Climate Finance and Policy Group
Energy and Technology Policy Group

Policy Brief

The cost of the EU energy transition depends on cost of capital, and could be substantially lower than simplified models suggest

CFP Policy Brief No. 3 (Aug 2021), based on: Polzin F. et al. (2021). The effect of differentiating costs of capital by country and technology on the European energy transition. ***Climatic Change*** 167:26, 1-21.
https://link.springer.com/article/10.1007%2Fs10584-021-03163-4 (free download)

The policy problem

Many policy decisions are based on results from energy system models. For investment decisions, including the large investments needed to execute the low-carbon energy transition, cost of capital is an important driver. Most energy system models, however, abstract from country or technology differences in cost of capital and use uniform assumptions. These might lead to biased results regarding the transition of certain countries towards renewables in the power mix, and potentially to a sub-optimal use of public resources.

The findings

Analyzing financial market data and project finance data, we find significant differences in the cost of capital across countries and power generation technologies. Implementing these differentiated costs of capital in a large energy system model that is commonly used for policy advice to the EU Commission, we show large implications for the technology mix deployment (see Figure), carbon emissions, and electricity system costs. Particularly, emissions decrease earlier and costs are lower in the differentiated cost of capital scenarios. The impact is larger with more ambitious decarbonization targets and higher carbon prices.

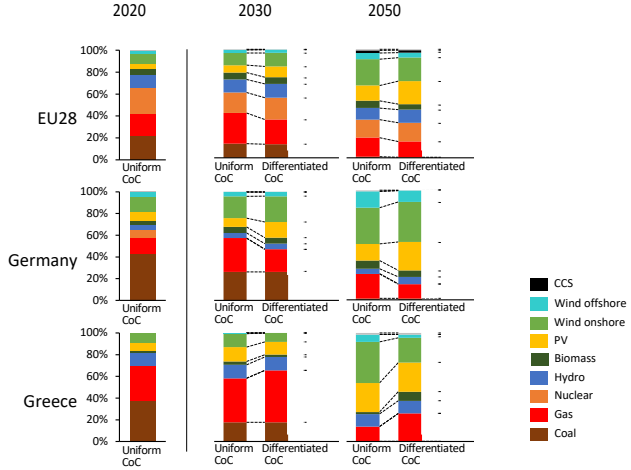

Figure: Efficient technology shares under different Cost of Capital (CoC) assumptions (2016 Reference Scenario)

Messages for policy

- The cost of capital (i.e. the cost of debt, and the required return on equity) for power generation investments differs strongly between technologies and European countries
- These differences have to be taken into account for policy analyses with energy system models, in order to avoid biased results
- For the decarbonization of the EU electricity sector, considering differentiated cost of capital leads to a more rapid renewable energy deployment and lower system costs as compared to the (classical) uniform cost of capital assumption

Our study

The analysis includes three key steps: First, we estimate empirical cost of capital per country and technology for EU countries, using financial market data and project finance data. Second, we implement these estimates as assumptions in the GEM-E3-Power model, a bottom-up energy system model with detailed technology representation. Finally, we compare different scenarios with respect to cost of capital assumptions and the ambition level for decarbonization.

Link to the full article (free download), and related work at www.cfp.ethz.ch

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