SERRA

EXECUTIVE SUMMARY

SERRA

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CONTENT

1 INTRODUCTION

1.1 CONTEXT OF THE SUSTAINABLE ENERGY AND CLIMATE ACTION PLAN

Nowadays, the transition to a low-carbon energy economy in cities is considered a fundamental step towards counteracting global warming that is seriously affecting life on our planet. The consequences of this phenomenon are shocking, drought, hunger, poverty, more dangerous weather phenomena, changing ecosystems, etc. so active participation of all citizens is necessary to curb their effects and preserve the environment.

The Covenant of Mayors is an initiative promoted in 2008 by the European Commission, specifically by the General Directorate of Energy, open to all cities and municipalities in order to generate a permanent network of exchange of good practices to improve Energy efficiency in the urban environment, with the objective of turning cities into depleted and resistant sites, in which citizens can access sustainable and affordable energy sources.

The new Covenant of Mayors for Climate and Energy is a tool that aims to bring Europe's energy goals to European municipalities. That is why the signatory municipalities undertake to:

- Reduce CO2 emissions by at least 40% by 2030.
- Increase energy efficiency by 27%.
- Increase the use of renewable energy sources by 27%.
- Prepare a Reference Emissions Inventory.
- Carry out an assessment of risks and vulnerabilities derived from climate change.
- Present the Action Plan for Sustainable Energy and Climate (SECAP) within two years after the official signature of the Pact.
- Present a follow-up report at least every two years.
- Adopt an integral approach to increase its resilience to adapt to the impact of climate change.

With the aim of supporting Local Councils in the implementation and development of the Mayor's Agreement for the Summit and Energy, the Provincial Council of Valencia approved in plenary on February 16, 2016 the agreement with the General Directorate of Energy of the European Commission, to establish itself as territorial coordinator of the agreement of the Mayors in the Province of Valencia.

The municipality of Serra adhered to the Pact of Mayors for Climate and Energy, dated **14/03/2016**, committing itself to the fight against climate change and betting on savings and efficiency energy.

At the date of this document, in Spain there are more than 1.700 signatories, of which 206 are municipalities located in the province of Valencia.

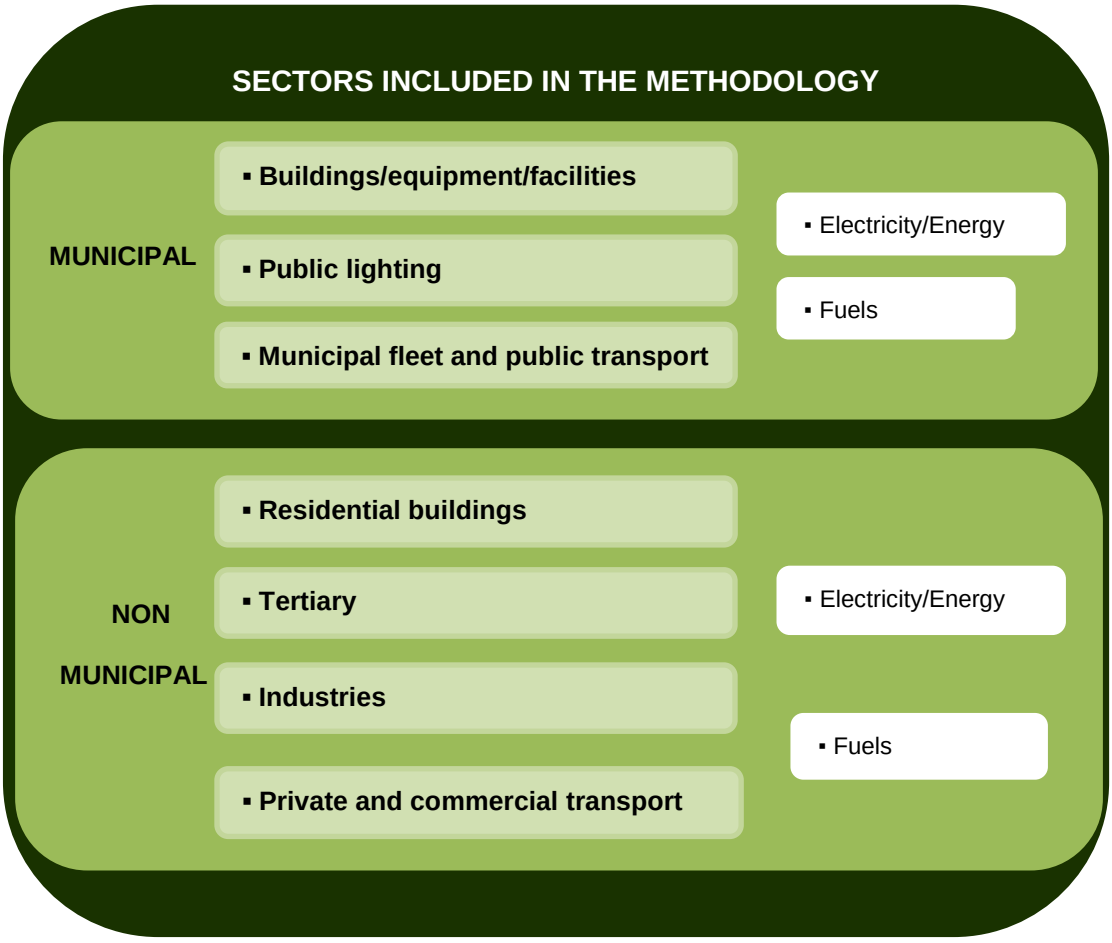
1.2 GENERAL METHODOLOGY

The SECAP is the main document of the Covenant of Mayors for Climate and Energy, within which the lines of work of the municipality will be established through actions to mitigate and adapt to climate change in order to achieve its objectives.

In the development of the PACES document, the points established in the Methodology for the development of the documents of the Covenant of Mayors for Climate and Energy in the province of Valencia, provided by the Council of Valencia, have been strictly followed. This methodology is generated based on the document of the European Commission "Guide for the presentation of reports of the Covenant of Mayors for Climate and Energy", in order to facilitate the elaboration of documents and standardize the calculations for allow to compare the results later.

In the methodology, there is a difference between:

- Sectors that depend directly on the City Council: in which the City Council can carry out direct actions to reduce emissions.
- Sectors that do not depend directly on the City Council: in which the City Council acquires reduction commitments but cannot intervene directly to achieve them.



The **Baseline Emission Inventory** -BEI is the initial document of the PAESC and aims to diagnose the initial situation of CO_2 emissions in the municipal territory, through the study of energy consumption in the municipality.

In the **Climate Change Risk and Vulnerability Assessment** it is analysed the possible risks that may affect specific sectors of the municipality's policies, and the assessment of the vulnerability that could constitute a possible evil or threat to people, goods and the environment.

The result of the risk and vulnerabilities assessment is the identification of areas of critical concern for the impacts of climate change and provides decisive information for the decision making in the definition of **adaptation actions** to better manage the risks, reduce their negative impacts to an acceptable level or, at least, avoid increasing over the years.

All of the foregoing is reflected in the SECAP document, which will be revised after 2 years of its completion when a follow-up report will be issued to analyse the evolution of all the work carried out during this period.

1.3 SCOPE AND OBJECTIVES

The results of the Baseline Emissions Inventory - BEI (Document I) and the Assessment of Risks and Vulnerabilities (Document II), are the starting point for the development of the mitigation and adaptation measures in the SECAP.

The new Covenant of Mayors for Climate and Energy was presented in 2015, after the success of previous initiatives, to contribute to the mitigation of climate change, to limit the phenomenon of global warming and to bring the energy targets marked by Europe in European municipalities.

These objectives are quantified considering the year 2010 as reference, as it is shown in the following table:

COVENANT OF MAYORS FOR CLIMATE AND ENERGY		
Baseline Year	**Emissions**	**Consumption**
2010	4.188,78 Tones CO2	20.660,76 MWh
REDUCTION OBJECTIVE 2030		
Energy saving	**Emission reductions**	**Use of renewable energy sources**
5.578,41 MWh	1.675,51 Tones CO2	3.992,74 MWh
27% of the baseline year consumption	40% of the baseline year emissions	27% of the objective year consumption (2030)

Table 1: Objective of compliance 2030

To achieve the objective of global reduction marked by the SECAP it is necessary to analyse in detail the results obtained in each field. It is very important to determine the relevance of emissions in each area, regardless of whether it is the direct competition of the city council, to identify where the municipality of Serra should focus its efforts.

2 CLIMATE CHANGE MITIGATION

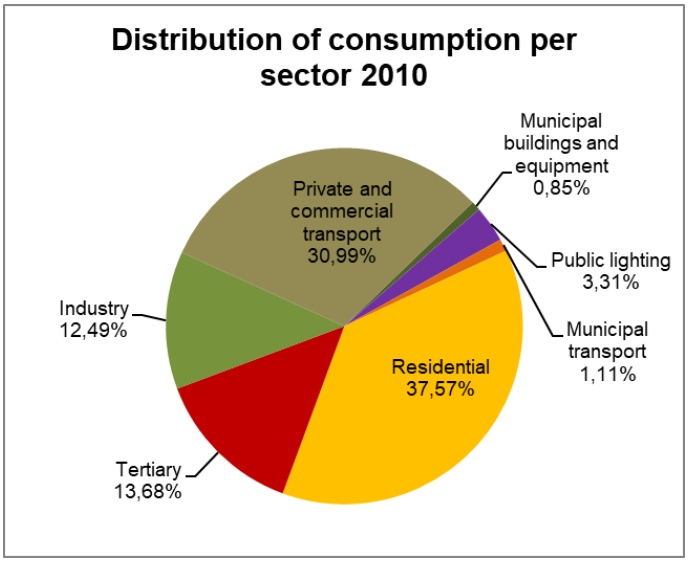
2.1 CO_2 REFERENCE EMISSIONS INVENTORY

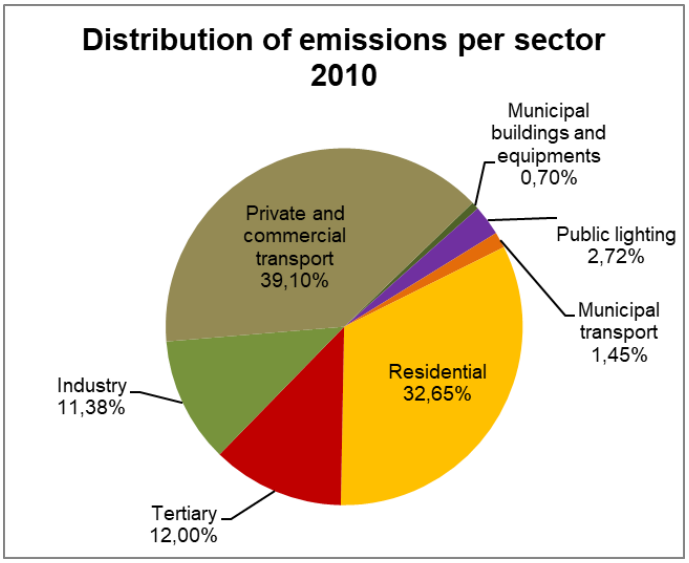
Below is a summary table of the Reference Emissions Inventory of the municipality of Serra with respect to the reference year 2010. According to the methodology, the data is broken down into "sectors that depend on the 'City council' and 'sectors that do not depend on the City Council'.

2010		
TOTAL SECTOR	**Consumption (MWh)**	**Emissions (TCO_2)**
MUNICIPAL	1.087,54	203,85
NON-MUNICIPAL	19.573,22	3.984,93
TOTAL MUNICIPALITY	**20.660,76**	**4.188,78**

Table 2: Consumption and emissions, year 2010

As can be seen, the consumption in the municipality of Serra in 2010 is mainly carried out in sectors that do not depend on the City Council, representing 95% of the total CO2 emissions, which is why mitigation efforts to reduce emissions must primarily focus on the non-municipal sector. The percentage distribution of consumption and emissions in different sectors are presented in the following graphs:





2.2 MITIGATION PLAN

Based on the results of the Baseline Emissions Inventory, in which the CO2 emissions from the municipality of Serra are quantified by a breakdown of areas and sectors, and knowing the objectives established by sector, it is defined in this section a list of the key mitigation actions established to implement the general strategy, differentiating them by field of action and indicating deadlines, estimated investment indicators of follow-up and calculations of the impacts.

In order to calculate the investments and savings of each of the proposed actions, the criteria of the document **"Methodology for the development of the documents of the Covenant of Mayors for Climate and Energy in the province of Valencia"** have been applied. The quotas for the application of the measures may vary slightly from the methodology, depending on the particularities of the municipality.

In total, 27 mitigation actions are proposed, from which 14 correspond to the municipal sector and 13 to the non-municipal sector.

With the application of the measures proposed, Serra Town Council will comply with the different objectives of the Covenant of Mayors for Climate and Energy, determined in relation to the 2010 baseline year.

SUMMARY TABLE OF OBJECTIVES FOR THE COVENANT OF MAYORS FOR CLIMATE AND ENERGY			
Objective	**Objective Value 2030**	**Expected value 2030**	**Expected result 2030**
Saving of 27% of baseline consumption (2010)	5.578,4 MWh	5.872,84 MWh	Saving of 28,43% of baseline consumption (2010)
Reduction of 40% of baseline emissions (2010)	1.675,51 Tn CO2	2.130,76 Tn CO2	Reduction of 50,87% of baseline emissions (2010)
Use of renewable energy sources in 27% of the consumption of the target year (2030)	3.992,74 MWh	4.278,66 MWh	Use of renewable Energy sources in 28,93% of the consumption of the target year (2030)

Table 3: Summary of Objectives for Serra

Below is the summary table with the economic, energy and environmental indicators estimation of each proposed mitigation action. The actions whose date of implementation is prior to 2019 have already been executed.

	ESTIMATED ENERGY SAVINGS (MWh)	EMISSIONS REDUCTION (Tn CO_2)	WEIGHT OF EMISSIONS IN SECTOR (%)	TOTAL WEIGHT OF EMISSIONS (%)	ESTIMATED INVESTMENT (€)	ESTIMATED SAVINGS (€)	ENERGY SAVED/ EURO INVESTED (kWh/€)	MEASURE PRIORITY	IMPLEMENTATION YEAR	EXECUTION
MUNICIPAL BUILDINGS AND EQUIPMENT	**110,24**	**35,06**			**391.128,80**	**50.441,57**				
M.a.1. MUNICIPAL ENERGY MANAGER	14,11	2,62	7%	0,13%	275.000,00	7.461,73	0,05	Short-term	2020	Multiannual
M.a.2. MUNICIPAL ENERGY ACCOUNTING (ELECTRICITY AND NATURAL GAS)	54,51	9,10	26%	0,46%	5.758,00	15.082,20	9,47	Medium-term	2022	Multiannual
M.a.5. ENERGY QUALIFICATION IN MUNICIPAL BUILDINGS	-	-	-	-	2.040,00	-	-	Short-term	2020	Annual
M.a.10. PROGRAM “50/50”	9,09	1,96	6%	0,10%	0,00	6488,82	-	Short-term	2020	Annual
M.a.13. RENEWAL OF LIGHTING	19,01	3,17	9%	0,16%	51.000,00	7.841,90	0,37	Short-term	2020	Annual investment – Multiannual saving
M.a.17. PHOTOVOLTAIC SOLAR ENERGY FACILITIES	-	3,17	9%	0,16%	42.120,00	6.416,10	-	Medium-term	2022	Annual investment – Multiannual saving
M.a.20. CONSCIOUSNESS AND AWARENESS OF MUNICIPAL EMPLOYEES	11,76	2,18	6%	0,11%	4.950,00	6.218,11	2,37	Short-term	2020	Multiannual
M.a.21. PUBLICATION OF CONSUMPTION OF MUNICIPAL EQUIPMENT	1,76	0,33	1%	0,02%	4.675,00	932,72	0,38	Short-term	2020	Multiannual
M.a.23. CONTRACTING WITH ENVIRONMENTAL AND ENERGY EFFICIENCY CRITERIA. EFFICIENT PURCHASES	-	-	-	-	1.500,00	-	-	Short-term	2020	Annual
M.a.24. PURCHASE OF CERTIFIED GREEN ENERGY	-	12,52	36%	0,64%	485,80	-	-	Short-term	2020	Multiannual
PUBLIC LIGHTING	**74,59**	**59,29**			**126.542,32**	**22.255,12**				
M.b.2. REPLACEMENT OF LUMINAIRES FOR OTHER MORE EFFICIENT	74,59	12,46	21%	0,63%	125.000,00	22.255,12	0,60	Short-term	2020	Annual investment – Multiannual saving
M.b.7 PURCHASE OF CERTIFIED GREEN ENERGY IN THE PUBLIC LIGHTING BOX	-	46,83	79%	2,38%	1.542,32	-	-	Short-term	2020	Multiannual
MUNICIPAL AND PUBLIC TRANSPORT	**58,82**	**15,37**			**86.000,00**	**66.740,98**				
M.c.2. COURSES ON EFFICIENT DRIVING	36,09	9,43	61%	0,48%	44.000,00	45.770,00	0,82	Short-term	2020	Multiannual
M.c.5. SUBSTITUTION OF VEHICLES FOR OTHER MORE EFFICIENT	22,74	5,94	39%	0,30%	42.000,00	20.970,98	0,54	Short-term	2020	Annual investment – Multiannual saving
RESIDENTIAL SECTOR	**672,48**	**263,44**			**104.873,40**					

	ESTIMATED ENERGY SAVINGS (MWh)	EMISSIONS REDUCTION (Tn CO_2)	WEIGHT OF EMISSIONS IN SECTOR (%)	TOTAL WEIGHT OF EMISSIONS (%)	ESTIMATED INVESTMENT (€)	ESTIMATED SAVINGS (€)	ENERGY SAVED/ EURO INVESTED (kWh/€)	MEASURE PRIORITY	IMPLEMENTATION YEAR	EXECUTION
M.d.1., M.d.3., M.d.4., M.d.5., M.d.6. AWARENESS CAMPAIGNS ADDRESSED TO THE CITIZENSHIP LINKED WITH THE RENOVATION OF LIGHT BULBS, APPLIANCES, IMPROVEMENT OF THE INSULATION AND PURCHASE OF GREEN ENERGY	568,11	224,45	87%	11,70%		-		Short-term	2020	Annual investment – Multiannual saving
M.d.8. REPLACEMENT OF GASOIL BOILERS TO BIOMASS BOILERS	1,25	5,19	2%	0,26%	28.278,00	-	20,09	Medium-term	2022	Annual investment – Multiannual saving
M.d.9. NATURAL GAS DIVERSIFICATION	33,45	11,68	5%	0,59%		-		Medium-term	2022	Annual investment – Multiannual saving
M.d.14. TAX BONIFICATIONS IN WORK LICENSES FOR IMPROVEMENTS OF ENERGY EFFICIENCY	69,68	16,20	6%	0,82%	76.595,4	-	5,73	Medium-term	2022	Annual
TERTIARY SECTOR	**149,41**	**94,79**			**502,72**					
M.e.2. PURCHASE OF GREEN ENERGY	-	69,49	73%	3,53%		-	-	Short-term	2020	Multiannual
M.e.3. PROMOTE THE ADHESION OF COMPANIES TO THE "GREEN COMMERCE" PROJECT	149,41	25,29	27%	1,28%	502,72	-	297,20	Short-term	2020	Annual
PRIVATE AND COMMERCIAL TRANSPORT	**3.432,99**	**1.043,18**			**315.200,00**					
M.f.2. RENEWAL OF THE CARPOOL AND PROMOTE THE USE OF VEHICLES USING NON-CONVENTIONAL FUELS	1.054,83	450,04	43%	22,86%	-	-	-	Short-term	2020	Multiannual
M.f.3. NETWORK OF RECHARGE POINTS OF ELECTRIC VEHICLES	620,10	143,10	14%	7,27%	1.000,00	-	620,10	Short-term	2020	Annual
M.f.4. ELABORATION OF A SUSTAINABLE URBAN MOBILITY PLAN	1.758,06	450,04	43%	22,86%	314.200,00	-	5,60	Short-term	2020	Multiannual
INDUSTRIAL SECTOR	**200,91**	**36,98**			**3.142,00**					
M.g.2. PROVIDE SUPPORT TO THE SUBSTITUTION OF ENERGY CONSUMER INSTALLATIONS FOR OTHER MORE EFFICIENT	114,81	21,13	57%	1,07%	3.142,00	-	63,94	Short-term	2020	Annual
M.g.4. PROMOTE THE USE OF COGENERATION	86,10	15,85	43%	0,81%		-		Short-term	2020	Annual
LOCAL PRODUCTION OF ENERGY		**419,84**			**6.284,00**					
M.h.1., M.h.5 IMPLEMENTATION OF PHOTOVOLTAIC SOLAR INSTALLATIONS FOR SELF-CONSUMPTION	-	419,84	100%	21,33%	6.284,00	-	-	Medium-term	2022	Annual investment – Multiannual saving

	ESTIMATED ENERGY SAVINGS (MWh)	EMISSIONS REDUCTION (Tn CO_2)	WEIGHT OF EMISSIONS IN SECTOR (%)	TOTAL WEIGHT OF EMISSIONS (%)	ESTIMATED INVESTMENT (€)	ESTIMATED SAVINGS (€)	ENERGY SAVED/ EURO INVESTED (kWh/€)	MEASURE PRIORITY	IMPLEMENTATION YEAR	EXECUTION
COLD/HEAT PRODUCTION		**0,36**			**500,00**					
M.i.1. HEATING NETWORK WITH BIOMASS	-	0,36	100%	0,02%	500,00	767,24	-	Medium-term	2022	Annual investment – Multiannual saving

Table 4: Summary of the Mitigation Plan

3 ADAPTATION TO CLIMATE CHANGE

Adaptation to climate change within the SECAP, contemplates a vision of the future that is more resistant to climate change, through the proposal of a series of specific adaptation actions in certain policy sectors of the City Council.

In order to define the actions to improve and reinforce the capacity for adaptation of the different sectors of a City Council, it is necessary to determine the degree of vulnerability of the sectors analysed to the different risks.

3.1 VULNERABILITIES AND RISK ANALYSIS

The process of developing the Risk and Vulnerability Assessment is based on the calculation methodology established by the Council of Valencia.

In Serra, the **sectors** that are considered most vulnerable to the risks of climate change are the following: Water; Urban planning, territorial planning and infrastructures, Environment and Biodiversity, Health and Forest.

In each case, the risks with the greatest impact are:

Water

- Increase in the demand for water resources and various affections in the municipality.
- Increase of the water consumption for the mitigation of fires.

Urban planning and infrastructures

- Reduction of climate comfort in the urban nucleus.
- Increase of energy demand due to extreme temperatures.

Environment and biodiversity

- Impacts on biodiversity such as reduction of habitat, increase in pests and phenological changes.

Health

- Increase in the number of medical care / hospitalizations / deaths.

Forest

- Increase in the frequency and intensity of forest fires.

Facing these risks, the degree of adaptive capacity of Serra is important to determine the final vulnerability of each sector to climate change. The capacity to adapt the municipality to climate change depends to a great extent on those drafted municipal plans which determine how to act in the event of a climate impact, such as the civil protection plans, the Municipal Action Plans, as well as others.

The following table is a summary of all the analysis in relation to the risks / impacts identified by sector, its adaptive capacity and the type of resulting vulnerability.

VULNERABILITY	IMPACTS BY VULNERABILITY	TYPE
EXTREME HEAT, DROUGHT AND FOREST FIRES ON THE WATER SECTOR	Increase in the demand for water resources and various affections in the municipality. Decrease of water resources. Increase of the water consumption for the mitigation of forest fires.	Socioeconomic
EXTREME HEAT ON THE URBANISM SECTOR	Reduction of climate comfort in the urban nucleus.	Socioeconomic
DROUGHT AND FOREST FIRES ON THE ENVIRONMENTAL AND BIODIVERSITY SECTOR	Impacts on biodiversity such as habitat reduction, increased pests and phenological changes.	Environmental
EXTREME HEAT ON HEALTH	Increase in the number of medical care / hospitalizations / deaths.	Socioeconomic
DROUGHTS AND FOREST FIRES	Increase in the frequency and intensity of forest fires.	Environmental

3.2 ADAPTATION PLAN

Based on the level of vulnerability obtained in the study, the general objectives of the Adaptation Plan and the more specific goals are identified.

Objectives:

- ***Improve education, awareness and human and institutional capacity in relation to mitigation of climate change, its adaptation, reduction of its effects and early warning.***

- ***Promote mechanisms to increase the planning and effective management capacity in relation to change, focusing on the sensitive population and local and marginalized communities.***

- ***Implement measures to increase energy efficiency by promoting rational and sustainable use and consumption of energy and natural resources.***

- ***Promote the generation of energy from renewable sources in order to reduce emissions of greenhouse gases and the impact on climate change.***

- ***Promotion of the development of participatory projects and plans to adapt to climate change in sectors and systems considered as priority.***

For the achievement of the general objectives of the Implementation of an Adaptation Plan to reduce the vulnerability of the municipality to the impacts of climate change, the following **GOALS** obtained from the analysis of the results of the evaluation study of the vulnerability are proposed:

GOAL 1: Implement actions to reduce the vulnerability of water supply to the municipality, like identifying and repairing leaks in the supply network, implementing remote management and drafting a Municipal Drought Plan.

GOAL 2: Implement actions to reduce drinking water consumption, through the realization of various actions in all sectors (residential, industrial, agricultural, tertiary) to reduce the vulnerability to the risks of drought increase and water shortage.

GOAL 3: Implement measures to deal with the contamination of groundwater by nitrates and other pollutants, reducing the use of fertilizers and pesticides and promoting the most effective use of organic fertilizers and betting on crops that do not need large quantities of fertilizers.

GOAL 4: Sustainable management of water resources in agriculture, with the creation of water storage areas in agricultural holdings and actions in irrigation techniques to reduce water consumption, and adaptation of crops in order to avoid effects on growth and productivity.

GOAL 5: Increase the surface of urban and peri-urban green areas to improve climate comfort in the municipality. These green areas may include urban parks, urban tree plantations to create shaded areas, among others.

GOAL 6: Promote reform and improvement actions on the private and public housing stock to increase its energy efficiency, improve its air conditioning, and generate energy through renewable sources such as photovoltaics.

GOAL 7: Implementation of sustainable drainage urban systems and those that contribute to attenuate and standardize the peaks of flows associated with extreme rainfall in sewerage systems, reducing the risk of flooding and increasing the efficiency of the sanitation networks.

GOAL 8: Infrastructure investments and early warning networks for civil protection and emergency in the face of extreme events, as well as training activities of dedicated personnel. Awareness campaigns and information of the population of the municipality on the impacts of climate change on health.

GOAL 9: Promote the protection and adaptation of biodiversity and natural spaces in the territory to the impacts of climate change. Evaluate the implementation of various actions such as the strengthening of agreements or custody agreements and conduct training workshops, or didactic itineraries to increase the awareness of the population and not residents about the importance of these spaces and species.

The adaptation actions a summarized in the following table:

ADAPTATION ACTIONS	PRIORITY OF THE ACTIONS	AVOIDED IMPACTS	AFFECTED VULNERABILITIES
A1. RENOVATION OF BUILDING	Short-Medium-Term	Extreme heat, Drought	Vulnerability of the urban planning sector and infrastructures to the extreme heat and drought
A4. INCREASE OF GREEN SURFACES	Short-Medium-Term	Extreme heat, Drought, Flooding	Vulnerability of the urban planning sector and health to extreme heat, drought and flooding
A5. REDUCTION OF WATER CONSUMPTION	Short-Medium-Term	Drought	Vulnerability of the water sector to drought
A7. ACTIONS RELATED WITH HEALTH AND CONSCIOUSNESS AND AWARENESS OF THE POPULATION	Short-Medium-Term	Extreme heat and flooding	Vulnerability of the health sector to extreme heat and floods
A8. ADAPTATION OF WATER SUPPLY	Short-Medium-Term	Drought	Vulnerability of the water sector to drought
A9. BIODIVERSITY ADAPTATION	Medium - Long Term	Extreme heat, Drought	Vulnerability of the environmental and biodiversity sector to extreme heat and drought
A10. FOREST ADAPTATION	Short-Medium-Term	Drought, forest fires	Vulnerability of the forest sector to drought and forest fires

Table 5: Summary of the Adaptation Plan

4 CONCLUSIONS

The transition to a low-carbon energy economy in cities is considered a fundamental step towards counteracting global warming that is seriously affecting life on our planet. The consequences of this phenomenon are shocking, so active participation of all citizens is necessary to curb their effects and preserve the environment.

The City Council of Serra voluntarily adhered to the Covenant of Mayors on **14/03/2016** and has assumed the formal commitment to change the current energy model and meet the objectives of the Pact with respect to 2010, defined as year of reference.

- Reduce the emissions of CO_2, at least 40% by 2030.
- Increase energy efficiency (27%).
- Increase the use of renewable energy sources (27%).
- Adopt an integral approach to increase its resilience to adapt to the impact of climate change.

The Mitigation Plan has been presented in this document, which establishes the Mitigation actions that the City Council of Serra should undertake in the corresponding areas to achieve the objectives set previously in relation to the baseline year 2010. The 27 actions to be implemented have been defined considering the results of the Emissions Inventory Report, in which the consumption and emissions are defined in the different sectors of the municipality.

It is important to note that approximately 95% of the municipal energy consumption is generated in the sectors that do not depend on the City Council, so that the economic efforts to carry out the mitigation actions have focused in these sectors.

An Adaptation Plan has also been proposed, which has defined 7 actions that set the road to be followed by the City Council in its environmental policy for the fight against climate change in the medium term. Unlike the Mitigation Plan, these measures have been based on the results of the Risk and Vulnerability Assessment, which has identified the most vulnerable sectors of the municipality to the impacts associated with the risks due to the evolution of climate change.

Two years after the implementation of the Sustainable Energy and Climate Action Plan (PACES) in 2021, a follow-up report will be carried out in which the evolution of the work carried out during these two years will be reflected. The objective of the Monitoring Report is to analyse the measures developed during this period to determine if it is necessary to provide modifications to the SECAP.