

Representative Concentration Pathways (RCPs)

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Key Facts

Representative Concentration Pathways (RCPs)

The latest approach to determining emission scenarios is known as Representative Concentration Pathways (RCPs).



[ref- newscientist]

About Representative Concentration Pathways (RCPs):

- RCPs is the latest approach to determining emission scenarios.
- They outline concentrations of greenhouse gases that, **by the year 2100**, will lead to a specified increase in **total radiative forcing** compared to pre-industrial levels.
- They are a set of **four greenhouse gas concentration trajectories** used for climate modeling and research.
- They are used to **capture assumptions within a set of scenarios**, and the conditions of each scenario are used to model possible future climate evolution.
- They **try to capture future trends**, such as whether humans will continue to burn fossil fuels at an ever-increasing rate, or will they **shift towards renewable energy**.
- **Four pathways:** RCP8. 5, RCP6, RCP4. 5 and RCP2. 6 - the last is also referred to as RCP3-PD.
- The numbers represent the **expected change in radiative forcing** from the year 1750 to 2100.
 - For instance, **RCP4.5 indicates an expected increase of 4.5 watts per square meter** of radiative forcing between 1750 and 2100.
- The **Intergovernmental Panel on Climate Change (IPCC)** considers **1750** as the **base year** as it **predates the Industrial Revolution** and the radiative forcing was quite stable.
- A **higher value of forcing** means **more concentration of greenhouse gases** and other pollutants, which in turn, means **higher global warming** and a more pronounced impact of climate change.
- scientists determined forcings and pathways by **relying on the existing literature** and **synthesizing values** from a broad **spectrum of scientific and socioeconomic data**.
 - This included factors such as **population growth**, GDP, air pollution, land use, and energy sources.
- RCPs are **not forecasts or policy recommendations**; rather, they are utilized to depict a wide range of potential climate outcomes.
- Policy makers can **use RCPs to plan for the type of future they hope to help create**.

What are the different RCP warming levels?

RCP2.6:

- It anticipates an additional radiative forcing of only 2.6 watts per square meter by the conclusion of the 21st Century.
- This represents the best-case scenario where greenhouse gas concentrations are significantly lowered, and stringent mitigation measures are implemented.
- RCP2.6 is also known as RCP3PD as **emissions peak around 2050** and then decline.
- As a result, the **global average temperature** would increase by **1.6 degree Celsius compared to pre-industrial levels**.

RCP4.5 and RCP6

- RCP4.5 and RCP6 represent **intermediate scenarios**.
- In RCP4.5, the **global average temperature** is projected to increase by 2.4 degrees Celsius, while in RCP6, it rises to 2.8 degrees Celsius above pre-industrial levels.

RCP8.5:

- The most severe scenario is RCP8.5, characterized by greenhouse gas and pollutant concentrations three times higher than the present.
- In this scenario, the temperature is projected to **increase by 4.3 degrees Celsius** by the year 2100.

What are emission scenarios?

- Emission scenarios are pathways that tell us about **emissions of greenhouse gases** and **aerosol** due to human activities over time.
- Scientists use these scenarios to feed into climate models, which then calculate things like **future global temperatures or sea levels**.

What is total radiative forcing?

- Total radiative forcing is the **difference between the energy entering and leaving the Earth's atmosphere**.
- Presently, due to **elevated levels of greenhouse gases** and **aerosols**, more energy is entering the planet than leaving, contributing to global warming.
- Radiative forcing is **quantified in watts per square meter**.