Managing the Transition to Climate Stabilization

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Abstract

A question frequently posed by policymakers is whether a particular near-term GHG emissions pathway is compatible with a long-term climate stabilization goal. The MERGE model provides the capability to simultaneously apply near-term and long-term constraints. The analysis is particularly relevant for policy regimes that stray from economically efficient scenarios with full "where" and "when" flexibility. We also explore the relative importance of assumptions about the availability and costs of low to zero emitting technologies in the energy sector.

A moderate long-term stabilization target (such as 550 ppmv CO_2) would allow for a gradual departure from baseline emissions levels. Accordingly, near-term policies that limit "when" flexibility increase the cost of achieving such a target. On the other hand, under an aggressive long-term stabilization target (such as 450 ppmv CO_2), there is little flexibility in the choice of emissions pathway. In this case flexibility relates only to *where* the reductions are made, not *when* they are made. They need to be made as quickly as is practicable. This distinction reveals an important threshold between the two stabilization targets.

With regard to the costs of climate stabilization, the major factor is likely to be something over which we have little control: the many bio-geophysical processes which, to a major extent, will determine what constitutes dangerous anthropogenic interference with the climate system. However, through the development of climate friendly technologies, something over which we do have control, GDP losses associated with achieving any of these targets can be reduced by a factor of two or more. The flexible design of the near-term policy regime can also influence cost, but to a lesser extent than the stabilization target and technology. Moreover, given the types of proposals being put forth, it is questionable that emissions will be reduced where and when it is least costly to do so. In the absence of economic gains from efficient mechanism design in the near term, a main contribution of climate policy will be the incentives it provides for new technology development. By recognizing and addressing the acute shortage of low-cost substitutes, the long lead times required for development and deployment, and the market failures that impede technological progress, technology-based climate policy can play an important role in reducing the long-term costs of the transition.

Key words:
Climate policy, technology development, integrated assessment modeling