

Cost-sharing plans can resolve grid stand-off

The impasse between developers of grid and wind farms must be addressed so that new transmission networks can be constructed where they are needed. The industry is already working on more innovative methods of sharing out the cost, finds [Mark Anderson](#)

Broad consensus paints a grim picture of the existing US electricity transmission infrastructure: aging, inadequate and bursting at the seams in too many places yet woefully far removed from much of the nation's best wind resources. Complicating matters is a sluggish economy that has reduced overall demand for new electricity supply as big business is content to sit on its money.

Myriad siting and permitting restrictions at federal, state and local levels frequently hold up transmission extensions, while approaches to cost allocation often fail to spread billion-dollar price tags across a wide ratepayer base. One troubling result has been a long-standing chicken-or-egg dilemma that keeps transmission construction from windy areas without turbines — developers resistant to building wind projects before transmission developers put up their network and vice-versa.

But a new “build it and they will come” mindset may be emerging, as indicated by the Federal Energy Regulatory Commission (FERC), the US government agency that regulates interstate electricity transmission. Last summer it approved a cost-allocation method for broad-based ratepayer support of major transmission construction in the nine-state Southwest Power Pool (SPP) region. The landmark \$1.14 billion plan includes five new transmission lines that will be built and paid for before any additional turbines go into the ground.

“We’re giving the regions a great deal of flexibility in determining the relationship between cost and benefit,” says FERC chairman Jon Wellinghoff. “We’re also giving them a good deal of flexibility to determine what would be included in the cost and the benefits for the particular cost-allocation method that they develop.”

Sharing the cost

Under SPP's so-called highway/byway plan, high-voltage transmission projects above 300kV are considered highways, with costs ascribed to electric utility ratepayers across SPP's entire middle-American footprint. Lower-voltage lines are considered byways and paid for through a formula that assigns proportional costs to regional utilities.

A variation on the Southwest region's plan is edging



JEFFREY G. KATZ

Sharing it out
Southwest Power Pool designates high-voltage lines as highways, and costs are spread across its nine-state region

towards reality in the Midwest Independent System Operator (MISO) region, where roughly 20 major lines intended primarily for renewable energy are expected to be built largely in advance of generation and funded by electricity ratepayers throughout MISO's 13-state Upper Midwest purview.

Wellinghoff expects grid operators to become increasingly creative as they develop and submit far-reaching plans that cut through several states and multiple transmission footprints, providing innovative solutions to allow more lines to be built ahead of new generation. “They’ll have to have cost-allocation methodologies not only for their region, but that will

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span across regions," he says. "Transmission developers need some level of certainty for how they would be treated with respect to cost allocation."

Planning, approvals and construction cannot happen soon enough. Recent numbers from the American Wind Energy Association (AWEA) show roughly 275GW of proposed wind projects currently stuck in transmission queues around the country. "Obviously, not all of those projects are going to be built," says Michael Goggin, AWEA's senior vice-president of public policy. "But it's a pretty staggering number and there's just not enough capacity on the grid to take their power."

Co-operation

To explore the new-wave methodology, grid operator PJM Interconnection is formulating a transmission cost-allocation plan that must eventually accommodate the 41GW of new generation needed to meet the growing renewable demands in its 13-state footprint. Electricity prices in PJM's region, from suburban Chicago to the Atlantic Seaboard, often exceed \$50/MWh and can be more than double the prices in MISO, meaning PJM is likely to need grid lines across the regions, as wind developers scramble to secure favourable rates.

"We need that many megawatts, either in the footprint or outside the footprint, delivered to PJM — and that could include a certain number of MISO wind generators," says Steven Herling, PJM vice-president of system planning. "So we need to be in a position to work with MISO to ensure that the needs at our rather lengthy boundary are met in a way that is satisfactory to both PJM and MISO — and doesn't impose any undue harm to either system or impose any undue costs."

Other areas making significant near-term headway include California's Tehachapi Valley, south-central Wyoming, eastern Nevada and the Pacific Northwest.

California's \$10 billion Tehachapi Renewable



Texas gridiron The Competitive Renewable Energy Zones project has become a transmission model for the US

Transmission Project is being built in phases, using 220kV and 500kV lines to carry wind and solar power from the windy Tehachapi Valley to the Los Angeles area, just in time to bolster the state's revamped energy standard, which is now calling for 33% of electricity to come from renewable sources by the decade's end.

In Wyoming, the 600-kilovolt TransWest Express is intended for 2015 completion and could move as much as 3GW of wind power from the south-western part of the state to population centres in far-away Nevada, Arizona and southern California. But the \$3 billion project is running into some of the problems inherent to interstate permitting, as it navigates the rules and regulations of the federal government and four states along its 1,150-kilometre course.

On Line, Nevada's 500kV project, is harnessing \$343 million in federal loan backing to run wires from the

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BUILD AND THEY WILL COME CREZ SHARES OUT THE COST

A Texas transmission project is about to spur 8.5GW of new wind development in the windiest area of a state that, with more than 10GW of wind power already online, is by far the US leader.

The \$5 billion Competitive Renewable Energy Zones (CREZ) project, a product of 2005 state legislation and expected to be complete by 2013, has become a transmission model for the US industry by solving two problems.

For starters, CREZ's costs will be rolled into ratepayer bills across the majority of a state with 25 million people and a self-contained grid.

But equally important is that the 3,200-kilometre web of new transmission will be ready in west

Texas long before the turbines arrive. "It really was pretty groundbreaking — that they would go out and identify the resource zones and then plan the transmission around that," says Michael Goggin, senior vice-president of public policy for the American Wind Energy Association. "I think that was where the concept came from for doing it in other regions."

The project was aided by its single-state evolution, meaning uniform regulations and clear signals from the Texas Public Utilities Commission (PUC).

"The PUC met with wind developers and asked, 'What are the prime areas that you want to develop?'" says Chris Schein,

communications director for Oncor, a Texas transmission developer responsible for more than 40% of the project. "There was consensus among both the legislative branch and the regulatory branch about the importance of this and what it can mean for the state."

Land acquisition

Oncor conducted 33 community meetings, attended by over 4,000 residents, and contacted more than 13,000 landowners. The PUC gave developers six months to complete landowner deals. Compulsory acquisition was available but never used.

"You get involved with smaller-area landowners and the

cities themselves," says PUC spokesman Terry Hadley. "Maybe somebody had what they felt was a picturesque ranch to retire on. They really don't need the money and don't want a power line on their land, so we've worked with those landowners, as have the utilities. Mission accomplished in terms of having all these cases done within the six months."

Oncor evaluated and negotiated on 11,600 kilometres of prospective routes before settling on its 1,400-kilometre contribution. "You might add a couple of miles to avoid a scenic vista," says Schein. "But that really gets back to the balance of landowners and the regulators and what the state needs."



CREZ

south-central part of the state to electricity-hungry Las Vegas, with the intention of eventually completing a northward connection to reach prime wind resources near the Idaho border.

In the Pacific Northwest, the Bonneville Power Administration (BPA) operates roughly 75% of the regional grid as a federal agency outside FERC's domain. BPA employs a periodic process called Open Season, which assesses transmission needs and allocates costs by securing monetary commitments from wind developers to use the lines before they are built. A handful of lines approved by the first Open Season process in 2008 will connect a growing number of turbines in the wind-rich Columbia River Gorge that defines the border between Oregon and Washington, moving power to population centres up and down the West Coast. BPA's 2010 Open Season began scoping out

Timely It takes around three years to build a wind project, and it can take seven or more to build transmission

the potential for new lines to connect Washington with British Columbia, Canada.

Offshore prospects

Offshore transmission may eventually become another part of the solution, although cost concerns and timelines are unlikely to make offshore wind a part of the US energy mix in the near term. No turbines are expected in US waters before the end of next year. Nevertheless, shorter distances between potential offshore sites and East Coast population centres are a viable long-term prospect. Last year internet giant Google spearheaded a \$5 billion consortium that announced plans to build a 6GW underwater backbone aimed at prospective offshore wind projects between New Jersey and Virginia. "Building an underwater cable is generally a lot more expensive than building it across the plains of the Midwest," says AWEA's Goggin. "But we should be doing both. I don't see them as mutually exclusive at all."

Meanwhile, the highest-profile US transmission development of all, a 3,200-kilometre west Texas build-out expected to be ready by the end of 2013, is emblematic of one overarching concern. The Competitive Renewable Energy Zone project, known as CREZ, is the product of 2005 Texas legislation intended to garner broad collaboration that includes mandated permitting, siting and statewide cost allocation. But even if everything continues according to plan, the \$5 billion project — forerunner of the 'build it and they will come' mindset — will have taken the better part of a decade to complete.

The wind industry cannot wait that long. "If we're going to get a lot of wind onto the grid, we've got to have more grid to get there," says Michael Skelly, president of transmission developer Clean Line Energy. "It's a problem now and the problem is getting worse." ■■W

"Roughly 275GW of proposed wind projects are stuck in transmission queues around the country"

American Wind Energy Association

NO TIME TO WAIT MORE WIND WITHOUT MORE TRANSMISSION

If the US wind industry expects to remain a world leader, it must find ways to circumvent the current dearth of transmission capacity and not simply wait for new lines to be added.

If it takes roughly three years to develop wind projects, and seven or more to build transmission, innovation is needed to alleviate congestion — especially if the US is to return to higher-capacity growth rates nearer 10GW per year.

One stopgap solution suggests building wind projects in areas that have been neglected because of second-rate wind resources, including many in or near regions with attractive electricity prices. Helped by improved turbine

efficiency and larger rotors, developers are beginning to squeeze increasing amounts of power from places previously deemed undevelopable.

Turbine innovation

To that end, all major turbine manufacturers are designing ever-better equipment, says Michael Skelly, president of Clean Line Energy Partners, a Texas-based transmission developer. "If you put a 2008 turbine in western Iowa or western Kansas, you'd get a low 40% capacity factor," he says of the actual power output per year in relation to the nameplated output. "But if you put a 2013 or 2014 machine in those areas, your capacity

factor could be 50% higher. That means that you're going to get 25% more bang for your transmission buck."

Another opportunity comes from a recent decree by the US Environmental Protection Agency, which will result in the decommissioning of 10GW or more of inefficient coal plants. While many will be replaced by plants fired with low-cost natural gas, opportunities for renewables will also exist. "As old stuff is driven out of the market, there is a need for new generation," says PJM Interconnection vice-president Steven Herling. "Some of that will be solar and some wind."

A relatively inexpensive substation upgrade could unlock a

windy part of barren western Montana that straddles two transmission footprints. A 500kV line owned by NorthWestern Energy already serves coal plants in the region and the upgraded substation would allow 400-600MW of generation from future wind projects to reach wires owned by the Bonneville Power Administration, which operates the grid in much of the Pacific Northwest.

"Montana suffers from some severe transmission constraints," says Cameron Yourkowski, transmission policy associate at Renewable Northwest Project. "But that one substation upgrade is low-hanging fruit that could be finished relatively quickly."