



# **Alternative Scenarios of Greenhouse Gas Emissions**

**Leo Schrattenholzer and Keywan Riahi**

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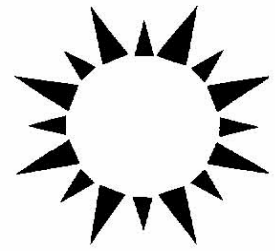
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# Greenhouse Gas Emissions, Alternative Scenarios of



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1. Greenhouse Gas Emissions Scenarios
  2. The Difference between Scenarios, Projections, and Forecasts
  3. Scenarios, Uncertainty, and Probability
  4. Energy–Economy–Environment Scenarios
  5. Why Build Scenarios of Greenhouse Gas Emissions?
  6. How are Scenarios of Greenhouse Gas Emissions Built?
  7. Driving Variables of Scenarios
  8. Scenarios and E3 Models
  9. Model Inputs and Outputs
  10. Published Scenarios
  11. Overall Ranges of Greenhouse Gas Emissions and Their Driving Forces
  12. Three Groups of Scenarios
  13. Integrated Assessment of Climate Change
  14. Scenarios and Policymaking

## Glossary

- E3 models** Energy–economy–environment models.
- final energy** The form of energy that is bought and sold in the market to consumers.
- greenhouse gas (GHG)** A gas that can trap heat in the atmosphere by absorbing the longwave radiation emanating from Earth's surface.
- Kyoto Protocol** An agreement between industrialized countries (the so-called Annex B countries), obliging them, individually or jointly, to ensure that their average annual carbon dioxide equivalent emissions of six greenhouse gases (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, SF<sub>6</sub>, CF<sub>4</sub>, and halocarbons) will be 5% below 1990 levels in the commitment period 2008 to 2012.
- primary energy** Naturally occurring form of energy.
- reference energy system (RES)** A schematic and aggregated representation of all energy conversion technologies and the flows between them. A RES is not uniquely defined,

- but rather depends on the level of aggregation considered in a particular analysis.
- scenario** A qualitative and/or quantitative description of (the development) of a system, based on a set of internally consistent assumptions concerning the main driving forces.
- stochastic models** Representations that include uncertainty by replacing certainty (of parameters and functional relations) with probability distributions.
- storyline** In connection with a scenario, a storyline is a qualitative, textual description of how the future might evolve.


This article reports on global carbon emissions projected with long-term energy–economy–environment (E3) scenarios. Many of the prominent emission scenarios have been published under the auspices of the Intergovernmental Panel on Climate Change (IPCC). After briefly discussing methodological aspects of scenario building—in particular its driving forces and other inputs—the article proceeds to systematically discuss scenario results for three groups of scenarios, that is, high-impact, CO<sub>2</sub> mitigation, and sustainable development scenarios. For these groups, ranges are given for the most important inputs and outputs. For mitigation scenarios, typical mitigation costs are reported.

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