



15 October 2022

Economic-environmental Indicators – Air emissions accounts
1995-2022

**CARBON INTENSITY OF THE NATIONAL ECONOMY REACHES THE LOWEST VALUE SINCE 1995.
82.1% OF GHG EMISSIONS ARE CONCENTRATED IN 5 INDUSTRIES (A82)
WHICH REPRESENT 13.9% OF GVA**

In 2022, Global Warming Potential (GWP) grew 3.7% compared to the previous year, in an economic context marked by strong economic growth in which Gross Value Added (GVA) increased 6.9% in volume.

The Acidification Potential (ACID) and Tropospheric Ozone Formation Potential (TOFP) also increased, 4.9% and 4.2%, respectively.

The combination of the positive variation in GWP emissions (+3.7%) with the positive variation of greater intensity in the Gross Domestic Product (GDP) (+7.0%) led to a reduction in Carbon Intensity in the national economy of 2.9%, the lowest result since 1995, the beginning of the series of observations.

Statistics Portugal publishes Air Emissions Accounts data for 2022, and also presents revised data for the period 1995 to 2021. [More detailed information](#) is available on the Statistics Portugal's website.

Table 1. Evolution of Global Warming (GWP), Acidification (ACID) and Tropospheric Ozone Formation (TOFP) Potentials

Indicators	Years		Change (%)			Annual average change (%)		
	2021	2022	2022/2021	2022/2013	2022/1996	1995-2022	2013-2022	2018-2022
GWP (10 ³ t equiv. CO ₂)	58 040	60 187	3.7	-9.5	-14.4	-0.6	-1.1	-3.9
ACID (t equiv. SO ₂)	261 750	274 592	4.9	-6.8	-59.3	-3.3	-0.8	-1.7
TOFP (t equiv. COVNM)	400 613	417 300	4.2	-9.3	-44.5	-2.2	-1.1	-1.7
GVA at basic prices (10 ⁶ Euros)	187 361	200 316	6.9	17.2	45.0	1.4	1.8	1.7

Source: Statistics Portugal ([Air Emissions Accounts](#); [National Accounts – Table A.1.3.4.5](#)).



1. Global Warming Potential (GWP)

Global Warming Potential (GWP) reached 60.2 million tons of CO₂ equivalent in 2022, increasing 3.7% compared to the previous year. This evolution was essentially due to the 4.9% increase in CO₂ emissions, which represented almost three quarters of the emissions responsible for GWP. N₂O and F-Gases emissions also increased by 1.8% and 0.4% respectively. The exception was the evolution of CH₄ emissions (-0.2%), mainly resulting from the reduction in production by 5.3% in the Agriculture, forestry and fishing sector of activity.

Table 2. Global Warming Potential, by gas type, 2022

Unit: 10³t CO₂eq

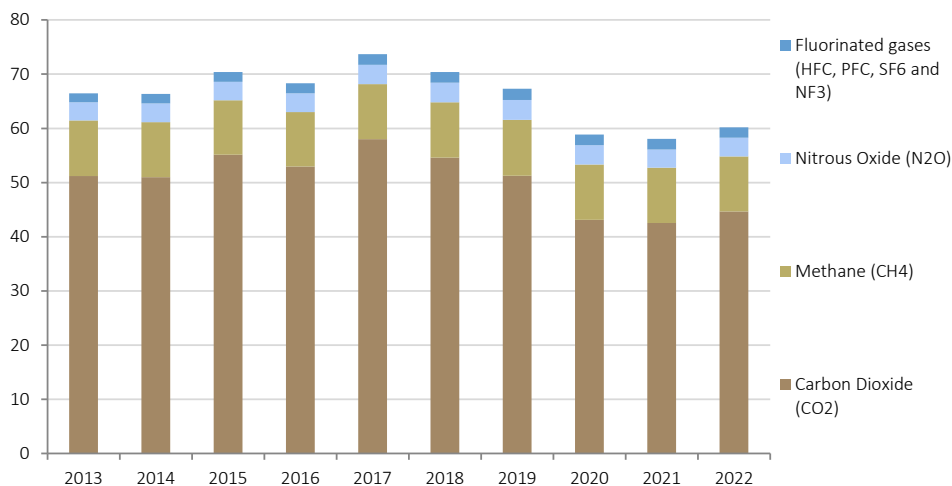
Gases	GWP	% over total	annual variation compared to 2021	
			absolute	%
Carbon Dioxide (CO ₂)	44 642.6	74.2	2 097.1	4.9
Methane (CH ₄)	10 200.3	16.9	-18.5	-0.2
Nitrous Oxide (N ₂ O)	3 408.8	5.7	60.5	1.8
Fluorinated gases (F-Gases)	1 935.6	3.2	7.9	0.4
TOTAL	60 187.3	100.0	2 147.0	3.7

Source: Statistics Portugal ([Air Emissions Accounts](#)).

Over the last ten years there has been an overall decrease of 9.5% in GWP. Essentially contributing to this evolution were the reduction in CO₂ emissions (-12.8%), but also the decrease in the heating potential of CH₄ (-0.8%), even though emissions of other GHG increased. The increases in the heating potentials of N₂O and F-Gases were 2.9% and 14.7%, respectively.

Chart 1: Global Warming Potential, by type of gas, 2013 - 2022

Unit: 10³t CO₂eq



Source: Statistics Portugal ([Air Emissions Accounts](#)).

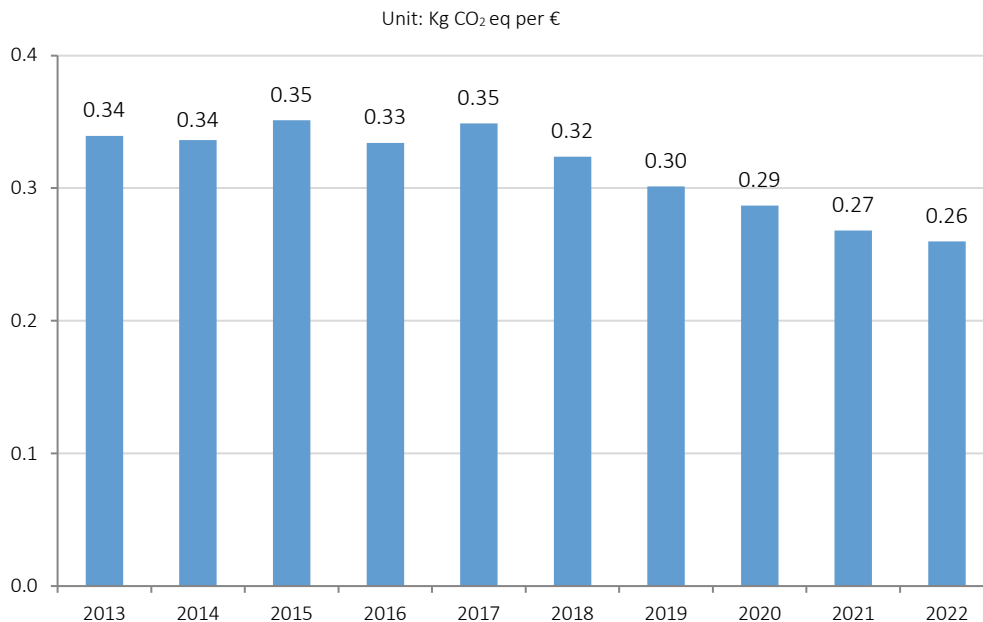


2. Carbon Intensity of the economy

In 2022, as a result of increases in GHG emissions (+3.7%) and GDP (+7.0%), the Carbon Intensity of the Portuguese economy decreased again (-3.1%), a trend that has been in place since 2013.

Between 2013 and 2022, the carbon intensity of the Portuguese economy fell by 23.5%. There are several factors behind this evolution, namely the 2.0 pp increase in the production of electrical energy from renewable sources, namely photovoltaics (634.7%), the replacement with less polluting sources in industry and the implementation of energy efficiency measures, such as improvements in the efficiency of transport and housing due to certification of buildings.

Chart 2: Carbon Intensity of the economy (GWP/GDP), 2013 – 2022



Source: Statistics Portugal ([Air Emissions Accounts](#); [National Accounts – Table A.1.1.2.6](#)).

2. Decoupling

A decoupling occurs when the growth rate of an environmental pressure, in this case GWP, is less than that of its economic driving force, in this case GVA, during a given period. Dissociation is said to be absolute, when the environmental variable is stable or decreasing while the economic driving force is increasing, or relative, if the growth rate of the environmental variable is positive, but lower than the growth rate of the economic variable.

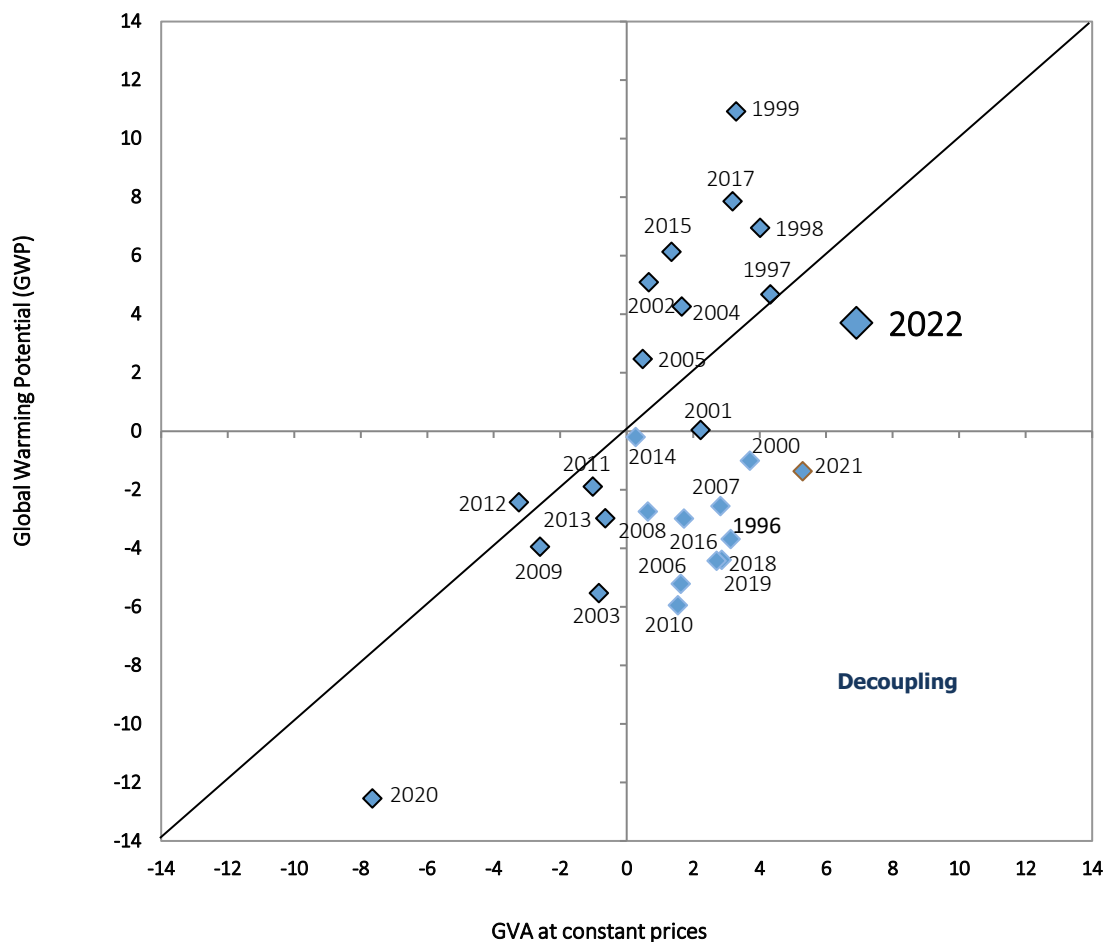
The use of renewable energy sources unquestionably contributes to a decrease in GHG from energy production and consumption, compared to internal energy consumption. Despite the increasing importance of other Renewable Energy Sources (RES), in Portugal the water source has always represented a significant



weight in the production of electrical energy. Considering this characteristic of the national generating system, the dissociation between the variation in GWP and the variation in GVA is generally observed in years in which there are normal or higher levels of rainfall, thus allowing more abundant resources to be created for the production of electricity.

Just like 2021, 2022 was classified as extremely hot in relation to air temperature and dry in relation to precipitation, which had repercussions on the production of hydropower and, consequently, on the production of electrical energy from renewable sources. In 2022, despite the increases observed compared to the previous year in photovoltaic (+57.3%), geothermal (+8.9%), biomass (+2.6%) and wind (+0.2%) energy production, the drop in hydropower production (-34.3%) led to a drop in the production of electrical energy from renewable sources (-9.6%) and a consequent decrease of 3.6 pp of its relative weight in total gross electrical energy production (from 64.9% in 2021 to 61.3% in 2022).

Chart 3: Dissociation between GWP and GVA - annual change rate, 1996 – 2022



Source: Statistics Portugal ([Air Emissions Accounts](#); [National Accounts – Table A.1.4.4.5](#)).



This situation, associated with the 2.5% increase in final energy consumption, resulted in an increase in the need to use fossil fuels in 2022 (given the lower availability and high price of natural gas with greater use of fuels more polluting liquid fossils) which led to more GHG emissions.

With an increase in GHG emissions (+3.7%) below the observed economic growth (+6.9%), 2022 was classified as a year of relative decoupling. In the entire series of results (since 1995), this situation had only occurred in 2001.