

## Electricity Transmission Expansion: What Does Successful Planning Look Like?

*California's Renewable Electricity Transmission Initiative to expand transmission to deliver renewable electricity to load centers is analyzed to identify factors of a successful planning process. As a one-state planning process, RETI may be atypical of attempts to build interstate transmission lines, but it points to the use of transparency, diverse stakeholder input and incremental decisions to facilitate renewable energy.*

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This analysis asks how energy innovations are to facilitate a greater reliance on renewable sources of electricity. There are many changes that have been proposed to stimulate greater use of renewable energy: smart grids, a new business model for utilities and distributed energy, to name a few, but high-voltage transmission line expansion is the focus of this paper. While transmission expansion will not solve all energy problems,

especially in the long run, it is a positive step forward. First, the benefits of transmission expansion in achieving energy policy goals will be examined. The second section focuses on obstacles to transmission. Third, the Socio-Technical Regime model is presented as a means to understand how innovation occurs. Fourth, a case study of an initiative in California is described to illustrate the successes and shortcomings of a

collaborative process to expand transmission. Finally, the usefulness of the California planning is analyzed.

## I. The Role of Transmission Expansion on Achieving Energy Policy Goals

Energy policy goals, of course, are as varied as the different individuals and organizations concerned with energy usage. Some goals are more easily agreed upon. For example, most recognize the importance of reliability of electricity service because it is fundamental to everyday activities and the ability of the modern society to function in accustomed ways. Similarly, many would agree that it is important to provide affordable electricity. Other goals, however, are much more controversial. Reducing greenhouse gases and moderating the effects of climate change has become a major political divide in American politics with proponents warning that if we fail to sufficiently decarbonize our economy, major social, economic and political upheaval will occur as humans struggle to adapt to extreme weather events, glacier melting, reduction of biological diversity, rising sea levels and spread of disease (IPCC, 2014). Others either deny that climate changes occur or argue they are not attributable to human actions. This analysis assumes that climate

change is a major threat and that an emphasis on energy efficiency and use of renewable fuels is necessary.

Decarbonization of society needs to occur over a long time frame and greater reliance on electricity will be an important part of the process. More efficient machines and appliances, increasing use of nuclear, wind, solar power, and carbon capture and sequestration are examples of

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low-carbon technologies that will make electricity an increasingly relied upon source of energy (Lester and Hart, 2012, pp. 4–19). Although distributed generation may become increasingly important, at present, most electricity is centrally generated and transmitted over a grid.

Transmission lines are critically important in delivering clean electricity to customers who live hundreds of miles from wind and solar energy sources. The generation of wind energy is at record highs thanks, in part, to transmission updates that are relieving congestion on

the grid. A record 10,000-plus MW of wind energy was delivered in August 2014 in Texas after the state facilitated private sector investment in and open access to an expanded transmission system (Thaler, 2014). The largest wind farm in the United States was approved by the Wyoming Industrial Siting Council, although the developer needs to obtain the necessary approvals to build a long-distance line to deliver the wind electricity to Southwest states (Massey, 2014). Our attention now turns to obstacles to expanding the current transmission system to reach remote renewable energy generation and reliably handle larger electricity loads.

## II. Obstacles to Transmission Expansion

There are a number of obstacles to grid expansion. First, traditionally, transmission focused on the need for reliability and then on economic benefits (MIT, 2011, pp. 79–80; Brown and Rossi, 2010, p. 751) with little concern for environmental or climate change impacts. There is a need for hundreds of miles of new transmission lines to deliver renewable electricity from remote locations where it is generated to urban customers. Even when there is recognition of the need for additional lines, problems arise because generation and transmission projects are often planned separately from each

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