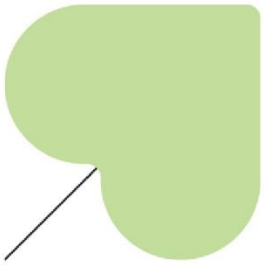
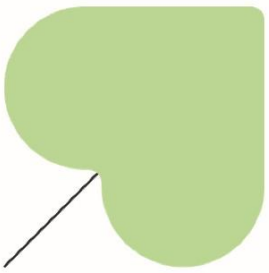
AJUNTAMENT DE VALÈNCIA

València Sostenible

Acuerdo climático de la ciudad de *València*



València



ANNEX 2:
Inventory and Indicators

1st iteration – January 2026

This document compiles consumption, emissions and other indicators related to the Climate Mission for the year 2023, as this is the most recent year for which a complete picture of the data needed to perform the corresponding calculations is available.

Energy consumption in 2023

Municipal buildings, equipment and facilities

Consumption in municipal buildings, equipment and facilities (MWh)			
Source	**2007**	**2014**	**2023**
Electricity	*71,630.35*	*43,097.35*	*38,832.52*
Natural gas	*6,349.09*	*14,440.52*	*10,775.81*
Diesel C	*526.97*	*1,229.74*	*1,145.72*
TOTAL	**78,506.41**	**58,767.61**	**50,754.05**

** Total data on purification and drinking water consumption are not included, due to the impossibility of compiling consistent information for all years. Purification consumption is included in the services sector.*

There has been a 35% decrease in consumption in the sector between 2007 and 2023.

Public lighting

Public lighting consumption (MWh)			
Source	**2007**	**2014**	**2023**
Electricity	*84,745.00*	*85,200.00*	*37,908.78*
TOTAL	**84,745.00**	**85,200.00**	**37,908.78**

Public lighting consumption in 2023 has decreased by 55% since 2007.

Public and municipal transport

Public and municipal transport consumption (MWh)			
Source	**2007**	**2014**	**2023**
Petrol	*72.22*	*72.22*	*1,907.27*
Diesel	*103,030.41*	*118,097.61*	*121,581.27*
Natural gas	*30,191.30*	*38,965.38*	*20,433.79*
Biodiesel (10%)	*17,602.78*	*0*	*0*
TOTAL	**150,896.71**	**157,135.21**	**144,405.34**

Public and municipal transport consumption in 2023 has decreased by 4% compared to 2007. The change in the consumption model is noteworthy, as the EMT has stopped using biodiesel (10% or 20%) and now uses natural gas.

Residential sector

Residential sector consumption (MWh)			
Source	**2007**	**2014**	**2023**
Electricity	*1,107,197.00*	*1,005,263.04*	*1,034,595.49*
Natural gas	*663,040.43*	*582,632.00*	*488,214.16*
TOTAL	**1,770,237.43**	**1,588,055.22**	**1,522,809.65**

In the residential sector, consumption has fallen by 14% between 2007 and 2023.

Services sector

Consumption in the services sector (MWh)			
Source	**2007**	**2014**	**2023**
Electricity	*1,539,839.65*	*1,268,206.98*	*1,216,620.62*
Natural gas	*118,853.48*	*148,583.48*	*109,694.88*
TOTAL	**1,658,693.13**	**1,416,790.46**	**1,326,315.50**

Consumption in the service sector has fallen by 20% between 2007 and 2023. It should be noted that since 2011, urban rail transport consumption corresponding to MetroValencia has been separated when compiling the inventory. If this consumption were not separated, in order to compare the evolution since 2007, the service sector would have reduced its consumption by 15% in 2023.

Industry

Industry sector consumption (MWh)			
Source	**2007**	**2014**	**2023**
Electricity	*162,961.00*	*92,497.98*	*86,968.76*
Natural gas	*414,624.00*	*73,276.00*	*138,696.12*
TOTAL	**577,585.00**	**165,773.98**	**225,664.88**

The industrial sector has seen a sharp decline in consumption since 2007, specifically 61%. This sharp decline suggests that the data available in the statistical yearbook sent by distribution companies is incorrect. According to this information, the industry has reduced its electricity consumption by 47% and its natural gas consumption by 67% between 2007 and 2023.

Private and commercial transport

Private and commercial transport consumption (MWh)			
Source	**2007**	**2014**	**2023**
Electricity	*0.00*	*367.46*	*6,303.44*
Petrol	*1,199,372.22*	*863,911.20*	*1,303,534.51*
Diesel	*4,178,358.48*	*3,272,382.27*	*2,913,063.14*
TOTAL	**5,377,730.70**	**4,136,660.94**	**4,222,901.09**

Private and commercial transport consumption in 2023 has fallen by 21% compared to consumption in 2007.

Urban rail transport			
Source	**2007**	**2014**	**2023**
Electricity	*0.00*	*76,549.02*	*79,676.42*
TOTAL	**0.00**	**76,549.02**	**79,676.42**

Waste treatment

Waste (t)			
Source	**2007**	**2014**	**2023**
Mass collection	*377,545.00*	*288,675.95*	*241,103.62*
Glass	*11,195.00*	*12,079.17*	*15,608.82*
Paper and cardboard	*18,159.00*	*9,653.01*	*21,982.88*
Packaging	*6,909.00*	*7,343.04*	*18,353.56*
TOTAL	**413,808.00**	**317,751.17**	**297,048.88**

As in most areas, there has been a gradual reduction since 2007, with a 28% decrease in waste generated in the city of Valencia between 2007 and 2023.

Locally generated energy

Locally generated energy			
Source	**2007**	**2014**	**2023**
Photovoltaic capacity (kW)	*2,809*	*5,599*	*5,742*
Photovoltaic self-consumption (kW)	*N/A*	*N/A*	*11.0*
TOTAL Installed (kW)	**2,809**	**5,599**	**16,742**
PV energy generated (MWh)	*4,026.327*	*8,025.265*	*8,613.465*
Energy generated by PV for self-consumption (MWh)	*N/A*	*NA*	*16,500,000*
TOTAL generated (MWh)	**4,026,327**	**8,025,265**	**25,113,465**

In 2007, the reference year for the emissions inventory, the municipality had 26 solar photovoltaic installations for local electricity production using renewable energy, with a total installed capacity of 2,809 kW.
Currently, this number has increased favourably to a total of 5,742 kW installed, spread across a total of 75 different installations. A calculation of the electricity generated has been made based on data provided by the "register of special regime production facilities" published by the Ministry of Industry, Energy and Tourism.

On the other hand, in self-consumption installations, the year 2023 closed with a total installed power of 11,000 kW.
As for certified green energy supply contracts, in the reference year, the municipality did not have any contracts of this type; however, currently all of the council's contracts are of this type.

Total energy consumed

Total consumption 2007 (MWh)	9,698,394.38
Total consumption 2014 (MWh)	7,684,932.43
Total consumption 2023 (MWh)	**7,610,435.7**

It should be noted that, in addition to the reduction in consumption brought about by the country's situation and the efforts made in terms of energy efficiency during this period, consumption has fallen by 20.8% between 2007 and 2020.

Greenhouse gas emissions in 2023

Municipal buildings, equipment and facilities

Emissions from municipal buildings, equipment and facilities (tCO2)			
Source	**2007**	**2014**	**2023**
Electricity	*21,746.07*	*7,166.81*	*599.17*
Natural gas	*1,276.17*	*2,902.54*	*2,165.94*
Diesel C	*139.65*	*325.88*	*303.62*
TOTAL	**23,161.88**	**10,395.23**	**3,068.72**

** Only emissions from contracts that do not have certified green energy are accounted for.*

It should be noted that emissions have been reduced by 87% in the period between 2007 and 2023, mainly due to contracts that have certified green energy.

Street lighting

Public lighting emissions (t CO2)			
Source	**2007**	**2014**	**2023**
Electricity	*25,727.51*	*14,168.20*	*0*
TOTAL	**25,727.51**	**14,168.20**	**0**

**Emissions are not considered as there is a certified green energy contract for all public lighting contracts.*

Public and municipal transport

Public and municipal transport emissions (t CO2)			
Source	**2007**	**2014**	**2023**
Petrol	*17.48*	*17.48*	*461.56*
Diesel	*27,303.06*	*31,295.87*	*32,219.04*
Natural gas	*6,068.45*	*7,832.04*	*4,107.19*
Biodiesel (10%)	*4,198.26*	*0*	*0*
TOTAL	**37,587.25**	**39,145.39**	**36,851.32**

Emissions from public and municipal transport in 2023 have been reduced by 4% compared to 2007.

Residential sector

Residential sector emissions (t CO2)			
Source	**2007**	**2014**	**2023**
Electricity	*336,131.03*	*167,168.64*	*136,080.94*
Natural gas	*133,271.13*	*117,109.03*	*98,131.05*
TOTAL	**469,402.16**	**284,313.71**	**234,211.99**

In the residential sector, emissions fell by 14% between 2007 and 2014.

Services sector

Emissions from the services sector (t CO2)			
Source	**2007**	**2014**	**2023**
Electricity	*467,475.88*	*210,894.49*	*160,022.81*
Natural gas	*23,889.55*	*29,865.28*	*22,048.67*
TOTAL	**491,365.43**	**240,759.77**	**182,071.48**

Emissions from the services sector have fallen by 20% between 2007 and 2023. It should be noted that since 2011, urban rail transport consumption corresponding to MetroValencia has been separated when compiling the inventory. If this consumption had not been separated, in order to compare the evolution since 2007, the service sector would have reduced its emissions by 15% in 2023.

Industry

Industry sector consumption (MWh)			
Source	**2007**	**2014**	**2023**

Electricity	*49,472.90*	*15,381.81*	*11,439.05*
Natural gas	*83,339.42*	*14,728.48*	*27,877.92*
TOTAL	**132,812.33**	**30,110.28**	**39,316.97**

The industrial sector has seen a significant decline in consumption since 2012, which, combined with improvements in electricity emission factors, has led to a 61% reduction in emissions between 2007 and 2023.

Private and commercial transport

Private and commercial transport emissions (t CO2)			
Source	**2007**	**2014**	**2023**
Electricity	*0.00*	*61.11*	*829.09*
Petrol	*290,248.08*	*209,066.51*	*315,455.35*
Diesel	*1,107,265.00*	*867,181.30*	*771,961.73*
TOTAL	**1,397,513.07**	**1,076,308.92**	**1,088,246.18**

Emissions from private and commercial transport in 2023 have been reduced by 21% compared to 2007.

Urban rail transport

Urban rail transport			
Source	**2007**	**2014**	**2023**
Electricity	*0.00*	*12,729.60*	*10,479.88*
TOTAL	**0**	**12,729.60**	**10,479.88**

Waste Treatment
To calculate the emissions associated with the waste treatment process, only waste collected in bulk has been considered, with emissions from selectively collected waste considered to be zero.

Waste (non-energy) (tCO2)			
Source	**2007**	**2014**	**2023**
Mass collection	*115,110.83*	*88,015.28*	*73,510.81*
Glass	*0*	*0*	*0*
Paper and cardboard	*0*	*0*	*0*
Packaging	*0*	*0*	*0*
TOTAL	**115,110.83**	**88,015.28**	**73,510.81**

As can be seen in most areas, there has been a gradual decline since 2007, with emissions from waste generated in the city of Valencia falling by 28% between 2007 and 2023.

Total CO2 emissions

Total emissions 2007 (t CO2)	**2,692,680.45**
Total emissions 2014 (t CO2)	**1,795,946.38**

Total emissions 2023 (t CO2)	**1,667,757.35**

It should be noted that, in addition to the reduction in consumption brought about by the country's situation, the efforts made during this period and the significant improvement in the electricity emission factor, emissions have been reduced by 38.1% between 2007 and 2023.

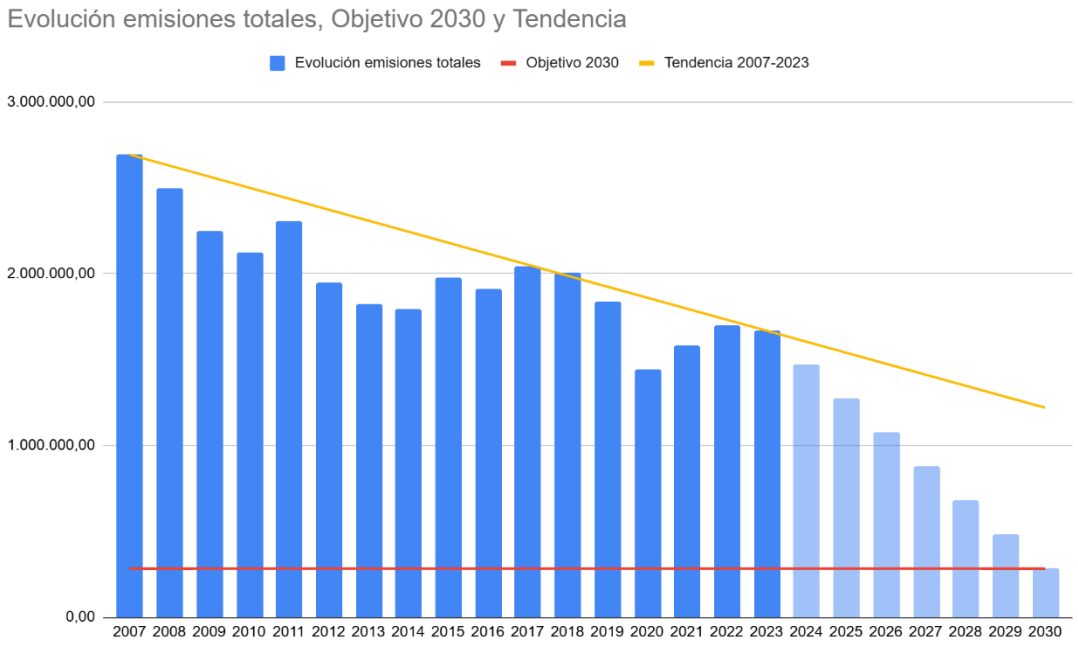
SUMMARY OF CONSUMPTION AND EMISSIONS IN 2023

Areas under the jurisdiction of the City Council	**Consumption (MWh)**	**Emissions (t CO2)**
Municipal buildings, equipment and facilities	**50,754.05**	**3,068.72**
Electricity consumption	*38,832.52*	*599.17*
Natural gas consumption	*10,775.81*	*2,165.94*
Diesel consumption C	*1,145.72*	*303.62*
Street lighting	**37,908.78**	**0.00**
Municipal transport	**144,405.34**	**£36,851.32**
Electricity consumption	*483.02*	*63.53*
Petrol consumption	*1,907.27*	*461.56*
Diesel consumption	*121,581.27*	*32,219.04*
Natural gas consumption	*20,433.79*	*4,107.19*
Total Areas under the jurisdiction of the City Council	**233,068.17**	**39,920.04**
Areas not dependent on the City Council	**Consumption (MWh)**	**Emissions (t CO2)**
Residential sector	**1,522,809.65**	**234,211.99**
Electricity consumption	*1,034,595.49*	*136,080.94*
Natural gas consumption	*488,214.16*	*98,131.05*
Services sector	**1,326,315.50**	**182,071.48**
Electricity consumption	*1,216,620.62*	*160,022.81*
Natural gas consumption	*109,694.88*	*22,048.67*
Industry sector	**225,664.88**	**39,316.97**
Electricity consumption	*86,968.76*	*11,439.05*
Natural gas consumption	*138,696.12*	*27,877.92*
Private and commercial transport	**4,222,901.09**	**1,088,246.18**
Electricity consumption	*6,303.44*	*829.09*
Petrol consumption	*1,303,534.51*	*315,455.35*
Diesel consumption	*2,913,063.14*	*771,961.73*
Urban rail transport	**79,676.42**	**10,479.88**
Electricity consumption	*79,676.42*	*10,479.88*
Waste (tonnes) (non-energy)	**297,048.88**	**73,510.81**
Mass collection (t)	*241,103.62*	*73,510.81*
Glass (tonnes)	*15,608.82*	*0*
Paper and cardboard (t)	*21,982.88*	*0*
Containers (t)	*18,353.56*	*0*
Total Areas not dependent on the City Council	**7,377,367.53**	**1,627,837.31**

Total in the municipality	**7,610,435.70**	**1,667,757.35**
Energy from renewable sources	*33,438.06*	

Evolution of emissions and target for 2030

As can be seen in the graph, emissions in Valencia show a positive trend and have decreased by 38% in the period 2007-2023 (2007 is the reference year for the Covenant of Mayors and the first year for which consumption and emissions data for the city are available) and by 9.1% in the period 2019-2023 (2019 is the base year used for the Climate Mission inventory). However, the ambitious target set by the city in the Mission requires accelerated action and increased efforts. Thus, if we estimate the downward trend in emissions for the period 2007-2023 and extrapolate it to 2030, we see that these emissions would be 330.9% higher than the target set.



Mitigation, adaptation and health

As part of the review of the City of Valencia's climate agreement, the aim is to better analyse the benefits for the city of taking strong mitigation action. To this end, key indicators have been selected from the "Consolidated diagnosis of vulnerability and risk to climate change in the municipality of Valencia" (2022). The "Number of hot nights" and the "Maximum duration of heat waves" are analysed for their direct impact on people's health and well-being. In addition, the "Cooling degree days" (CDD) indicator is included because of its link to mitigation, as it serves as a proxy for future variations in energy consumption linked to cooling needs. The

comparison between an intermediate emissions scenario (RCP 4.5) and a high emissions scenario (RCP 8.5) allows us to estimate the impacts that could be avoided by transitioning to climate neutrality. The data analysed originally comes from AEMET and the AdapteCCa Climate Change Scenario Viewer[1] .

Based on the analysis of climate indicators in Valencia, growing trends are observed that project a future with greater challenges associated with high temperatures. The differences between a high emissions scenario (RCP 8.5) and an intermediate emissions scenario (RCP 4.5) are notable, especially from the middle of the century onwards, underlining the urgency of implementing measures to mitigate extreme weather events.

The number of warm nights, when the minimum temperature exceeds the 90th percentile reference, shows a clear upward trend and could be two to three times more frequent by the end of the century (Figure 1). For the period 2070-2100, 82 warm nights per year are expected in an RCP 4.5 scenario, a figure that increases to 107 in a high emissions RCP 8.5 scenario, highlighting the direct impact on the thermal comfort and rest of the population.

At the same time, the duration of heat waves (Figure 2) will increase significantly, a trend that has already been observed in the last decade. The average duration of heat waves is estimated to be around 17 days between 2010 and 2039, double that of the historical reference period (1951-2000). Looking ahead, models indicate that for the period 2070-2100, heat waves could have an average annual duration of between one and two months. The difference between scenarios for that time is drastic, with a maximum duration of 33 days for RCP 4.5 compared to 58 days for RCP 8.5. This represents an increase in maximum duration of almost 600% for the RCP 8.5 scenario by the end of the 21st century.

This general increase in temperatures and the greater frequency and intensity of heat waves will be accompanied by an increase in energy consumption associated with greater cooling needs. The "cooling degree days" (CDD) indicator (Figure 3), used to estimate this energy demand, shows an upward trend. It is from 2040 onwards that the differences between the RCP 4.5 and RCP 8.5 scenarios become more clearly apparent. By the end of the century, the values of this indicator will almost double in the most pessimistic scenario, rising from 191 in the RCP 4.5 scenario to 224 in the RCP 8.5 scenario.

These divergent projections unequivocally highlight the critical importance of mitigation actions. Reducing greenhouse gas emissions, in line with a scenario such as RCP 4.5, could significantly limit the most severe meteorological impacts in Valencia, moderating the increase in warm nights, the duration of heat waves and the consequent pressure on people's health and the energy system's own energy- . Inaction, on the other hand, leads us to an RCP 8.5 scenario with much more extreme consequences.

[1] https://escenarios.adaptecca.es/

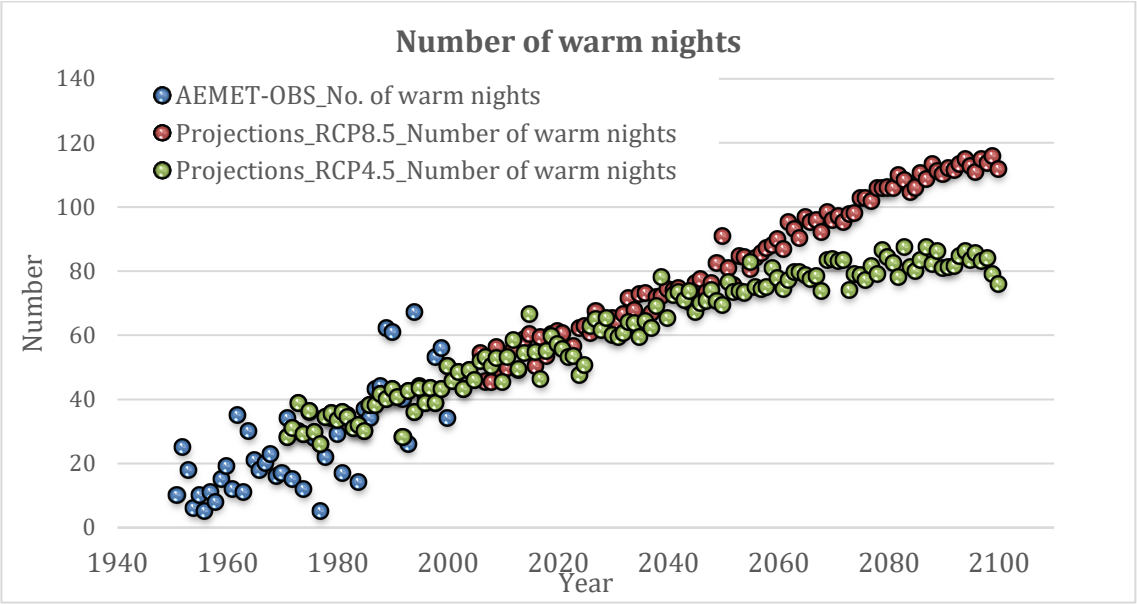


Figure 1. Number of warm nights in Valencia. Data observed 1951-2000. Source: Processed from data from the Adaptecca climate scenario viewer

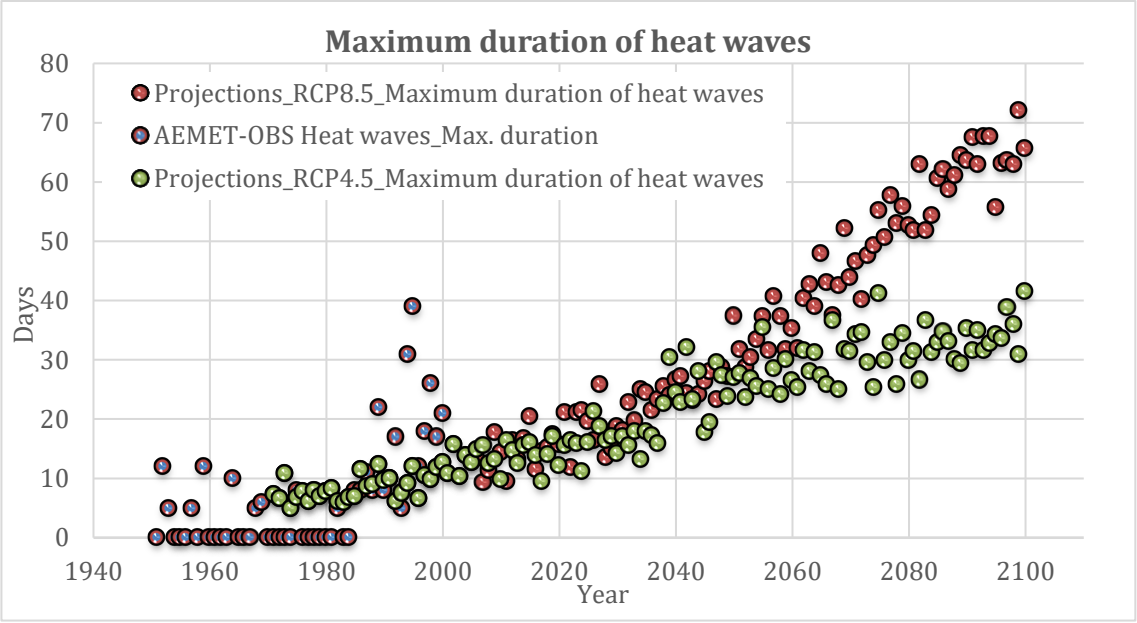


Figure 2. Maximum duration of heat waves in Valencia. Reference period 1951-2000. Source: Processed from data from the Adaptecca climate scenario viewer.

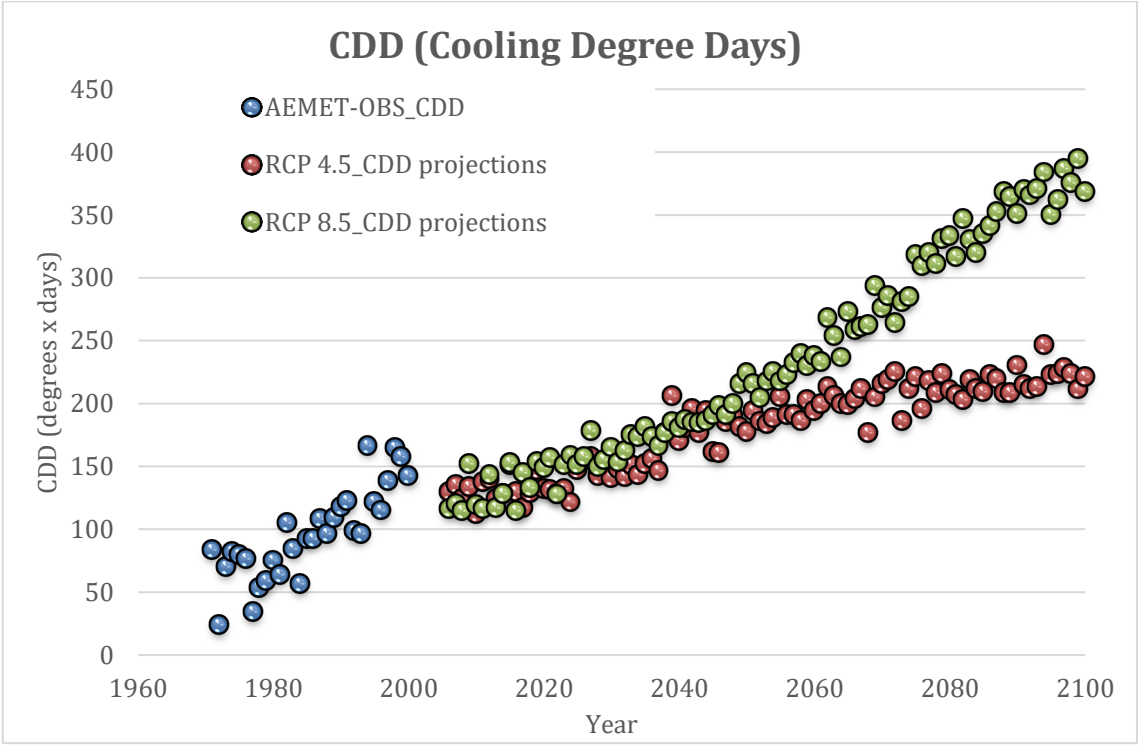


Figure 3. Cooling degree days (CDD) in Valencia. Data observed 1971-2000. Source: Processed from data from the Adaptecca climate scenario viewer

Co-benefits control table

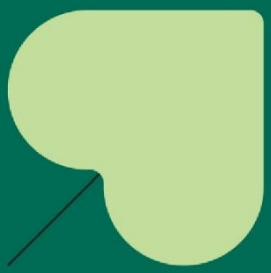
The direct relationship between mitigation, adaptation and health described in the previous section emphasises the importance of not only monitoring energy consumption and greenhouse gas emission indicators, but also collecting and analysing indicators related to the co-benefits of the ecological transition that have a direct impact on the well-being, health and safety of the population.

Below is a set of co-benefit indicators that have been agreed upon by the Spanish cities in the Mission, thanks to the collaborative work of the Spanish citiES network.

Indicator	2022	2023	2024
1. PM2.5 concentration levels (µg/m³)	12	11	11
2. PM10 concentration levels (µg/m³)	24	22	22
3. NO2 concentration levels (µg/m3)	20	20	19
4. Percentage of population exposed to average day-evening-night noise levels (Lden) ≥ 55 dB [1]	64.59	64.59	64.59
5. Average daily maximum temperature (TXX) (°C TXX) [2]			
6. Average daily minimum temperature (TNN) (°C TNN) [2]			
7. Heatwave incidence (HWI) (number of heatwaves in summer) [2]			

8. Green spaces (hectares / 100,000 inhabitants)	72	72	72
9. Energy consumption per household (kWh/capita)	1.94	1.84	
10. Modal share of environmentally friendly modes of transport and public transport (%)	62	63	
11. Percentage of municipal buildings equipped with energy management systems (%) [3]			
12. GDP per capita (€/cap) [4]	24,473	26,453	
13. Budget allocated to climate action projects (% of municipal percentage) [5]			
14. Percentage of municipal waste recycled (%)	30.7	31.8	33.5
15. Percentage of tree cover within the city (%)	10.6	10.6	10.6

[1] The required data corresponds to the 2022 Strategic Noise Map, which is updated every five years.
[2] The three indicators defined in citiES relating to maximum and minimum temperatures and heat waves are not considered sufficiently useful for analysing the impact of extreme weather events on the city, as much longer historical periods and projections are required. Therefore, these indicators are not included and are considered to be covered in the previous section on "MITIGATION, ADAPTATION AND HEALTH".
[3] This data is not available.
[4] Regional GDP per capita.
[5] There is no green or climate budget analysis available from the City Council.



València