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Clean Energy Technologies: Learning by Doing and Learning by Waiting

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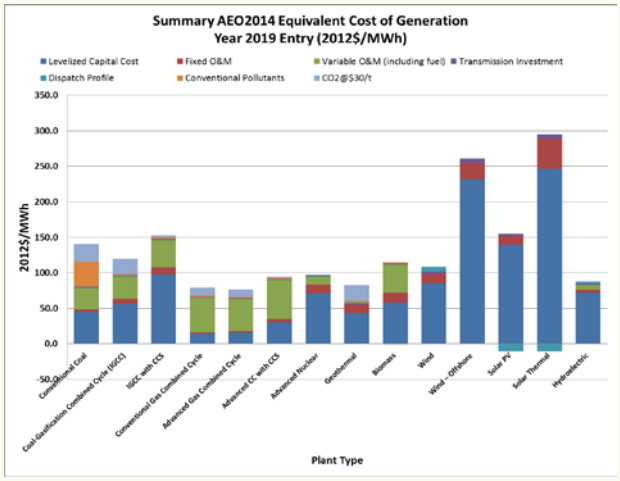
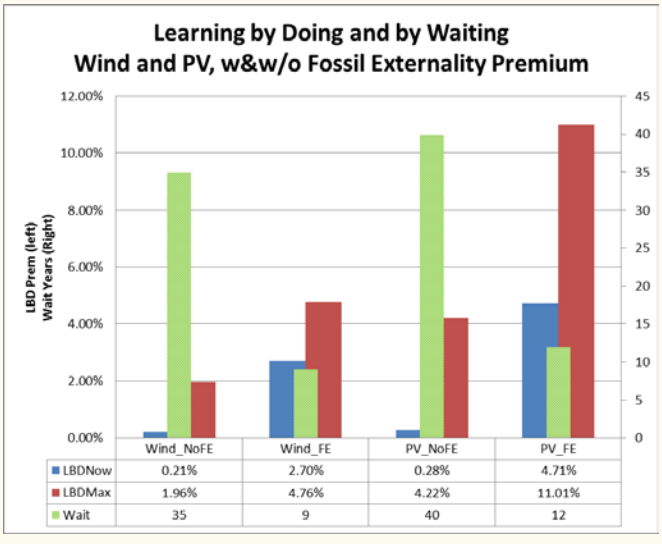
Absent a carbon policy, how much should we spend to subsidize the deployment of currently-available renewable technologies? For the moment, nothing, said Raymond Plank Professor of Global Energy Policy William Hogan, arguing that priority ought to be put on funding basic research to improve our current renewable energy options, not on subsidizing large-scale deployment of technologies that are not on track to be cost competitive.

The cost of transforming the energy system to address the climate problem will be "significant but worth it," Hogan said. But he argued that dedicating money to speeding the deployment of existing wind and solar technologies is a mistake, given the current significant gap between the costs of these technologies and the cost of natural gas generation.

Professor Hogan began by examining the cost-competitiveness of renewable energy, presenting an "apples to apples" comparison of the levelized cost of energy from different sources, based on data from the Energy Information Administration, adjusted by backing out all subsidies, adding in externalities costs for conventional pollutants and for CO2, and setting background economic assumptions (such as the cost of capital) at equal levels for all energy sources. The comparison showed that even with the inclusion of the externalities costs, renewables like wind and solar are still significantly more expensive than energy from gas (in the range of an additional 37% in the case of the lower-cost options such as on-shore wind, to an additional 83% in the case of solar pv, with significantly higher costs associated with offshore wind and solar thermal energy).



But if renewable energy is not cost-competitive today, could it be made competitive by cost savings developed in the course of deployment ("learning by doing")? The answer depends in part on how fast learning by doing can be expected to work, Hogan said. But under most common assumptions (using a model developed by William Nordhaus), the appropriate premium is relatively low (too low to make up for the current cost-competitiveness gap, in most cases).



However, this does not mean that renewable energy can never be competitive. As Hogan explained, the alternative to deployment subsidies is not technology stasis. Waiting by itself provides time for technological innovations in other sectors of the economy to take hold and make new cost savings possible in the renewables area. And even more can happen if "waiting" is interpreted to include support for basic research.

How long will we have to wait for renewables to approach competitiveness with other energy sources? The answer, Hogan said, depends a great deal on whether or not a country imposes a price on carbon, a step which immediately increases the competitiveness of zero-carbon energy. With no carbon price in place, the best strategy would be to wait for 35-40 years to allow the technology to advance before subsidizing deployment. With a carbon price, the optimal "wait" time in the analysis declined to 9-12 years.

Professor Hogan spoke as part of the Kennedy School's Energy Policy Seminar Series, which is jointly sponsored by the Energy Technology Innovation Policy research group of the Belfer Center and by the Consortium for Energy Policy Research of the Mossavar-Rahmani Center on Business and Government.