

Under2MOU Appendix

Geography, population and economy

Andalusia, in the south of Spain, covers a surface area of 87,597 km² and has a population of 8,394,246 inhabitants as at 2014. Population density varies greatly depending on the sub-region; the Metropolitan Area of Seville is the most populated with 1,516,081 inhabitants, followed by Malaga with 1,004,922 inhabitants, Bahía de Cadiz-Jerez with 642,784, and Granada with 531,944ⁱ.

The region's GDP and *per capita* income in 2013 were €156,878 M PPS and €18,700 PPS/inhabitant respectivelyⁱⁱ. With an economy in crisis since 2007, in the six years 2007-2013 Andalusia suffered a 7.9% drop in GDP (-5.9 % Spain and -1.8% the Eurozone). The crisis has especially affected construction (-46% of the GVA generated in the period 2007-2013), and industry (-10.8%). Conversely, the primary sector and services have grown slightlyⁱⁱⁱ. The services sector has created the highest number of jobs. This sector, and especially the tourism sub-sector, is strategic for the Andalusian economy.

Andalusia's lower level of GDP is due to the lower employment rate (77% of the European average), since productivity is close to the European average, even higher in some sectors^{iv}. The unemployment rate stood at 31.73 % in the third quarter of 2015^v

The gross value added generated by the Andalusian economy in 2013, expressed in current prices, was €128,705,734 M. This figure is broken down by major economic sectors as follows: 76.8% services, 12.0% industry, 6.1% construction, and 5.1% primary sector.^{vi}

Territory

Eight million hectares of Andalusia's total land area is agricultural or forest land; this can be broken down into cropland (48%), forest, bush and scrub land (35%), and land used mainly for pasture (17%)^{vii}

Andalusian croplands are home to olive trees, covering 1.5 million hectares, cereals, covering a quarter of all croplands, and fruit trees and industrial crops, which jointly account for nearly 20%^{viii}. With regard to the land area given over to ecological agriculture, in 2012 Andalusia this accounted for a total of 949,025 hectares. This can be broken down into croplands (17.4% of the total certified area), forestry and wildcrafting (17.2%), pasture meadow and forage crops (61.8%), and fallow and green manure (3.6%). Of the 165,516 hectares of certified croplands, olive trees account for 33.1%, cereals and pulses for 35.9%, and nuts, 22.9%^{ix}.

Andalusia is one of the largest reserves of plant biodiversity in Europe. It has more than 4,000 taxa, including species and subspecies, of which 484 are regional endemics and 466 are Iberian or Betic-Rifean. Andalusia has over 2.9 million hectares of land designated as Natura 2000 (European network of protected areas) sites^x.

Impacts of climate change

Andalusia is one of the regions of the planet which is most vulnerable to climate change, as studies from the IPCC and the EEA confirm. Ecosystems, economic activities and social equilibrium are at risk, the latter due to migration caused by droughts and famines. An example of the alteration of the physical environment in an adverse scenario is that between now and 2040 the coastline of the Gulf of Cadiz will recede by about 2 m and the Andalusian Mediterranean coastline by 1.5 m^{xi}

The Adaptation Programme of the Andalusian Climate Action Plan (PAAC) estimates that average maximum temperatures in Andalusia will be up by 5.4 degrees by the end of the 21st century in scenario A2 and that

average precipitation will fall by 7% in scenarios A2 and B2. This may have serious consequences for the community, such as a higher risk of forest fires, the over-exploitation of water resources, the intensification of desertification processes, and impacts on biodiversity, among others^{xii}.

Greenhouse gas emissions

Andalusia is an Autonomous Community of the Spanish state, for which the Spanish Constitution establishes a division of competences between the central and autonomous governments. The Statute of Autonomy of Andalusia differentiates between exclusive competences (for example, territorial planning), shared competences (for example, the environment), and executive competences (for example, compulsory expropriation). Thus provisions of the European Community, of the Spanish state, and of the Autonomous Community itself are all applicable to Andalusia.

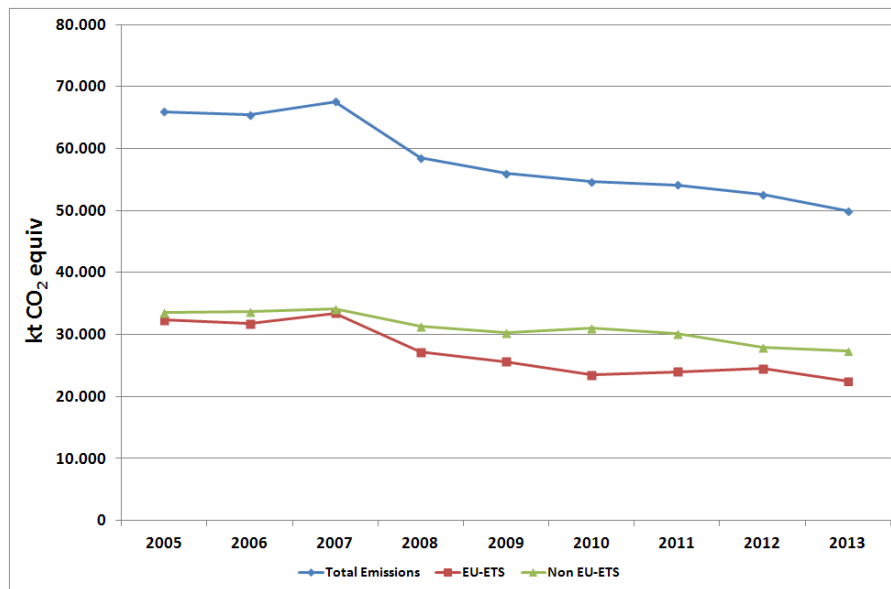
Consequently, the European Union Emissions Trading Scheme (EU-ETS) is applicable to Andalusia. It calls for a reduction of emissions aimed at the most important industrial facilities from an emissions viewpoint. Emissions regulated by the EU-ETS account for approximately half of all emissions. The rest are diffuse emissions, see Table 1

Table1 CO₂ equivalent emissions in Andalusia

SECTORS	Emissions 2013 (tCO_{2eq})
Power generation	10,792,179
Combined heat and power	2,983,669
Cement	3,061,363
Oil refining	3,120,263
Other EU-ETS sectors	2,544,067
EU-ETS subtotal	22,501,541
Transport	11,974,603
Agriculture	5,602,017
Industrial non-EU-ETS	2,767,778
Residential, commercial, inst.	2,588,408
Waste	2,838,500
Fluorinated gases	1,550,930
Other	72,288
Non-EU-ETS subtotal	27,394,525
TOTAL	49,896,066

Total emissions (EU-ETS emissions plus diffuse emissions) in the period 2005-2013 have been on a downward trend since 2007, as shown in Figure 1. This is partly due to the economic crisis, but the measures adopted have also played their part, as we will be seeing later.

Figure 1. Emissions trend in Andalusia in 2005-2013



We go on to analyse the two main components of total emissions, which are electricity generation and transport.

Emissions from electricity generation are mostly due to coal-fired thermal power plants, while the rest are due to combined cycle gas turbines. It should be noted that renewable electricity generation has seen a major upsurge in recent years, meeting 40% of demand in 2014.^{xiii}

The electricity generation park in Andalusia is highly diversified, with a total installed capacity of 15,771 MW in 2014. This capacity can be broken down into 38.8% from renewable energy sources, 38.3% from gas combined cycles, 13.1% from coal-fired thermal plants, 5.8% from cogeneration, 3.6% from pumping plants, and the remaining 0.1% from waste.^{xiv}

With regard to renewable energies, we should note that wind farms account for over half of the renewable energy installed capacity (54.4% in 2014) and that there is a major presence of plants using advanced technologies, such as solar thermal energy (16.3% in 2014).

Emissions from transport stated in Table 1 refer to all means of transport. Emissions from vehicular traffic, which is the most commonly used means of transport, account for 94.4% of the total, followed by emissions from marine traffic (3.2%), air traffic (2.1%) and rail traffic (0.3%).^{xv} Final energy consumption due to transport in Andalusia has fallen significantly since 2005, from 5,323 ktep to 4,360 ktep in 2014, which represents an 18.1% reduction. Looking at automotive fuels, we can see how gasoline consumption in 2014 fell by 42.3% compared to 2005, while diesel consumption increased in the years 2006 and 2007, before shrinking until 2012, and then growing slightly in 2013 and 2014. Diesel consumption in 2014 fell by 16.6% compared to the year 2005.^{xvi}

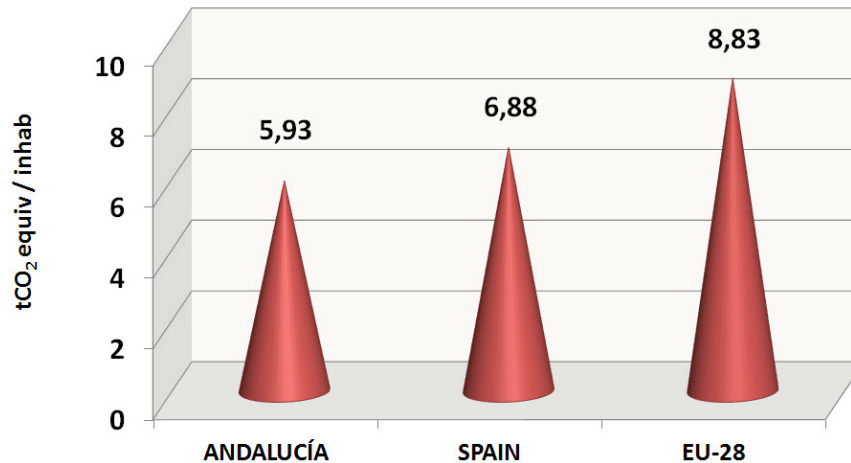
In parallel, the consumption of biofuels increased eightfold in the period 2005-2014. Even so, in 2014 it only represented 4% of the final energy consumed by transport, which means that there is still scope for the penetration of this type of fuel to improve.

Finally, we should highlight two issues regarding vehicular traffic emissions. The first is that Andalusia's

motorization rate, which had been rising since 1986, has flattened out since 2007, standing at 6.3 vehicles per every 10 inhabitants in 2014, slightly below the national average of 6.6. The second is that the vehicle stock has an increasingly higher proportion of low emission vehicles.

In Figure 2 we compare the *per capita* emission figure for Andalusia, Spain and EU-28:

Figure 2. Per capita emissions in 2013



Actions: the Andalusian law on climate change

In 2002 the Government Cabinet of Andalusia approved the Andalusian Climate Change Strategy and, subsequently, the Mitigation Programme (2007), the Adaptation Programme (2010) and the Communication Programme (2012).

The Government is currently working on the draft Andalusian bill on climate change, which contains resolutions regarding the exercise of competences and the administrative organization of climate change planning, awareness raising, public participation, and the creation of emissions mitigation instruments.

One key element of the draft bill is the Climate Action Plan, which is the general planning tool. It will be approved by Cabinet Decree and contains three programmes that must be implemented by all government departments.

Mitigation programme

Aimed at diffuse emissions, the purpose of this programme is to determine the measures required to meet the overall emissions target established by law, and to coordinate, monitor and drive the sectoral policies needed to reduce emissions. It is based on a multi-annual carbon budget, divided on a sectoral basis corresponding to executive competences. The law sets a diffuse emissions target to 2020 of 4.25 t CO₂ equivalent/inhabitant. This target will be reviewed a minimum of every six years.

This programme is the successor to a programme of the same name approved by Cabinet Resolution in 2007, based on 140 mitigation measures, the aim of which was to reduce total per capita emissions by the year 2012 by 19% over the 2004 figure. This target was exceeded, as a 20% reduction was achieved by 2012.

The draft bill also includes specific mitigation instruments, such as the Andalusian Emissions Offset System.

This is a scheme which obliges entities with high energy consumptions to monitor their emissions, produce a Reduction Plan and, if necessary, offset emissions that exceed the benchmark figure for their economic activity.

Meanwhile, the Carbon Footprint Registry of products and services was set up, based on life-cycle analyses. Inclusion in this registry may be an evaluation criterion for proposals for government contracts.

The Mitigation Programme also includes measures to enhance the region's carbon sink capacity, among which are emissions offset forestry projects.

Adaptation programme.

The draft bill aims for the Adaptation Programme to serve as a benchmark for the inclusion of adaptation measures in regional and local planning in order to minimize the Andalusia's vulnerability to the economic, environmental and social impacts of climate change. It aims to:

- Guide the programming of climate change adaptation actions of the Regional Government of Andalusia and local entities according to an assessment of assumable risks based on a common scenario.
- Broaden the knowledge base regarding climate change impacts on the Autonomous Community.
- Encourage the participation of the most vulnerable private sectors, identifying the opportunities created by adaptation.

The forerunner to this programme is the adaptation programme approved by Cabinet Resolution in 2010, in which, with the aid of the relevant Andalusian government departments, a number of basic reports on impacts and vulnerabilities in the following areas were produced:

- Tourism
- Livestock
- Water resources
- Territorial and urban planning
- Transport
- Biodiversity
- Energy
- Insurance
- Rise in the sea level
- Agriculture
- Forestry
- Forest fires
- Health
- Floods
- Soils

Communication programme.

According to the draft bill, this programme aims to promote the knowledge and awareness of climate change issues and citizen participation in those issues. This includes:

- Training activities in matters of mitigation and adaptation.
- Awareness-raising and environmental education actions to improve people's awareness of climate change in Andalusia.
- Social participation and environmental volunteer activities

The Communication Programme is the successor to a programme of the same name approved by Cabinet Resolution in 2012.

Municipal plans

The draft bill obliges local authorities to take climate change into consideration in their actions. Municipalities with linked populations of over 50,000 inhabitants will need to approve a Municipal Climate Change Plan, including mitigation, adaptation and communication actions, within the framework established in the Andalusian Climate Action Plan.

So far 550 Andalusian municipalities, representing nearly 85% of the population, have produced Sustainable Energy Action Plans within the framework of the Covenant of Mayors of the EU Directorate General for Climate Action (DG CLIMA). The Regional Ministry has a benchmark emissions inventory for the 774 municipalities of Andalusia for the period 2000-2013

The benchmark system

The draft bill on climate change also calls for:

- The use of the approved climate scenarios as a reference for planning in Andalusia.
- The production of a yearly Andalusian Greenhouse Gas Emissions Inventory.
- The creation of a network of climate change observatories, consisting of an interrelated group of awareness-raising agents belonging to the Andalusian R&D&i system, linked by cooperation agreements within the framework of a common work programme.
- The inclusion of climate change as a specific objective of the Andalusian Statistical Plan

The energy strategy

The energy model pursued by Andalusia is based on the gradual establishment of a low carbon economy and, as a result, an economy with lower greenhouse gas emissions. This is to be achieved by the use of clean and autochthonous energy resources, which will enable the region to reduce its energy dependence on external sources and will promote economic growth and increased competitiveness while protecting the environment.

The objectives of the Andalusian energy policy in the 2020 scenario are as follows:

- To reduce the business-as-usual consumption of primary energy by 25%
- To provide 25% of the final gross energy consumption using renewable energy sources
- To self-consume 5% of the electricity generated from renewable sources
- To decarbonize energy consumption by 30% compared to the 2007 figure
- To achieve a 15% improvement in energy supply quality

Further information

Regional Ministry of the Environment and Territorial Planning

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SIMA, IECA, Municipal census. The Metropolitan Area of Seville is considered to be made up of 42 municipalities.

ii *Eurostat, NUTS2 regions*

iii *Economic Plan for Andalusia 2014-2020*

iv *Economic Plan for Andalusia 2014-2020. In the primary sector, construction and industry, hourly labour productivity in Andalusia is higher than the Europe 28 average (228%, 148%, and 110%). For services the figure is lower (92%)*

v *Unicaja.*

vi *Institute of Statistics and Cartography of Andalusia.*

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- vii *Regional Ministry for Agriculture, Fishing and Rural Development, Agrarian and Fishing Statistics Yearbook of Andalusia, 2012*
- viii *Regional Ministry for Agriculture, Fishing and Rural Development, Agrarian and Fishing Statistics Yearbook of Andalusia, 2012*
- ix *Economic Plan for Andalusia 2014-2020*
- x *Economic Plan for Andalusia 2014-2020*
- xi *Environmental Hydraulics Institute of Cantabria*
- xii *Andalusian Climate Action Plan Adaptation Programme, 2011*
- xiii *Andalusian Energy Agency*
- xiv *Andalusian Energy Agency*
- xv *National Inventory of Greenhouse Gas Emissions breakdown for Andalusia 1990-2013, 2015 edition.*
- xvi *Andalusian Energy Agency*