



European Green Capital Award 2016

1. Climate Change: Mitigation & Adaptation



An initiative of the
European Commission

2016



Spain

1. CLIMATE CHANGE: MITIGATION & ADAPTATION

1A. Present Situation

Describe the present situation in relation to CO₂ emissions, including any relevant disadvantages or constraints resulting from historical, geographical and/or socio-economic factors which may have influenced this indicator area. Where available, information/data should be provided from previous years (5 – 10) to show trends.

Provide figures for, and comment on, the following specific indicators for the city:

1. Total CO₂ emissions equivalent (tonnes) per year;
2. CO₂ emissions equivalent per capita (tonnes) per year;
3. CO₂ emissions equivalent per capita (tonnes) resulting from fuel use in transport;
4. CO₂ emissions (tonnes) per MWh electricity consumed;
5. CO₂ emissions reduction target).

Mention any target adopted specifically for the municipal administration.

Give details of any Baseline Emission Inventory prepared by the city, mentioning the baseline year. Provide a breakdown of the main sources of emissions. Scientific grounds should be provided for any claimed reduction in CO₂ emissions.

Zaragoza defined in 2005 its “Strategy for Climate Change Mitigation and Improvement of Air Quality” aiming to reduce a 30% of CO₂ by person in the period 2005-2015. This Strategy was complemented in 2010 with the “Climate Change Adaptation Strategy”.

The first step was to make an Emission Register using CORINAIR methodology in order to calculate every activity individually regarding 18 pollutants.

Since the annual updating of the register is difficult to make, a methodology based on official data and real consumption has been established:

• Direct emissions	National Emissions Record. Ministry of Environment
• Emissions produced by the use of electricity *	Emission factors proposed by the National Commission of Energy
• Direct fuel consumption (electricity, natural gas and liquid fuels)	Direct information of the conduits
• Direct consumption of LPG	Estimate from distributors data

**The indirect emissions produced electricity vary every year depending on the use of renewable and the energy mix.*

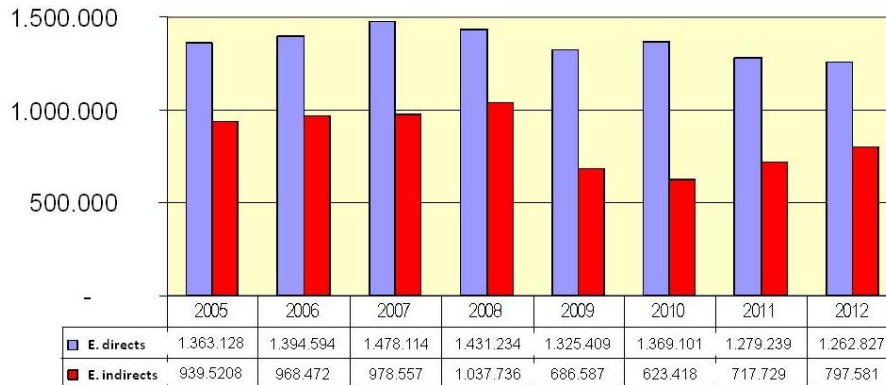
The reducing effect produced by using carbon sinks has not been introduced yet.

(1)

The total of CO₂ emissions in the areas managed by the City (Pact of Mayors) in 2012 was 2,060,454 tons.

The top was reached in 2008 with the works for the Expo infrastructures whereas the bottom level was in 2009, with a fall of 18.5 points due to the reduction of consumption and the

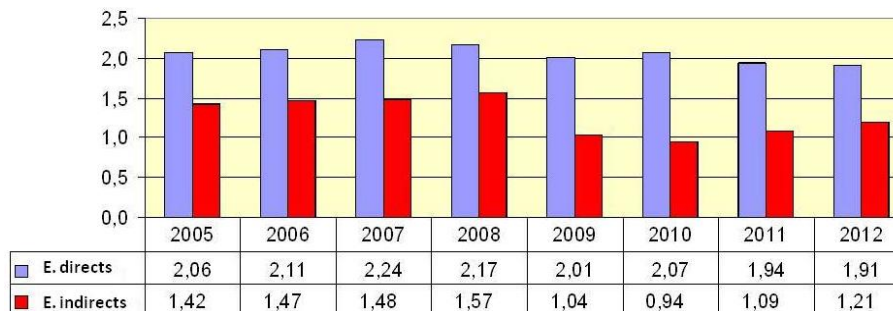
increase in the use of renewable energies. Between 2005 and 2012 global emissions fell a 10.5% (*graphic 1*).



Graphic 1. Total emissions CO₂ t/year

(2)

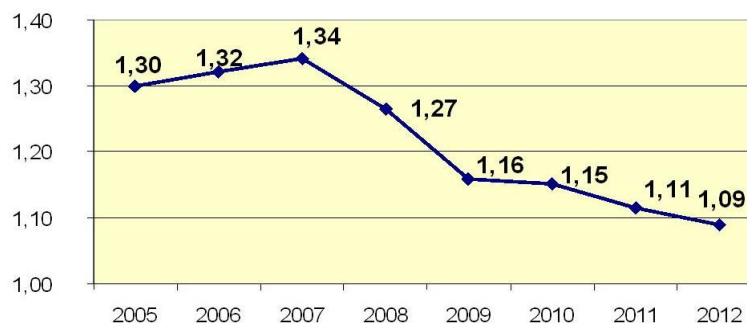
The equivalent of emissions per person was 3.12 tons/year. There is also a downward evolution, with a reduction of a 13.5% in that period, exceeding the strategic goal of 10% foreseen for the year 2010 (*Graphic 2*).



Graphic 2. CO₂ emissions t/ person/year

(3)

The equivalent of emissions per person of fuel used for transport activities was 1.09 ton/year (*Graphic 3*).



Graphic 3. CO₂ emissions by using fuel for urban mobility. t/person.

Nevertheless, the way fuel consumptions are obtained penalises Zaragoza since it is an important logistic centre and most of the refuelling is made by vehicles just passing through the city.

In spite of that, emissions by urban mobility have fallen a 16.25% in the period 2005-2012. This clearly reflects the impact of Zaragoza Sustainable Mobility Plan.

(4)

CO₂ emissions by electric consumption and person reached a peak value in 2008, experimenting from then on an important decrease. Nevertheless, the increase is progressive since 2010 due to a bigger contribution of fossil fuels to the energy mix produced by adverse weather (a long dry period) and the consequent fall of water energy available. But, in any case last years' values will be reached.

Between 2005 and 2012 the percentage of reduction by indirect emissions of CO₂ by person has been 5%, even though between 2005-2010 the reduction was over 27%.

(5)

Zaragoza signed in 2011 the Pact of Mayors, endorsing its commitments for the period 2010-2020:

- ✓ 24% reduction of CO₂ emissions
- ✓ 24% reduction of primary energy consumption
- ✓ 35% of energy coming from renewable sources

Until 2002, there has been a reduction of a 13.5% in CO₂ emissions and the production of renewables in the metropolitan area represents the 70.14% of the consumption of electric energy in the whole city.

(6)

The strategy followed has placed Zaragoza at the head of the ranking of big Spanish cities with the lowest levels of CO₂ emissions ("25 Sustainable Spanish Cities" KMPG 2011).

1B. Past Performance

Describe the measures implemented over the last 5 to 10 years to reduce greenhouse gas emissions, including resources allocated to implement these measures. Comment on which measures have been most effective.

Make reference to:

1. An overall strategy for climate change or any other strategy or action plan to reduce emissions, for this period;
2. Mainstreaming of climate protection measures across municipal services and in key areas of action such as energy efficiency in residential and commercial buildings, public transport and waste management. Highlight any innovative schemes for the built environment such as low carbon zones;
3. Mechanisms used. Explain how the city works on emissions reduction with other governmental bodies, private sector service providers, enterprises and citizens. Mention relevant national legislation or programmes and participation in EU-funded projects or networks.

Describe the city's approach to adaptation to the impacts of climate change.

Provide details on how this approach is monitored.

(1)

The goal of Zaragoza Climate Change Mitigation Strategy and the Improvement of Air Quality for 2015 is to reach a reduction of a 30% of CO₂ emissions/person by adopting measures in four areas plus in industry as well as three cross-over lines that will be developed below.

Most part of these measures has already been launched. There has been a reduction of a 13.5% by person, and a reduction of 11.5% in global emissions is expected to be reached in 2015.

(2)

Climate protection measures in four areas:

Model for a sustainable city and its buildings

Actions of the Sociedad Municipal Zaragoza Vivienda

Rehabilitation (1989/2012) with sustainable criteria of 3,612 buildings and 6,105 actions in buildings older than 40 years. Municipal grant: 61,152,544€

BEST qualification. "Rehabilitation Program 2010" (United Nations, Dubai)

Renaissance Project (Concerto Programme: Lyon, Zaragoza, Lombardy)

Energy saving, bioclimatic buildings and incorporation of renewables for avoiding 5,000 t of CO₂/m². Construction of 616 bioclimatic innovative dwellings and a Centre of Sustainable Urban Development. Rehabilitation of 360 homes with a 65% of energy saved, with a reduction of 231 tons of CO₂/m². Photovoltaic rehabilitation and installation (19 kW) in a public school (*Graphic 4*).

BEST rating "Rehabilitation program 2010" (UN, Dubai)

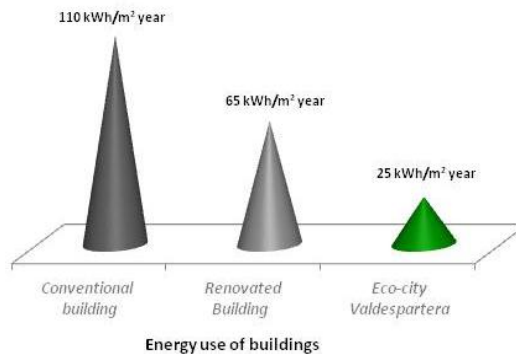
First Prize Endesa

First Prize AVS (2011)

Street	Flats	m ²	Emissions before (kg CO ₂ /m ²)	Emissions after (kg CO ₂ /m ²)	Savings (kg CO ₂ /m ²)	Average annual savings x flat (kg CO ₂ /m ²)	Average annual savings x m ² restored (kg CO ₂ /m ²)
Gral. Yagüe	40	4.047,2	53,2	15,6	37,6	3.804,3	152.174,72
Anzánigo	30	1.731,3	113,5	15,4	98,1	5.661,3	169.840,53
TOTAL	70	5.778,5	166,7	31,0	135,7	9.465,6	322.015,25

Renovation School Cándido Domingo	BEFORE RENOVATION		AFTER RENOVATION		SAVINGS	
	HEATING DEMAND hWh/m ²	EMISSIONS tCO ₂ /m ²	HEATING DEMAND hWh/m ²	EMISSIONS tCO ₂ /m ²	HEATING DEMAND hWh/m ²	EMISSIONS tCO ₂ /m ²
	98,2	64,4	51,5	39,5	47,50%	38,60%

Graphic 4. Renaissance Project results

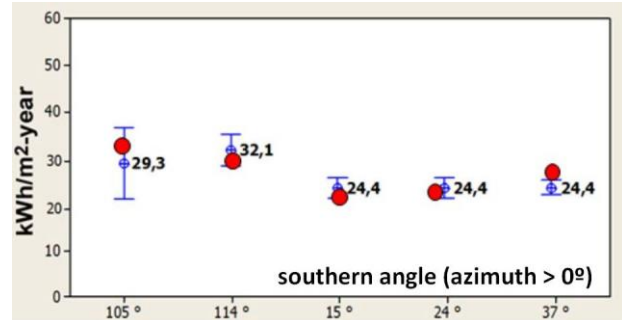


Eco-city Valdespartera

Centre of Sustainable Urban Development, experimental field of new energies
 Bioclimatic construction of 10,000 dwellings (Graphic 5) reducing energy consumption to 24.4 kWh/m² year/home (Graphic 6)
 Goya Park, first bioclimatic urban experience (1996)
 Best Practice (GOOD) 2004 and 2006. United Nations.
 Best Practice 2012. Habitat Committee of the UN



Graphic 5. Bioclimatic rehabilitation of a building in Valdespartera



Graphic 6. Comparison of consumptions in different orientations vs results of the simulation

ZERO EMISSIONS Building

Example of bio-construction and integration of renewable energies with a near zero balance of emissions.

Actions in heating and cooling, and reduction of electric consumption

Coal boilers replaced by biodiesel and biomass coal boilers, and Central air-conditioning.

Programme of Sustainable Renovation of SME and hotel and catering

196 firms taking part in the "Meeting Club with Agenda 21 local".

Energy saving in hotels (2006-2007)

Energy efficiency in pharmacies and shops.

Municipal services

Centre for Urban Waste Treatment

Built in 2009, it centralizes recycling for obtaining electric energy (15,730 MWh) and composting.

Municipal mobility

The use of ecological fuels in all the municipal vehicles and those from firms working for the City are compulsory by 2007 Municipal Regulation

Energy analysis and saving measures in municipal buildings

Program of audits and actions on energy efficiency in more than 100 municipal buildings, based on the Pact of Mayors and its commitments for reducing emissions.

Supply, sanitation and water treatment

The water treatment plant counts with a photovoltaic system that produces 3,413 MWh/year.

La Almozara water treatment plant treats muds through anaerobic digestion and uses the biogas produced to generate 1,713 MWh/year.

La Cartuja water treatment plant treats muds through incineration and uses heat to produce 3,588 MWh/year. The plant has been modified for reducing energy consumption to 5,000 MWh/year.

Public lighting

It has been obtained a saving of 9,447 MWh/year by establishing regulators, reduction in the time street and ornamental lighting is on, selective lights-off and the adaptation of the systems.

Sustainable mobility

The Plan of Sustainable Mobility 2006-2015 establishes strategies and actions for improving air quality.

The launching of tram line no 1 in 2013, the commuting train system and the re-ordenation of the bus system has produced a reduction of a 28.3% of traffic in the city centre. The city has 235 km of pacified thoroughfares, 783 streets with a 30 km/h speed limit and 106 km of cycling lanes.

Renewable energies

Zaragoza has exceeded the figure of 800 MW of renewable power by making use of every kind of technology currently in use.

(3)

The participation of the City in the strategy against climate change is shown in the legislation that is based on three cross-over lines: taxation, legislation and environmental education.

Local legislation:

“Support and promotion of initiatives for the development of tools able to reduce greenhouse gas emissions” (2005)

Municipal Byelaw on the "Use of ecological fuels in vehicles of the municipal fleet and those of firms contracted by the City" (2007)

Municipal By Law on "Energy eco-efficiency and use of renewable energies in buildings and its equipment" (2009)

Fiscal legislation:

Municipal Fiscal Byelaw No 6 on vehicles and mechanical drawn. Reduction from 50 to 75% of motor vehicle taxes

Municipal Fiscal Byelaw No 10 on constructions, equipment and works. Reduction until a 30% in the quantity to pay by users of biomass boilers.

The industries of the city also collaborate for reaching this goal, with an investment of approximately 100 million euro spent for reducing emissions. In the non-industrial sector - pharmacies- an average fall of 840 kg of CO₂ by individual business has been reached, with a saving of 530 €/year according to data obtained by the energy audits made by students of the University of Zaragoza.

Active participation of the citizens in the Municipal Programmes of Environmental Education.

25,000 school children have taken part in the "Program Stop to CO₂" (*Graphic 8*).

The "Meeting Club with Agenda 21 Local" is a tool of social participation and municipal coordination that includes firms, organizations and Zaragoza City Council.

Zaragoza participates in European programmes linked to that goal. It leads projects such as (2006, 2007, 2012) and European innovation networks (6th Framework Program).

PROGRAM/PROJECT	REDUCTION CO ₂ EMISSIONS
STOP TO THE CO ₂	4 % by year in the schools of the project
GREEN HOMES	2008-2009: 6.15 % 2009-2010: 6.66 % 541 homes
GOYA PARK	1.25 t CO ₂ /6 months (8.54 % electric consumption) 27 homes analysed. Being implemented.
E2 DEMOCRACY	Year 1: 3.35 % Year 2: 4.14 % Average: 3.745 %
RENAISSANCE	125 t CO ₂ /year

The City of Zaragoza forms part of the Spanish Network of Cities for Climate and participates in international networks (ICLEI, Energy cities).

Zaragoza endorsed the Pact of Mayors in 2011.

(4)

Zaragoza Climate Change Adaptation Strategy establishes a Decalogue of actions:

- Sustainable urban development: green areas and bioclimatic buildings
- Adequate infrastructures to stop climate change
- Sustainable mobility
- Renewable energies
- Environmental education
- Health promotion
- Organic farming
- Waste treatment. Public awareness on recycling
- Health protection of the citizens
- Social welfare of the citizens.

Its establishment is controlled by "Zaragoza Sustainability Indicators" as well as by 10 European common indicators and 29 local specific indicators.

A few examples:

A2. Local contribution to local climate change

Reduction of a 13.5% of CO₂/person (2012)

A3. Local mobility and local transport

Still to be updated after the implementation of the tram line and the reorganization of the traffic.

A4. Availability of open areas and basic local services

A 99.78% of the population lives less than 300 m away from them

A5. Ambient air quality

The emission of particles PM₁₀ and PM_{2.5} are under the legal limits

B7. Sustainable management of the local authority and companies

PN4. Urban Nature

The surface of parks and gardens has been doubled (2007-2012) and is over 8.3 million m² (12.1 m²/person, improving WHO standard).

(5)

The Agency of Environment and Sustainability supervises the strategy, guarantees its cross-over working as well as the integration of all the areas managed by the Municipality.

The Sectoral Board of Environment and the Commission 21 on Climate Change are the two specific bodies of social participation.

1C. Future Plans

Describe the future short and long term objectives and proposed approach for further emissions reduction, 'climate proofing' and adaptation to the impacts of climate change. Describe planned measures, including timescales and emphasise to what extent plans are supported by commitments, budget allocations, and monitoring and performance evaluation schemes.

Make reference to any long-term strategy employed.

Briefly explain the rationale for choosing these future measures and highlight any innovative financing arrangements.

Four years after the ZCAS passing, it is been also considered the passing, during the last quarter of this year, of the new Zaragoza 2020 Strategy on Sustainable Energy Management.

This strategy is an answer to the Pact of Mayors and includes actions and projects for reaching the goal of a 24% reduction of CO₂ emissions in the period 2010-2020. It also groups one more time all the municipal departments and citizens in a participation process.

The process -ended in June 2013- has the goal of integrating its contributions for the definition and development of the Strategy Zaragoza 2020.

The Plan and the "Strategy for Climate Change Mitigation and the Improvement of Air Quality in Zaragoza" and "Zaragoza Strategy for Adaptation to Climate Change" are a strong tool in the municipal policies against climate change.

There is a clear and ambitious program of actions. Its achievement and evaluation will be monitored by the Sustainability Indicators System of Zaragoza Agency of Environment and Sustainability.

Innovative aspects:

Promote the municipal bike loan reducing use rates till very low levels, financing it cost exclusively by publicity.

Reaching almost complete funding for the extension of Tram by public tender which includes construction, maintenance and operation of the new line.

Reaching almost complete funding for the construction of the Urban Orchards in 'Parque del Agua' by public tender which includes it construction and operation.

Relocation of companies upset and pollutants with urban mechanisms zero cost to the Corporation.

Focusing on mitigation policies, the introduction of the different measures included in the ECAZ, in its goal **ZCAS 2015**, continues. In line with the action described and with the data to be obtained on 31 December of that year, the results will be evaluated depending on the level of implementation of the goal **ZSEM 2020** for establishing a new and more ambitious goal for 2030.

The City of Zaragoza has adopted and will adopt in the future strict measures for preserving its environment and quality of life.

But it is also true that certain number of these measures clash with the habits of the citizens. As an example, the new mobility plan, the entry into service of the tram and the reorganization of the bus system that modifies the usual urban routes. These are essential measures that reinforce our fight against climate change and that require a strong dose of pedagogy and public awareness. This is the goal of the programs of environmental education of the Municipality, especially addressed to children and teenagers.

It is also important to take into account that the City of Zaragoza must be sensible in carrying out impact measures requiring additional funding efforts since the period of crisis that Spain is suffering is affecting in a direct way to the capacity of local entities to reinforce and even apply new investment plans.

In any case, Zaragoza has the vocation and commitment to carry out the accepted goal derived from the Pact of Mayors for 2020.

1D. References

Legislation

- Municipal Byelaw on Promotion of Rehabilitation. 2010
http://www.zaragoza.es/ciudad/normativa/detalle_Normativa?id=1442.2011
- Mayor's Decree of 12 April 2007 on the use of ecological fuels in municipal vehicles and those for firms working for the Municipality
http://www.zaragoza.es/ciudad/medioambiente/enlace/normativa/detalle_Normativa?id=88
- Mayor's Decree of 24 November 2008 with measures for municipal efficiency and saving
http://www.zaragoza.es/ciudad/medioambiente/enlace/normativa/detalle_Normativa?id=543
- Municipal Byelaw on Electronic Administration. 2010
http://www.zaragoza.es/ciudad/normativa/detalle_Normativa?id=922
- Municipal Fiscal By Law No 6 on Tax for Mechanical Drawn Vehicles (2013)
http://www.zaragoza.es/ciudad/normativa/detalle_Normativa?id=3464
- Municipal Byelaw on energy eco-efficiency and the use of renewable energies in buildings and its equipment
<http://www.zaragoza.es/ciudad/normativa/detalleNormativa?id=245>

Documents

- Program of environmental education 2013-2014
- Green homes
- Zaragoza Strategy for Climate Change Mitigation and Improvement of Air Quality
<http://www.zaragoza.es/contenidos/medioambiente/EstrategiaCCCAZ.pdf>
- Zaragoza Strategy for Adaptation to Climate Change
<http://www.zaragoza.es/ciudad/medioambiente/atmosfera/estrategiasadaptacion.htm>
- Zaragoza Strategy for a Sustainable Management of Energy. Horizon 2010-2020
<http://www.zaragoza.es/contenidos/medioambiente/estrategia-gestion-sostenible-2012.pdf>
- 25 Spanish Sustainable Cities
<http://www.madrid.es/UnidadesDescentralizadas/Sostenibilidad/EspecialesInformativos/EnergiaCambioClimatico/05ForoProclima/25ciudadesespac3b1olassostenibles.pdf>

- Renaissance Project
<http://www.renaissance-project.eu/?lang=en>
- Sustainability Indicators of Zaragoza
<http://www.zaragoza.es/ciudad/medioambiente/agenda21/observatorio/indicadores.htm>
- Plan of Sustainable Mobility
<http://www.zaragoza.es/ciudad/movilidad/>
- Ecocity Valdespartera
<http://www.valdespartera.es/>
- Zaragoza Vivienda
<http://www.zaragozavivienda.es/>
- Goya Park “Pint in Green”
<http://zaragozaciudad.net/parqueyapintaverde/>
- e2 democracy
<http://www.e2democracy.eu/content/sections/index.cfm/secid.15/secid2.0/lang.3>