

17 October, 2014

Economic-environmental Indicators – Air emissions accounts 1995-2012

Air emissions accounts: Global Warming Potential kept on reducing in 2012, although less intensively than the economic activity

In 2012, according to Air Emissions Accounts, the Global Warming Potential registered a decrease of 1.8% (equal to the reduction observed in 2011), reaching a new minimum for the series started in 1995. However, this reduction was lower than the decreases observed in the 2006-2010 period, what is partly explained by the low rainfall level in 2011 and 2012, which implied a lower production of electricity by hydropower plants and the consequent use of more polluting energy sources, namely coal. In 2012 GVA decreased (-2.6%), more intensively than Global Warming Potential.

Statistics Portugal publishes Air Emission Accounts data for 2012 and revised data for the period 1995 to 2011. This revision was essentially motivated by the incorporation of the revisions of National System of Emissions and Environmental Pollutants Removal Inventory (NSEEPRI) made by the Portuguese Environmental Agency and changes resulting from the adoption of the new base 2011 of the Portuguese National Accounts (PNA) for the allocation of emissions to industries and households. The new base of the PNA, released in 29th august 2014, and substituting the 2006 base, implements the new European System of National and Regional Accounts (ESA 2010).

On the Statistics Portugal website, in the National Accounts release area (section of Satellite Accounts¹) tables with more detailed information are available.

Air Emissions Accounts allows for an analysis of the environmental implications of the country production standards, since their results, which are consistent with the National Accounts, enable the development of an integrated environmental-economic analysis.

¹ http://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_cnacionais2010&contexto=cs&selTab=tab3&perfil=220674570&INST=220617355&xlang=en

1. ENVIRONMENTAL INDICATORS

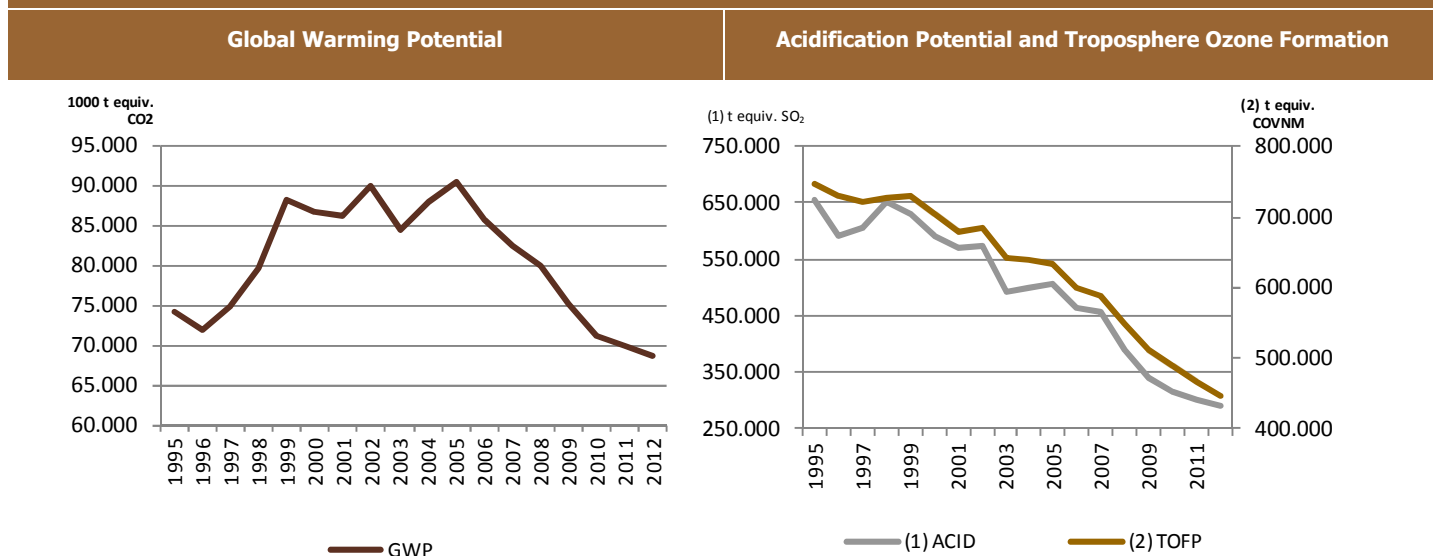
For the assessment of environmental effects of various gases emitted by economic activity and households there are three important indicators: Global Warming Potential (GWP), Acidification Potential (ACID) and Troposphere Ozone Formation (TOFP).

Chart 1 presents the evolution of these three environmental indicators for the period 1995-2012. **GWP** increased significantly from 1997 to 1999, after presenting an irregular behaviour in the period 2000-2005 (reference to the peaks of 2002 and 2005, justified by the low level of water in reservoirs, with consequent change in the mode of electricity production, using more polluting energy sources than water). After this period, the indicator has recorded successive decreases, largely explained by the introduction of natural gas (diminishing the consumption needs of coal and fuel oil), by efficiency improvements in industrial production processes and by the increase in installed capacity of electricity production from wind power. However, in 2011 and 2012, the reductions of this indicator (-1.8% in both years) were not as pronounced as in previous years (average annual decreases of 4.7% from 2006 to 2010). This was mainly a result of the low level of rainfall recorded in these two years, thereby decreasing the production of electricity by hydroelectric plants. Note that in 2012 the annual average amount of rainfall was much lower than the normal 1971-2000.

ACID presents a sharp downward trend (the average rate of change in the period 1995-2012 corresponds to -4.5%), diminishing 3.7% in 2012, associated to the emissions reductions of the oxides of nitrogen (NO_x) and of the sulfur oxides (SO_x), since ammonia (NH₃) emissions have been relatively stable since 2006. The oxides of nitrogen (NO_x), the component with higher relative weight and that have as major emission sources the branches Industry and Transport, have been reducing significantly since 2006. This trend is explained, largely, by technical developments in engines, which made them less polluting, in compliance with existing European legislation in this field, and by the significant reduction in fuel consumption in 2011 and 2012. The sulfur oxides (SO_x) emissions result mainly from the burning of coal and fuel oil by industry and energy, water and sanitation branches. The decrease of these emissions in recent years is explained by the replacement of these fuels by natural gas and by technological adaptations, following the entry into force, in 2000, of legislation that limits the sulphur emissions from certain types of liquid fuels derived from petroleum.

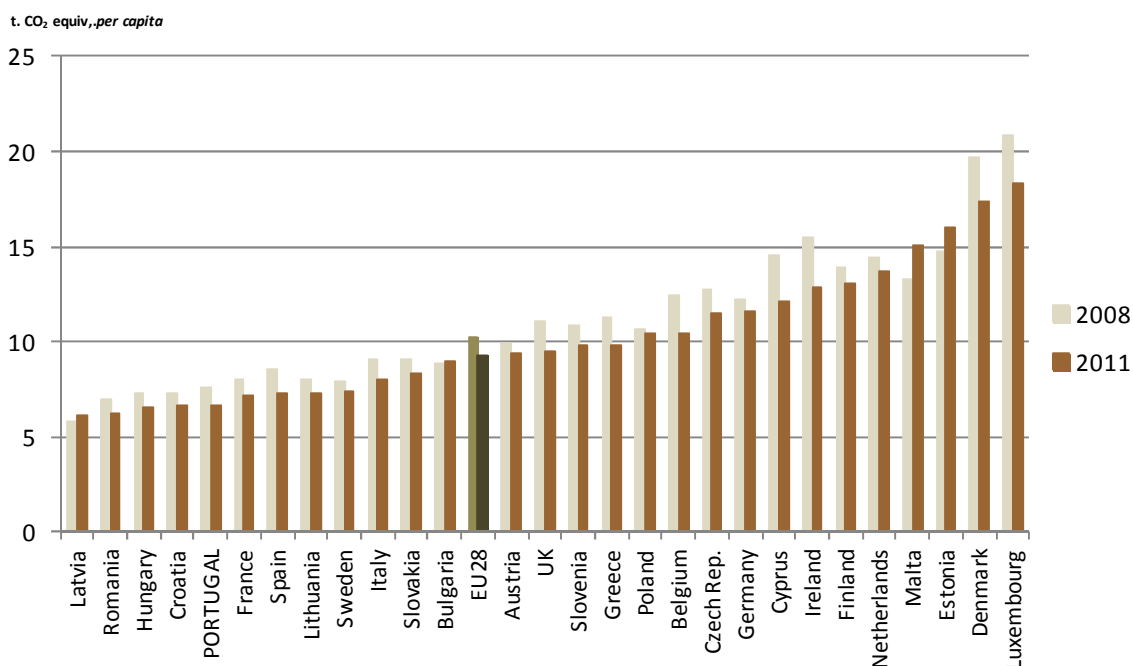
TOFP also showed a downward trend, more pronounced since 2006. The behaviour of this indicator was mainly determined by the evolution of emissions of nitrogen oxides (NO_x), previously described.

Chart 1. Evolution of environmental indicators



Since that comparable data only exists at European level for the period 2008-2011, the indicator "GWP per capita" is analyzed only for that period. Portugal showed lower values for this indicator comparing to most countries in the EU28, presenting the fifth lowest value in 2008 and 2011. In 2011, the EU28 average was 9.28 tonnes of CO₂ equivalent *per capita* and in Portugal was 6.66 tonnes of CO₂ equivalent *per capita* (i.e. 71.8 % of the EU28 average).

Chart 2. GWP per capita in EU28, in 2008 and 2011

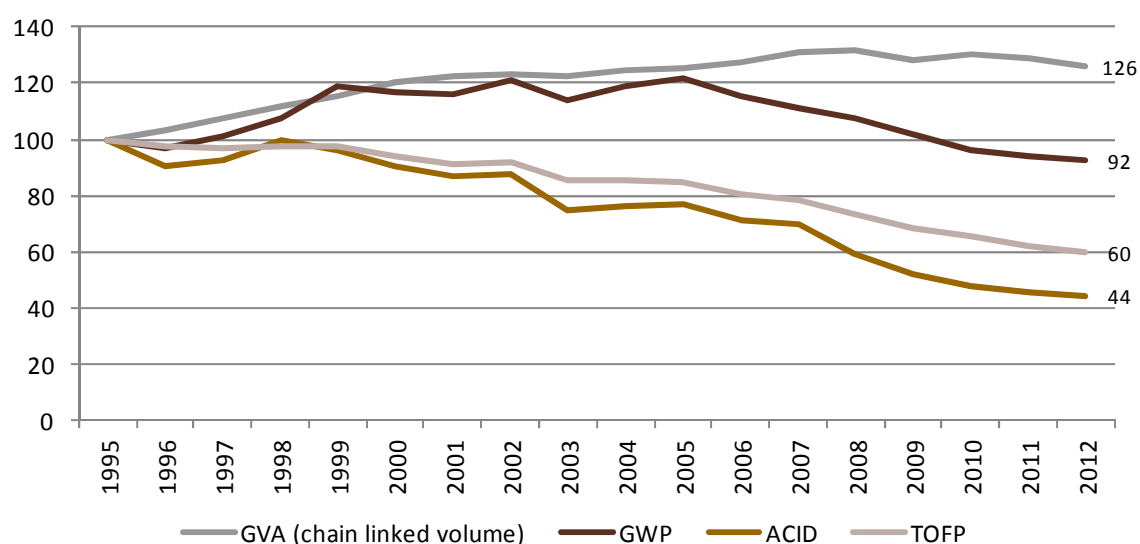


2. ENVIRONMENTAL-ECONOMIC INDICATORS

In this section physical environmental data and economic data are compared, using, as much as possible, the same classification and rules of the National Accounts, in order to evaluate the environmental efficiency of the economy in the specific field of atmospheric emissions.

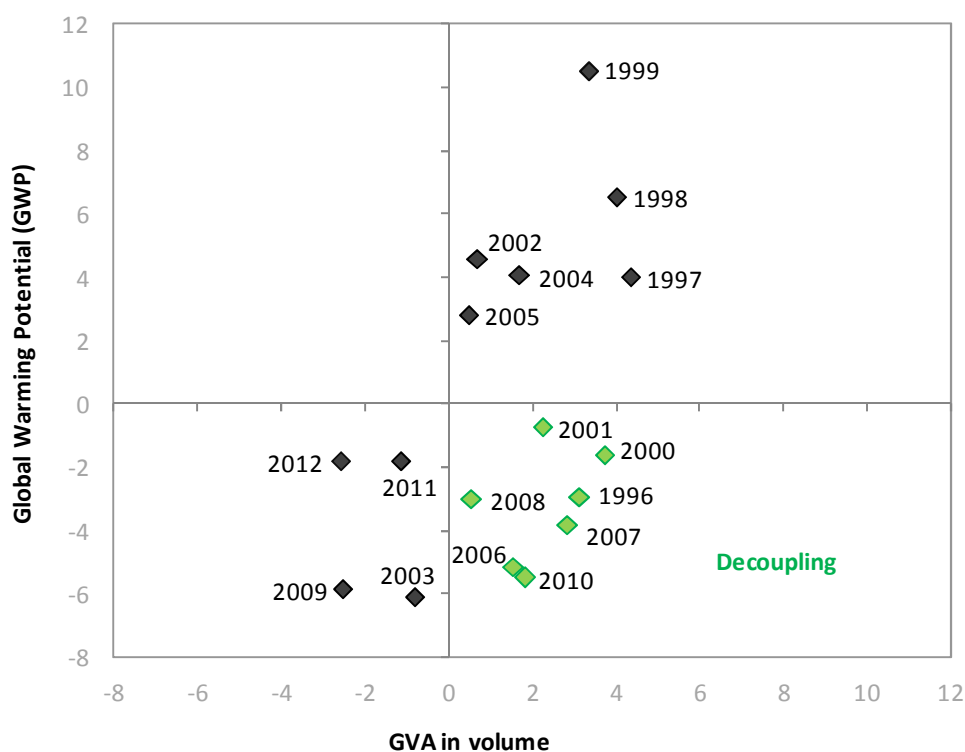
Chart 3 allows comparing the evolution of the Gross Value Added (GVA) in volume with the three above mentioned environmental indicators. In accumulated terms, it can be observed that all environmental indicators showed a decrease between 1995 and 2012, differing from the GVA behaviour.

Chart 3 – Evolution of GVA, in volume, and of the environmental indicators (1995 = 100)



The GWP showed an upwards trend until 2005, following the evolution of GVA, although presenting, in general, a lower average annual rate in this period. The period between 2006 and 2011 observed successive reductions of GWP, although GVA has increased in 2007, 2008 and 2010, representing a decoupling between economic activity and this environmental indicator. In 2009 and 2011, the GWP decreased more than GVA, in opposition to what happened in 2012, when the GWP diminished (-1.8%), but less intensively than GVA (-2.6%).

Chart 4 – Decoupling between GWP and GVA (volume change rates)



The emissions level is highly dependent on the types of energy used by the Energy, water and sanitation industry, since it is the branch with the highest relative weight, representing, on average, about 30% of total emissions of the GWP series. The water source has a significant weight in this industry, which is, in turn, significantly conditioned by the rainfall levels recorded every year. However, this conditioning has been attenuated since 2005, with the gradual increase in the share of wind energy production in total electricity production. Note that 2012 was the first year in which the weight of wind energy production (22.0%) in total electricity production exceeded the water source weight (14.3%). In 2004 wind power accounted for only 1.8% of total electricity production.

The ACID and the TOFP showed a downwards trend since 1995, the beginning of the series, in dissociation with economic activity in most years.