

## **Abstract**

Can near-term public support of renewable energy technologies contain the increase of mitigation costs due to delays of implementing emission caps at the global level? To answer this question we design a set of first and second best scenarios to analyze the impact of early deployment of renewable energy technologies on welfare and emission timing to achieve atmospheric carbon stabilization by 2100. We use the global multiregional energy–economy–climate hybrid model REMIND-R as a tool for this analysis. An important design feature of the policy scenarios is the timing of climate policy. Immediate climate policy contains the mitigation costs at less than 1% even if the CO<sub>2</sub> concentration target is 410 ppm by 2100. Delayed climate policy increases the costs significantly because the absence of a strong carbon price signal continues the carbon intensive growth path. The additional costs can be decreased by early technology policies supporting renewable energy technologies because emissions grow less, alternative energy technologies are increased in capacity and their costs are reduced through learning by doing. The effects of early technology policy are different in scenarios with immediate carbon pricing. In the case of delayed climate policy, the emission path can be brought closer to the first-best solution, whereas in the case of immediate climate policy additional technology policy would lead to deviations from the optimal emission path. Hence, technology policy in the delayed climate policy case reduces costs, but in the case of immediate climate policy they increase. However, the near-term emission reductions are smaller in the case of delayed climate policies. At the regional level the effects on mitigation costs are heterogeneously distributed. For the USA and Europe early technology policy has a positive welfare effect for immediate and delayed climate policies. In contrast, India loses in both cases. China loses in the case of immediate climate policy, but profits in the delayed case. Early support of renewable energy technologies devalues the stock of emission allowances, and this effect is considerable for delayed climate policies. In combination with the initial allocation rule of contraction and convergence a relatively well-endowed country like India loses and potential importers like the EU gain from early renewable deployment.