ENERGY

2.10

Environmental profile of Spain 2012

According to the data of the United Nations, one out of every five people do not have access to domestic electricity and almost 40% of the world population depend on wood, coal or animal waste for cooking. Furthermore, only 15% of world energy is generated by renewable energy.

With the aim of 'ensuring universal access to modern energy services; reducing global energy intensity by 40%; and increasing the use of renewable energy at global level by 30%", the UN General Assembly launched in 2011 the initiative Sustainable Energy for All headed by the UN General Secretary Ban Ki-moon. This initiative aims to mobilise governments, the private sector and civil society across the world to achieve these objectives. The European Commission, within the framework of Sustainable Energy for All, announced in April 2012 a new European initiative called Energising Development, which aims to bring sustainable energy to 500 million people in developing countries by 2030.

Within the framework of the initiative, the UN General Assembly declared 2012 as the International Year of Sustainable Energy for All, with the objective of raising awareness about the importance of sustainable energy and at the same time increasing access to energy and energy efficiency at local, national, regional and international level. In Spain, during 2012, to commemorate this International Year, initiatives led by the Spanish National

Research Council (CSIC) were carried out in order to raise awareness of energy related topics. A specific website was created (http://www.energia2012.es), containing educational resources to promote knowledge of energy, and an exhibition called 'The energy moves us. Science for a cleaner, more sustainable and more accessible energy' was created.

Regarding European policy, in April 2013 the Commission launched a consultation on the framework for future energy policies and the climate for the year 2030. This consultation aims to gather the points of view of the member states, institutions and other stakeholders, in relation to the framework of future policies on climate and energy policies within that timeframe. As a starting document for the consultation, the Commission drew up a 'green paper', which set out the current framework and the goals achieved up to now, as well as establishing the key points for the consultation and proposing questions to guide the contributions from interested parties.

KEY MESSAGES

- In 2010 Spain had the sixth lowest primary energy intensity of the EU-27, according to Eurostat.
- For the first time since 2005 there was an increase in energy-related GHG emissions intensity, with these being 17.64% higher than in 2010.
- Renewable energy still occupies an important place in the primary energy demand structure, although in 2011 this suffered a decrease of 1.85% in its contribution to the total. Spain is the sixth leading country in terms of the generation of electricity from renewable sources.
- Between 1990 and 2011, the energy sector improved its eco-efficiency, decoupling economic growth from energy consumption and in terms of integrating renewables into its economic structures, thereby reducing GHG emissions.

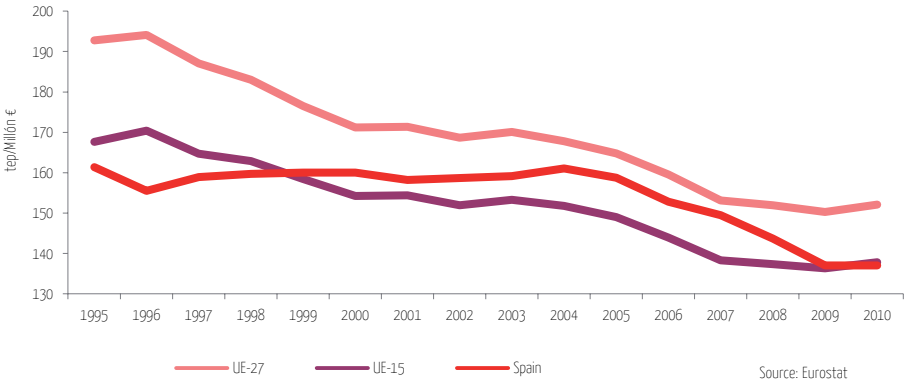
INDICATORS

- Primary energy intensity
- Energy-related GHG emissions intensity
- Renewable energy
- Enviromental efficiency in energy

Primary energy intensity

In 2010 Spain had the sixth lowest primary energy intensity of the EU-27, according to Eurostat

Primary energy intensity



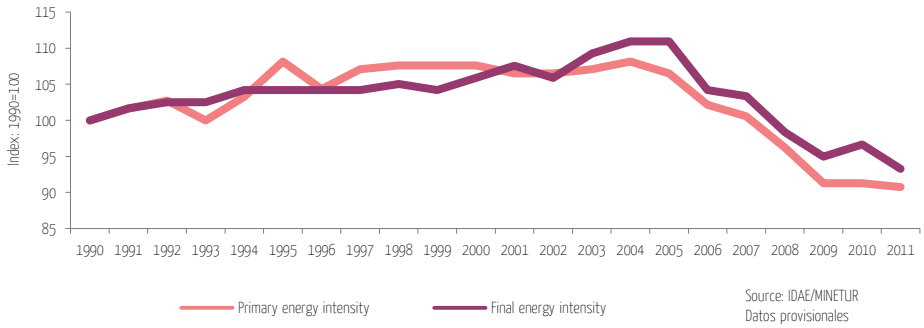
According to Eurostat data, in 2010 the primary energy intensity in Spain maintained almost the same levels as the previous year: around 137 toe/million euros.

The energy intensity of the Spanish economy has decreased at a significant rate since 2005, to reach the minimum value in the Eurostat series (1990-2010), 137.02 toe/million euros. In other words, in Spain, to produce one unit of wealth, increasingly less energy is needed.

With respect to the European average, Spain continues, as in previous years, to be below the value for the EU-27 and, for the first time since 1998, below the EU-15 average, although the difference is very small (0.8 toe/million euros). At an individual level, five countries had a primary energy intensity below the Spanish figures: Ireland, Denmark, United Kingdom, Italy and Austria.

If we compare 2010 values with those for 2000, the primary energy intensity of Spain decreased by 14.4%, the EU-27 by 11.2% and the EU-15 by 10.7%. The Annual Report of Energy Indicators (Relevant Indicators. Year 2011) of IDAE, gives provisional data concerning energy intensity, both primary and final, for the 1990-2011 series. Taking 1990 as a base 1990 (index 1990=100), it can be seen that both energy intensities decrease, but

Energy intensity in Spain



final energy intensity does so after increasing 1.77% in 2010 and primary energy intensity does so having stayed the same, with no movement, that year. Therefore, in 2011 the values of both intensities in 2011 are similar, as a direct consequence of the higher decrease in final energy intensity. In this process the change in the structure of electricity generation has been fundamental, as indicated by the publication Energy in Spain, 2011, with greater contribution of energy from fossil fuels and less efficiency in transformation.

NOTES

- IDAE calculates the global intensities, expressed in constant currency of the year 2000, from GDP figures published by the National Statistics Institute in February 2013, in the National Accounts of Spain (CNE) base 2008, in conformity with the new European System of Accounts and in line with the Regulation 715/2010 of the Commission, modifying Regulation (CE) 2223/96 of the Council concerning the adaptations of the national accounts.

SOURCES

- EUROSTAT, 2013. Energy Intensity of the Economy- annual data (nrg_ind_332a). Information from the web page. Available in: Statistics/Statistics per theme/Environment and Energy/Energy
- Institute for Diversification and Energy Saving (IDAE). Ministry of Industry, Energy and Tourism. Annual Report of Energetic Indicators. Main Indicators. Year 2011. Available in: IDAE/Eficiencia y Renovables: informes y estadísticas.
- Ministry of Industry, Energy and Tourism, 2012. The Energy in Spain 2011.

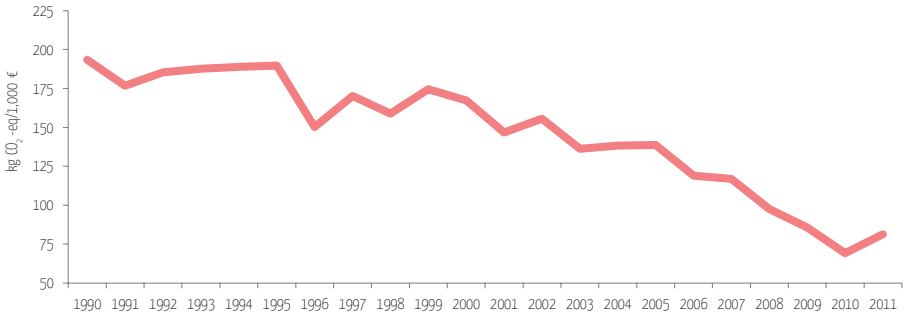
FURTHER INFORMATION

- http://epp.eurostat.ec.europa.eu
- http://www.minetur.es
- http://www.idae.es

Energy-related GHG emissions intensity

Energy-related GHG emissions intensity increased for the first time since 2005, being 17.64% higher than in 2010

Intensity of energy-related GHG emissions



Source: MAGRAMA and Eurostat

In 2011 GHG emissions from energy production increased by 19.26%, from 72,551.37 to 86,526.04 Gg equivalent of CO_2. This increase in emissions is related to the behaviour of the primary energy intensity indicator analysed above. In 2011 there was a change in the structure of electricity generation in Spain, with greater use of fossil fuels such as coal and less efficiency in transformation. As indicated by Energy in Spain 2011, in this year 7.4% more coal was consumed than in 2010 as a primary energy source, with a total of 12,456 ktoe. This increase in the use of coal by thermal power plants is, to a large extent, responsible for the increase in GHG emissions and is related to the fall in renewable energy production from the two largest sources, hydro-electric and wind, due to the fall in the available hydro-electric and wind energies in 2011 (Energy in Spain 2011).

At the same time, GDP at current prices in Spain has increased to a lesser extent than emissions, 1.38%. The GDP in 2011 was 1,063,355 million euros, according to Eurostat data, and 1,048,883 million euros in 2010. This increase, although modest, was larger than the one experienced during the period 2009-2010, a period in which it barely moved (0.08%).

The ratio between the quantity of energy-related GHG and the GDP gives the GHG emissions intensity indicator shown on the graph. It can be seen that, as in 2011, the GHG emissions

intensity of the energy production industry has increased, as the generation of 1000 euros of wealth requires more emissions than in the previous year. In particular, in 2011 the emissions intensity was 81.37 kg of CO_2-eq for each 1,000 euros of GDP, which is 17.64% more than in 2010, when the emissions intensity reached the lowest level of the series analysed, at 69.17 kg of CO_2-eq/1,000 euros.

In 2011, the intensity of the energy-related GHG emissions was 57.91% less than in 1990, the reference year for the comparison of emissions and the year which registered the maximum intensity of the series (193.32 kg of CO_2-eq/1000 euros). With respect to 2005 it was 41.34% lower.

NOTES

- For the purpose of calculating this indicator, the emissions of GHG used are the total emissions from combustion in the energy-sector industries included under the Energy heading (as per the IPCC categories). These emissions comprise the six GHG covered by the Kyoto Protocol and are expressed as CO_2-equivalent. The combustion activities covered by the energy category include energy generation, combustion at refineries and transformation of combustible fuels, as well as combustion in mining. The emissions considered are those in the '1.1. Group of Energy Industries', according to the CRF classification, which includes thermal power stations, oil refineries and fuel transformation.
- The six main GHG covered by the Kyoto Protocol are, in order of importance: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and fluorinated gases, which include perfluorocarbons (PFC), hydrofluorocarbons (HFC) and sulphur hexafluoride (SF_6), although this latter have no impact in the energy sector as they are only emitted in industrial processes.
- The GDP data are at market prices, calculated at current prices.

SOURCES

- Emission data: MAGRAMA, 2013. Inventory on GHG Emissions in Spain. Years 1990-2011. Communication to the Secretariat of the Framework Convention on Climate Change and Kyoto Protocol. Directorate-General of Environmental Quality and Assessment and Natural Environment. MAGRAMA. Available in: Eionet/Reportnet/CDR Repository/Spain/United Nations (UN)/UNFCCC-GHG Inventories/Spain GHG Inventory.
- GDP data: Eurostat, 2013. GDP and main components- Current prices (nama_gdp_c). Information from the web page. Available in: statistics/statistics per theme/National accounts (including GDP).
- Ministry of Industry, Energy and Tourism (MINETUR), 2012. The energy in Spain 2011

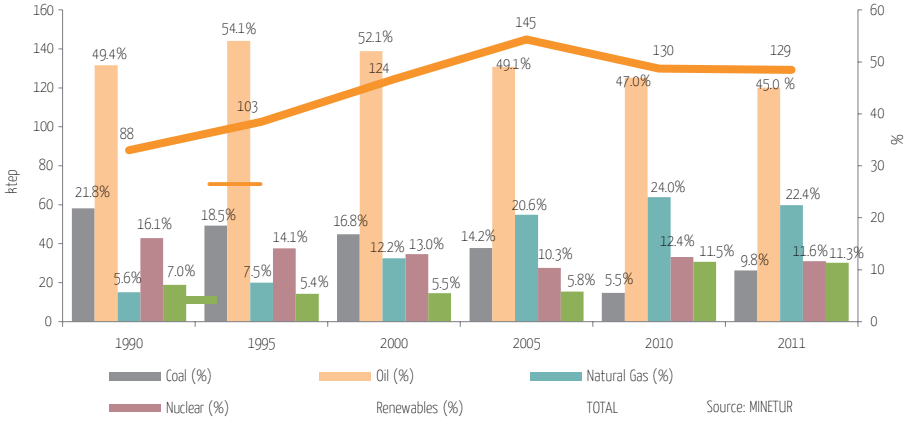
FURTHER INFORMATION

- http://www.eionet.europa.eu
- http://epp.eurostat.ec.europa.eu
- http://www.minetur.es
- http://www.magrama.es
- http://www.idae.es

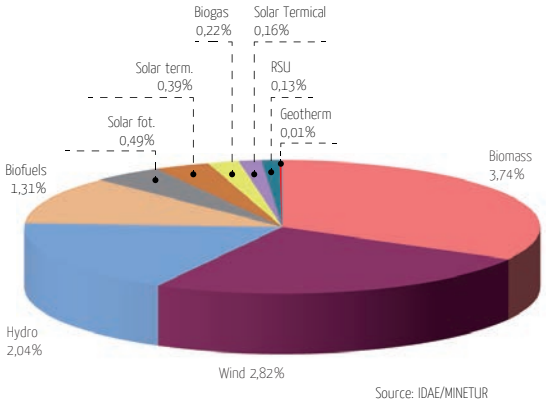
Renewable energy

Although there was a slight decrease in 2011, renewable energy still has a significant role in the structure of primary energy consumption, and puts Spain sixth in terms of electricity generation from renewable sources.

Primary energy consumption and distribution per type of source



Renewables. Year 2011 (%)



Source: IDAE/MINETUR

In 2011, primary energy consumption in Spain decreased by 0.41% compared to the previous year, standing at 129,298 ktoe. With respect to 1990 levels, the primary energy demand in 2011 was 47% higher; nevertheless, from 2005, the trend has been downward, with a reduction of 10.78% with respect to that year.

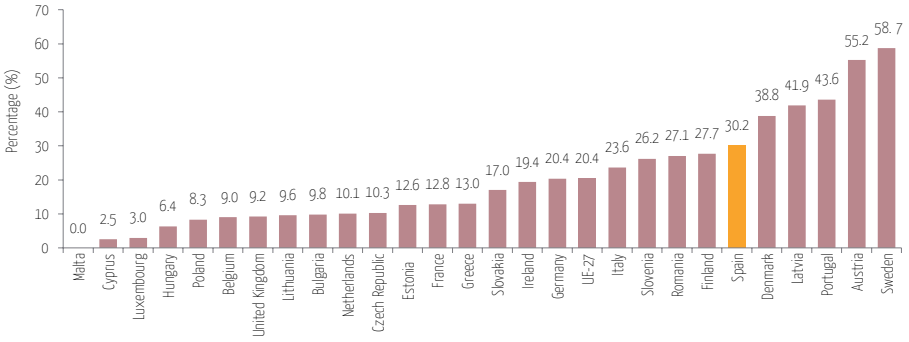
In the distribution of primary energy consumption by source type, a change can be observed with respect to 2010. The energy consumption from coal increased by 77.41%, making up 9.8% of the total. At the same time, the conventional energy sources, oil, natural gas and nuclear energy, contributed less. Despite the decline, oil and natural gas still hold first and second places in terms of their contribution to primary energy demand, representing respectively 45.04% and 22.4%. Nuclear energy is the third largest source, providing 11.6%.

For renewable energy, according to data from MINETUR, in 2011 14,666.9 ktoe were consumed from these primary energy sources, 1.85% less than in the previous year. The contribution with respect to the total primary energy consumed in Spain also fell, from 11.5% in 2010 to 11.3% in 2011. In comparison with 1990 levels, renewable energy has increased its contribution by 4.29 points in terms of the structure of primary energy demand.

In terms of types of renewable energy source, the largest decrease in primary demand was seen in hydro-electric, with a fall of 27.68%, going from 2.8% in 2010 to 2.04% of the total primary energy consumed in 2011. Counteracting this reduction in hydro-electric primary energy consumption, there was an increase in the other types of renewable energy. The group made up of wind, solar and geothermal power grew its demand by 3.21%, from 4,858.1 ktoe to 5,014 ktoe, increasing by 0.14 percentage points its contributions to the primary energy structure. The group comprising biomass, biofuels and wastes saw even greater growth, increasing its demand from 6,447.4 ktoe to 7,021.5 ktoe, representing an increase of 8.90% and an improvement of 0.5 points, to stand at 5.4%.

At an individual level, according to data provided by IDAE, the renewable sources of primary energy with the greatest representation in 2011, in addition to hydro-electric were, in this order: biomass, wind, biofuels and solar (including photovoltaic, thermoelectric and thermal). Out of these, biomass, biofuels and solar improved their representation in the energy mix by 0.23, 0.22 and 0.25 percentage points, respectively, over the previous year. Wind energy, on the other hand, fell 0.11 points. The use of biogas increased by 0.01 its contribution, while waste and geothermal practically maintained their 2010 levels.

Percentage of electricity from renewable energies within EU-27. Year 2011



Source: Eurostat

Analysing the structure of electricity generation in Spain, we can see, according to the information provided by IDAE, a decrease in renewable energy from 32.43% to 29.55%, due mainly to the reduction in hydro-electric. Despite this decrease, renewables maintained their position as the leading electricity-generating source, above even natural gas (28.97%) and coal (15.4%), taking into consideration that this latter increased its contribution by 6.67 percentage points from 2010 to 2011. These figures put Spain in sixth place in terms of electricity-generation from renewables within the EU, according to Eurostat data

NOTES

- The sources included as renewable are: biomass, biofuels, wastes, wind, solar, geothermal and hydro-electric.

SOURCES

- Primary energy consumption: MINETUR, 2013. Quarterly Bulletin on the Energy Situation. Fourth quarter 2012. Available on the web site.
- Contribution of renewable energy and structure of electric generation: data provided by the Department of General Coordination of the Institute for the Diversification and Energy Saving, IDAE. MINETUR. 2013.
- EUROSTAT 2013. Electricity generated from renewable sources (nrg_ind_333a). Information provided by the web page. Available in: Data base per theme/Environment and energy/Energy/Main indicators-Energy statistics/Energy statistics-Structural indicators in energy-annual data.

MÁS INFORMACIÓN

- http://www.idae.es
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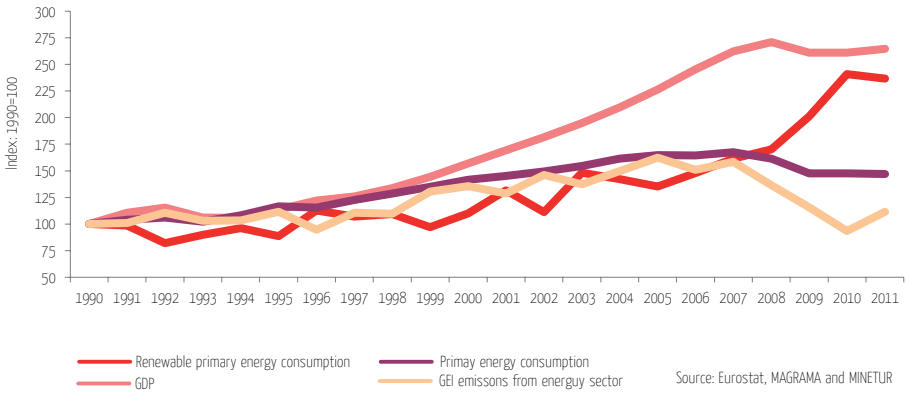
- http://epp.eurostat.ec.europa.eu

Enviromental efficiency in energy

Between 1990 and 2011, the energy sector improved its environmental efficiency, decoupling economic growth and energy consumption and integrating renewable energy into its production structure, thereby reducing GHG emissions

Environmental efficiency in the energy sector



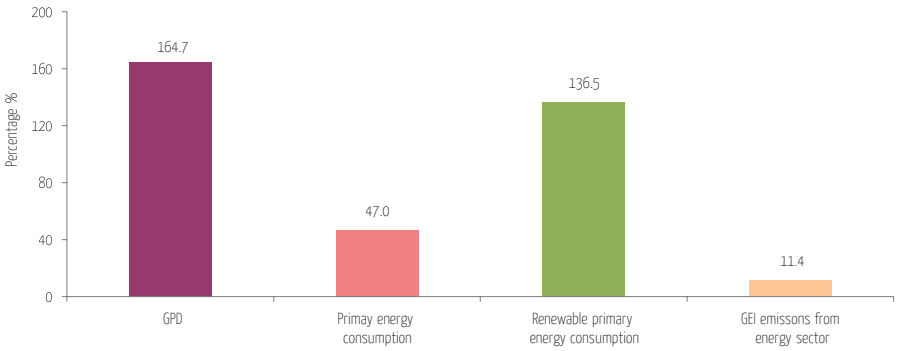
Source: Eurostat, MAGRAMA and MINETUR

Economic growth in Spain, represented here by GDP (at current prices), can be grouped within the series studied into three different periods: 1990-1995; 1996-2008 and 2009-2011.

Between 1990 and 1995 GDP grows moderately, as do primary energy demand and GHG emissions. From 1996 up to 2008, the economy underwent strong growth, as seen by the curve on the line representing GDP at current prices. In 2008, GDP was 170.81% above 1990 values. In line with this, the primary energy demand also grew between 1996 and 2007, but at a slower rate and with a loosening of the trend over the period, in spite of the continuous growth of GDP at current prices. Along with primary energy demand, GHG emissions of the energy-production sector also increased, though it rose and fell throughout the series. In 2007, primary energy demand was 67.38% above 1990 values, and GHG emissions 58.57%. At the same time, there is a growing overall trend for renewable primary energy consumption to rise when GHG emissions fall, and vice versa.

The third and last period would be between 2009 and 2011. In 2009, GDP declined by 3.65% falling to 1,048,060 million euros; in 2010 it stayed at practically the same level as in 2009, and in 2011 it saw a small upturn to reach 1,063,355 million euros. The change in energy consumption trends is produced one year before that of GDP. Already in 2008 a drop in the primary energy consumption can be seen, that continues in 2009, with a fall over these two years of 11.77% with respect to 2007. In 2010 and 2011, primary energy consumption stabilised at around 129,000 ktoe. Although there was variable behaviour in terms of energy consumption between 2007 and 2011, GHG emissions saw a constant fall up to the year 2010, with a slight increase in 2011. Renewable primary energy consumption followed the opposite trend, growing between 2008 and 2010 and falling in 2011. The behaviour seen on the graph during the years 2009, 2010 and 2011 should be highlighted because, although primary energy consumption stayed constant, some variations were produced in terms of renewable primary energy consumption and therefore GHG emissions. This confirms the effect these sources have on the environmental efficiency of the energy sector.

Environmental efficiency of the energy sector. Changes between 1990-2011



Source: MAGRAMA, MINETUR, IDAE

An overall assessment of the period 1990-2011 shows that GDP at current prices grew by 164.7%, while primary energy demand increased by 47% and GHG emissions by 11.4%. Renewable-related primary energy consumption experienced a net growth of 136.5% with respect to 1990.

NOTAS

- Las emisiones de Gases de Efecto Invernadero contempladas para calcular el indicador se refieren a las emisiones totales de las actividades de combustión de combustibles de las industrias del sector energético incluidas dentro del procesado de la energía (según categorías IPCC) y originadas por los seis GEI contemplados en el Protocolo de Kioto, expresadas como CO_2 equivalente. Las emisiones consideradas se corresponden con el grupo "1.A.1 Industrias del sector energético" según la nomenclatura CRF, que incluye las centrales térmicas, las refinerías de petróleo y la transformación de combustibles.

FUENTES

- Datos de emisiones: Eionet, 2013. *Inventario de Emisiones de Gases de Efecto Invernadero de España. Años 1990-2011*. Comunicación a la Secretaria del Convenio Marco sobre Cambio Climático y Protocolo de Kioto. Dirección General de Calidad y Evaluación Ambiental y Medio Natural. MAGRAMA. Consultable en: Eionet/Reportnet/CDR Repository/Spain/United Nations (UN)/UNFCCC-GHG Inventories/Spain GHG Inventory.
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