September 30th, 2010

Economic-environmental Indicators – NAMEA

1995 - 2008

Air Emissions Accounts

In 2008, it is estimated that the intensity of the greenhouse gases emissions has reduced by 2.1%, in relation to 2007. In fact, in 2007 the emissions of CO_2 were 579.4 g by Euro of Value Added generated, whilst in 2008 corresponded to 567.1 g of CO_2. Since 2006, this behaviour stressed the trend of a lower variation rate of these emissions relatively to the changes in economic activity.

Environmental Accounts encompasses a set of statistical projects that have underlying the conceptual framework of National Accounts making the linkage between environment and economy and explain how economic activities and households interact with the environment.

For this specific case and as published in previous years, Statistics Portugal report data on air emissions of economic agents for 2008 and revises the series for the period of 1995 to 2007.

The current Air Emissions Accounts' data incorporates the new updated information released by the National Environmental Agency (Agência Portuguesa do Ambiente) and adjusts the series to the new benchmark of National Accounts – Base 2006.

The different gases emitted by economic activity may be grouped in two indicators that allow the quantification of two important environmental impacts: the greenhouse effect and acidification.

The Global Warming Potential (GWP) is calculated through the combination of the most contributing three gases to the greenhouse effect: Carbon Dioxide (CO_2), Nitrous oxide (N_2O) and Methane (CH_4).

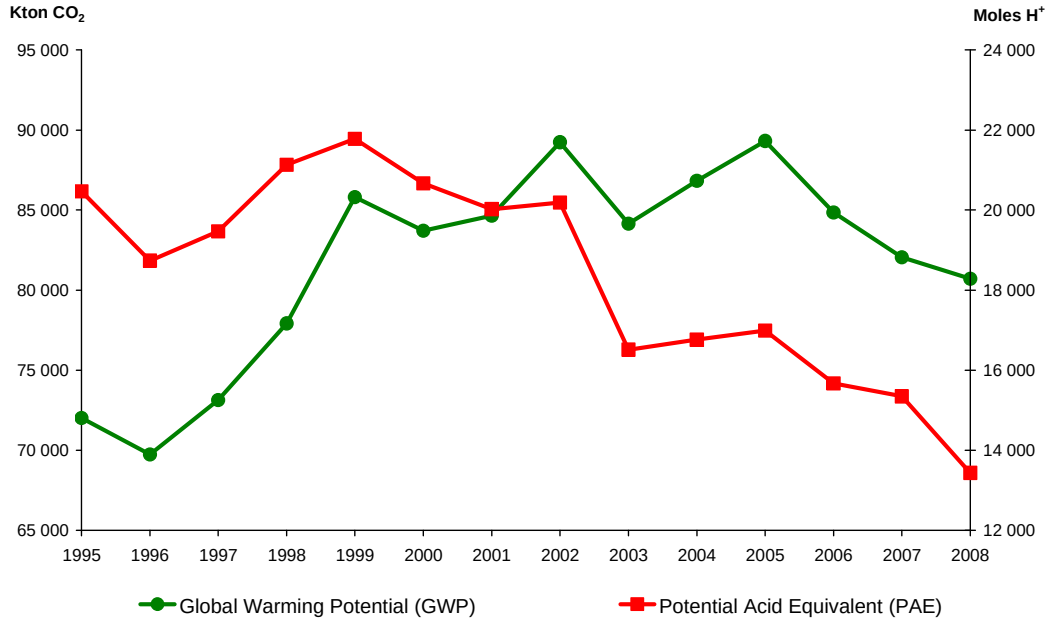
The Potential Acidification Equivalent (PAE) is calculated through the combination of the most contributing three gases to the environment acidification: Nitrogen Oxides (NO_X), Sulphur Oxides (SO_X) and Ammonia (NH_3).

Graph 1 shows an evolution of environment indicators for the period 1995-2008. Global Warming Potential increases until 1999. Between 2000 and 2006 this indicator presents a relatively stable path (except for the years of 2002 and 2005 due to the lack of water in the dam bayou reservoirs along with the resulting changes in the means of producing electricity, using more fuel oil, natural gas and coal), and onwards GWP starts decreasing.

This evolution can also be explained by the introduction of natural gas that which burns more cleanly than coal or fuel oil used by manufacture and power plants and also due to efficiency improvements in industrial production processes.

The Potential Acidification Equivalent registered a decrease of 5.2%, in average, by year, since 1999.

Graph 1 – Evolution of the environment indicators GWP e PAE



Air Emissions Accounts enable the compilation of economic-environmental indicators that measure the environmental efficiency of an economy. One of these measures consists in the relation between the generation of income with its associated air emissions.

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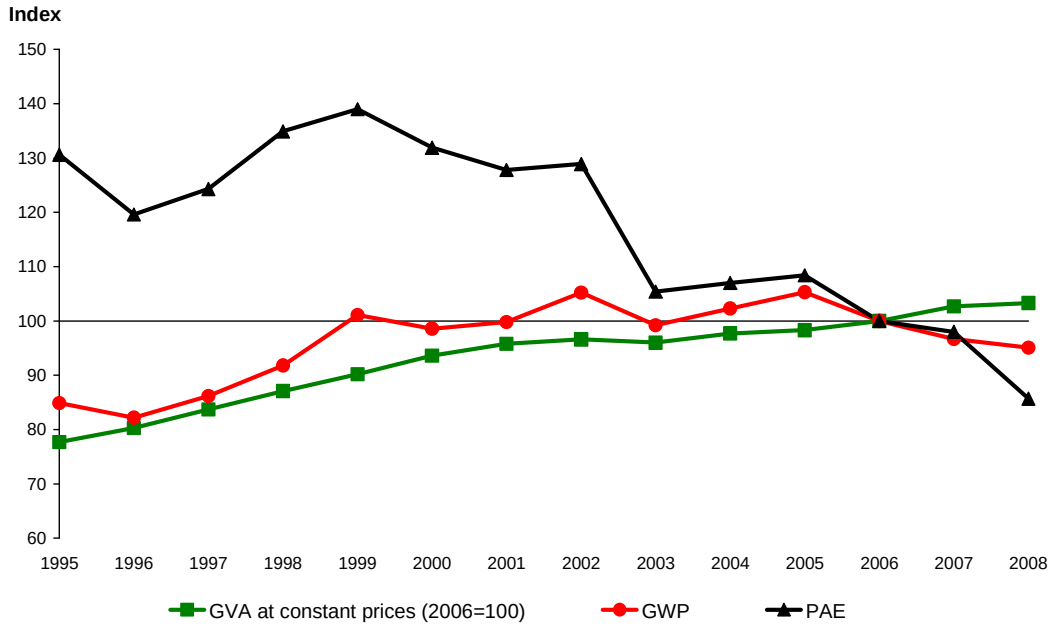
Graph 2 depicts changes in GVA (chain linked volume data), in GWP and PAE.

During the period 1995-2008 Global Warming Potential (GWP) seems to have an evolution more or less similar to the economic growth path although sometimes in an irregular way. In particular, for the last two years of the data series of GWP in spite of a growth in GVA there is some evidence of decoupling.

This GWP decoupling effect has started in 2006 and can be associated to the significant increase in the share of wind power, in the set of inputs for producing electricity (from 6%, in 2006, to 12%, in 2008).

Regarding the Potential Acid Equivalent Index (PAE), it's clear that, since 2000, emissions of acidifying substances decreased, hence showing an absolute decoupling.

Graph 2 – Changes in GVA (chain linked volume data), in GWP and PAE (2006 = 100)



Graph 3 registers the change of the quantity of CO_2 equivalent, in grams, measured by the environmental indicator Global Warming Potential, by Euro of Value Added generated (chain-linked volume data, reference year=2006) for the total of the economy.

The analysis of the series "Total of economic activity" shows that the intensity of the total of the economy is highly dependent on the fluctuations of the emissions of the Energy industry considering that the peaks of 1999, 2002 and 2005 are connected to periods of lower level of water resources for the production of electricity. By excluding this effect it becomes obvious that the intensity of emissions has been diminishing at an average rate of 1.0% per year, between 1995 and 2008.

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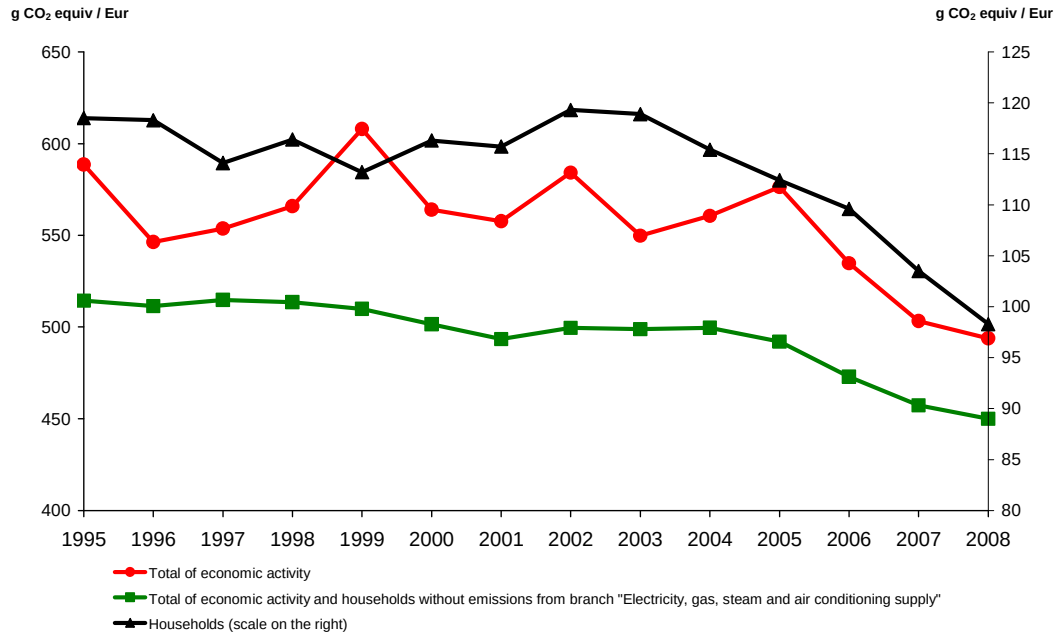
The environmental efficiency of households can be measured by using the economic indicator "final consumption expenditures of resident households". In 1995 households emitted 118.5 grams of CO_2 equivalent, by Euro of expenditure, and in 2008 these emissions were 98.3 grams of CO_2 equivalent corresponding to an average reduction of 1.4% on this period.

Graph 3 – Intensity of emissions of greenhouse gases, by unit of GVA produced



Final note: all data regarding the 29 indicators related to this statistical project is available on Statistics Portugal's portal, under "Statistical data", theme "Environment".

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Methodological notes:

Being an integrated and relevant part of Environmental Accounts, **NAMEA (National Accounting Matrix including Environmental Accounts)** is a conceptual instrument (framework) that relates National Accounts with Environmental Accounts. In particular, in this press release, is analysed one of its extensions – the air emissions accounts. National Accounts provide macroeconomic data regarding economic activities that combined with air emissions data allow the linkage between environment and economy. More specifically it measures in what way economic agents contribute to the degradation of environment while producing or consuming.

During NAMEA's compilation process, National Accounts principles and rules are used, like the classification of activities, the residence principle and other accounting rules. Also in this framework,only emissions that can be traced to economic activities are considered. Emissions from non-economic agents, for instance nature (e.g. geothermal energy), are excluded. Furthermore, transboundary emissions and nature's absorption of substances are also excluded.

Economic data is provided by National Accounts, and it's classified by NACE, Rev. 2. Emissions data is provided by the Portuguese inventory of emissions (SNIERPA - Sistema Nacional de Inventário de Emissões Antropogénicas por Fontes e Remoção por Sumidouros de Poluentes Atmosféricos), which is compiled by the Portuguese Environmental Agency. This data is classified by SNAP97 (Selected Nomenclature for Air Pollution), which is divided by eleven sources of emissions. Since SNAP97 and NACE Rev.2 aren't compatible, it was necessary to identify which branches of activity where responsible for the emissions. Emissions derived from road transport where allocated to all industries and households that use this kind of transport. In addition, emissions were allocated to industries according to the primary energy consumed, even if that energy is transformed on a later stage. For instance, emissions derived from the production of electricity were allocated to the electricity industry and not to the industries that consumed that electricity. Moreover any secondary production of electricity was allocated to the electricity industry and not to the industry that produced that energy.

Finally, NAMEA takes into account the nationality of economic agents and not the territory. Thus, emissions from non-national entities occurred in the national boundary are excluded and emissions from national economic units abroad are included.

This way, NAMEA figures are different from those used by National authorities for purpose of the European Emissions Trading Scheme or the National Plan for Allocation of Emissions. Any kind of comparison between these sets of data should be avoided.

Factors to calculate Global Warming Potential (GWP) – equivalents defined by IPPC 1995 (Intergovernmental Panel on Climate Change) which express the effect, in the atmosphere's irradiative properties, of one ton of the respective gas to one ton of CO_2.

CO_2 equivalent = 1 ton CO_2

N_2O equivalent = 310 ton CO_2

CH_4 equivalent = 21 ton CO_2

Factors to calculate Potential Acid Equivalent index (PAE) – expressed in number of H^+ moles per unit of gas emitted, measure the content of a determined agent necessary to form an acid.

NO_X equivalent = 1/46 moles H^+ by ton of NO_X

SO_X equivalent = 1/32 moles H^+ by ton of SO_X

NH_3 equivalent = 1/17 moles H^+ by ton of NH_3

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