The Annual Greenhouse Gas Index (AGGI) is defined as the ratio of total direct radiative forcing due to long-lived greenhouse gases to that due to CO₂ alone in the year 1990. The AGGI has been calculated by dividing the direct radiative forcing (DRF) of greenhouse gases (GHGs) by the direct radiative forcing of CO₂ alone (α). The AGGI is designed to help bridge the gap between scientists and society by providing a simple index to represent the overall impact of GHGs on climate warming.

Table 2 and on the right-hand axis of Figure 4, is a measure of the interannual changes in conditions that affect climate forcing. This index is designed to enhance the connection between scientists and society by providing a way for this warming influence to be presented as a simple index.

The Intergovernmental Panel on Climate Change (IPCC) defines climate forcing as "An externally imposed influence on the energy budget of the Earth System, and includes the effects of increasing greenhouse gases, changes in surface albedo, changes in aerosol optical properties, and changes in land use." Climate forcing is a way of quantifying the impact of different factors on climate change. Since the preindustrial period, the long-term increase in climate forcing is dominated by increases in greenhouse gases, specifically CO₂ and methane. This increase has been driven by human activities such as burning fossil fuels and deforestation.

The increase in radiative forcing (representing an increase in total direct radiative forcing of 45% since 1990) has been primarily due to the growth of GHGs in the atmosphere. Since the 1980s, the increase in radiative forcing has been dominated by increases in CO₂, methane, and the CFCs. However, the increase in radiative forcing since 2000 has been dominated by increases in methane and nitrous oxide.

Figure 4 shows radiative forcing for the major gases and a set of 15 minor long-lived halogenated gases (CFC-12, CFC-11, HCFC-22, and similar compounds). The increase in radiative forcing has been particularly pronounced for these gases in recent years. The increase in radiative forcing since 1990 was 60.6% (see Fig. 3). The decline in the CFCs has tempered the increase in net radiative forcing since 2010, but the increase in radiative forcing from methane and nitrous oxide has continued.

The NOAA monitoring program provides high-precision measurements of the global abundance and distribution of major GHGs. These measurements are used to calculate the AGGI and to track changes in climate forcing over time. The NOAA monitoring program has been in operation since the 1970s and is a key component of the Global Monitoring Laboratory of the U.S. Department of Commerce.

Figure 3. Trends in global atmospheric CH₄ concentrations from 1979 - 2004: Introduction of the Annual Greenhouse Gas Index, 2005 - 2019. The NOAA monitoring program provides high-precision measurements of the global abundance and distribution of major GHGs. These measurements are used to calculate the AGGI and to track changes in climate forcing over time.