



The New Annual Greenhouse Gas Index

The Annual Greenhouse Gas Index reflects the global changes in the total atmospheric radiative effect of all the long-lived greenhouse gases from both natural sources and human activities. Based on accurate measurements, it will be updated each year and is expected to provide an important decision-support tool for managing greenhouse gases at the global level, but not at regional or national levels.

The new Annual Greenhouse Gas Index (AGGI), developed by the U.S. National Oceanic and Atmospheric Administration (NOAA) has the potential of becoming an important tool for assessing, at the global level, the effectiveness of international efforts to curb greenhouse gases in the atmosphere. Indeed, the AGGI gives a simple number that reflects the total radiative effect of the most important greenhouse gases (carbon dioxide, methane, nitrous oxide, chlorofluorocarbons (CFCs) and the replacements for CFCs). Contrary to climate models, it is based on high precision measurements of the greenhouse gases' atmospheric levels collected from 105 sites of NOAA's global sampling network since 1979. Furthermore, the AGGI does not provide the greenhouse gases emission concentrations, but their radiative effects based on actual atmospheric concentrations.

The AGGI is calculated by adding the "climate effect" (radiative forcing) of individual gases, obtained by multiplying the change in atmospheric concentrations of each gas since pre-industrial times (taken as 1750 by the IPCC) and the IPCC-recommended expression (radiative efficiency). Finally, the AGGI is derived by relating the total radiative forcing from all the gases to the one measured in 1990 (chosen because greenhouse gas emissions targeted by the Kyoto Protocol are indexed to 1990).

The AGGI has continually increased since 1979. Knowing that AGGI was indexed to 1 in 1990, the 2004 value (1.20) represent a 20 percent increase in radiative forcing by the long-lived gases during the past 26 years, thus 20 percent increase of the global greenhouse effect by these gases on the Earth's system. Most of this increase is due to CO₂, which now accounts for about 62 percent of the total greenhouse gas effect.

Although the AGGI includes the most relevant greenhouse gases that are well known and are changing due to anthropogenic activity, it does not include other important elements which also create radiative forcing and contribute to the global greenhouse effect, such as induced changes in atmospheric water vapour and atmospheric aerosol particles.

Nevertheless, being based on actual measurements, AGGI is very sensitive to variations of the most important greenhouse gases atmospheric levels that are induced by both natural events and human activities. As such, it is expected to serve as a valuable indicator of success or failure of our efforts to curb greenhouse gases in the atmosphere both by natural and human-engineered processes.

However, as this radiative index may be valuable mainly at a global scale, it is not intended to replace the Global Warming Potential indicator that is particularly useful at the national and sectoral scales.

For more information: <http://www.cmdl.noaa.gov/milestones/2005/>

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