



Electric Transmission and Carbon Reduction:

A Survey of Environmental Leaders and State Regulators

by Dr. Robert Wasserstrom and Susan Reider

Electric Transmission and Carbon Reduction: A Survey of Environmental Leaders and State Regulators

by Dr. Robert Wasserstrom and Susan Reider

January 23, 2010



Executive Summary

From March, 2009, to December, 2009, the Center for Energy Economics and Terra Group surveyed state and federal regulators, environmental leaders, industry representatives and other key stakeholders in the U.S. electric power transmission system. This survey updates an earlier study completed in 1996. At that time, few “non-traditional” stakeholders were interested in transmission projects.

This situation has changed significantly. At present, public discussion of high-voltage transmission has been subsumed within broader policy debates about reducing greenhouse gases, moving renewable energy over long distances and redesigning our nation’s overall electric system. New players – including national environmental groups, academics, Washington think tanks, trade associations and renewable power generators – now play a major role in shaping public debate about transmission siting and need.

Other major findings include:

- ▶ State regulators remain adamantly opposed to greater federal transmission routing and siting authority. They are concerned about cost, unmanageable procedures and the enormous gap between local customers and federal bureaucrats.
- ▶ At the moment, many states seem to be prepared to accept limited benefits from the status quo rather than take a chance on unproven benefits “from “green superhighways” at potentially huge cost to ratepayers. Federal officials often perceive this resistance as parochialism, but under many current planning scenarios it may be entirely reasonable.
- ▶ Major environmental groups want a national energy policy that achieves “the greatest carbon reduction at the lowest cost in the shortest time,” primarily through renewables, increased energy efficiency, optimization of existing infrastructure and distributed generation. They are likely to support new transmission that reinforces this policy.
- ▶ Whatever national policies are adopted, transmission projects will continue to draw opposition. Although opponents often invoke environmental issues, they are usually motivated by other concerns: land use, property values, “viewshed,” potential impacts on nearby recreational areas or wildlife habitat, etc. They also argue that new lines are not needed, and where this view is shared by national or regional organizations, they may receive outside support and encouragement. But where their opposition conflicts with larger policy goals of reducing carbon emissions and encouraging renewables, they can expect less help in the future.
- ▶ National environmental organizations are eager to sit at the table with federal and state regulators, utilities, ISOs, consumer advocates and other key constituencies. At the same time, they recognize that they will need to raise their own game – to come armed with independent data (for example, on demand forecasting and need) and technical expertise.

Based on our own experience with potentially controversial energy facilities, we would like to offer three additional observations:

- ▶ Left unaddressed in this discussion are the critical issues of transmission routing and siting. Certainly, transmission planning and energy policy-making should include environmental organizations and other non-traditional stakeholders. But a better planning process is unlikely to build support for specific lines among grassroots groups and potential opponents, who tend to focus on local, not broader impacts.

- ▶ At present, routing approval remains in the hands of state officials, usually public utility commissioners or a state siting board. Actual routes are most often designed by project developers based on what they think they can build. In some states, developers must additionally show that they have analyzed several potential corridors; occasionally, the siting board itself picks a final route from among various alternatives. Siting boards are usually constituted as inter-agency committees; in our experience, they do not as a rule include “outsiders” representing major stakeholder constituencies.
- ▶ What seems to be lacking, at least in the Eastern Interconnection, is a collaborative siting process, similar to the RETI stakeholder committee that identified potential transmission corridors in California (as well as renewable energy zones). This process would include a robust and transparent procedure for analyzing alternative routes and determining the best options. Route selection committees would not grant regulatory approval for specific lines: that decision can remain with state or federal authorities. But its findings should become binding on project developers and intervenors who may choose to oppose them.
- ▶ Opposition will never disappear. We are a litigious society, and “delay is often victory,” as community organizing manual from the 1990s pointed out. But a siting process that forges consensus around realistic alternatives can overcome much potential opposition. Properly designed, it will help to close the yawning gap between society’s broader environmental goals (such as carbon reduction) and local land use decisions that will be needed to attain them.

BACKGROUND

In 1996, the Terra Group issued its first report on public attitudes toward electric transmission lines.¹ In that report, we explored the potential impact of FERC Order 888 on America's power grid, as the old "compact" between local utilities and their customers altered to allow wholesale (and eventually retail) electric sales.

"The system wasn't designed to do what FERC wants to do with it."

From Trouble on the Line, 1996

Our hypothesis in the first study was that FERC Order 888 would make it harder to win public acceptance for new high-voltage lines, because many of them would, in fact, be built to benefit more distant customers. This hypothesis was confirmed in our interviews, and also in the declining pace of transmission construction as deregulation loomed on the horizon.²

Even in 1996, several new trends were emerging. The most important one involved need, which lies at the heart of most state "certificate" processes. Increasingly, we found, opponents hired expert witnesses to challenge an applicant's load growth forecast or other projections and propose an "environmentally friendly" alternative: more demand-side management, greater distributed generation or wind energy, etc. Unless a proposed line was clearly required to meet local needs, utility commissioners remained overwhelmingly reluctant to approve it.

By 1999, the transmission debate had changed. Major environmental groups – notably, the Union of Concern Scientists – were beginning to participate in it.³ In the upper Midwest, the Environmental Law and Policy Center argued that new high-voltage lines might increase air emissions "as low-cost coal plants are cranked up to sell more power outside the region."⁴ They took an especially dim view of retail competition, which "would increase pollution, reduce reliability, shift costs to small consumers, and eliminate energy efficiency and renewable energy progress."⁵ Together with other non-governmental organizations (NGOs), they proposed an alternate view of energy markets, with important roles for efficiency, conservation and renewables.⁶

Instead of broadening market access, then, advocacy groups favored a different approach: targeted regulation. Specifically, they wanted the government to maintain "vigilant regulatory oversight that emphasizes demand-

TROUBLE ON THE LINE: KEY FINDINGS (1996)

- ▶ New transmission projects had already decreased in most regions since 1994 in anticipation of deregulation. Few utilities wanted to build a line that might serve their competitors. Faced with industry consolidation, many of them waited to see whether they were going to be winners or losers.
- ▶ State regulators were already worried about reliability and growing demand. "The system wasn't designed to do what FERC wants to do with it," one of them said.
- ▶ Most new transmission lines faced local opposition, based on concerns about residential property values. Intervenor quickly discovered that permits were seldom denied for that reason. So they learned to file technical objections, regarding EMFs, environmental impact, etc. Deregulation strengthened their arguments about need and equity: Why should a line be built here when its users live somewhere else?

side management, distributed generation, wind and solar power, and other low- impact technologies."⁷ Lower voltage lines (138-kV and 345-kV) were acceptable, as long as these lines addressed reliability or other local needs. But higher voltages or longer lines raised suspicion.

Ten years later, the country's transmission grid now sits at the center of an intense public debate over national energy policy. Increasingly, this debate is driven by a coalition of major environmental groups: the Union of Concerned Scientists, Environmental Defense Fund, Sierra Club, The Wilderness Society and Natural Resources Defense Council. Academics, Washington think tanks, trade groups, independent system operators, wind generators, and other non-traditional stakeholders have also joined in.⁸ The debate no longer centers on whether Utility X should build a line in State Y – or even across State Y to State Z. It has become a struggle for the direction of America's energy future.

Public debate now centers on at least three main issues:

- ▶ Long-term energy policy, including first and foremost greenhouse gas reduction.
- ▶ A top-to-bottom redesign of the entire energy system, emphasizing "non-wires" solutions.
- ▶ The role of renewable energy and high-voltage transmission in this system and as a tool for regional economic development.

THE UNIVERSITY OF TEXAS/TERRA GROUP TRANSMISSION STUDY

Over the past nine months, we have interviewed state and federal regulators, environmental leaders, industry representatives, state consumer advocates and other key stakeholders about their views of the transmission grid (see Appendix for a list of participating organizations and agencies). In the end, we focused on state regulators and environmental groups, because of their role in shaping public policy. Our goal was to gauge the likely impact of current policy debates on public acceptance (or rejection) of new transmission lines.

In general, our interviews focused on four main questions:

- ▶ Do we need a national (or interconnection-wide) grid? If so, how should it be reinforced? Or should we stick with the existing patchwork of regional systems? Or maybe something in between?
- ▶ Who should plan, design and oversee the grid: state regulators, FERC, power generators and transmission operators, or some as yet-to-be-designed entity? What should it look like and how should its priorities be set?
- ▶ Who should be responsible for forecasting load and demand?
- ▶ Should we build large “backbone lines” to bring renewable energy from remote generation sites to high-demand markets? Will the benefit of these energy super-highways outweigh their environmental and financial costs? Will states be able to meet their renewable energy standards without them?⁹

1. State Regulators

Virtually all state regulators agree that federal authority to site high-voltage transmission lines is a Bad Thing. Above all, they believe that FERC-sited lines will overly expensive, “inherently unfair” and take too long for approval. Beyond that, opinion varies.

According to one commission chairman, the vacuum on federal energy policy has forced many states to come up with their own plans regarding renewables (e.g., RPS and RES), greenhouse gases, energy efficiency, smart grid, etc. All of these initiatives will affect the rate base – and such impacts are difficult to calculate. A colleague observed that “Nobody prices out renewable portfolio standards.” New federal mandates must be designed and

implemented carefully to minimize unintended but significant economic consequences.

Most regulators agree that transmission and generation planning now requires a major overhaul. Several key issues must be addressed:

- ▶ Decreasing demand. The current recession has called historical load forecasting into question. No one is quite sure how to predict short-term or medium-term demand growth in today’s market. Many regulators believe that growth will remain in the 1.5% to 2.0% annual range and may never reach its historical 3% again. At the same time, most utility commissions continue to rely on power companies for forecasting data. This has led to many officials to suspect that companies are “putting their thumbs on the scale” or using “outlier” estimates to justify inflated transmission investments. FERC’s “rate candy” for certain transmission projects (a guaranteed 12-14% rate of return) has only deepened these suspicions.
- ▶ Renewable energy standards. A majority of states (36 at last count) have now adopted requirements for renewable energy, led by Maine (40% by 2017) and California (20% by 2010 with a goal of 33% by 2020). Again, the impact of these requirements is hard to predict. Several commissioners have pointed out that such requirements will be expensive to meet and may require significant additional transmission infrastructure (e.g., for transporting “stranded wind” to load centers). At the moment, they are also unsure about how to integrate renewables (and associated transmission) with their long-standing mandate to provide “safe and reliable power at just and reasonable rates.” And in many regions, renewable energy development is seen as a potential job-creation tool, not an expensive commodity to buy from somewhere else.
- ▶ Energy efficiency. At least a dozen states have enacted energy efficiency standards, usually a phased decrease in overall demand. For example, New York’s PSC has adopted a goal of reducing total electric consumption by 15% in 2015.¹⁰ But regulators acknowledge that such efforts will be expensive; as one of them said, “People have no idea how much this will cost.”

They think it should be cheap.” So future electric rates that capture those costs are hard to foresee. And assumptions about future efficiency are also risky: one former chairman asked what would happen if the ISO operator plans for lower demand and then efficiency targets aren’t met?

- ▶ The “over-my-dead-body” factor. Many state regulators – even officials who recognize the need for some sort of regional planning – are generally unwilling to permit power lines that primarily serve out-of-state customers. It is often hard to understand this reluctance except as a form of the “prisoner’s dilemma”: each state receives an assured but limited benefit from non-cooperation (by minimizing its own costs), although the potential benefits of cooperation among several states could be much greater (by buying or selling power that is otherwise unavailable). A major problem is uncertainty: as a Midwestern commissioner put it, “If we knew how much power we could sell, this would be easy.” But another dynamic also prevails. To quote one senior staff member: “If a transmission line doesn’t help us, I don’t want it.”

“The grid was built so that generation would be located close to need. Are we going to redesign the whole system?”

Northeastern Commission Chairman, 2009

As a former commission chairman points out, the country’s transmission grid can serve two very distinct purposes: as an “enabler” to more power generation and demand-side management, or as a competitor. Either option may produce greater efficiency: if transmission prices compete with other alternatives, customers may reduce their power consumption. Another question: Should transmission decisions be driven by generation investment or vice-versa? And should we favor a “strong” grid, capable of sending power over long distances, or the “weak” one that we now have? These are major policy questions that need to be resolved.¹¹

Significant differences of opinion exist within the Eastern and Western Interconnections, as well as in Texas. Here is a summary of views in each region.

The Eastern Interconnection

“No company ever comes in here and says they want to build a line to New Jersey. It’s always for local reliability.” In one form or another, this remark (by a Pennsylvania regulator) came up in almost all of our interviews. Another example (from Illinois): “The Midwest must spend more now for big lines that benefit the East, because they didn’t build anything when they should have.” And another one: “It’s like someone putting a second fridge in your kitchen. Even if they pay you rent, you don’t want the fridge.”

Federal officials often interpret such reluctance as parochialism and cite it to justify expanding their role in transmission siting. But the “prisoner’s dilemma” issue helps to explain this resistance. State commissioners and their senior staff members are usually quite clear about what they don’t want.

Most state regulators agree that the country’s transmission system needs to be improved. But the agreement ends there. Quite a few believe that their own piece of the grid is adequate to meet future demand, or nearly so. Taking into account their renewable and energy efficiency goals, for example, commissioners in three densely populated Eastern states see no need for additional high-voltage lines.

This leads to the next conclusion: state regulators believe almost unanimously that FERC-sited lines will be too expensive. The problem is that FERC is looking at a grand design, the transmission superhighway, which will benefit a few states at the expense of others. And state authorities have little confidence that federal regulators can successfully balance competing needs. As one commissioner simply put it, “The feds will bigfoot you.”

“Long lines are inherently inequitable.”

Northeastern Commissioner, 2009

FERC officials often claim that they have successfully sited hundreds or thousands of miles of high-voltage lines using proven review and approval procedures. They point to a recent memorandum of understanding among various agencies to show that they are capable of effective leadership.¹² State regulators see things differently.

For one thing, they point out, FERC holds no jurisdiction over other federal agencies, notwithstanding the

recent MOU. For another, its background with transmission siting is confined primarily to federal lands in the West, not to crowded jurisdictions in the East. Even there, one Midwestern siting board member observed, “it took 14 years for AEP to get a permit on federal land. So what will we get with federal authority?” Another senior official pointed to recent experience with the National Interest Electric Transmission Corridors in his region and called it “worse than useless. It just made people angry.” He credited the federal government with ending any possibility that high-voltage lines will cross Mid-Atlantic states.

But doesn't FERC's bring useful experience with gas pipelines? “Everyone knew that long pipelines were needed” to bring gas from the Gulf of Mexico, explained one senior staff member in the Northeast. “That's where the gas is produced.” Transmission lines are different: they have traditionally connected local generation to local customers. And people have to look at them every day.

State regulators also fear that a federal process will be “easy for politics to derail.” Utility commissioners are used to hearing from angry state legislators or local mayors, who object to one line or another. Specifically, they are used to ignoring them. Most people want good electric service, and commissioners have hewed very closely to the principles of reliability and lowest cost that enjoy broad public support.

But what will happen when commissioners start hearing from U.S. senators and representatives? When the line provides service in another state (“with little off ramps to get us off their backs”)? Early results from the NIETCs are not encouraging. As one commission chairman said, current scenarios all take a “ready-fire-aim” approach. “Maybe planners should just avoid some parts of the country where political opposition is overwhelming,” he suggested.

Another common concern: FERC will be “insensitive to local needs.” Nobody but FERC seems to believe that it runs an effective process. State regulators tend to see it as remote, disengaged and *ex parte* in the extreme. One siting board chairman asked whether “states will be welcome at the table with FERC siting authority.” Another staff member said he was “torn” about greater federal involvement: “it might make some things easier, but local issues would become more complicated.” In the words of a colleague, “Will Grandma Jones have to go to Washington to get a pole moved?”

Others are worried that federal authorities will derail state goals for renewable energy, efficiency and load management. In New York, for example, the PSC has

set its sights on reducing carbon and “flattening the demand curve” in major load centers. Careful integration of its remote wind resources will be needed – but not a big 765-kV line from the Midwest. “Coal by wire” remains another major concern. And so are questions about the all-in costs of renewable energy from the Upper Midwest – the “Saudi Arabia of wind” – compared to local sources. In virtually every other Northeastern state, regulators raised similar objections.

Still, most state officials see a bigger role for the federal government in electric transmission. Opinions vary, but they cluster around three views:

- ▶ One group suggests that FERC should take the lead in planning a more integrated transmission system. Once this national plan has been developed, states should be responsible for routing and siting the lines. If that fails, perhaps other measures should be taken. As one chairman put it, “There may be a reason to preempt state authority, but it has to be part of a larger plan. And that plan doesn't exist.”
- ▶ In contrast, an equal number of regulators believe that planning should be left entirely to the states, or at most to state commissioners working together within a single ISO footprint. They point to the MISO state commissioners group as a current model.¹³ From this angle, federal transmission planning looks like the proverbial “camel's nose”: start with power lines, and pretty soon they'll be telling us where to build generation facilities and what to build. And who will pay the bill? Yet members pause uneasily when asked what will happen if one state refuses to approve a line that its neighbors want.
- ▶ Virtually all state regulators agree that FERC should retain strong backstop authority with eminent domain to site lines where states fall short. These officials believe that federal authority might make their siting job easier, although they do not want FERC to use it. Only one senior staff member said he thought that FERC authority – in the sense of actually siting interstate lines – is “inevitable.”

Throughout the debates over transmission, according to one Midwestern commissioner, the 800-pound gorilla is carbon reduction. Even if every state meets its RES, this commissioner points out, the impact on carbon emissions will be insufficient. The impending specter of federal greenhouse gas restrictions is the “real problem” facing

state regulators, not FERC or transmission siting. This assessment certainly squares with the views of major environmental groups, which have focused on electric transmission as part of a broader strategy to address climate change (see Section 2). But interviews with many state regulators suggest that they see carbon reduction as “one issue among many” in their portfolios. In most states, transmission cost – especially, an imperative to avoid getting stuck with the bill for someone else’s power lines – occupies pride of place in their agenda.

Exceptions exist. In 2005, ten Eastern and Mid-Atlantic states formed the Regional Greenhouse Gas Initiative (RGGI) to “reduce CO² emissions from the power sector 10% by 2018.”¹⁴ In effect, they have created a regional market for cap-and-trade sales, which conducted its first auction in 2008. Commissioners in two major states believe that such auctions will become a critical tool in reaching their carbon reduction goals – although other measures will be needed. But federalizing this process introduces greater bureaucracy and risk.

The Western Interconnection

Things are different in the West.¹⁵ Most Western states have set relatively aggressive standards for renewable energy: California, 20% by 2010 (with a goal of 33% by 2020); Colorado and New Mexico, 20% by 2020; Nevada and Oregon, 25% by 2025.¹⁶ Major markets – say, Los Angeles or Denver – are often located far from power supplies.

One important difference with the East is that California authorities have identified enough wind and other renewables within the state itself to meet their needs. California’s renewable energy zones may not always provide the cheapest solution – bringing in solar power or wind from other states might be cheaper – but it frees Californians from the vagaries of permitting outside their own jurisdiction.

In Colorado, too, the Public Service Commission has designated five renewable energy zones in southern counties with abundant wind energy and other resources. Colorado’s energy plan includes high-voltage lines that will bring this power into Denver, Boulder and Colorado Springs; rural landowners are eager to lease rights-of-way for new transmission projects. And while limited opposition has arisen in suburban areas, PSC staff members doubt that such opposition will block proposed lines.

Elsewhere in the West, however, inter-jurisdictional permitting remains the main obstacle in transmission siting. In 2007, the Western Governors’ Association (WGA) and U.S. Department of Energy launched their own multi-stakeholder process to define “Western Renewable Energy Zones” that would operate more or less like CREZ in California, Colorado and Texas. Last June, the WGA group issues its “Phase 1 Report” that identified “Qualified Resource Areas”: regions with at least 1,500 MW of wind or solar power and a maximum radius of 100 miles from their geographic center.²¹

CALIFORNIA’S RENEWABLE ENERGY TRANSMISSION INITIATIVE (RETI)

In 2007, the California PUC and the California Energy Commission created RETI, the Renewable Energy Transmission Initiative, “to build broad-based and, to the extent possible, consensus support for approval and construction” of major transmission facilities.¹⁷ RETI was charged with identifying and ranking the state’s competitive renewable energy zones (CREZ) and related transmission corridors.¹⁸ It was overseen by a coordinating committee including the PUC, CEC, California Independent System Operator, Southern California Public Power Authority, Northern California Power Agency and the Sacramento Municipal Utility District. Work on the renewable energy zones was carried out by a Stakeholder Steering Committee that involved representatives of industry, public interest groups, government agencies and other key constituencies.¹⁹ Their Phase 2A Final report was completed in September, 2009.²⁰

The RETI report was prepared with technical assistance from an independent engineering consultant using load data and demand forecasts that were broadly accepted by

all committee members – a critical issue for public interest groups. It determined that 85% of California’s renewable transmission needs can be addressed by using existing rights-of-way, either in their current configuration or by expanding them.

Will the RETI process avoid public opposition to new transmission lines? In many cases, yes; in some cases, no. Stakeholder committee members believe that they have developed a blueprint to minimize environmental impacts and keep costs low. But they recognize that not everyone will be happy. In particular, local conservation and land use groups – and perhaps even a few county governments – may disagree with proposed routes. Still, committee members argue that other alternatives are worse. Speaking of local conservationists, one of them noted that “Sometimes people forget this is ultimately about reducing greenhouse gases. For every degree centigrade of global warming, we’ll lose 20 desert species in California. Pretty soon, we won’t have anything left to conserve.”

Yet WREZ's future remains uncertain. According to one participant, consensus about fully defining these energy zones has stalled over jurisdictional issues and disputes about wildlife conservation, routing and other thorny issues. The report itself acknowledged such obstacles. It concluded that "The WREZ seeks to aggregate the regional demand for and supply of renewable energy to benefit the entire region. This will require addressing the political and regulatory obstacles to the permitting and construction of cross-jurisdictional transmission lines and renewable energy projects, as well as addressing any barriers to coordinated purchasing by load-serving entities."²² But the authors offered no suggestions about how this will be done.²³

Meanwhile, according to the Western Interstate Energy Board (a WGA affiliate), existing federal processes present other obstacles:

Along with the NEPA [National Environmental Policy Act] review process, a major transmission project proponent in the West must navigate through a complex array of federal public land management requirements administered by the Bureau of Land Management..., the Forest Service, the Fish and Wildlife Service, the National Park Service, and the Bureau of Reclamation. In addition, a major project often requires modifications to land use management plans, which trigger an expensive, time-consuming, and often litigious process.²⁴

On top of that, "the federal government's timelines for environmental reviews often exceed" those of state and local authorities, so that time-sensitive studies have to be redone. In the worst case, project proponents "end up being forced to site portions of a line without any certainty" about where the rest of it will go.²⁵

In the end, this report anticipated a different outcome:

The FERC's Section 1221 backstop authority is but the initial step toward a comprehensive federal transmission permitting regime...that would give the federal government the final say in the approval process for major electric transmission development...the federal government will ultimately do what the states in the West cannot or will not do for themselves in facilitating regional transmission infrastructure improvement.²⁶

It is unclear what role the states will play in that process.

ERCOT

In 2007, regulators in Texas designated five competitive renewable energy zones in West Texas, far from load centers along the "I-35 Corridor." Subsequently, they called for proposals to build transmission connecting the renewable zones to customers in San Antonio, Austin and Dallas-Ft. Worth (which will free up existing resources for Houston).

As in Colorado, landowners in West Texas have jumped at the chance to provide rights-of-way for these lines. Most environmental NGOs also support the PUC's plan. Localized opposition arose in the Hill Country west of Austin,

A VIEW FROM FERC

FERC officials often disagree with the judgments of state regulators. According to a former senior federal official,

"The Holy Grail of Planning is probably the single largest impediment to actually constructing multi-state high voltage transmission. Planning is just code for indecision and delay when it comes to constructing needed energy infrastructure. The planning process can never keep pace with market signals and should be subsumed in a federal process where all the would-be planners can perform the same function by participating in the disciplined development of a federal record for the public interest decision in real time."

This official also rejected the notion that electric transmission lines present a different siting challenge than gas pipelines. After all, he suggested, the fundamental problem – generation sites located far from load centers – is the same in both cases.

As for the idea that somehow a federal process would become more "political" than state permitting, he pointed out that no one "ever heard of an LNG plant or a high pressure pipeline going through the Northeast that did not have huge political pressures. Yet [FERC] got the job done. Those that failed did so because the states fell to political pressure and denied needed state permits." And he noted that Congress is considering several proposals that all set a one-year limit on federal review, including NEPA.

where proposed lines cross expensive residential property, and in the Dallas suburbs. In at least one case, the PUC has told a transmission developer to come back with better routes. And a recent court decision now requires the commission to reconsider its transmission contracts, which will undoubtedly slow the entire process.²⁷

2. Environmental Organizations

Since 2006, a national coalition of major environmental groups has begun to focus on shaping transmission policy. This coalition includes the Environmental Defense Fund, Natural Resources Defense Council, Sierra Club, Union of Concerned Scientists and The Wilderness Society. All of them were included in our study.²⁸

Environmental leaders recognize that their involvement in a highly technical field like transmission planning brings unique challenges. For one thing, there's the language gap. During the RETI process, one environmental representative recalled, participants exchanged a glossary of terms so that they could understand each other. After that, the process proceeded more smoothly. For another thing, major environmental groups have invested in hiring their own experts: at least one Ph.D.-level electrical engineer and lawyers with utility experience. "We'll have to do more than throw around rhetoric," one representative acknowledged. "Otherwise we'll continue to just be interesting accessories at meetings."

We're looking for the least carbon at the lowest cost in the shortest time."

Senior environmental representative

Points of Consensus

Most national and regional environmental organizations agree that transmission expansion must be closely tied to reducing greenhouse gases: "the lowest carbon at the least cost," as one senior attorney put it. In general, environmental leaders do not object to short lines that improve reliability or relieve congestion – and in this way, they often part company with local grassroots groups that mobilize reactively to oppose specific projects. In their view, the key to designing our country's grid lies in planning: who sits at the table, who determines need and forecasts future demand, what decisions should be made by government and which ones should be left to the market.

Although environmental leaders differ in details, they share three common assumptions:

- ▶ A new national energy system must ensure "safe and reliable, economically affordable and environmentally sustainable electric power." First and foremost, this system requires federal legislation to cap carbon emissions.

- ▶ Energy planning should follow a hierarchy of technical and economic options: enhanced energy efficiency, demand response, "clean distributed resources," smart grid technologies. New transmission lines should maximize use of existing infrastructure or support development of renewables.
- ▶ Planning must be inclusive and transparent, "based on the input of all interested electric system stakeholders." It should rely primarily on "the analysis of experts with no economic interest in the results." And it should look beyond "traditional wires-based solutions."
- ▶ Many environmental leaders point to California's RETI process as an example that can be emulated. In particular, they praise its inclusiveness: the systematic identification and participation of representatives from key stakeholder groups, including power generators, transmission operators, technology companies, environmental groups, government agencies, etc.²⁹ Others suggest that the Western Governors' WREZ initiative might provide a useful model, although they also acknowledge that it is more heavily weighted than RETI toward "insiders."

"We're trying to make climate policy through transmission and it's not working."

Western environmental leader

Central to this discussion is the issue of need. Most environmental leaders agree that need no longer means simply building something to serve the load within specific states or regions. It now means "needed to implement [energy] policy" – in this case, carbon reduction.³⁰ Without a clear policy framework, environmental groups are concerned that new high-voltage lines may become a sneaky way to send "coal by wire," even if those lines also carry renewables.

Often, too, they suspect that unnecessary high-voltage lines are being built or proposed because of guaranteed FERC rates of return for utility shareholders.³¹ Such projects may include "green extension cords" and transmission superhighways. "The system is set up to enable construction of new infrastructure," one senior attorney observed.

One recent example involves the Piedmont Environmental Council's opposition to federal designation of NIETCs in the East: "The Department of Energy's implementation of the NIETC program will have the lasting effect of undermining climate change initiatives set forth by local governments, states and future federal legislation by locking population areas of the Eastern United States into an electricity grid heavily dependent on coal fired power generated at plants built before the Clean Air Act of 1970."³² These views are shared by national environmental groups, which have provided logistical and legal support.

Finally, there is the critical question of energy efficiency. Citing a recent report by McKinsey and Company (June, 2009), one environmental expert pointed out that "the US could save \$1.2 trillion on energy bills and meet all projected demand growth [through 2020] by promoting investment in cost-effective energy efficiency...Obviously, if the US adopted policies that resulted in zero demand growth it would have a major impact on transmission."³³

Why haven't state and federal policymakers placed more emphasis on efficiency? This expert explained:

Only a handful of states have adopted policies that would drive this level of investment and we're only just starting to scratch the surface of federal policies that could do this. About half the states do close to nothing on efficiency [because] some commissioners are far from convinced that it is as abundant, affordable and reliable a resource as many of their peers, the entire environmental community and McKinsey believe. In our view, this is not really a disagreement about facts on the ground so much as (i) a disagreement about what efficiency is (advertising campaigns to mind your thermostat and use CFLs [compact florescent lights] vs. comprehensive programs that include financial incentives and other market interventions); (ii) concerns about rates vs. bills and (iii) the fact that so many regulators have been unwilling to seriously consider alternatives to traditional rate regulation that ties utility profits and recovery of fixed costs to sales, which often makes the utility a powerful advocate for of a view of efficiency that is extremely limited.

Clearly, increased efficiency lies at the core of environmentalist strategies to reduce the need for "wires only" solutions.³⁴

Whatever national policies are adopted, however, it should be recognized that they are unlikely to dissuade

local or regional transmission opponents. Grassroots groups generally form to block transmission lines in their area. Although they often invoke environmental issues, they are usually motivated by other concerns: land use, property values, "viewshed," potential impacts on nearby recreational areas or wildlife habitat, etc.

In many places, such groups usually argue that new lines are not needed – and where this view is shared by national or regional organizations, they may receive outside support and encouragement. But where their opposition conflicts with larger policy goals of reducing carbon emissions and encouraging renewables, they can expect less help from major groups in the future.

Points of Disagreement

As always, the devil is in the details. Among environmental leaders, opinions on system planning seem to coalesce around major three views:

- ▶ Interconnection-Wide Assessment Commissions and Multi-State Planning Authorities. Several groups lean toward forming new super-regional or interconnection-wide planning entities. These commissions would assess "electric system needs and resource options" within each interconnection and identify high potential renewable energy zones. They would also evaluate potential transmission corridors – perhaps in conjunction with a special task-force of federal agencies. Detailed planning and siting decisions would be left to multi-state planning authorities staffed by technical experts and appointed by state governors. Planning authorities would be required to confer with regional stakeholder committees whose members would include state utility commissioners, environmental regulators, consumer advocates, NGOs and other organizations. FERC would oversee the entire process and exercise backstop authority if it broke down.

In theory, many environmental leaders support an interconnection-level approach. But they also recognize that it would require herculean political efforts and involve substantial risks. "A couple of black eyes," one of them noted, "and the whole process could be repealed." For that reason, they are focusing on other options.

- ▶ Enhanced ISOs. Many groups favor an approach that could be called the "enhanced ISO." In this case, a regional authority would be created

within each ISO to plan for load management, energy efficiency, system optimization, renewable energy, distributed generation and other measures. Like RETI or WREZ, regional authorities would include broad stakeholder representation – with environmental groups playing a substantive role in energy planning. Specific routing and siting decisions would remain in the hands of state regulatory commissions, which would be obligated to implement regional plans or submit to FERC backstop authority. Most environmental leaders believe that this approach is the most “doable” without huge and potentially fruitless expenditures of political capital.

- ▶ Reliability Council Entities. Several environmental leaders lean toward an option that might be called “Enhanced ISO Plus.” Recognizing that ISOs in the East and Midwest often fit unevenly into regulatory jurisdictions, this option would broaden the planning entity to coincide with state boundaries. Alternatively, planning responsibilities might fall to existing reliability councils, augmented with new powers and authority.

In the end, according to one expert, the precise grouping of states is less important than “getting the planning principles right.” In his view, such principles include reducing electricity demand and increasing efficiency; broadening the geographic horizon of regional planning (preferably to include the entire interconnection); and extending the planning horizon to ten years or more.

Is broad geographic scope a critical factor for success? Yes, he argued. “If we really want to significantly reduce carbon by 2050,” he noted, “it won’t just come from off-shore wind. We need to do everything.”³⁵

CONCLUSIONS

- ▶ Over the past 15 years, discussion about high-voltage transmission lines has shifted from localized concerns (e.g., property values and EMFs) to a debate about our country’s energy policy. New players – including the federal government, national environmental groups, academics, Washington think tanks, trade associations and power generators – now occupy a major role in shaping public debate about transmission siting and need.
- ▶ State regulators remain adamantly opposed to

federal transmission routing and siting. They are concerned about cost, unmanageable procedures and the enormous gap between local customers and federal bureaucrats. Their views were summarized by one commission chairman who said, “One size does not fit all.” In contrast, they are generally prepared to accept “some role” for the federal government in transmission planning.

- ▶ At the moment, many states seem to be caught in the grip of a “prisoner’s dilemma” on renewable energy: they are prepared to accept limited benefits from the status quo rather than take a chance on unproven benefits at huge cost. Federal officials often perceive this resistance as parochialism, but under current planning scenarios it may be entirely reasonable.
- ▶ Major environmental groups want an energy policy that achieves “the greatest carbon reduction at the lowest cost in the shortest time,” primarily through renewables, increased energy efficiency, optimization of existing infrastructure and distributed generation. They sometimes form alliances with grassroots groups, primarily where the broader environmental benefits of proposed transmission projects remain unclear.
- ▶ Most national groups support transmission that will be needed to implement the new energy policy, but not before this new policy is in place. They are concerned that current expansions – even expansions that may carry renewable energy – will inevitably be used to send “coal by wire” and thus undermine their goal of carbon reduction.
- ▶ Whatever national policies are adopted, transmission projects will continue to draw opposition. Although opponents often invoke environmental issues, they are usually motivated by other concerns: land use, property values, “viewshed,” potential impacts on nearby recreational areas or wildlife habitat, etc. They also argue that new lines are not needed, and where this view is shared by national or regional organizations, they may receive outside support and encouragement. But where their opposition conflicts with larger policy goals of reducing carbon emissions and encouraging renewables, they can expect less help in the future.
- ▶ Major environmental organizations are eager to sit at the table with federal and state regulators,

utilities, ISOs, consumer advocates and other key constituencies. Such discussions must be based on three fundamental principles: complete transparency, broad stakeholder involvement in future demand forecasts, and a willingness to consider generation alternatives beyond a traditional “wire-based” solutions. In contrast, they reject current “consultation” procedures that simply allow them to air their views but exclude them from the room when important decisions are made.

- ▶ At the same time, they recognize that they will need to raise their own game – to come armed with independent data (for example, on demand forecasting and need) and expertise. Several major groups have already hired Ph. D.-level experts to prepare for the challenge of making significant contributions.

Pending federal legislation will play a significant role in addressing many of these issues. But our interviews also suggest that they will not be resolved simply by passing new federal laws. Key policy questions will remain: What limits will be set on carbon? What is the right mix of energy efficiency and renewables? Where should the new transmission lines be built and who should designate the routes? Clearly, the discussion will continue.

Based on our own experience with potentially controversial energy facilities, we would like to offer three additional observations:

- ▶ Left unaddressed in this discussion are the critical issues of transmission routing and siting. Certainly, transmission planning and energy policy-making should include environmental organizations and other non-traditional stakeholders. But a better planning process is unlikely to build support for specific lines among grass-roots groups and potential opponents, who tend to focus on local, not broader impacts.
- ▶ At present, routing approval remains in the hands of state officials, usually public utility commissioners or a state siting board. Actual routes are most often designed by project developers based on what they think they can build. In some states, developers must additionally show that they have analyzed several potential corridors; occasionally, the siting board itself picks a final route from among various alternatives. Siting boards are usually constituted as inter-agency committees; in our experience,

they do not as a rule include “outsiders” representing major stakeholder constituencies.

- ▶ What seems to be lacking, at least in the Eastern Interconnection, is a collaborative siting process, similar to the RETI stakeholder committee that identified potential transmission corridors in California (as well as renewable energy zones). This process would include a robust and transparent procedure for analyzing alternative routes and determining the best options. Route selection committees would not grant regulatory approval for specific lines: that decision can remain with state or federal authorities. But its findings should become binding on project developers and intervenors who may choose to oppose them.

Opposition will never disappear. We are a litigious society, and “delay is often victory,” as community organizing manual from the 1990s pointed out. But a siting process that forges consensus around realistic alternatives can overcome much potential opposition. Properly designed, it will help to close the yawning gap between society’s broader environmental goals (such as carbon reduction) and local land use decisions that will be needed to attain them.

Endnotes

1. Robert Wasserstrom et al., *Trouble on the Line. Deregulation Fuels Public Opposition to Transmission Lines*, Terra Group, Houston, 1996, available at www.terra-group.net.
2. This pattern persists. According to FERC, only 668 miles of higher voltage lines – 230-kV and above – have been built across state borders since 2000 and only one of them involved a 765-kV line. See J. Mark Robinson, “Electric Transmission Siting Presentation,” Washington, 2008, <http://www.ferc.gov/industries/electric/indus-act/siting/trans-siting-present.pdf>.
3. In that year, UCS called for 10% renewable generation in the U.S. by 2010. Alan Noguee, Steven Clemmer, Bentham Paulos, Brent Haddad, *Powerful Solutions. 7 Ways to Switch America to Renewable Electricity*, Washington: Union of Concerned Scientists, January, 1999, available at http://www.ucsusa.org/assets/documents/clean_energy/ps-all.pdf.
4. Robert Wasserstrom et al., *Crossed Wires. Electric Power Deregulation Leaves Holes in the Nation's High-Voltage Transmission System*, Terra Group, Houston, 1999, p. 1.
5. Environmental Law and Policy Center Web site, 1999, quoted in *Crossed Wires*, p. 5.
6. *Crossed Wires*, p. 1. In 2001, ELPC released its blueprint for alternative energy, *Repowering the Midwest*, Chicago, 2001. Cosponsors of the report included a broad range of groups: Citizens Action Coalition of Indiana, Dakota Resource Council, Iowa-RENEW, Izaak Walton League of America, Minnesotans for an Energy-Efficient Economy, RENEW Wisconsin, and the Union of Concerned Scientists. A chronology of ELPC's involvement in electric power issues back to 1994 is available on their Web site at <http://elpc.org/>.
7. *Crossed Wires*, p. 1.
8. Recent examples include Bracken Hendricks, *Wired for Progress 2.0. Building a National Clean-Energy Smart Grid*, Washington, Center for American Progress, April, 2009; Rob Gramlich, Michael Goggin and Katherine Gensler, “Green Power Superhighways. Building a Path to America's Green Energy Future,” American Wind Energy Association and Solar Energy Industries Association, Washington, February, 2009; Shalini Vajjhala and Paul S. Fischbeck, *Quantifying Siting Difficulty. A Case Study of U.S. Transmission Line Siting*, Resources for the Future, Washington, February, 2006; Shalini Vajjhala, Anthony Paul, Richard Sweeney and Karen Palmer, *Green Corridors. Linking Interregional Transmission Expansion and Renewable Energy Policies*, Resources for the Future, Washington, March, 2008.
9. Renewable energy standards are also called “renewable portfolio standards” (RPS) and other names in various states. For simplicity, we will use the term “RES” in this report. For a survey of existing standards, see the Pew Center on Global Climate Change, “Renewable and Alternative Energy Portfolio Standards,” http://www.pewclimate.org/what_s_being_done/in_the_states/rps.cfm, updated December 14, 2009.
10. The PSC's order may be found at <http://documents.dps.state.ny.us/public/Common/ViewDoc.aspx?DocRefId={D9F7E0DF-A518-4199-84CC-C2E03950A28D}>
11. The authors wish to thank Craig Glazer for permitting us to use his presentation, “Planning in the 21st Century: The Black Sheep or Crown Jewel of the Electric Industry,” Energy Daily Conference, Washington, September 30, 2009.
12. “Memorandum of Understanding Among the U.S. Department of Agriculture, Department of Commerce, Department of Defense, Department of Energy, Environmental Protection Agency, the Council on Environmental Quality, the Federal Energy Regulatory Commission, the Advisory Council on Historic Preservation, and Department of the Interior, regarding Coordination in Federal Agency Review of Electric Transmission Facilities on Federal Land,” October 23, 2009, <http://www.ferc.gov/legal/maj-ord-reg/mou/mou-transmission-siting.pdf>.
13. Members of this group also view the Eastern Interconnection Planning Cooperative as an opportunity to expand the planning “footprint,” although at the moment, they see it more a place to “talk” than to plan.
14. Regional Greenhouse Gas Initiative, <http://www.rggi.org/home>.
15. The Western Interconnection includes Alberta, Arizona, British Columbia, California, Colorado, Idaho, Montana, New Mexico, Nevada, Oregon, Utah, Washington, Wyoming, as well as small parts of Texas and Baja California. Together with ERCOT (the rest of Texas), it accounts for 25-30% of the country's total electricity use. A helpful discussion of renewable energy zones in Texas and the West can be found in A. Schumacher, S. Fink and K. Porter, “Moving Beyond Paralysis: How States and Regions are Creating Innovative Transmission Projects,” National Renewable Energy Laboratory, Golden, CO, October, 2009, http://www.nrel.gov/wind/systemsintegration/pdfs/2009/innovative_transmission_projects.pdf.

16. For a survey of state goals and standards, see "Lessons Learned from Renewable Energy Credit (REC) Trading in Texas," prepared by the Center for Energy Economics, Bureau of Economic Geology, University of Texas, for the State Energy Conservation Office, 2009. Note also that California has effectively eliminated the "coal-by-wire" option by severely constraining long-term contracts for coal-fired power generation.
17. RETI, "Frequently Asked Questions (FAQ)," http://www.energy.ca.gov/reti/RETI_FAQ.PDF, p. 2. The California Energy Commission oversees public and municipal power authorities.
18. According to its mission statement, "RETI will assess all competitive renewable energy zones (CREZs) in California and neighboring areas that can provide significant electricity to California consumers by the year 2020. RETI also will identify those CREZs that can be developed in the most cost effective and environmentally benign manner and will then use existing transmission planning processes to prepare transmission plans of service..." See RETI, "California Renewable Energy Transmission Initiative Mission Statement," April 25, 2008, http://www.energy.ca.gov/reti/Mission_Statement.pdf, p. 1.
19. A list of Stakeholder Committee members is available at http://www.energy.ca.gov/reti/steering/SSC_Member_List.pdf.
20. This report can be found at <http://www.energy.ca.gov/2009publications/RETI-1000-2009-001/RETI-1000-2009-001-FREV2.PDF>.
21. Western Governors' Association & U.S. Department of Energy, "Western Renewable Energy Zones – Phase 1 Report," June, 2009, www.westerngov.org/wag/publicat/WREZ09.pdf, p. 10.
22. "Phase 1 Report," p. 19. An overview of its Phase 2 "conceptual transmission plans" is also available. See Doug Larson, Executive Director, Western Interstate Energy Board, "WRTZ and UREZ Transmission," July 16, 2009, http://geology.utah.gov/sep/renewable_energy/urez/task_force/pdf/wrez_urez_transmission071609.pdf.
23. Other signs are similarly discouraging. In August, 2009, the Western Interstate Energy Board (a WGA affiliate) wrote that "Many state and local government entities are reluctant to base a decision on regional or national interests of a transmission project if there is no direct benefit to the state or local jurisdiction through which the transmission line will pass. In some case, siting authorities are prohibited from approving projects that do not directly address state needs, though they may be responding to significant regional needs. In states where local governments have primary siting authority, a battle of wills often plays out as local needs trump state and regional needs." See James A. Holtkamp and Mark A. Davidson, "Transmission Siting in the Western United States: Overview and Recommendations," Holland and Hart, prepared for the Western Interstate Energy Board, August, 2009, p. 7.
24. "Transmission siting," p. 7.
25. "Transmission siting," p. 8.
26. "Transmission siting," p. 12.
27. "District Judge Rules in Favor of Texas Ratepayers," Enhanced News Online, January 15, 2010, http://eon.businesswire.com/portal/site/eon/permalink/?ndmViewId=news_view&newsId=20100115006287&newsLang=en.
28. The Department of Energy has recognized the importance of involving non-traditional stakeholders in interconnection-wide transmission planning. It recently awarded planning grants totaling \$60 million that include funding for environmental participants and others.
29. Environmental leaders who participated in RETI also point out that it was not flawless. Several key groups were missing; one major organization walked away during discussions and was not replaced. "It's critically important to have the right people at the table," one participant noted. "And representatives have to do their job – reach out to the stakeholder groups they're supposed to represent, let them know what's going on, and bring their opinions back."
30. One key advocate pointed out that PJM's recent decision to postpone the PATH line in West Virginia, Virginia and Maryland represented "a first and a victory for the energy efficiency/environmental communities." In this leader's view, PJM's decision acknowledged "changing economic conditions and increased penetration of customer demand management programs. This has the potential to have a huge impact on all pending transmission planning scenarios where those factors have not been included in the analysis to date, as well as forcing transmission planning entities in the future to include these factors in the needs assessments. This is the first real crack in the largely generation-only planning that has been the rule until now."
31. FERC officials often show a certain impatience with this viewpoint. "Regardless of the policy framework," one senior official noted, "you will have coal electrons flowing on almost any high voltage line...How will [wind energy] from the Alleghany Front get over the mountains and make it to the Northeast?"
32. Piedmont Environmental Council, *The Impacts of "Coal-by-Wire": How NIETC Designation is Changing Electricity Planning in America*, Warrenton, VA, undated, available at <http://www.pecva.org/anx/index.cfm/1,285,0,44,html/Understanding-National-Interest-Electric-Transmission-Corridors-NIETC>.

33. See Hannah Choi Granade, Jon Creyts, Anton Derkach, Phillip Farese, Scott Nyquist and Ken Ostrowski, *Unlocking Energy Efficiency in the U. S. Economy*, McKinsey and Company, July, 2009, http://www.mckinsey.com/client-service/electric-power-natural-gas/downloads/us_energy_efficiency_full_report.pdf.
34. For an authoritative survey of state programs on energy efficiency, see Maggie Eldridge et al., *The 2009 State Energy Efficiency Scorecard*, American Council for an Energy-Efficient Economy (ACEEE), Report Number EO97, Washington, October 2009.
35. Explaining this point, he added that “onshore wind in the Midwest is the cheapest utility scale renewable energy resource currently available in the East...we do not have the luxury of taking that off the table given the scale and the speed with which we need to move on climate. We need a process that weighs the economic and environmental costs of all options and ultimately that process should define the path forward.”

List of Participating Agencies and Organizations

ENVIRONMENTAL ORGANIZATIONS

Environmental Defense Fund
Natural Resources Defense Council
Piedmont Environmental Council
Resources for the Future
Sierra Club
Union of Concerned Scientists
The Wilderness Society

FEDERAL AGENCIES (INCLUDING CONFERENCE PRESENTATIONS)

Department of Energy
Department of the Interior
Federal Energy Regulatory Commission

STATE REGULATORY AGENCIES

California Public Utilities Commission
Colorado Public Utilities Commission
Connecticut Department of Public Utility Control
Florida Public Service Commission
Illinois Commerce Commission
Minnesota Public Utilities Commission
New York State Public Service Commission
Public Utilities Commission of Ohio
Pennsylvania Public Utility Commission
Pennsylvania Office of Consumer Advocate
Public Utility Commission of Texas
Public Service Commission of Wisconsin

TRADE GROUPS AND INDUSTRY REPRESENTATIVES

American Wind Energy Association
Edison Electric Institute
Horizon Energy
PJM Interconnection
PSE&G (New Jersey)

Bibliography

Innumerable documents have been produced on electric power transmission. We have included the ones that were used to prepare this report.

Alholinna, Jared, *Dispersed Renewable Generation Transmission Study*, three volumes, prepared for the Minnesota Department of Commerce, Office of Energy Security, June 16, 2008.

Apt, Jay, and Granger Morgan, *Critical Electric Power Issues in Pennsylvania: Transmission, Distributed Generation, and Continuing Services when the Grid Fails*, produced by the Carnegie Mellon Electricity Industry Center for the Pennsylvania Department of Environmental Protection, February, 2005.

Eldridge, Maggie et al., *The 2009 State Energy Efficiency Scorecard*, American Council for an Energy-Efficient Economy (ACEEE), Report Number E097, Washington, October 2009.

ERCOT System Planning, *Analysis of Transmission Alternatives for Competitive Renewable Energy Zones in Texas*, Austin, December, 2006.

Farrell, John and David Morris, *Energy Self-Reliant States*, New Rules Project, Minneapolis, October, 2009.

Federal Energy Regulatory Commission, "Memorandum of Understanding Among the U.S. Department of Agriculture, Department of Commerce, Department of Defense, Department of Energy, Environmental Protection Agency, the Council on Environmental Quality, the Federal Energy Regulatory Commission, the Advisory Council on Historic Preservation, and Department of the Interior, regarding Coordination in Federal Agency Review of Electric Transmission Facilities on Federal Land," October 23, 2009, <http://www.ferc.gov/legal/maj-ord-reg/mou/mou-transmission-siting.pdf>.

Glazer, Craig, "Planning in the 21st Century: The Black Sheep or the Drown Jewel of the Electric Industry," presented at the Energy Daily Conference, Washington, September 30, 2009.

Granade, Hannah Choi, Jon Creyts, Anton Derkach, Phillip Farese, Scott Nyquist and Ken Ostrowski, *Unlocking Energy Efficiency in the U. S. Economy*, McKinsey and Company, July, 2009, http://www.mckinsey.com/client-service/electricpower-natural-gas/downloads/us_energy_efficiency_full_report.pdf.

Gramlich, Rob, Michael Goggin and Katherine Gensler, "Green Power Superhighways. Building a Path to America's Green Energy Future," American Wind Energy Association and Solar Energy Industries Association, Washington, February, 2009.

Gulen, Gurcan, "Lessons Learned from Renewable Energy Credit (REC) Trading in Texas," prepared Center for Energy Economics, Bureau of Economic Geology, University of Texas, for the State Energy Conservation Office, April, 2009.

Hendricks, Bracken, *Wired for Progress 2.0. Building a National Clean-Energy Smart Grid*, Washington, Center for American Progress, April, 2009.

Holtkamp James A., and Mark A. Davidson, "Transmission Siting in the Western United States: Overview and Recommendations," Holland and Hart, prepared for the Western Interstate Energy Board, August, 2009, http://www.hollandhart.com/articles/Transmission_Siting_White_Paper_Final.pdf.

ISO New England et al., *Joint Coordinated System Plan Report*, Vols. 1 and 2, JCSP, 2008.

Larson, Doug, "WRTZ and UREZ Transmission," Western Interstate Energy Board, July 16, 2009, http://geology.utah.gov/sep/renewable_energy/urez/task_force/pdf/wrez_urez_transmission071609.pdf.

Lerner, Eric, "What's Wrong with the Electric Grid?," *The Industrial Physicist*, October/November, 2003, pp. 8-14.

Mills, Andres, Ryan Wiser and Kevin Porter, *The Cost of Transmission for Wind Energy: A Review of Transmission Planning Studies*, Ernest Orlando Lawrence Berkeley National Laboratory, February 2009, <http://eetd.lbl.gov/EA/EMP>.

Nogee, Alan, Steven Clemmer, Bentham Paulos, Brent Haddad, *Powerful Solutions. 7 Ways to Switch America to Renewable Electricity*, Washington: Union of Concerned Scientists, January, 1999, available at http://www.ucsusa.org/assets/documents/clean_energy/ps-all.pdf.

Pew Center on Global Climate Change, "Renewable and Alternative Energy Portfolio Standards," http://www.pewclimate.org/what_s_being_done/in_the_states/rps.cfm, updated December 14, 2009.

Piedmont Environmental Council, *The Impacts of "Coal-by-Wire": How NIETC Designation is Changing Electricity Planning in America*, Warrenton, VA, undated, available at <http://www.pecva.org/anx/index.cfm/1,285,0,44,html/Understanding-National-Interest-Electric-Transmission-Corridors-NIETC>.

Porter, K. and S. Fink, *State Transmission Infrastructure Authorities: The Story So Far*, National Renewable Energy Laboratory, Golden, Colorado, May, 2008.

Regional Greenhouse Gas Initiative, "Overview of RGGI CO2 Budget Trading Program," December 2009, <http://www.rggi.org/home>.

Renewable Energy Transmission Initiative (RETI), "California Renewable Energy Transmission Initiative Mission Statement," April 25, 2008, http://www.energy.ca.gov/reti/Mission_Statement.pdf.

Renewable Energy Transmission Initiative (RETI), "California Renewable Energy Transmission Initiative Frequently Asked Questions (FAQ)," 2008, http://www.energy.ca.gov/reti/RETI_FAQ.PDF.

Robinson, J. Mark, "Electric Transmission Siting Presentation," Washington, 2008, <http://www.ferc.gov/industries/electric/industact/siting/trans-siting-present.pdf>.

Rogers, John, Chris James and Robin Maslowski, *Importing Pollution. Coal's Threat to Climate Policy in the U.S. Northeast*, Union of Concerned Scientists, Cambridge, MA, December 2008.

Schumacher, A., S. Fink and K. Porter, "Moving Beyond Paralysis: How States and Regions are Creating Innovative Transmission Projects," National Renewable energy Laboratory, Golden, CO, October, 2009, http://www.nrel.gov/wind/systemsintegration/pdfs/2009/innovative_transmission_projects.pdf.

Smitherman, Barry T., "CREZ: Who Will Build the Transmission and When?," Public Utility Commission of Texas, February 18, 2009.

Task Force on Renewable Resource Generation Development Areas, *Connecting Colorado's Renewable Resources to the Market*, Report of the Colorado Senate Bill 07-091 Renewable Resource Generation Development Areas, December 21, 2007.

Tikalsky, Susan M. and Cassandra J. Willyard, "Aesthetics and Public Perception of Transmission Structures," *Right of Way*, March-April, 2007, pp. 28-32.

U.S. Department of Energy, *National Transmission Grid Study*, Washington, May, 2002.

U.S. Department of Energy, *National Electric Transmission Congestion Study*, Washington, August, 2006.

Vajjhala Shalini, "Siting Renewable Energy Facilities. A Spatial Analysis of Promises and Pitfalls," *Resources for the Future*, Washington, July 2006.

Vajjhala Shalini, and Paul S. Fischbeck, *Quantifying Siting Difficulty. A Case Study of U.S. Transmission Line Siting*, *Resources for the Future*, Washington, February, 2006.

Vajjhala, Shalini, Anthony Paul, Richard Sweeney and Karen Palmer, *Green Corridors. Linking Interregional Transmission Expansion and Renewable Energy Policies*, *Resources for the Future*, Washington, March, 2008.

Wasserstrom, Robert, Neil Palmer and Susan Reider, *Trouble on the Line. Deregulation Fuels Public Opposition to Transmission Lines*, Terra Group, Houston, 1996.

Wasserstrom, Robert, Neil Palmer and Susan Reider, *Crossed Wires. Electric Power Deregulation Leaves Holes in the Nation's High-Voltage Transmission System*, Terra Group, Houston, 1999.

Western Area Power Administration, "Transmission Line Siting: One Agency's Approach to Public Involvement," undated, <http://www.wapa.gov/pubinvolv.htm>.

Western Governors' Association & U.S. Department of Energy, "Western Renewable Energy Zones – Phase 1 Report," June, 2009, www.westerngov.org/wag/publicat/WREZ09.pdf.

Western Interstate Energy Board, "Summary of State Transmission Siting Law in the Western Interconnection 2009, http://www.westgov.org/wieb/transmission/other/siting_paper.pdf.

Whiteley, David, "Eastern Interconnection Planning Collaborative," presented at EIPC Stakeholder Seminars," Washington, October 13 and 16, 2009.

Woolf, Tim et al., *Repowering the Midwest. The Clean Energy Development Plan for the Heartland*. Environmental Law and Policy Center, Citizens Action Coalition of Indiana, Dakota Resource Council, Iowa-RENEW, Izaak Walton League of America, Minnesotans for an Energy-Efficient Economy, RENEW Wisconsin, and the Union of Concerned Scientists, Chicago, 2001.