cost with a slow return on investment). Therefore, all organisations involved in the city will seek to mobilise resources in a way that promotes efficient management of infrastructure and human capital. Each action will seek to carry out an economic evaluation of the impacts achieved in order to attract and justify the economic investments made.

Organisation: Due to the necessary multi-stakeholder participation and coordination between different areas, barriers can arise regarding the existing coordination mechanisms between different services in the city. In order to tackle this situation, the creation of spaces and instruments for intersectoral coordination is proposed. In this

sense, it is also relevant to develop contingency plans that integrate possible climate risks, as well as early detection mechanisms.

Green infrastructure: Due to its extreme climatic conditions in winter and summer, Zaragoza faces a demanding barrier in the establishment, progress and maintenance of its green infrastructure. To overcome this barrier, the best adapted species options will be considered and those characteristics will be studied that will allow improvements in planting and revegetation techniques to be achieved in the city.

Nature: Without a proper environmental assessment, certain actions could produce changes in the city's ecosystem, leading to a simplification and destruction of habitats. To this end, the city will seek to promote biodiversity nodes and connectors between green areas and the different natural spaces in the city, favouring the conditions for the spontaneous appearance of fauna and flora. Likewise, the city will strengthen awareness programmes among citizens and, as far as possible, establish and/or strengthen alliances with entities that promote Zaragoza's natural capital.

A-3.3: Description or visualisation of participatory model for the city climate neutrality

Carbon neutrality cannot be tackled by acting exclusively on emission sources, but requires a social transformation that changes current paradigms and lifestyles. This is a choral task in which many actors must be involved, from administrations to the private sector, academia and citizens.

Participation is an issue that encompasses all areas of human relations. In the case of the city of Zaragoza, citizen participation has always been a primordial element when it comes to intervening in the spaces that make up the city, due to the importance of involving all the actors in the decision-making processes. In this sense, involving them can contribute to ensuring that the actions carried out correspond to the real needs of the citizens.

The strategic vision, the legal and regulatory framework and the economic impetus of the administrations are crucial. The local action of city councils such as that of Zaragoza is, on occasions, conditioned by the contexts offered by administrations of different levels, such as the autonomous, national or European ones.

In this sense, the dissemination of the main objectives and actions described in this Climate City Contract is considered part of its own implementation and development process. The communication and citizen participation strategy will adapt its contents according to the target audience, communication channel and objective of each informative action.

Furthermore, it is also essential to disseminate this Climate Contract in detail within Zaragoza City Council, so that all departments seek to align the policies of the different municipal areas.

On the other hand, the complicity of the private sector, organised society and citizens in general is particularly necessary. The key messages and conclusions of this Climate Contract, as well as the climate ambition, must reach all of them in a way that is appropriate to their position and capacity for action in order to ensure effective participation.

In this context, the Action Plan sets as an objective the creation of collaborative platforms conceived as permanent participatory environments for the improvement of actions towards climate neutrality. In general, these collaborative platforms will have the following characteristics:

- **Technical** approach, focused on identifying weaknesses, threats, strengths and opportunities, and taking derived actions.
- **Consultative** approach, aimed at sharing information, opinions and approaches and obtaining feedback.
- **Propositional** Orientation, which includes the definition of concrete actions for the development of the city and allows the birth of concrete projects.
- **Coordinated** management of joint actions that can contribute to the success of the initiatives, allowing the synthesis of proposals.
- **Practical** model, based on simple and flexible tools and simple, predefined and clear consultation and participation cycles.
- **Specialised** organisation by subject area, thus allowing for greater efficiency and depth of discussion.

PART B - Pathways towards Climate Neutrality by 2030

This module represents the core of the Climate Neutral Action Plan 2030, consisting of the essential elements: scenarios, strategic objectives, impacts, action portfolios and indicators for monitoring, evaluation and learning.

MODULE B-2: Climate Neutrality Portfolio Design

B-2.1: Description of action portfolios		
Sector	Portfolio description	
	List of actions	Descriptions
Transport	Reduction in the need for motorised transport	SECAP 2030 includes measure AM12 Curb urban sprawl, which involves a 10% reduction in transport demand. This would avoid emitting 43 kton CO2e and save 174 GWh per year. Regarding BAU 2030, the reduction would need to be increased to 35%, to mitigate 94 kton CO2e per year.
	Bus electrification	The Zaragoza SUMP proposes measures that would reduce 186 kton CO2e and save 120 GWh annually. Based on the SUMP, the SECAP 2030 includes measure AM13 'Low Emission and Electric Mobility Plan'. In terms of the Economic Model, it is required: - Electrify 32% of the passenger vehicle fleet by 2040 to mitigate 21 kton CO2e. - Electrify 100% of the public transport vehicle fleet by 2030 to mitigate 21 kton CO2e. - Electrify 15% of <3.5 ton trucks by 2040 to mitigate 21 kton CO2e and electrify 40% of >3.5 ton trucks by 2040 to mitigate 21 kton CO2e
	Car electrification	
	Electrification of trucks	
	Modal shift: shift to public and non-motorised transport	The Zaragoza SUMP proposes measures that would reduce 186 kton CO2e and save 120 GWh annually. Based on the SUMP, the SECAP 2030 includes measures AM14 'Develop mobility actions aimed at improving citizens' health'; AM15 'Promote intermodality between modes of transport' and AM16 'Ensure accessibility to all mobility spaces and services'.
	Shared transport	

		In terms of the Economic Model, it is required: - achieve a modal shift to a 30% reduction in private vehicle passenger-km to mitigate 35 kton CO2e per year. - Increase transport efficiency by 15% with car sharing measures, this will mitigate 16 kton CO2e per year.
	Optimisation of freight transport logistics	The Zaragoza SUMP proposes measures that would reduce 186 kton CO2e and save 120 GWh annually. In urban logistics, a 10% reduction in travel distance through route optimisation is required to contribute to a mitigation of 63 kton CO2e compared to BAU 2030.
Buildings and Heating	Building renovations	In line with measures AM1 and AM2 of the SECAP 2030 relating to the renovation of housing with energy efficiency criteria and use of renewable energies. Regarding BAU 2030, the economic model requires increasing the annual building renovation rate from 1% to 4% (of the existing building stock).
	New near-zero energy buildings	Measure that does not exist in the SECAP 2030. Regarding BAU 2030, the economic model requires 80% of new buildings to be constructed according to the highest energy efficiency standards.
	Efficient lighting and appliances	Within the SECAP 2030, for municipal buildings and public lighting, measure AM6 (Strategy 2020 - (block I): optimisation of contracts and improvement of supply conditions) and measure AM7 (Strategy 2020 - (block II): energy savings, reduction of consumption and improvement of energy efficiency of electrical equipment) are considered. With regard to BAU 2030, 100% of luminaires are required to be retrofitted between 2020 and 2030, in order to improve their efficiency by 40%.
	Low-emission heat generation (decarbonisation of heating)	The SECAP 2030 includes the measures AM5 (Promotion of thermal generation systems using renewable sources in housing), AM9 (Installation of thermal generation systems using renewable sources in municipal buildings) and AM11 (Promotion of thermal generation systems using renewable sources in the tertiary sector). Regarding BAU 2030, 67% of local heating is required to be produced with electricity.
Electricity	Low-emission electricity generation	SECAP 2030 includes measures AM4 (Promotion of renewable electricity generation systems in housing), AM8 (Installation of renewable electricity generation systems in municipal buildings) and AM10 (Promotion of renewable electricity generation systems in the tertiary sector).

		In order to match the renewable electricity production levels of the PNIEC 2030, the SECAP includes measure AM3 "Promotion of the purchase of energy with Renewable Energy Certificates". In addition, the ECAZ 3.0 contains measure 27 "Promotion of renewable electricity generation systems in the industrial sector". With regard to BAU 2030, 85% of current electricity production from fossil sources is required to be replaced by renewable energies.
Waste	Waste recycling	ECAZ 3.0 includes measures 30 "Reducing food waste"; 31 "Collection, reuse and recycling of clothing"; 32 "Collection and reuse of electrical and electronic equipment"; and 33 "Use of organic waste for energy production and/or composting". Regarding BAU 2030, the EMCD requires a reduction of 10 kton CO2e due to waste recycling.
Other	Renaturalisation	

B-2.2: Individual action outlines		
Action plan	Action name	PILLAR 1: SUSTAINABLE AND SMART MOBILITY Reduction in the need for motorised transport
	Action type	Technical interventions
	Action Description	SECAP 2030 includes measure AM12 Curb urban sprawl, which involves a 10% reduction in transport demand. This would avoid emitting 43 kton CO2e and save 174 GWh per year. Regarding BAU 2030, the reduction would need to be increased to 35%, to mitigate 94 kton CO2e per year. For the management and optimisation of urban transport, Zaragoza is working on: - DiTRA (Digitalisation of urban traffic and reduction of its emissions) project based on a digital system for the control, management and reduction of real road traffic emissions.
Reference to impact pathway	Field of action	Reduction in the need for motorised transport
	Systemic lever	Technology / Infrastructure; Financing; Learning and Skills
	Short and medium-term changes	Articulate all the necessary infrastructure: green ring, cycle lanes, electric fleets, vehicle chargers, tram, etc., Generalise the availability of sustainable alternatives in a multimodal transport system, Adoption of new digital and mobility optimisation solutions.

Implementation	Responsible bodies/person for implementation	Urban Mobility Service.
	Action scale & addressed entities	Municipal
	Involved stakeholders	National government or agencies; Sub-national governments or agencies; Business and private sector; NGOs and civil society.
	Comments on implementation	-
Impacts & costs	Generated renewable energy (if applicable)	
	Removed/substituted energy, volume or fuel type	Included in SECAP 2030: 174 GWh/year
	GHG emissions reduction estimate (total) per emission source sector	Included in SECAP 2030: 43 tonnes GHG/year. Result of the EMCD: 94 kton CO2e / year
	Total costs and costs by CO2e unit	

B-2.2: Individual Action Schemes		
Action plan	Action name	PILLAR 1: SUSTAINABLE AND SMART MOBILITY Vehicle electrification
	Action type	Technical interventions
	Action Description	The Zaragoza SUMP proposes measures that would reduce 186 kton CO2e and save 120 GWh annually. Based on the SUMP, the SECAP 2030 includes measure AM13 'Low Emission and Electric Mobility Plan'. In terms of the Economic Model, it is required: - Electrify 32% of the passenger vehicle fleet by 2040 to mitigate 21 kton CO2e. - Electrify 100% of the public transport vehicle fleet by 2030 to mitigate 21 kton CO2e. - Electrify 15% of <3.5 ton trucks by 2040 to and electrify 40% of >3.5 ton trucks by 2040 to mitigate 21 kton CO2e. Among the initiatives underway, the following stand out: - Electrification of the city bus fleet: The city is currently planning to acquire 202 electric buses by 2030. Installation of e-Bus charging infrastructure in Zaragoza's city bus depots: supply electricity to 260 100 kW chargers, one 300 kW emergency charger for electric buses in the depots, including SET and line. First phase: 75 100 kW chargers, one 300 kW emergency charger. Electrification of urban transport: 39,199,212 euros. Adaptation of depots: 10,387,721.14. In a 2030 neutrality scenario, 100% of the fleet would need to be electrified. - In parallel, work is underway to promote the transformation of the taxi fleet to Electric Vehicles. The implementation of support for the electric and accessible transformation of taxi services (10% every two years until reaching 50% in 2030): The annual investment in this aspect is €200,000 for the renewal of the fleet to electric, with a contribution per vehicle of €10,000. With this budget availability, it will be possible to promote the changeover of 20 taxis per year. Taking into account that the taxi fleet exceeds 1,700 taxis, it is not possible that by 2030, with this investment, electric taxis will have been incorporated into the fleet. In the same way, €110,000 is invested every year for the incorporation of accessible and electric vehicles into the taxi fleet, which, in the case of acquiring a vehicle that fulfils both conditions, the aid amounts to €20,000 per vehicle. - In collaboration with CTAZ, the tender and subsequent management of the new transport service to Zaragoza airport is planned, consisting of an on-demand line, depending on the flights that are programmed and which will be provided with electric or fuel cell buses.

		- Finally, the capacity of tram L1 will be increased with the purchase of two new tram units, which will improve the frequency at peak times, reducing the current 5-minute frequency and increasing the line's transport capacity by up to 20%. Purchase price of the two tram units: €9,312,131 (excluding VAT). -- network of charging points to be put into operation consists of 37 locations spread across the city, including 89 semi-fast 22 kW chargers, 30 fast 50 kW chargers and 24 ultra-fast 150 kW chargers to be installed by 2023. - concession of space in on-street car parks for the installation of photovoltaic generation plants. The proposal is to install 3.4 MW in total, with an approximate investment by the concessionaires of around 3.5 million euros. As this is a concession, the City Council has no expenditure, but it does have income.
Reference to impact pathway	Field of action	Bus electrification Car electrification Electrification of trucks
	Systemic lever	Technology / Infrastructure; Financing; Learning and Skills
	Short and medium-term changes	Electrification of public transport, Generalising the availability of sustainable alternatives in a multimodal transport system, Introducing the right incentives to boost the mobility transition, Financial support for the purchase of electric taxis.
Implementation	Responsible bodies/person for implementation	Urban Mobility Service.
	Action scale & addressed entities	Municipal
	Involved stakeholders	National government or agencies; Sub-national governments or agencies; Business and private sector
	Comments on implementation	If the cost is calculated at 2022 purchase prices for the 189 buses (185 to be renewed between now and 2030 and the 4 already in the fleet), the amount amounts to 111 million euros. If the objective is to renew the entire fleet by 2030, the cost would double, i.e. an estimated amount, at 2022 prices, of 220 million euros, to which should be added the cost of electrifying the depots for the entire fleet, which could amount to a total of 40 million euros. In terms of items implemented in 2002 for decarbonisation: 5.5 million euros of municipal contribution to the share capital of the SEM for the purchase of the two new tram units. 7.6 million for electrification of city bus depots.
Impacts & costs	Generated renewable energy (if applicable)	
	Removed/substituted energy, volume or fuel type	The Zaragoza SUMP proposes measures that would save 120 GWh per year (total SUMP contribution, not only electrification).

	GHG emissions reduction estimate (total) per emission source sector	The Zaragoza SUMP proposes measures that would reduce 186 kton CO2e per year (total SUMP contribution, not only electrification). In terms of the Economic Model, it is required: - Electrify 32% of the passenger vehicle fleet by 2040 to mitigate 21 kton CO2e. - Electrify 100% of the public transport vehicle fleet by 2030 to mitigate 21 kton CO2e. - Electrify 15% of <3.5 ton trucks by 2040 to and electrify 40% of >3.5 ton trucks by 2040 to mitigate 21 kton CO2e.
	Total costs and costs by CO2e unit	

B-2.2: Individual Action Schemes		
Action plan	Action name	PILLAR 1: SUSTAINABLE AND SMART MOBILITY Modal shift and car sharing
	Action type	
	Action Description	The Zaragoza SUMP proposes measures that would reduce 186 kton CO2e and save 120 GWh annually. Based on the SUMP, the SECAP 2030 includes measures AM14 'Develop mobility actions aimed at improving citizens' health'; AM15 'Promote intermodality between modes of transport' and AM16 'Ensure accessibility to all mobility spaces and services'. In terms of the Economic Model, it is required: - achieve a modal shift to a 30% reduction in private vehicle passenger-km to mitigate 35 kton CO2e per year. - Increase transport efficiency by 15% with car sharing measures, this will mitigate 16 kton CO2e per year. Zaragoza is constantly extending its pedestrian and cycling infrastructure. Currently, the following are being implemented: - Bicycle lanes of Pablo Ruiz Picasso, Fray José Casanova, Almozara, Duquesa Villahermosa, Pedro III, Cesáreo Alierta and those that will connect with different industrial estates. - The development of Plaza Salamero and its surroundings, as well as the connections with the underground car park. In addition, the construction of cycle lanes and metropolitan transport interchange areas in Zaragoza is planned. In line with the city's desire to expand the cycling infrastructure, it is collaborating with the Zaragoza Area Transport Consortium to obtain a European subsidy for the construction of several cycle lanes. Actions will also be developed to improve the connectivity of urban and metropolitan public transport in the municipality of Zaragoza. The length of all these lanes amounts to 35.5 km. Also, a new public bicycle concession with station is being worked on. New public bicycle contract with station. The city will incorporate 218 stations and 2180 electric bicycles. Proposal to the second MITMA 2022 call for proposals. Investment required: €7,303,242.820 excluding VAT. 90% requested, i.e. €6,572,918.54. In case of being granted, the City Council will have to assume with its own funds 730,324.28 € plus VAT. For the management and optimisation of urban transport, Zaragoza is working on: - MaaS (Mobility as a Service) platform. To promote the use of public transport. Investment through CTAZ (including Apps and validators).

Reference to impact pathway	Field of action	Modal shift: shift to public and non-motorised transport Shared transport
	Systemic lever	Technology / Infrastructure; Financing; Learning and skills
	Short and medium-term changes	Articulate all the necessary infrastructure: green ring, cycle lanes, electric fleets, vehicle chargers, tram, etc., Generalise the availability of sustainable alternatives in a multimodal transport system.
Implementation	Responsible bodies/person for implementation	Urban Mobility Service.
	Action scale & addressed entities	Municipal
	Involved stakeholders	National government or agencies; sub-national governments or agencies; business and the private sector; NGOs and civil society
	Comments on implementation	In terms of items implemented in 2002 for decarbonisation: • 200,000 for the adaptation of the cycling network.
Impacts & costs	Generated renewable energy (if applicable)	
	Removed/substituted energy, volume or fuel type	The Zaragoza SUMP proposes measures that would save 120 GWh per year (total SUMP contribution, not just modal shift).
	GHG emissions reduction estimate (total) per emission source sector	The Zaragoza SUMP proposes measures that would reduce 186 kton CO_{2e} per year (Total contribution of the SUMP, not only by modal shift). In terms of the Economic Model, it is required: - Modal shift: 35 kton CO_{2e} per year. - Carpooling: 16 kton CO_{2e} per year.
	Total costs and costs by CO2e unit	

B-2.2: Individual Action Schemes		
Action plan	Action name	PILLAR 1: SUSTAINABLE AND SMART MOBILITY Optimisation of freight transport logistics
	Action type	
	Action Description	The Zaragoza SUMP proposes measures that would reduce 186 kton CO2e and save 120 GWh annually. In urban logistics, a 10% reduction in travel distance through route optimisation is required to contribute to a mitigation of 63 kton CO2e compared to BAU 2030.

		Among the strategies underway: - Regulated parking, ZBE, APR access control and loading and unloading control. The regulated parking concession consists of the concessionaire implementing regulated parking in different areas of the city. In this case, reaching some 25,000 spaces. This discourages the use of private vehicles. This concession will include the management system for the implementation of the ZBE. It will also control access to restricted streets in the historic centre and the management of loading and unloading, which will result in a better urban distribution of goods. The investment over the 10 years is around 15 million euros. The city council does not spend and collect the fee offered by the concessionaire.
Reference to impact pathway	Field of action	Optimisation of freight transport logistics
	Systemic lever	
	Short and medium-term changes	Adoption of new digital and mobility optimisation solutions.
Implementation	Responsible bodies/person for implementation	Urban Mobility Service, logistics companies.
	Action scale & addressed entities	Municipal
	Involved stakeholders	National government or agencies; sub-national governments or agencies; business and the private sector; NGOs and civil society
	Comments on implementation	-
Impacts & costs	Generated renewable energy (if applicable)	
	Removed/substituted energy, volume or fuel type	
	GHG emissions reduction estimate (total) per emission source sector	63 kton CO2e/year
	Total costs and costs by CO2e unit	

B-2.2: Individual Action Schemes

Action plan	Action name	PILLAR 2: ENERGY AND EFFICIENCY New near-zero energy buildings
	Action type	Technical interventions

	Action Description	Measure that does not exist in the SECAP 2030. Regarding BAU 2030, the economic model requires 80% of new buildings to be constructed according to the highest energy efficiency standards.
Reference to impact pathway	Field of action	New near-zero energy buildings
	Systemic lever	Technology / Infrastructure; Governance and policy; Social innovation; Democracy and participation; Finance; Learning and skills; Democracy and participation.
	Short and medium-term changes	Optimisation of energy consumption; Implementation of mechanisms to save energy, avoiding losses; Fight against energy poverty with the incorporation of vulnerable participants free of charge.
Implementation	Responsible bodies/person for implementation	City Council, companies.
	Action scale & addressed entities	Neighbourhood / Urban Scale.
	Involved stakeholders	Business and the private sector; NGOs, civil society
	Comments on implementation	
Impacts & costs	Generated renewable energy (if applicable)	-
	Removed/substituted energy, volume or fuel type	-
	GHG emissions reduction estimate (total) per emission source sector	Included in SECAP 2030: - Result of the EMCD: 32 kton CO2e / year
	Total costs and costs by CO2e unit	

B-2.2: Individual Action Schemes

Action plan	Action name	PILLAR 2: ENERGY AND EFFICIENCY Efficient lighting and appliances
	Action type	Technical interventions
	Action Description	Within the SECAP 2030, for municipal buildings and public lighting, measure AM6 (Strategy 2020 - (block I): optimisation of contracts and improvement of supply conditions) and measure AM7 (Strategy 2020 - (block II): energy savings, reduction of consumption and improvement of energy efficiency of electrical equipment) are considered.

		With regard to BAU 2030, 100% of luminaires are required to be retrofitted between 2020 and 2030, in order to improve their efficiency by 40%. Among the projects underway by the City Council, the renovation of the lighting on the Integrated Path stands out: - Condes de Aragón: 110 12 m columns with 136 luminaires. 144 poles and columns of various heights (from 10 to 4 m), with 292 LED luminaires Energy savings of up to 60% in consumption and 50% in installed power. - Strategic city scale: under study - PPA: bilateral 100% renewable energy contracting or Power Purchase Agreement
Reference to impact pathway	Field of action	Efficient lighting and appliances
	Systemic lever	Technology / Infrastructure; Financing
	Short and medium-term changes	Implementation of mechanisms to save energy, avoiding losses. Efficient and solidarity-based use of available energy sources. Fight against energy poverty by incorporating vulnerable participants free of charge. Municipal aid for housing rehabilitation.
Implementation	Responsible bodies/person for implementation	Zaragoza Housing Town planning
	Action scale & addressed entities	Urban scale
	Involved stakeholders	Government or national agencies; citizenship
	Comments on implementation	-
Impacts & costs	Generated renewable energy (if applicable)	
	Removed/substituted energy, volume or fuel type	
	GHG emissions reduction estimate (total) per emission source sector	Included in SECAP 2030: 32 kton CO2e / year ME result:48 kton CO2e / year
	Total costs and costs by CO2e unit	

B-2.2: Individual Action Schemes		
Action plan	Action name	PILLAR 2: ENERGY AND EFFICIENCY Low-emission heat generation (decarbonisation of heating)

	Action type	Technical interventions
	Action Description	The SECAP 2030 includes measures AM5 (Promotion of thermal generation systems using renewable sources in housing), AM9 (Installation of thermal generation systems using renewable sources in municipal buildings) and AM11 (Promotion of thermal generation systems using renewable sources in the tertiary sector). Mitigation of 27.7 kton CO2eq and 137 GWH/year is estimated. Regarding BAU 2030, 67% of local heating is required to be produced with electricity. This would mean a total mitigation of 631 kton CO2eq. Among the unique projects that Zaragoza City Council is carrying out, several actions stand out: - The implementation of the first positive neighbourhood including different types of residential and educational buildings (NEUTRALPATH project) and a district heating with hydrothermal heating that will allow the removal of individual gas from residential buildings and the use of photovoltaic renewable energies placed on the roofs of the buildings.
Reference to impact pathway	Field of action	Low-emission heat generation (decarbonisation of heating)
	Systemic lever	Technology / Infrastructure; Governance and policy; Social innovation; Democracy and participation; Finance; Learning and skills; Democracy and participation.
	Short and medium-term changes	Install local renewable energy generation infrastructure. Promotion of the creation of local energy communities through the legal instrument of collective self-consumption. Implementation of mechanisms to save energy, avoiding losses. Efficient and solidarity-based use of available energy sources. Fight against energy poverty by incorporating vulnerable participants free of charge.
Implementation	Responsible bodies/person for implementation	City Council, companies.
	Action scale & addressed entities	Neighbourhood / Urban Scale.
	Involved stakeholders	Business and the private sector; NGOs, civil society
	Comments on implementation	
Impacts & costs	Generated renewable energy (if applicable)	Included in SECAP 2030: 137 GWh/year produced locally.
	Removed/substituted energy, volume or fuel type	

	GHG emissions reduction estimate (total) per emission source sector	Included in SECAP 2030: 27.7 kton CO2e / year Result of the EMCD: 631 kton CO2e / year
	Total costs and costs by CO2e unit	

B-2.2: Individual Action Schemes		
Action plan	Action name	PILLAR 2: ENERGY AND EFFICIENCY Low-emission electricity generation
	Action type	Technical interventions
	Action Description	The SECAP 2030 includes measures AM4 (Promotion of electricity generation systems using renewable sources in housing), AM8 (Installation of electricity generation systems using renewable sources in municipal buildings) and AM10 (Promotion of electricity generation systems using renewable sources in the tertiary sector). A mitigation of 6.8 kton CO2e/year and a production of 74 GWh/year is estimated. To match the levels of renewable electricity production of the PNIEC 2030, the SECAP includes the measure AM3 "Promotion of the purchase of energy with Renewable Origin Certificates" which implies a mitigation of 120 kton CO2e/year. In addition, the ECAZ 3.0 contains measure 27 "Promotion of renewable electricity generation systems in the industrial sector". A mitigation of 45.5 kton CO2e/year is estimated. Regarding BAU 2030, 85% of the current electricity production from fossil sources is required to be replaced by renewable energies. This is a total required mitigation of 411 kton CO2e/year. Among the projects being developed by Zaragoza City Council, the following stand out: - Barrios Solares Zaragoza: This is a renewable energy project based on solidarity and proximity. It includes the promotion of photovoltaic installations placed in a municipal space for collective self-consumption using the grid and in which neighbours and businesses can participate if they are located within the criteria established by RD 244, including being located within a radius of 500m. 7 Solar Neighbourhoods planned. Creation of a "Solar Neighbourhood" Office to raise awareness, inform and advise residents on energy issues: energy rehabilitation of homes, self-consumption, efficient habits and contract optimisation. 280 k€ per installation. 2 M€ for 7 installations. First Barrio Solar

		Actur pilot; production 150 MWh per year. - Production in municipal buildings: Zaragoza City Council has a pre-feasibility study of solar capacity for the installation of photovoltaic energy for self-consumption in municipal buildings. The city has a usable surface area of 214,571 m2 which would allow it to produce 28270 MWH per year. - Solar energy community in MERCAZARAGOZA: The objective of the project is the implementation of a 1 MW photovoltaic installation in Zaragoza, which will be exploited by the MERCAENERGY, S. COOP. energy community and will make direct beneficiaries of this action, both at the energy, social and economic level, to the actors located in the same cadastral reference within the industrial estate.
Reference to impact pathway	Field of action	Low-emission electricity generation
	Systemic lever	Technology / Infrastructure; Governance and Policy; Social Innovation; Democracy and Participation; Finance; Learning and Skills; Democracy and Participation.
	Short and medium-term changes	Installing local renewable energy generation infrastructure; Encouraging the creation of local energy communities through the legal instrument of collective self-consumption; Implementing mechanisms to save energy, avoiding losses; Efficient and solidarity-based use of available energy sources; Fighting energy poverty by incorporating vulnerable participants free of charge; Creating a "Barrio Solar" office to raise awareness, inform and advise neighbours on energy issues; Creating a "Barrio Solar" office to raise awareness, inform and advise neighbours on energy issues.
Implementation	Responsible bodies/person for implementation	Solar neighbourhoods: EDP Solar, Zaragoza City Council and ECODES will form a consortium or similar legal entity to enable public-private collaboration and the constitution of an energy community. Others: City Council, companies.
	Action scale & addressed entities	Neighbourhood / urban scale.
	Involved stakeholders	Business and private sector; NGOs, civil society.
	Comments on implementation	First pilot pilot Barrio Solar Actur: is the first renewable and solidarity-based solar neighbourhood in Spain, with a PV installation for shared self-consumption in residential buildings. Neighbours and businesses within 500 m of the installation participate and benefit from energy savings of around 30% on their bills.
Impacts & costs	Generated renewable energy (if applicable)	Included in SECAP 2030: 74 GWh/year produced locally.
	Removed/substituted energy, volume or fuel type	

	GHG emissions reduction estimate (total) per emission source sector	Included in SECAP 2030: 126.8 kton CO2e / year From ECAZ 3.0: 45.5 kton CO2e / year Result of the EMCD: 411 kton CO2e / year
	Total costs and costs by CO2e unit	

B-2.2: Individual Action Schemes		
Action plan	Action name	PILLAR 3: RENATURALISATION AND CIRCULAR ECONOMY Waste recycling
	Action type	Technical interventions
	Action Description	ECAZ 3.0 includes measures 30 "Reducing food waste"; 31 "Collection, reuse and recycling of clothing"; 32 "Collection and reuse of electrical and electronic equipment"; and 33 "Use of organic waste for energy production and/or composting". Regarding BAU 2030, the EMCD requires a reduction of 10 kton CO2e due to waste recycling. Among the projects underway, the following stand out: - Circular Biocarbon: This is a circular economy project that will build and operate Europe's first commercial industrial scale Municipal Solid Waste (MSW) biorefinery. The mission is to achieve a sustainable bioeconomy and optimise the management of solid urban waste and wastewater treatment plant (WWTP) sludge, which become resources, obtaining high added-value end products from them. Some of the final products that can be obtained thanks to the valorisation of this waste will be: coated tools and mechanical moving parts with greater durability, night vision cameras, 5G technology telecommunications devices, biodegradable and compostable bags for waste collection, biodegradable mulching films for soil, biostimulants based on microalgae with fertilising properties, or tailor-made biofertilisers. This circular economy initiative is a milestone for the whole of Europe, both in terms of its scale of implementation (industrial level) and its replicability. It will also be connected to other initiatives in the city, such as the Bosque de los Zaragozanos, which will benefit from the waste treated in this project. - Biowaste treatment CTRUZ and REDOL project: Subsidies for the promotion of the circular economy through actions in the prevention and management of household waste, within the framework of the PRTR. Actions for the implementation and improvement of the separate collection of bio-waste destined for

		the Zaragoza urban waste treatment complex (CTRUZ). Line 1: Actions for the Implementation and Improvement of the Separate Collection of Bio-waste destined for the Zaragoza Urban Waste Treatment Complex (CTRUZ). Budget: 2,708,591€. Line 2: Actions for the Separation and Recycling at Source of Biowaste by means of domestic and community composting in the Zaragoza Metropolitan Area. Budget: 296,750€. Line 3: Construction and Improvement Actions in the Complex. Budget: 6,507,639.99€. Line 4: Acquisition of Mobile Clean Point. Budget: 150.000€.
Reference to impact pathway	Field of action	Waste recycling
	Systemic lever	Technology / Infrastructure; Social innovation
	Short and medium-term changes	
Implementation	Responsible bodies/person for implementation	Public Services Zaragoza City Council Circular Biocarbon: Urbaser
	Action scale & addressed entities	Urban scale
	Involved stakeholders	Business and private sector
	Comments on implementation	The biorefinery will begin construction in 2022 on the premises of Urbaser's "Alfonso Maíllo" R&D&I Centre and the Zaragoza Urban Waste Treatment Complex (CTRUZ) in the Recycling Technology Park (PTR). The project will have a duration of 5 years and an overall budget of ¤23 million, of which the European Commission will finance a total of ¤15 million in the form of a grant.
Impacts & costs	Generated renewable energy (if applicable)	
	Removed/substituted energy, volume or fuel type	
	GHG emissions reduction estimate (total) per emission source sector	From ECAZ 3.0: 340 kton CO2e / year Result of the EMCD: 10 kton CO2e / year
	Total costs and costs by CO2e unit	

B-2.3: Summary strategy for residual emissions

PILLAR 3: RENATURALISATION AND CIRCULAR ECONOMY

The City Council is going to develop a plan to geolocate the city's green areas and forest and tree stands. The purpose of this plan is to be able to measure, with the help of satellite images, their capacity as CO_2 sinks. In this way, it will be possible to plan the necessary expansion of these green areas with the aim of achieving a 5 to 7% reduction in the total emissions generated in the city of Zaragoza.

To this end, the use of state-of-the-art technologies is proposed for use as an analytical basis for the construction, development and monitoring of ecosystem indicators, including carbon sequestration capacity (e.g. analysis and interpretation of multi-spectral satellite images of very high spatial resolution for use as an analytical basis) as well as scientific research to facilitate the valuation of ecosystem services of vegetation.

The possibility of immediate use of high-precision satellite technology is integrated as a possibility for the automatic preparation of inventories of species and elements associated with green areas, as well as in the construction of terrestrial observation indices (aligned with the European project USAGE - Urban Data Space for Green Deal) for the evaluation of the health of the vegetative state in the municipality, as well as the characterisation of urban heat island phenomena (these will be identified as areas of preferential action).

Bosque de los Zaragozanos: with the general objective of planting 700,000 trees and bushes by 2030, generating one of the most important carbon sinks at a local level through a collaborative project involving companies, organisations, schools, associations and citizens, greening and connecting the city and its territory.
Three types of forest will be used: Mediterranean, riverside and urban. Campaign 2021-2022 completed. A total of 52,214 plants planted on 65.6 hectares. Areas intervened: Monte de Peñaflor, Monte La Plana, Ribera del Río Gallego, Parque del Agua, Campos del Canal and other urban areas of opportunity.

Recovery of the urban section of the river Huerva: The project envisages the ecological, urban and landscape development of the river Huerva from the Fuente de La Junquera and the mouth of the river Ebro, and with greater intensity between the Blasco del Cacho bridge and the Emperador Augusto bridge, the latter section being where the actions will be most effective, seeking to improve the ecological state of the river system and restore the identity of the river Huerva as the backbone of the city. The objectives pursued are:
- Ecologisation-renaturalisation: Environmental action that respects and enhances the environmental and ecological value of the river Huerva as a green space within the city. Preservation and enhancement of the existing trees and fauna, channelling of spillages, and cleaning of rubble on slopes and riverbed.
- Connectivity: A low-cost, low-impact landscaping project that allows reduced pedestrian accessibility and linear continuity at the three main levels (riverbed, intermediate slopes and upper urban streets), providing areas for urban uses that enhance the relationship and respectful encounter between citizens and the natural ecosystem of the River Huerva.
The fluvial corridor of the river Huerva has to become an axis of mobility, and this more urban objective must become an urban, green and pedestrian street, which must vertebrate the system of free spaces of the city, so that the longitudinal and transversal continuity is fundamental.
- Safe city: Action to guarantee the safe use of this new natural space in the city against vandalism, deterioration and aggression.
- Adaptation to climate change: To be an example of sustainable and ecological action, with criteria for action to curb climate change: porous paving with low emissivity, plantations avoiding the generation of "heat islands".
Estimated costs: 28.4 M €.

Green infrastructure plan: ecosystem services: Green infrastructure management action plan for Zaragoza - Ecosystem benefits: the ecosystem benefits that are currently being generated by the current Green Infrastructure have been assessed through the Baseline project for the city of Zaragoza. Based on these, a system of indicators associated with a spatial geographical representation has been generated, in order to facilitate decision-making when planning public space, specifically for Zaragoza, to measure, evaluate and specify improvement objectives for these benefits. They comprise a total of 26 ecosystemic indicators represented in 150x150 m grids and accompanied by a graphic representation by neighbourhood, in what are called ecosystemic wheels.
It also supports the diagnosis and assessment in the implementation of high definition satellite technology, specifically with the VERSAT project, a project of OHL Servicios Ingesan S.A. for the characterisation, adaptation and implementation of an environment for the analysis and interpretation of multispectral satellite images (16 bands) of very high spatial resolution (15 cm/pixel - 30 cm/px - 50 cm/px) for their complementary use in the construction, elaboration and monitoring of ecosystem indicators.
Other actions programmed as part of the management of the urban green infrastructure: Planting of empty tree pits with tree species to give cohesion and connectivity to the urban green fabric.

MODULE B-3: Indicators for Monitoring, Evaluation and Learning

Selection of indicators taken from the Comprehensive Indicator Sets developed by NetZeroCities. An overview table listing the selected indicators by outcome and impact, including targets and assessment points (B-3.1); and a metadata table for each selected indicator, as specified in the Comprehensive Indicator Sets (B-3.2), is provided.

The following impact pathways come from the Economic Model for Cities' Decarbonisation that the city of Zaragoza has elaborated with the support of the Spanish National Platform of Cities.

B-3.1: Impact pathways

Outcomes/impacts addressed	Actions/project	ID	Indicator name	Target values		
				2025	2027	2030
	Reduction in the need for motorised transport	1	Reduction of private vehicle passenger-km.	5%	20%	35%
	Modal shift: shift to public and non-motorised transport	2	Reduction in private vehicle passenger-km due to modal shift	5%	15%	30%
	Shared transport	3	Increasing transport efficiency through car-sharing measures	2%	10%	15%
	Car electrification	4	Percentage of the car fleet electrified by 2040	2%	10%	32% (2040)
	Bus electrification	5	Percentage of the bus fleet electrified by 2030	30%	60%	100%
	Optimisation of freight transport logistics	6	reduction of travel distance through route optimisation	1%	5%	10%
	Truck electrification (1)	7	Percentage of the Truck fleet <3.5t electrified by 2040	1%	5%	15% (2040)
	Truck electrification (2)	8	Percentage of the truck fleet >3.5t electrified by 2040	1%	5%	40% (2040)
	Building renovations	9	Ratio of renovations per year over all existing buildings.	2%	4%%	4.0%
	New near-zero energy buildings	10	percentage of new buildings constructed to the highest energy efficiency standards	50%	60%	80%
	Efficient lighting and appliances	11	Percentage of luminaires retrofitted between 2020 and 2030 (40% efficiency improvements)	20%	50%	100%

	Low-emission heat generation (decarbonisation of heating)	12	Percentage of electric local heating	10%	30%	67%
	Low-emission electricity generation	13	Percentage of current electricity production from fossil sources is replaced by renewable energies.	10%	30%	85%
	Waste recycling	14	Percentage of collected waste that is recycled.	60%	70%	90%

Indicator metadata will be included in future iterations of this Climate City Contract.

B-3.2: Indicator metadata	
As directed by NetZeroCities, this table will be completed in subsequent iterations of this Climate City Contract.	
Indicator name	
Indicator unit	
Definition	
Calculation method	
Context	
Does the indicator measure direct impacts (i.e. reduction of greenhouse gas emissions)?	[yes/no] [yes/no
If yes, to which area of emission is the co-benefit linked?	Emission domains according to MyCovenant or CDP / ICLEI
Does the indicator measure indirect impacts (i.e. co-benefits)?	[yes/no] [yes/no
If yes, what co-benefit do you measure?	
Can the indicator be used to monitor impact pathways?	[yes/no] [yes/no
If yes, for which impact pathway?	
Is the indicator captured by existing CDP/SCIS/Mayor's Compact platforms?	[yes/no] [yes/no
Additional information	
Planned data source	

Planned availability	
Planned collection interval	
References	
Results describing the indicator	
Other indicator systems using this indicator	

MODULE B-1: Climate Neutrality Scenarios and Impact Pathways

Impact pathways, short- and long-term outcomes and direct and indirect impacts (co-benefits).

<table>
<tr><th colspan="7">B-1.1: Impact pathways</th></tr>
<tr><th>Issuing sector</th><th>Issuing sub-sector</th><th>Systemic levers</th><th>Early changes (1-2 years)</th><th>Late outcomes (3-4 years)
OKR</th><th>Direct impacts (emission reductions) (kton)</th><th>Indirect impacts (co-benefits)</th></tr>
<tr><td rowspan="5">Transport</td><td>Reduction in the need for motorised transport</td><td rowspan="5">Technology / Infrastructure

Funding

Learning and skills</td><td rowspan="5">- Electrification of public transport.
- Articulate all the necessary infrastructure: green ring, cycle lanes, electric fleets, vehicle chargers, tram, etc.
- Generalise the availability of sustainable alternatives in a multimodal transport system.

- Introduce the right incentives to boost the mobility transition.
- Financial aid for the purchase of electric taxis.

-Adoption of new digital and mobility optimisation solutions.</td><td rowspan="5"></td><td>94</td><td rowspan="5">- Improvement of air quality.

- Fair distribution of public space.

- Reduction of accidents.

- Improved health associated with active mobility.

- New economy around electric technologies.</td></tr>
<tr><td>Modal shift: shift to public and non-motorised transport</td><td>35</td></tr>
<tr><td>Shared transport</td><td>16</td></tr>
<tr><td>Car electrification</td><td>21</td></tr>
<tr><td>Bus electrification</td><td>24</td></tr>
</table>

	Optimisation of freight transport logistics			63	
	Electrification of trucks			21	
Buildings and Heating	Building renovations	Technology / Infrastructure Governance and policy Social innovation Democracy and participation Funding Learning and skills	- Install local renewable energy generation infrastructure. - Continue with the energy rehabilitation of buildings and optimisation of energy consumption. - Promotion of the creation of local energy communities through the legal instrument of collective self-consumption. - Implementation of mechanisms to save energy, avoiding losses. - Efficient and supportive use of available energy sources. - Fighting fuel poverty by incorporating vulnerable participants free of charge. - Municipal aid for housing rehabilitation. - Creation of a "Barrio Solar" office to raise awareness, inform and advise neighbours on energy issues.	69	- Greater energy independence. - Jobs associated with the maintenance of distributed infrastructure. - Greater democratisation of the energy sector.
	New near-zero energy buildings			32	
	Efficient lighting and appliances			48	
	Low-emission heat generation (decarbonisation of heating)			631	
Electricity	Low-emission electricity generation			411	
Waste	Waste recycling	Technology / Infrastructure	- Increasing recycling capacity and waste recovery - Promote the circular economy and the greening of urban space.	10	- Reduced water use. -Green job creation.

		Social innovation	- Valorisation of materials resulting from treatment.		Savings in raw materials.
Other	Renaturalisation	Governance and policy Social innovation Democracy and participation Funding	-Achieving territorial balance and urban renewal - A renaturalisation of the city, changing the green management model, greening the city and its territory and connecting the city through nature (Zaragoza Natural). designing and implementing nature-based solutions - Improving citizens' health and increasing biodiversity -Collaborative projects open to citizens, companies, organisations, associations, etc.	-370 (-24 already absorbed by existing urban trees)	- Ecosystem services of green infrastructure - Reduction of heat islands.

B-1.2: Description of impact pathways

The city of Zaragoza has established **3 pillars** to achieve the goal of climate neutrality by 2030. In relation to the results of the Economic Model, each of the pillars is described below:

PILLAR 1: SUSTAINABLE AND SMART MOBILITY

SECTOR: TRANSPORT.

SUBSECTOR: Reduction in the need for motorised transport, Modal shift: shift to public and non-motorised transport, Shared transport, Electrification of cars, Electrification of buses, Optimisation of freight transport logistics and Electrification of trucks.

- Supporting a transition to cleaner, greener and smarter mobility.
- Make all modes of transport more **sustainable**.
- Articulate all the **necessary infrastructure**: green ring, cycle lanes, electric fleets, reserved platform for public transport, electric vehicle chargers, drones, etc.
- Introduce the **right incentives** to boost the mobility transition.
- Generalise the availability of **sustainable alternatives** in a multimodal transport system.

PILLAR 2: ENERGY AND EFFICIENCY

SECTOR: BUILDINGS AND BUILDING SERVICES; ELECTRICITY

SUBSECTOR: Building renovations, Nearly Zero Energy New Buildings, Efficient lighting and appliances, Low emission heat generation (decarbonisation of heating); Low emission power generation

- Generation and use of **renewable energies**.
- Energy refurbishment of buildings and optimisation of energy consumption.
- Implementation of mechanisms to **save energy**, avoiding losses.
- Encouraging the creation of **local energy communities** through the legal instrument of collective self-consumption.
- **Efficient use of** available energy sources.

Pillar 3: RENATURALISATION AND CIRCULAR ECONOMY

SECTOR: WASTE; OTHER

SUBSECTOR: Waste recycling and renaturation.

- Promoting **the circular economy** and the greening of urban space
- A **renaturalisation** of the city, changing the green management model and greening the city and its territory, connecting the city through nature (Zaragoza Natural).
- Designing and implementing nature-based solutions
- Increasing recycling capacity and waste recovery
- Achieving **territorial balance** and urban renewal
- Improving citizens' **health** and increasing **biodiversity**

PART C - Enbling Climate Neutrality by 2030

Outline of any enabling interventions - i.e. in relation to organisational environment or governance models, or social innovations - designed to support and implement the climate action portfolios described in module B-2, as well as to achieve the co-benefits described in the impact pathway (module B-1).

MODULE C-1: Organisational and Governance Innovation Interventions

Summary table indicating organisational and governance actions and describing their impacts (C-1.1). Section for more detailed descriptions and comments (C-1.2).

C.1.1: Organisational and Governance Interventions					
Intervention name	**Description**	**Responsible entity/ dept./ person**	**Involved stakeholder**	**Enabling impact**	**Co-benefits**
#1 DG European Funds	Establishment of the Directorate-General for European Funds as a key integrating and driving element of the Mission.	Directorate-General for European Funds	City Council	Effective leadership and coordination of cross-cutting climate neutrality initiatives	Increasing European funding for projects of local interest and their strategic value.
#2 Open government and data governance	City quality data available for consultation and re-use according to transparency and accessibility criteria.	Zaragoza Open Government	City Council Companies	Digitised administration and new processes for governance, control and quality of sustainability data	Re-use of information by citizens, businesses and other organisations for new business and value-added services.
#3 External Projection	Deployment of strategic plans based on cross-cutting public-	Outreach Office	City Council	Boosting sustainable actions aimed at promoting	Securing sources of funding, which contribute to the

	private coordination.			Zaragoza abroad	present and future development of the city.

C-1.2: Description of organisational and governance interventions

DG European Funds: The Directorate General for European Funds would centralise technical support to the areas of government applying for and managing projects with European funding. It would be a tool for increasing European funding for projects of local interest and their strategic value. Its functions would include the identification of opportunities and strategic advice on fundraising; leadership and coordination of cross-cutting initiatives related to the Mission; advice, support and assistance in the preparation of projects and the submission of applications, management and justification of projects, as well as the coordination of knowledge and dissemination of city projects.

Working and coordination group of the areas of Zaragoza City Council: Internal coordination between the different areas of the City Council related to the areas of the European Mission of cities (Urban Planning, Public Services, Mobility and Infrastructures, Environment, Parks and Gardens, Cleaning and Waste, Citizen Participation and External Projection) that met monthly to monitor the progress of the city's Climate City Contract and provide technical contributions to the particular projects reflected in the Annex of the Action Plan.

Open government and data governance: Zaragoza City Council is currently one of the pioneers in the development of tools so that citizens, social agents and companies can know, explore, use and reuse the data it publishes on the Open Government Platform (GobiernoAbierto.zaragoza.es). It has participated in several leading national and international projects and has been awarded for its work in the field of open data policy. The tools provided to the public by Zaragoza City Council receive thousands of visits and respond to hundreds of queries each year. Among the most outstanding tools are the Catalogue of datasets, the APIs developed to consult different types of information, the visualisation service for data related to public procurement or the IDEZar spatial data portal. In this sense, Zaragoza seeks to provide all the parties involved in the Mission with a catalogue from which they can access the set of open data related to climate neutrality. Through this open data management, and provide a treatment of the information systems that not only generates wealth, but also develops and transmits a series of values such as quality, interoperability, participation, coordination, collaboration, transparency and accessibility. The management of the participatory processes will be carried out through the Idea Zaragoza tool.

Outward projection: The Outward Projection Office aims to make a decisive contribution to the promotion of the city by compiling key signs of identity, past, present and future, identifying its strengths and weaknesses and deploying strategic plans based on transversal public-private coordination, which ensures sources of funding, to contribute to the present and future development of the city of Zaragoza. The objective is to promote actions aimed at the promotion of the city abroad, as well as the elaboration, coordination, development and monitoring of a strategic plan for the promotion of Zaragoza abroad in collaboration with other institutions and entities. This strategy defines among its main vectors urban innovation; culture and heritage; tourism and leisure; education and innovation; and economic and logistical development.

MODULE C-2: Social and other Innovation Interventions

Summary table listing social and other innovation actions and describing their impact (C-2.1). Section for more detailed descriptions and comments (C-2.2).

C.2.1: Social innovation and other interventions					
Intervention name	**Description**	**Responsible entity/ dept./ person**	**Involved stakeholder**	**Enabling impact**	**Co-benefits**
#1 Right to energy	Concrete measures against fuel poverty, including an energy advice point.	Community Social Services Zaragoza Housing	First Attention Programme; Zaragoza Housing; City Council; Citizenship	Citizens' energy advice through audits of habits, installations and characteristics of the home	Increased public awareness and expert advice on energy-saving measures
#2 Zaragoza Activa	Fostering an entrepreneurial, innovative, creative and collaborative ecosystem	ZAC Network City Council	City Council, ZAC companies	Supports initiatives that generate economic activity, including some that promote neutrality.	New initiatives from local companies committed to climate neutrality and awareness raising
#3 Climate empowerment	Social tools: education, communication, awareness-raising, training, capacity building and climate participation	City Council	City Council Technical Office for Participation and Transparency Environment and Sustainability Service European project participants Citizenship	Empower citizens to participate in climate neutral actions.	-Creating and fostering a social culture of climate neutrality Improving socio-environmental (climatic) determinants of health

C-2.2: Description of social innovation interventions

Right to energy and the fight against energy poverty: This is addressed within the First Attention Programme of the Community Social Services of the City Council through specific measures, including: information, guidance and advice on a personalised individual level; group interventions to achieve cost rationalisation; issuing a certificate in special circumstances to obtain a social voucher; collaboration with services and entities that work on this issue, as well as advice on legislative changes and modifications in the sector; processing of emergency aid for electricity and gas debts for households that cannot pay their bills. It includes an Energy Advice Point, which seeks to advise on energy saving and citizens at risk of energy poverty by means of audits of habits, installations and characteristics of the home.

Zaragoza Activa: Public service with the mission of promoting an entrepreneurial, innovative, creative and collaborative ecosystem in Zaragoza, fostering environmental sustainability. Through training, dissemination and networking activities, this dynamic network supports initiatives that generate economic activity, especially those capable of creating employment and a transformative social impact.

Climate empowerment, understood as climate education, awareness raising, capacity building and participation: Action aimed at climate neutrality requires educating, training and engaging all people from different social sectors (from citizenship, to businesses, organisations, governments, and particularly decision-makers) and in different fields (energy saving and efficiency in all sectors, renewable energies, sustainable transport and mobility, healthy and sustainable food, responsible and critical consumption, circular economy, biodiversity and green infrastructure....) to reduce and adapt to the health, environmental, economic and social impacts of the climate crisis and achieve a low-emission, decarbonised, climate-resilient and just future.

To achieve this, climate neutral cities, as Zaragoza intends to do, must use the tools established by the Climate Empowerment Action such as education and communication on the climate crisis, training, public awareness, public participation, public access to information and cooperation between them on these elements. In this regard, municipal management plans, programmes and actions related to climate neutrality:

- incorporate clear and accessible information on the causes, consequences, solutions and possible actions and commitments for the visualisation and reduction of energy consumption and greenhouse gas emissions in everyday actions, promoting energy savings and efficiency.
- develop educational instruments, programmes and actions for different social sectors and educational levels, as well as communication, awareness-raising and sensitisation campaigns, programmes and tools.
- implement training tools that train different professional sectors with practical climate-neutral skills and competences;
- allow for participation in decision-making, through the legal instruments provided, involvement in the elaboration of plans and programmes, practical and concrete actions in which to involve citizens
- establish synergies and cooperation links with other climate-neutral cities for common learning and exchange of best practices and experiences.

In short, the aim is to extend and reinforce sustainable and low-carbon lifestyles to all citizens and social sectors, which are facilitated and reinforced by strong public policies that facilitate and serve as a context, framework for action and positive reinforcement of citizen action for climate neutrality.

MODULE C-3: Financing of Action Portfolio (*Economic Case*)

The following costs come from the Economic Model for Cities' Decarbonisation that the city of Zaragoza has elaborated with the support of the Spanish National Platform of Cities.

C-3.1: Summary of interventions with cost implication								
Issuing sub-sector	**Sub-sector number**	**Person and entity responsible**	**Start and end date**	**Issuing sector**	**Impact**			**Estimated total cost (MEUR - NPV 2020-2030)**
					GHG reduction (kton CO2e)	Operational cost savings (MEUR - NPV 2020-2050)	co-benefits (MEUR - NPV 2020-2050)	
(list the actions in your portfolio of transformative projects in modules B-2, C-1 and C-2)	Assumptions 2030	(indicate the entity and person responsible)	(indicate the start and end date of the activity)	(indicate the area to which the action belongs)	(indicate the impact of the action, e.g. GHG reduction/co-benefits)			(Indicate the total estimated cost of the action in €)
Reduction in the need for motorised transport	35%	reduction	2020-2030	Transport	94	€ 1,179	€ 256	€ -

Modal shift: shift to public and non-motorised transport	30%	reduction in private vehicle passenger-km		2020-2030	Transport	35	€ 148	€ 460	€ (120)
Shared transport	15%	due to increased transport efficiency		2020-2030	Transport	16	€ 227	€ 60	€ -
Car electrification	32%	of the electrified fleet by 2040		2020-2040	Transport	21	€ 18	€ 4	€(37)
Bus electrification	100%	of the electrified fleet		2020-2030	Transport	24	€ 31	€ 18	€(35)
Optimisation of freight transport logistics	10%	reduction of travel distance through route optimisation		2020-2030	Transport	63	€ 632	€ 140	€ -
Electrification of trucks	15%	Trucks <3.5 t to 2040		2020-2030	Transport	21	€ (13)	€ 33	€ (293)
	40%	Trucks >3.5 t to 2040		2020-2031	Transport				
Building renovations	4.0%	of all existing buildings / year		2020-2030	Buildings and heating	69	€ 732	€ 20	€ (1,170)
New near-zero energy buildings	80%	percentage of new buildings constructed to the highest energy efficiency standards		2020-2030	Buildings and heating	32	€ 375	€ 10	€ (113)
Efficient lighting and appliances	100%	of luminaires retrofitted between 2020 and 2030 (40% efficiency improvements)		2020-2030	Buildings and heating	48	€ 618	€ 20	€ (457)
Low-emission heat generation (decarbonisation of heating)	67%	Percentage of electric local heating		2020-2030	Buildings and heating	631	€ 703	€ 78	€ (1,465)

Low-emission electricity generation	85%	Part of the current electricity production from fossil sources is replaced by renewable energies.		2020-2030	Electric	411	€ 474	€ -	€ (234)
Waste recycling				2020-2030	Waste	10	€ 2	€ -	€ (1)
Total						1475	€ 5,127	€ 1,097	€ (3,925)

OUTLOOK AND NEXT STEPS

The Climate City Contracts, as part of an iterative process of continuous improvement, will be reviewed within the next 2 years.

Subsequent iterations will develop in greater detail the projects that the city will carry out to meet its climate neutrality target by 2030. Specifically, it will include projects that have been awarded in the framework of national calls such as those related to the Recovery, Transformation and Resilience Plan, European calls such as Horizon Europe or INTERREG projects, as well as private initiatives that are carried out by the actors present in the business fabric of the municipality.

The following are the next steps and plans in the process of reviewing and improving the Action Plan as part of the city's Climate City Contract.

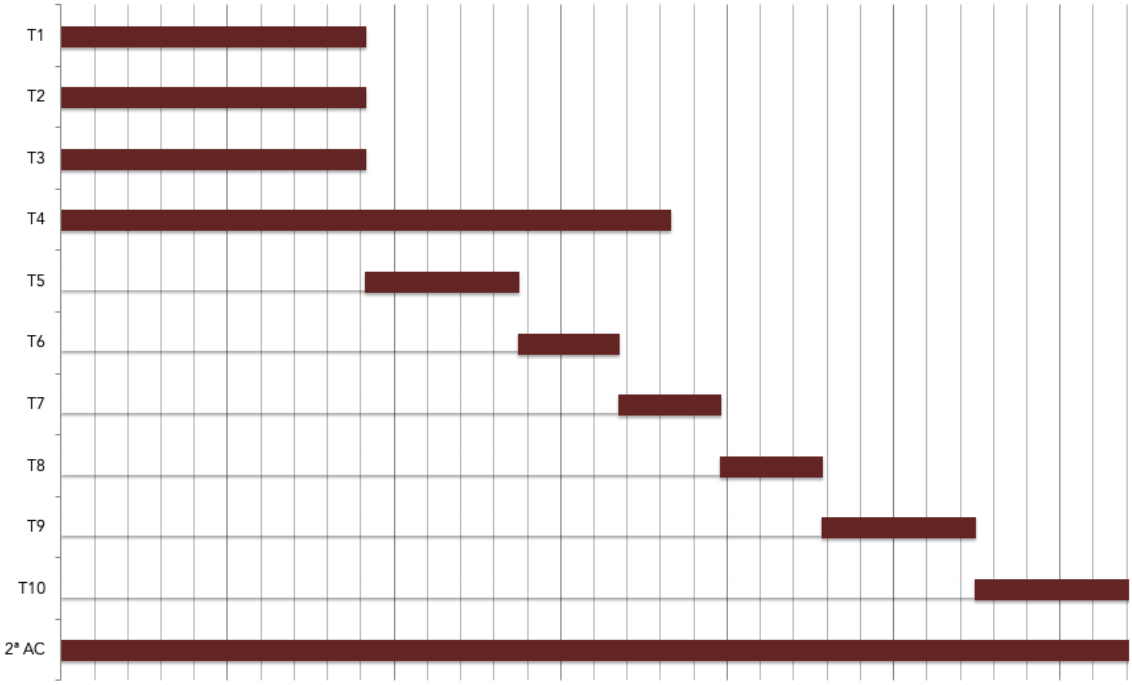
1. **Improving and expanding the Economic Model**: This refers to the review and adjustment of the current economic model with the aim of broadening its scope and refining its analysis so that it reflects even more accurately the ambition of the climate action plan and the associated capital and investment needs.
2. **Specification of the initiatives and projects included in the Action Plan**: This involves identifying and defining in detail the different actions, initiatives and projects that form part of the Action Plan, with the aim of ensuring their financing and adequate implementation.
3. **Broaden interdepartmental collaboration to advance the implementation of the Climate Investment Plan**: This refers to the need to promote greater collaboration between the different departments and work areas involved in the implementation of the Climate Investment Plan, in order to improve their coordination and increase their effectiveness.
4. **Obtain specific commitments from various entities within the framework of the Climate City Contract (Letters of Accession)**: The aim is to obtain the formal commitment of various entities and organisations within the framework of the Climate City Contract, through the signing of Letters of Accession, to support and collaborate in the achievement of the objectives and goals established therein.
5. **Development of a monitoring and evaluation plan**: Key CCC indicators, data collection method and monitoring reporting requirements: This refers to the development of a detailed plan for monitoring and evaluation of the Climate City Contract, identifying the key indicators to be measured, the data collection

method and the monitoring reporting requirements.

6. **Implementation of the monitoring and evaluation process, including communication of the plan to participating cities and guidance on data collection and reporting**: This is the implementation of the monitoring and evaluation plan, including communication of the plan to participating actors and entities and guidance on how to collect data and prepare the related monitoring reports.
7. **Collection of baseline data on the key indicators identified in the M&E plan**: Refers to the collection of baseline data on the key indicators identified in the M&E plan, in order to establish a basis for comparison for future measurement and analysis.
8. **Analysis of reference indicators and degree of progress in achieving emission reduction targets**: The aim is to analyse the benchmark indicators and assess the degree of progress in achieving the emission reduction targets set out in the Climate City Contract.
9. **Review of the Climate City Contracts based on the results of the evaluation process, including assessment of the effectiveness of the monitoring and evaluation process and identification of areas for improvement**: Refers to the review of the Climate City Contracts based on the results of the evaluation process.

The timelines below are indicative and may be modified and adapted as deemed necessary, keeping the maximum timeframe for a 2nd version of the Climate City Contract to a maximum of 2 years.

T	Tasks	Start date	Final date
T1	Improvement and extension of the Economic Model	M1	M6
T2	Specification of the initiatives and projects included in the Action Plan	M1	M6
T3	Expand interdepartmental collaboration to advance the implementation of the Climate Investment Plan.	M1	M6
T4	Obtain specific commitments from various entities under the Climate City Contract (Letters of Accession).	M1	M12
T5	Development of CCC monitoring and evaluation plan: Key CCC indicators, data collection method and monitoring reporting requirements	M6	M9
T6	Implementation of the monitoring and evaluation process, including communication of the plan to participating cities and guidance on data collection and reporting.	M9	M11
T7	Gathering baseline data on key indicators identified in the monitoring and evaluation plan	M11	M13
T8	Analysis of baseline indicators and progress towards achieving emission reduction targets	M11	M13
T9	Review of the Climate City Contracts based on the results of the evaluation process, including assessment of the effectiveness of the monitoring and evaluation process and identification of areas for improvement.	M13	M16
T10	Drafting of the 2nd version of the Climate Accords based on the results of the assessment and monitoring process	M16	M24
2ND CA	2nd version Climate City Contract	M1	M24


T1
T2
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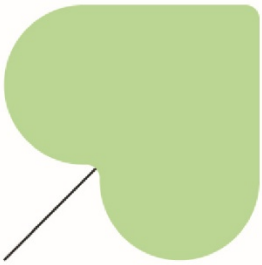


ANNEX 3:
Individual Signatory Commitments

Annex III: City stakeholders' commitments

Other actors

During the preparation of the Expression of Interest for the city's European bid, the City Council received more than a hundred and twenty letters of support from companies, financial institutions, universities, foundations, collectives, professional associations and consumer associations, among others.

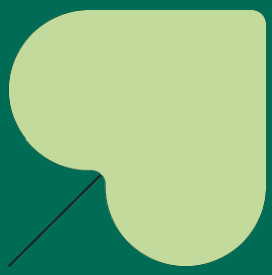
The city is currently working to gather explicit support from relevant actors in Zaragoza through concrete commitments from local entities and their formal adherence to this Climate City Contract.

To this end, Zaragoza is working closely with the Confederation of Aragonese Companies (CEOE) and the Confederation of Small and Medium-sized Aragonese Companies (CEPYME Aragon), which act as the main umbrella organisations for the city's private companies.

Currently, through a series of sectoral events, the City Council is communicating the key messages of the European Mission and of this Climate City Contract in order to establish synergies between the different actors in the city. The aim is to be able to translate the concrete commitments reached into the next iteration of this Climate City Contract.

Commitments from other actors

Name of the organisation
To date, there are two letter of support from REPSOL and CEPSA, which are included below. Future iterations of this Climate City Contract will include the list of organisations and their specific commitments that this entity makes in relation to the Climate City Contract. Given the proximity of the election period, it has not been considered appropriate to ask for endorsements, but agreements with business organisations such as CEOE and CEPYME are ready, which will be launched with the new corporation and will be included in the next iteration of this Agreement.



Zaragoza