



Historical Responsibility for Climate Change – from countries emissions to contribution to temperature increase

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The notion of historical responsibility is central to the equity debate and the measure of responsibility as a countries' share of historical global emissions remains one of the essential parameters in so-called equity proposals, which attempt to distribute effort among countries in an equitable manner. The focus of this contribution is on the historical contribution of countries, but it takes it one step further: its general objective lies on estimating countries' contribution directly to the change in climate. The historical responsibility is not based on cumulative emissions but instead measured in terms of the countries' estimated contribution to the increase in global-mean surface-air temperature.

This is achieved by (1) compiling a historical emissions dataset for the period from 1850 until 2012 for each individual Kyoto-greenhouse gas and each UNFCCC Party using a consistent methodology and (2) applying those historical emissions to a revised version of the so-called Policy-maker Model put forward by the Ministry of Science and Technology of the Federative Republic of Brazil, which is a simple, yet powerful tool that allows historical GHG emissions of individual countries to be directly related to their effect on global temperature changes.

We estimate that the cumulative GHG emissions until 2012 from the USA, the European Union and China contribute to a total temperature increase of about 0.50°C in 2100, which is equivalent to about 50% of the temperature increase from total global GHG emissions by that year (of about 1.0°C). Respectively, the USA, the European Union, and China are responsible for 20.2%, 17.3%, and 12.1% of global temperature increase in 2100. Russian historical emissions are responsible for 0.06°C temperature increase by 2100, ranking as the fourth largest contributor to temperature increase with 6.2% of the total contribution. India ranks fifth: Indian emissions to date would contribute to roughly 0.05°C of global mean temperature increase by 2100, or about 5.3%. Brazilian historical emissions would contribute to 0.04°C to global temperature increase by 2100 or 4.4% to total temperature increase. If the European Union countries were considered independently, Germany and Great Britain would be responsible respectively to 3.9% and 3.4% of global temperature increase in 2100.

We present the results on countries' historical responsibilities and then outline in detail the methodology employed to obtain the historical emissions dataset and final temperature contributions including the different approaches to derive a revised version of the Policy-maker Model, its underlying assumptions, advantages, and limitations for estimating countries' historical contribution to temperature increase.