This is the fifth in a series of posts. The first post is here. The second post is here. The third post is here. The fourth post is here.

Decarbonization is a long-term challenge, and it requires commitments to drive the investments required for innovation and deployment of non-fossil-fuel energy sources. But long-term commitments, which are more effective at driving investments, are also vulnerable to reversals due to electoral changes or pushback from existing fossil fuel interest groups. How can we ensure a long-term commitment to decarbonization in the face of possible retrenchment, and the inevitability of changes in who is in power politically?

Here again, interest group dynamics are key. To the extent that climate policy has created new interest groups with a stake in lobbying for climate policy, and resources to do so, those interest groups can advocate for their goals across different political administrations, and respond to the power of fossil fuel interest groups. Indeed, subsidies for research and deployment can both reduce the costs of innovation and deployment, and also increase the strength of interest groups that can lobby against retrenchment on climate policy – a version of what is called in academic circles "policy feedback." The large investments in the energy sector can create particularly strong feedback effects.

Those strong feedback effects in energy have a downside: One of the key theoretical challenges identified by researchers in decarbonization has been the problem of "carbon lock-in" – in which the political and economic power of fossil fuel industries make transitions to other energy systems difficult or impossible. That power arises in part from the substantial investments that have been made in a fossil-fuel energy sector, and the challenge of building up a separate portfolio of substantial investments for an energy sector that does not depend on fossil fuels.

But those feedback effects also have an upside: At some point, the investments made in renewable and other carbon-free energy sources can create what Nina Kelsey has called a "green spiral" in which costs decline, productivity increases, and carbon-free energy displaces fossil fuel energy both politically and economically. The result can be "renewable lock-in" in which renewable and other carbon-free energy sources become dominant both economically and politically.

There is a risk here though. Feedback effects can result in dead ends in energy policy, in which support for a fossil-free energy alternative turns out to be a false lead that entrenches itself politically, while producing minimal emissions

reductions. Corn-based ethanol is an unfortunate example of just such a dynamic.

Inevitably there will be tradeoffs and choices here – we want flexibility to respond to promising new technologies, drive further decarbonization, and also respond to future, unseen social challenges in our energy sector. But we also want a policy dynamic that continues to drive further decarbonization, and is less vulnerable to retrenchment.