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Why Updated Policies are Needed to Spur Modernization of America's Electricity Grid

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At the heart of America's aging infrastructure is the power grid that brings electricity into American homes and businesses. Modernizing the grid will reduce power outages and pollution, increase efficiency and save money, and improve performance after extreme weather events, fires, or other hazards. At the same time, modernizing the grid can boost local jobs, create opportunities for economic development, and reduce air pollution and carbon emissions.

What will it take to modernize the U.S. electricity grid? Investments in energy-efficient and low-carbon technologies and low-cost resources will provide a wider range of options for meeting consumer electricity needs. Advanced information, communication, and control system technologies can improve grid efficiency and reliability. However, to realize the potential of these possibilities, policymakers must work with other stakeholders to make institutional and policy changes that will spur innovation, enable private investment, and expand economic opportunities from anticipated investments in America's energy future.

Why New Policies and Rule Changes are Necessary

Investing in grid modernization can create economic opportunities and promote system reliability, affordability, and value. However, many of the current rules and institutional arrangements create market inefficiencies that limit the value of new infrastructure investments like smart meters. Deploying low-cost and energy-efficient technologies often requires changes in how the grid operates and compensates energy system participants. For example, micro-grids and new control technologies can offer enhanced reliability and more efficient use of resources, but are often difficult to implement or illegal under current regulations.

Critical Changes to Support Grid Modernization

Transitioning to a modern grid involves new technologies and new policies in three areas:

- **Reform organized electricity market rules to expand interconnection of regional systems and to economically integrate low-cost clean energy**. Over 70% of wholesale electricity sales are managed by regional transmission organizations that coordinate, control, and monitor multi-state electric grids. These organizations also negotiate market, planning, and operating rules for these grids and affect billions of dollars in market transactions and trillions of dollars of investments. For example, we compared earnings of one hydro energy plant under the rules of two different regional transmission organizations and found that differences in the rules changed the potential plant earnings by 240%. Regional transmission organizations enhance the reliability and efficiency of grid infrastructure and energy assets and also provide an effective way to integrate renewable resources, like wind and solar, into the system. They should be expanded to more regions in the U.S. and market, planning, and operating rules should be updated because they affect how energy generators operate and are compensated, and therefore how much clean power is used.

- **Modify rules that determine how utilities are compensated to promote innovation and private investment in distributed energy resources.** Some utilities are transforming how they manage operations and interact with consumers on local electricity distribution networks. Utilities like the Consolidated Edison Company (Con Edison) of New York, the Hawaiian Electric Companies, and the Sacramento Municipal Utility District of California are planning to efficiently integrate new sources of energy and deploy innovative software and monitoring and control methods. For example, Con Edison is offering solar power systems with battery storage, along with software to manage aggregated energy storage, to more than 300 homes. This pilot project is allowing Con Edison to explore remote

monitoring and control of energy storage resources to meet peak demand and assess the potential revenue streams from these distributed resources, rather than relying solely on traditional power plants. But new rules are needed, because in many states and municipalities utilities are actively blocking such energy system innovations that could benefit homes and businesses. Decentralized grid innovations, like rooftop solar, energy efficiency, and energy storage, offer the potential for targeted investments to improve system operation and promote economic development.

- **Allow customers to access and manage their own energy data.** Utility-specific practices affect what consumers know about their energy use and how they can manage it. Energy consumption data can help residential, commercial and industrial electricity consumers manage their energy use and make effective investment decisions. While the U.S. government has invested billions to ensure over 50% of consumers have smart meters that track hourly electricity usage, many consumers are still unable to easily access, manage, or share their energy data. This can prevent consumers from using or sharing these data and limit their participation in "demand response" programs that lower peak demand energy use. These data could also allow consumers to evaluate investments in building retrofits, small-scale solar, electric vehicles, or storage. New federal and state policies requiring standardized data collection, sharing and protections for consumer rights can underpin gird modernization efforts. An example of what is possible lies in the Green Button initiative, a voluntary effort among utilities and electricity suppliers to standardize data collection and sharing.

The bottom line is the future of economic development in the United States depends on smart, large-scale investments in a modernized electric power system. But the investments needed are not only a matter of money. Updated rules and institutions are also needed – from federal, state, and local governments. These policy reforms must be made with an eye to promoting innovative, cost-efficient operations and integrating new technologies. America's policies need to encourage, not block or discourage, investments in cutting-edge low-carbon technologies and in techniques consumers can use to manage energy use and invest wisely in clean energy. America's aging energy infrastructure must be upgraded to further clean and efficient energy practices – and evolving our public policies and approaches to regulation are a vital part of this effort.

Read more in Nathan Paine, Frances R. Homans, Melisa Pollak, Jeffrey M. Bielicki, and Elizabeth J. Wilson, "Why Market Rules Matter: Optimizing Pumped Hydroelectric Storage When Compensation Rules Differ." *Energy Economics* 46 (2014):10-9; Stephanie Lenhart, Natalie Nelson-Marsh, Elizabeth J. Wilson, and David Solan, "Electricity Governance and the Western Energy Imbalance Market in the United States: The Necessity of Interorganizational Collaboration." *Energy Research & Social Science* 19 (2016):94-107; Jennie C. Stephens, Elizabeth J. Wilson, and Tarla Rai Peterson, *Smart Grid (R)Evolution: Electric Power Struggles* (Cambridge University Press, 2015); and Alexandra B. Klass and Elizabeth J. Wilson, "Remaking Energy: The Critical Role of Energy Consumption Data." *California Law Review* (2016): 15-28.