UNIVERSITÄT ZU KÖLN

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Titel:

Jurisdictional reward funds for renewable energy expansion

Abstract:

We study the optimal design of a jurisdictional reward fund (JRF) that would reward governments in proportion to how much their renewable energy capacity expansion exceeds a certain universal reference number times its GDP. For this purpose, we develop an analytically tractable dynamic model of renewable capacity expansion with concave (national) net benefits derived from the stock and a flow of expansion costs that are convex in the speed of expansion. We derive a sufficient statistics formula for the relative size of the mechanism's "static incentives" arising from the conditionality of current reward payments on the current expansion rate as compared to the "dynamic incentives" arising as current expansion choices affects future opportunities for reward payments. A preliminary calibration suggests that the static incentives dominate. Based on this result, we then take the static snapshot version of the model and derive an explicit formula for the optimal universal reference level as a function of the available budget, generating a practical proposal requiring as inputs only the observed distribution of expansion rates and an estimate of the jurisdictional responsiveness to reward payments. We then provide a numerical calibration of the model for the case of separate JRFs with eligibility restricted to lower middle income countries, low income countries, and upper middle income countries. The funding coalition {EU, China} is stable and donates $33 billion overall to these three JRFs, inducing 731 MtCO2 of emission reductions.