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Grid Federalization: The Time Has Come

Given the government's extraordinary to-do list, is federalizing the U.S. transmission system a good idea?

BY EDWIN F. FEO & HENRY T. SCOTT

Today, there are approximately 150,000 miles of high-voltage transmission lines in the U.S. While this number is more than double what existed in 1960, load growth and generation have each increased by over 500% in the last 50 years. Renewable energy project installations have further strained the existing transmission grid.

As federal and state policies have promoted renewable energy investment in the past three decades, investment in transmission has simply not kept pace – especially in the service provided to renewable energy projects. And the grid, electric reliability and consumers have suffered as a result.

The transmission grid through which today's interstate electricity flows was not designed for a national wholesale electricity market, nor to support remote renewable generation. The nation's transmission infrastructure was built by vertically integrated utilities, primarily in order to serve the needs of their service-territory customers.

Today, however, the grid is ill-designed to transmit electric power from renewable generation sources in the Great Plains, West Texas, the Southwest and elsewhere to the nation's load centers. In congested markets, such as Manhattan, Los Angeles and Chicago, low-priced generation simply cannot reach consumers, because the transmission infrastructure necessary to deliver the power has not been constructed.

Inadequate transmission is costly. In 2008, the Department of Energy estimated that congestion cost the 200 million consumers on the Eastern Interconnection $8 billion, or nearly $40 per capita, over the course of the year. Congestion charges in New York state alone cost Empire State consumers well over $1 billion annually. And the economic costs of transmission disruptions are staggering. The blackout of summer 2003 alone, for example, is estimated to have exacted an economic cost of $4 billion to $6 billion.

Inadequate transmission is a principal impediment to the development of renewable generation. The experience of wind projects in Tehachapi, Calif., and Wyoming is similar: an inability to interconnect without significant cost or delay. Or, in the case of wind projects in West Texas, curtailment and low spot market prices as the amount of installed generation has overcome the transmission infrastructure.

Transmission tomorrow

Transformative change is coming to the nation's transmission infrastructure. The American Recovery and Reinvestment Act of 2009, enacted in February, provides for $4.5 billion in advanced grid technology investments and promises billions more in loan guarantees for transmission projects. The so-called smart grid may prove to be a highly efficient way to build a more resilient, green and intelligent electric power infrastructure that is less dependent upon fossil energy sources.

In the longer term, investments in smart grid technologies, energy efficiency and distributed generation systems may transform the electric power industry entirely.

The traditional emphasis on larger generation projects may yield to smaller-scale, highly efficient and technologically adroit networks of electric generation, transmission and distribution systems. Nanotechnology may transform an industry traditionally dominated by large-scale power plants.

At least in the near term, though, meeting ambitious renewable portfolio standards and aggressive emissions requirements will almost certainly require the upgrading of existing lines and the construction of new ones. Unless distributed generation, widespread energy storage and the smart grid become a reality on a massive scale, access to reliable, affordable and clean sources of electricity depends upon a robust, interregional transmission grid – one capable of connecting the coastal load centers with inland green generation.

Moreover, the deployment of an improved national electricity backbone consisting of transmission superhighways should complement, rather than compete with, efforts to make the grid smarter and more efficient. A central feature of the smart grid should be the deployment of high-efficiency, high-capacity trunk lines. These additional lines will ensure the flow of renewable energy to load-serving entities in an efficient manner. Obstacles associated with wind and solar intermittency and the difficulty of responding to peak demand are mitigated by the adoption of smarter networks that permit electric energy to flow to (and from) consumers across the entire nation.

The benefits of improved transmission, especially in the smart grid paradigm, are multifarious. Inter- and intra-regional transmission ensures reliability, keeping the lights on when local generation is insufficient to meet local demand.

Transmission promotes efficiency by allowing consumers to draw upon marginally less expensive power sources before tapping more expensive, peaking (typically fossil fuel-powered) units. Because the marginal cost of renewable power is relatively low because of the absence of a fuel cost, renewable energy sits at the bottom of the power-supply curve.

Thus, not only does improved transmission facilitate the development and integration of clean sources of electricity, but it also enables competitive and efficient markets, benefiting consumers by keeping electricity prices down.

Replacing fossil fuels with renewable energy sources improves air quality and the overall environment by drawing upon emissions-free sources of electricity. Morning winds in the Dakotas could power air conditioners humming on hot Chicago afternoons.

Smart grid requires federal role

The nation's economic growth, national security and long-term environmental sustainability depend upon the realization of the nation's vast – and, all too often, untapped – renewable resources. Improved transmission capacity – especially the ability to draw power from a dispersed area – is particularly important if the nation is to rely on variable, intermittent renewable generating sources, such as wind and solar power.

Furthermore, a redundant, multinodal network is more reliable than today's fragmented patchwork of intermittently linked transmission systems, better able to withstand a terrorist attack and capable of delivering to consumers the long-promised cost-savings benefits of deregulated wholesale electricity markets. So-called renewable trunk lines – radial high-capacity transmission lines that link the interconnected transmission system to remote areas of power generation – have the potential to deliver all these benefits at once.

Building the nation's transmission superhighways will require federal participation and, in some cases, federal intervention. Because transmission is the central market facilitator for the entire electric power industry, Congress and the Federal Energy Regulatory Commission (FERC) must further encourage transmission development, including the upgrading and integrating of existing lines and the laying of new ones. Investment in transmission should be made coincident with investments in smart grid technologies, as improved transmission is an aspect of and complementary to overall investments in a smarter grid.

Important steps have already been taken. The Energy Policy Act of 2005 (EPAct05) authorized FERC to establish incentive rates for transmission development. In response to the congressional mandate to encourage development, FERC promulgated Order No. 679 (later modified by Order No. 679-A).

The final rule permits incentive rates of return on equity for new investment (both for traditional utilities and stand-alone transmission companies), affords full recovery of prudently incurred development and construction costs and provides accelerated depreciation of transmission property. In addition, the rule provides special, additional incentives for independent transmission companies and those utilities that participate in independent transmission organizations.

In addition to establishing the legal foundation for FERC to promulgate an incentive-rate schedule, EPAct05 confronted long-standing difficulties with transmission siting. EPAct05 authorized the creation of national energy corridors on Western public lands, and provides backstop authority to site interstate transmission lines elsewhere. Two such corridors have been established: the Mid-Atlantic Area National Corridor and the Southwest Area National Corridor (seven counties in Southern California and three counties in western Arizona).

Still, more needs to be done. The important first steps of incentive rates and expedited siting have not been enough, especially on interstate transmission. Legislation under consideration by Congress would dramatically expand the federal government's power with respect to the siting and cost allocation of transmission lines. Importantly, proposed legislation also provides for interconnection-wide transmission planning. Coordinated federal policy to address the shortcomings of the nation's existing transmission

infrastructure is key. Like the laying of the interstate highway system, the siting of interstate transmission lines requires some degree of central planning.

Certain interregional projects entail system-wide benefits. These system-wide benefits become even more pronounced in the smart grid paradigm, where power supply and demand are harmonized across entire interconnections by sophisticated networks of real-time, two-way integrated communications, sensing and measuring equipment. It makes sense, then, that the costs of these lines be allocated to ratepayers across the grid and not simply borne by the ratepayers of the utility that constructs the line. This, again, calls for a broader federal role.

Siting and environmental review should rest – from the outset – with the federal government. Transmission siting remains a complex endeavor, slowed by multiple regulatory jurisdictions. Duplicative state environmental reviews add unnecessary expense to transmission projects.

Local interests can trump regional interests by stopping a segment of a proposed regional line, notwithstanding the best efforts to coordinate regional planning. Placing siting decisions in Washington will insulate decision-makers from local politics. And federal eminent-domain powers may properly be used to ensure that the channels of today's interstate commerce remain open.

Regardless of the specific tools policy-makers use to improve transmission infrastructure, a set of basic principles should guide the federal government. First, transmission should be viewed as the wholesale-electricity-market-enabling infrastructure that it is, rather than as a commodity. Second, policy-makers should accept that reliability, efficiency and the integration of renewable resources are not independent variables.

A more reliable system is inherently less congested, and reliability adds value to the system as a whole, especially when it facilitates the introduction of intermittent renewable electricity.

Finally, investment in the grid should be treated as a systems problem, because system-wide planning is required for efficient investment.

Keeping these principles in mind, a variety of fixes are within policy-makers' reach. Workable investment will follow if Congress and FERC regularize interregional transmission pricing and cost allocation in a way that better encourages investment by independent transmission companies in renewable trunk lines and market hubs. Federal siting and eminent-domain authority should expedite the planning process.

As a final caveat, though, the widespread adoption of distributed generation and the deployment of smart grid technologies may mean that fewer new lines are needed. Long-range plans must model uncertainty as the electric power industry stands on the brink of truly transformative change. WP

Edwin F. Feo is a partner, and Henry T. Scott is an associate attorney, at the global project finance group of Milbank, Tweed, Hadley & McCloy LLP in Los Angeles. Feo can be reached at (213) 892-4417 or efeo@milbank.com, and Scott can be reached at (213) 892-4378 or hscott@milbank.com.