Comments of the American Council for an Energy-Efficient Economy (ACEEE)
on
The U. S. Department of Energy's
Draft National Interest Electric Transmission Corridor Designations
Mid-Atlantic Area National Corridor (MAANC)
Docket No. 2007-OE-01
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Summary

ACEEE provides in these comments documentation of energy efficiency, demand response, and distributed generation resources that can be used to defer or eliminate the need for new transmission facilities, including but not limited to the proposed Mid-Atlantic Area National Corridor (MAANC).

Designation of MAANC and other national-interest corridors constitute a significant federal subsidy for transmission facilities. For this and other reasons, the authorizing provisions of the Energy Policy Act of 2005 (EPAct 2005) require the Department of Energy (DOE) and the Federal Energy Regulatory Commission (FERC) to consider alternatives to the conventional transmission corridors and facilities under study in this proceeding.

Although the focus of Section 1221 of EPAct 2005 is on transmission, this section should not be interpreted to narrowly address transmission issues alone, because granting the right of eminent domain for transmission would affect the viability of other types of resources, including demand-side resources (DSR). We define DSR as: energy efficiency (customer end-use energy efficiency that achieves permanent reductions in electricity demand), demand response (customer load management technologies that provide dispatchable demand reductions as part of a utility or RTO program), and distributed generation (small-scale generation systems, located at customer facilities, that reduce peak system load and congestion). It is thus imperative that DOE and FERC fully examine what the Department's Bonneville Power Administration terms "non-wires solutions" to problems that would appear to call for new transmission construction.

A transmission line built in a corridor such as MAANC may introduce nominally-low-cost electricity generation from outside the region into the PJM market. However, this can make it more difficult for other resources to enter the market. Non-transmission resources can reduce the cost and environmental impact of electricity service—but they must be specifically included in energy resource planning and siting processes in order to provide these benefits.

ACEEE has summarized a range of research other documentation that demonstrates that substantial demand-side resources exist in the PJM and other regions of the U.S., and could defer or eliminate the need for new transmission capacity. Specifically:

- In the PJM region, estimates of cost-effective demand-side resource potential exceed 50,000 MW, or about 30% of PJM's 2022 forecast summer peak demand.
- Seventeen states in the Northeast and around the U.S. are establishing Energy Efficiency Resource Standards, which mandate utilities to acquire demand-side resources in specific amounts, often consistent with these resource potential estimates. This means that resource potentials are being translated into binding policy commitments that will affect future electricity demand in PJM and other regions.
- Federal agencies, state utility commissions, utilities, and local governments have used demand-side resources effectively to defer or eliminate the need for new transmission and/or distribution capacity.
- Despite ample documentation of resource potential, and binding policy commitments in several states, PJM and other RTOs have been slow to modify their demand forecasts, continuing to base them on historical trends. This suggests that PJM, NERC, and other demand forecasts are subject to substantial modification.

These data strongly suggested that DOE and other federal agencies in the NIETC process should undertake serious and detailed analyses of demand-side resource alternatives to new transmission projects, before they use federal powers to approve such projects.

Overview of Demand-Side Resource Potential

ACEEE and others have developed substantial documentation of the resource potential available on the "demand side of the meter" that can be used to meet customers' needs for reliable and affordable electricity service, in place of "supply-side" electricity system needs, including generation, transmission, and distribution resources. These analyses show that the majority, if not all, of forecast electricity demand growth can be met through demand-side resources. The body of this resource analysis gives DOE and FERC ample basis for full consideration of demand-side resources in evaluating the need for new transmission capacity in MAANC and other corridors under study.

ACEEE's review of 11 electricity efficiency resource potential studies shows a median value of 24% of electricity usage as a median achievable potential estimate.[1] This means that, over time, up to 24% of forecast electricity demand can be avoided through cost-effective technologies than can be deployed using proven programs and policies. This is an inherently conservative estimate, because it is a subset of the total economic potential, which represents the energy savings potential if market barriers and other delivery

[1] Nadel et al. 2004. "The Technical, Economic, and Achievable Potential for Energy Efficiency in the United States: A Meta-Analysis of Recent Studies." In *Proceedings of the ACEEE Summer Study on Energy Efficiency in Buildings.* American Council for an Energy-Efficient Economy.

constraints were not applicable. These potential estimates are also conservative in that they limit themselves to current performance and cost estimates for today's technologies. Technology performance will improve, and costs will fall, which means that the achievable efficiency potential is likely to increase, not decrease.

Energy efficiency resource potential is most usefully expressed in an electric system planning context in terms of annual percentage effect on demand. In our meta-review, we found that the 24% median value for economic potential translated into a 1.2% median impact on electricity sales. That means that 1.2% of total utility electricity sales can be saved annually, and that load forecasts can be adjusted accordingly.

Comparing this level of achievable energy efficiency potential to current demand forecasts in the middle atlantic region shows that efficiency can offset most of the region's load growth. PJM's 2007 forecast projects that summer peak demand will grow 1.5% over the next 15 years.[2] Since achievable energy efficiency resources are in the 1.2%/year range, PJM's demand growth could be substantially reduced. If, for example, only half of achievable savings were realized as summer peak demand impacts, PJM's 2022 summer peak would be reduced from 171,295 MW to 155,792 MW, a savings of 15,503 MW.

Additional peak savings can be achieved through demand response, the active use of load management technologies and pricing policies to realize short-term peak demand reductions. The report of the Pennsylvania Demand Side Response Working Group includes an estimate that dispatchable demand response can reduce peak demand by 5% to 10%.[3] If PJM's peak were reduced by only 5%, that would reduce peak demand by 8565 MW in 2022. Combined with efficiency impacts, total peak demand reductions could be 24,068 MW in 2022, a reduction of 14% from the current forecast.

Yet PJM's Load Forecast Report shows only 2467 MW of demand response, about 10% of the estimated potential. PJM's under-development of demand response is particularly puzzling in light of its own analysis of the benefits of deploying demand response. To quote from it's recent report:

- "Curtailing 3% of each selected zone's super-peak load, which reduces PJM's peak load by 0.9%, yields an energy market price reduction of $8-$25 per megawatt-hour, or 5-8% on average, during the 133-152 hours in which curtailment occurs in at least one zone. The range depends on market conditions.

- Assuming all loads (i.e., customers or their retail providers) are exposed to spot prices, the estimated price reductions could benefit non-curtailed loads in MADRI states by $57-$182 million per year. The potential benefits to the entire PJM system amount to $65-$203 million per year."[4]

[2] PJM Load Forecast Report, January 2007. http://www.pjm.com/reports.
[3] Pennsylvania Public Utility Commission. 2007. *Report on Conservation, Energy Efficiency, Demand Response, and Advanced Metering Infrastructure.*
[4] Brattle Group. 2007. *Quantifying Demand Response Benefits in PJM.* PJM, Valley Forge, PA

Such analysis should justify a massive expansion of demand response in PJM, and an accompanying reduction of the peak demand forecast.

The third type of distributed resource, distributed generation, is also not factored into PJM or any other electricity system forecast. The Department's own analysis of combined heat and power (CHP) potential in the U.S. shows substantial opportunity for building generation close to load centers, in ways that relieve transmission congestion, reduce the need for new generation, and reduce the new for new long-distance transmission lines.[5] DOE's report shows that in 9 of the states PJM serves, commercial/institutional CHP potential totals 17,712 MW of capacity.

PJM and other utility load forecasts also largely ignore the effects of major advances in appliance, lighting, and equipment efficiency standards. Federal legislation and Department of Energy rulemakings in recent years have set stringent new standards for a range of electricity-using products and equipment, including:

- Residential and commercial air conditioners
- Residential and commercial refrigerators
- Residential and commercial lamps and lighting fixtures
- Utility and building electricity transformers

These and other standards are estimated to reduce electricity demand nationally by about 5% in 2020.[6] In PJM, that would reduce demand by as much as another 8565 MW.

Summing up the potential peak demand reductions from these distributed resources yields the following estimate:

Total Demand Side Resource Potential in PJM	
Resource Type	Total Potential (MW)
Energy Efficiency	15,503
Demand Response	8,565
CHP (commercial only)	17,712
Efficiency standards	8,565
TOTAL	50,345

The combined potential for demand-side resources available to reduce PJM peak demand is thus over 50,000 MW, almost 30% of the PJM load forecast for 2022.

Despite this well-documented potential for demand-side peak reduction, PJM's forecasts show projections based almost entirely on historical growth curves. Such business-as-

[5] Onsite Sycom. 2000. *The Market and Technical Potential for Combined Heat and Power in the Commercial/Institutional Sector*. U.S. Department of Energy, Washington, DC.
[6] ACEEE staff analysis.

usual approaches fly in the face of FERC's orders to increase the use of demand response and energy efficiency in its planning and system operations, and of state policies in the region designed to aggressively pursue energy efficiency and demand response.

DOE should thus not rely blindly on PJM or NERC forecasts for demand growth estimates, because they do not take into account either known resource potentials or existing policies that would substantially reduce peak demand growth. In its consideration of MAANC and other transmission corridors, DOE should explicitly and thoroughly calculate the potential for such demand-side resources.

Summary of State Policies That Will Reduce Electricity Demand in the PJM/Mid-Atlantic Region

DOE and FERC assessment of alternative to MAANC and other transmission development options should take into account state policies and programs that will reduce future growth in electricity demand. In the PJM region and nearby states, the following states have established legislative or regulatory policies that specify energy savings targets for electric utilities:

- **Virginia.** Senate bill 1416, enacted as amended in April 2007, requires electric utilities to reduce energy use 10% by 2022.
- **Maryland.** On July 3, 2007, Governor O'Malley announced a plan to reduce per-capita electricity usage in the state by 15% in 2015.
- **Delaware.** In June 2007, the General Assembly passed Senate Bill 18, which establishes a Sustainable Energy Utility in the state. The goal set for the SEU is to save an average of 30% of electricity usage for participants in its programs, and to reach one-third of residential customers, with a net effect of 10% of electricity usage in that customer class.
- **New Jersey.** In June 2007 the state legislature passed a climate action bill that includes a provision to set an Energy Efficiency Portfolio Standard, targeted to save 20% of electricity use by 2020.
- **New York.** In May 2007, Governor Spitzer announced a goal of saving 15% of total electricity usage in 2015 compared to the current forecast. The Public Service Commission has opened a docket to implement this energy efficiency resource standard policy.
- **Connecticut.** In 2005, state legislation added a Tier III resource requirement to its Renewable Portfolio Standard law, such that utilities are required to save 1% of total sales each year from 2007 through 2010. These requirements cumulate, so that savings in 2010 will be 4% of total sales.

ACEEE's analysis indicates that the following states across the nation have established Energy Efficiency Resource Standards (EERS), defined as policies that establish binding, quantitative, long-term energy savings targets for electric and/or gas utilities:

- Hawaii, California, Washington, Nevada, Colorado, Texas, Minnesota, Virginia, Delaware, New Jersey, New York, Connecticut, Vermont

The following states have EERS under development:

- Illinois, Michigan, North Carolina, Massachusetts

ACEEE issues a 2006 report on Energy Efficiency Resource Standards, which contains more details on many of these states.[7]

Savings targets in these state EERS typically range from .5% to 2% of annual electricity sales, which is in keeping with the efficiency potential estimates in the resource potential discussion above. This suggests that these policies will have a large impact on future demand growth, comparable to the estimate for PJM in the section above, as well as other regions of the country. This wave of state policy action aimed at significantly reducing electricity demand growth suggests that states are making firm resource commitments to reduce demand growth, and that DOE should thus reconsider current electricity demand forecasts when it considers the need for MAANC and other transmission corridor proposals.

Summary of Demand-side Resources Used as Transmission Alternatives

The FERC, state utility commissions, utilities, and federal power agencies have used demand-side resources many times in recent decades to defer or eliminate the need for new transmission lines.

FERC and RTO Actions. FERC in the last several years has required RTOs and other transmission market participants to employ demand-side resources in various planning and resource acquisition processes. In 2007, FERC approved the New England Independent System Operator (NE-ISO) Forward Capacity Market[8], which explicitly allows for energy efficiency, demand response, and distribution generation resources to bid into the forward capacity market system.

FERC has also recently ordered PJM to include energy efficiency as well as demand response its RPM forward capacity market currently under development:

> "..we agree with the New Jersey Commission that RPM does not treat investment in energy efficiency as a type of capacity resource eligible to participate in the capacity market and, that to the extent possible, energy efficiency solutions should be able to compete on an equal footing with demand response, generation, and transmission solutions."[9]

[7] Nadel, Steven. *Energy Efficiency Resource Standards: Experience and Recommendations.* Report No. E063. American Council for an Energy-Efficient Economy.

[8] 119 FERC ¶ 61,045 (2007))

[9] 119 FERC ¶ 61,318 (2007)

It thus reasonable to expect that transmission and wholesale power markets under FERC jurisdiction will be creating new ways to engage demand-side resources, which can have a substantial impact on future needs for transmission as well as generation capacity in these markets. Since the MAANC corridor would primarily serve the PJM market, it is therefore reasonable to include new demand-side resources as alternatives to transmission facilities built in MAANC.

Federal Power Agencies. Federally-owned power marketing agencies have explored alternatives to transmission construction, most notably the Bonneville Power Administration (BPA). BPA created a "non-wires solutions" initiative earlier in this decade to consider alternatives to building new transmission. BPA defines non-wires solutions as:

- Energy efficiency measures that reduce peak demand;
- Generation at or near loads;
- Loads selling back power at peak, either under contract or in response to periodic offers to pay a set amount for load reductions. This set of activities is referred to as "demand response.

These definitions were included in a 2004 study of the alternatives to a proposed 500-KV line to serve the Olympic Peninsula in Washington. The study found that a combination of these three resource types would be more than adequate to eliminate the need for the proposed line.[10] The chief kinds of resources found to be cost-effective for this purpose included microturbines with combined heat and power, stand-alone diesel generators, building efficiency improvements to heating systems, lighting, and building shells, and demand response/load management programs including direct load control, interruptible rates, and time of use rates.

Utilities, State and Local Governments. Examples of utility, state and local initiatives to use DSR to meet transmission, distribution, and related challenges include:

- **Chicago Reliability Fund.** In response to serious power outages in 1999, the City of Chicago reached a legal settlement with Commonwealth Edison to, among other commitments to improve reliability, create a $100 million fund for the city to use to use demand-side resources for reliability improvement. The city has used this fund to:
    - Upgrade energy efficiency in over 40 million square feet of buildings
    - Adding and upgrading emergency generation systems in the city for dispatchable use in reliability emergencies
    - Funding the construction of distributed renewable energy systems, including photovoltaic power generation and fuel cells.

[10] Energy and Environmental Alternatives, Inc. 2004. *Olympic Peninsula Study of Non-Wires Solutions to the 500 KV Transmission Line from Olympia to Shelton and a Transformer Addition at Shelton.* Bonneville Power Administration, Portland, Oregon.

- **Mad River Valley Line Deferral.** Green Mountain Power in Vermont faced the need to build a 34.5KV line into this area to serve a growing ski industry center. The utility and the customer worked out a solution that includes an interruptible contract such that the customer's peak load will not exceed the 30 MW that the current utility lines can reliably serve, and an intensive energy efficiency effort to reduce current loads sufficiently to accommodate new growth without building a new line.

- **NYSERDA – Distributed Resources Installation Support Program.** In 2001, New York was 300 MW short of the New York ISO required 18% reserve margin NYSERDA created a $10.4 million program to support the installation of distributed resources. One particular element is PV support, at the rate of $6 per Watt installed. The program paid for DG and curtailable load installations at the rate of $150 per kW installed, in return for generating or reducing load upon request from NY ISO.

- **Illinois Municipal Electric Agency—Backup Power.** Illinois Municipal Electric Agency (IMEA), a wholesale power provider serving 39 municipalities in Illinois, established a program that deploys backup generators to help meet peak summer demand. IMEA pays customers for the right to "dispatch" back-up generators during peak summer months. This allows IMEA to increase reliability and reduce costs while saving customers money on backup generators. These systems provide power when transmission lines are constrained. Many of IMEA's members have taken advantage of this program.

These are but a few of the many examples of state and local efforts to engage demand-side resources to address transmission and distribution system capacity issues. They provide concrete glimpses into the abundance of demand-side resource opportunities contained within the resource potential estimates provided above. Demand-side resources are real, practical, proven, and still largely untapped. DOE should thoroughly examine these resources in considering alternatives to MAANC and other transmission corridor projects.

Conclusions

ACEEE and others have reviewed the resource potential, the policy commitments, and the existing program experience associated with demand-side resources in the MAANC region and nationwide. Based on our research we find that:

- Demand side resource potential, in the form of energy efficiency, demand response, and distributed generation, contain documented resource potential sufficient to reduce the PJM 2022 summer peak demand forecast by over 50,000 MW, or about 30%.
- Seventeen states are establishing Energy Efficiency Resource Standards (EERS), which set specific, binding resource targets that utilities must acquire in the form of distributed resources over the next 8-15 years. Many of these resource targets are consistent with the resource potential identified above.

- Federal agencies including FERC and Bonneville Power have established specific policies that require the accelerated development of energy efficiency and demand response as resources in transmission system planning and wholesale capacity markets. States, utilities, and local governments have proven in numerous specific programs that these resources can be tapped effectively for transmission system and wholesale market needs.

We therefore conclude that DOE must undertake serious, quantitative assessments of demand-side resource alternatives before approving any transmission corridors, including MAANC, under its EPAct 2005 powers. Deploying DSR on an accelerated basis in transmission-constrained regions can reduce prices, improve reliability, reduce air pollutant and greenhouse gas emissions, and reduce customer electricity bills in ways that transmission investments alone will not do. We therefore urge DOE and other federal agencies, as well as RTOs, state utility commissions, and utilities with interests in these issues, to deploy demand side resources prior to constructing new transmission or other supply-side resources.