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Building Electric Transmission Lines:

A Review of Recent Transmission Projects

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Acronyms

AC	alternating current
BLM	Bureau of Land Management
BPA	Bonneville Power Administration
CHP	Champlain Hudson Power
CPCN	certificate of public convenience and necessity
DC	direct current
DOD	Department of Defense
DOE	United States Department of Energy
DPS	Department of Public Service
EIS	Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
IOU	investor-owned utility
kV	kilovolt(s)
LBNL	Lawrence Berkeley National Laboratory
MISO	Midcontinent Independent System Operator
MSTI	Mountain States Transmission Intertie
MW	megawatt(s)
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NPS	National Park Service
ON Line	One Nevada Transmission Line
PATH	Potomac-Appalachian Transmission Highline
PSC	Public Service Commission
PSE&G	Public Service Electric and Gas
PUC	public utilities commission
QER	Quadrennial Energy Review
RES	Renewable Energy Standard
ROD	Record of Decision
SCC	State Corporation Commission
WECC	Western Electricity Coordinating Council
Western	Western Area Power Administration
WSMR	White Sands Missile Range

Executive Summary

The first Quadrennial Energy Review (QER) recommended that the Department of Energy (DOE) conduct a national review of transmission plans and assess barriers and incentives to their implementation.[1] DOE tasked Lawrence Berkeley National Laboratory (LBNL) to prepare two reports to support the agency's response to this recommendation. The companion report to this one reviews regional transmission plans and transmission planning processes.[2] This report reviews recent transmission projects that provide examples of factors affecting project implementation that arise outside of regional transmission planning.[3] We organize these factors under four broad headings: (1) issuance of a certificate of public convenience and necessity (CPCN) by state authorities; (2) routing, siting, and permitting of a transmission line, often involving preparation of an Environmental Impact Statement (EIS) by a federal or state agency; (3) public and stakeholder sentiment and involvement, especially in the form of organized action, which surrounds and directly impacts both of the first two factors; and (4) economic or commercial factors that affect the need for and/or financial viability of projects, which underlies and is affected by all three of the preceding factors.

Table ES - 1. Summary of Transmission Projects Reviewed

Project	Status	Development Factors Discussed
One Nevada Transmission Line (ON Line)	In service 2014	• Competing commercial interests
Susquehanna-Roseland Electric Reliability Project	In service 2015	• EIS process involving a single federal agency • Public/stakeholder engagement
Champlain Hudson Power Express (CHP Express)	Planned 2017	• State regulatory approval • Presidential Permit • Public/stakeholder engagement
Southline Transmission Project	Planned 2020	• Co-led federal EIS process
Great Northern Transmission Line	Planned 2020	• Federal and state coordination to prepare EIS • Presidential Permit • Public/stakeholder engagement
Grain Belt Express Clean Line	Planned 2021	• Multiple state regulatory approvals • public/stakeholder engagement
SunZia Southwest Transmission Project	Planned 2020	• EIS process involving multiple federal agencies
Mountain States Transmission Intertie (MSTI)	Cancelled 2012	• EIS process co-led by two federal agencies • Public/stakeholder engagement • Changing economic drivers
Potomac-Appalachian Transmission Highline (PATH)	Cancelled 2012	• Multiple state regulatory approvals • Public/stakeholder engagement • Changing economic drivers

[1] We have interpreted the QER recommendation's use of the word "implementation" to include all factors affecting development and construction of a transmission project, both those directly associated with inclusion or selection of a project in a plan and those that arise outside a plan or planning process.
[2] Eto, J. 2016. *Planning Electric Transmission Lines: A Review of Recent Regional Transmission Plans*. LBNL- 1006331.
[3] This report uses the term "transmission projects" to include what others may describe as "transmission facilities."

This report presents case studies of nine recent or current transmission projects that illustrate how the above factors have affected project development (see Table ES - 1).

The report concludes by discussing barriers and incentives to implementation of transmission projects associated with the factors that are reviewed and illustrated in the case studies. Our discussion sometimes frames these factors as commercial risks that must be managed by transmission project developers. That is, the development of a transmission project is a commercial venture involving investors who are prepared to incur significant, yet ultimately limited, up-front development costs in return for the opportunity to earn future profits from the sale of transmission services and/or a regulated return on invested capital. Adopting a developer's perspective enables us to view the factors reviewed in this report as affecting the cost or time required to construct a transmission project. The extent to which these factors present barriers to the implementation of transmission projects is thus an assessment of whether these costs or time requirements are avoidable or necessary.

Finding 1: *Developers that engage early with stakeholders and the general public and respond meaningfully to address concerns they raise can pre-empt or at least mitigate the impacts of some forms of organized opposition to transmission projects.*

Organized public opposition to proposed transmission lines has frequently had a material impact on project development by adding time to siting and routing processes, and it has sometimes led or contributed to the cancellation of projects or to the addition of mitigation measures that have increased the project developers' costs. There are documented examples of project developers who have sought to reduce these costs and associated time requirements through up-front information sharing and joint (and early) development of mitigation approaches. The success of these activities has hinged largely on the extent to which they lead to meaningful engagement and tangible commitments to address public concerns over line routing.

Finding 2: *The likelihood of completion for multi-state projects is increased if each involved state finds that the project will adequately address the public interests of the state.*

When a project is wholly contained within a single state, the range and coordination of issues that must be considered is comparatively straightforward. By contrast, for projects involving more than one state, coordination among multiple state proceedings can require more time and become more complicated, especially if some states seek to take into account the possible actions of neighboring affected states. Developers of projects involving multiple states must demonstrate to each state's satisfaction that the benefits and costs of the projects are fairly or reasonably aligned within the boundaries of each state. Successful project developers have ensured that there are identifiable project beneficiaries within each state from which approval had to be obtained.

Finding 3. *Efficient and consistent agency involvement is required for timely resolution of siting issues that arise as part of compliance with the National Environmental Policy Act.*

For transmission line projects involving federal lands, compliance with the National Environmental Policy Act (NEPA) involves a prescribed and deliberate sequence of open processes: scoping meetings, public reviews of both a draft and final EIS, and issuance of a Record of Decision (ROD). Because of their geographic scope, multi-state transmission projects can entail coordination among more than one federal agency, multiple state offices of a single federal agency, and also related state, tribal, and local agencies during the NEPA process. NEPA processes involving multiple agencies raise many institutional issues that sometimes result in significant mitigation costs and time requirements to obtain final approval for a route involving non-private lands. The roots of these institutional issues can often be traced to (a) the diverse statutory missions of agencies, (b) the adequacy and competencies of the agencies' staff in terms of workload, turn-over, and prior experience in siting transmission lines, (c) the efficiency and ease of intra- and inter-agency information-sharing, and (d) the nature of agency decision-making processes (for example, the authorities of field offices versus central offices). There are documented examples of efficient, effective processes and coordination among and within agencies, but these are often overshadowed by well-publicized examples of delays and inconsistencies.

Conclusion

Developing a transmission project involves simultaneously managing two categories of commercial risk. One is the risk associated with securing the capital necessary to build the project. Eto (2016) focused on one example of capital risk: that associated with seeking regional cost allocation. The other category encompasses risks associated with the actual construction of a project. This report is focused on a key subset of these project-construction risks: the cost of satisfying the due process requirements of state and federal agencies involved in permitting and siting lines, which is often increased when there is organized public opposition to the project. These are necessary costs associated with transmission-line construction. Some can made more manageable through proactive actions by developers. Still others can be made more manageable through the actions of federal and state agencies to enhance the efficiency and accountability of their processes. Thus, while the project review process can be slow and add costs to project development, transmission lines are being built. Moreover, there are promising signs that both groups are taking actions to improve the processes, both in terms of their duration and the quality of the decisions that get made. We found examples of merchant transmission projects successfully gaining needed approvals and being constructed. Their experiences, in particular, suggest that if the economics of potential projects are sound, someone will find a way to build them.

1. Introduction

The first Quadrennial Energy Review (QER) recommended that the Department of Energy (DOE) conduct a national review of transmission plans and assess barriers and incentives to their implementation.[4] DOE tasked Lawrence Berkeley National Laboratory (LBNL) to prepare two reports to support the agency's response to this recommendation. The companion report to this one reviews regional transmission planning.[5] This report reviews recent transmission projects that offer examples of factors affecting project implementation that arise outside of regional transmission plans and planning processes.[6]

1.1. Scope of this Report

Factors affecting project implementation that arise outside of regional transmission planning include, but are not limited to issuance of a certificate of public convenience and necessity (CPCN) or related approval by state authorities, and routing and siting of a transmission line, which often entails preparation of a National Environmental Policy Act (NEPA) Environmental Impact Statement (EIS) by a federal or state agency. These factors are wholly distinct from the regional allocation of project costs, which are the focus of the regional transmission planning processes reviewed in Eto (2016). Other factors considered in the current report include public and stakeholder participation, and economic and commercial circumstances, both of which are also involved to varying degrees in the regional transmission planning processes reviewed in Eto (2016).

The clearest example of the difference between the focus of this report and the focus of Eto (2016) is the inclusion in this report of merchant transmission projects. Merchant transmission project developers rely on buyers of bulk transmission services to establish a project's financial viability. These developers do not rely on the recovery of costs allocated through the regional transmission planning processes reviewed in Eto (2016) and hence through cost-based tariffs approved through related Federal Energy Regulatory Commission (FERC) and state ratemaking processes.

The projects included in this review, both merchant and non-merchant, exemplify a broad range of factors that affect transmission project implementation and that are outside the scope of regional transmission planning processes. In our case studies of each individual project, we a focus on only one or two such factors; that is, the case study examples are not intended to be comprehensive reviews of all aspects of each project. Likewise, the reviews are not intended to express judgments regarding the representativeness of a particular project in relation to other projects whose development may be also be affected by these same factors. The projects included in this review were selected because they are recent examples, and information to support development of cases studies was readily available.

[4] We have interpreted the QER recommendation's use of the term "implementation" to include all factors affecting development and construction of a transmission project, both those directly associated with inclusion or selection of a project in a plan, as well as those that arise outside a plan or planning process.
[5] Eto, J. 2016. *Review of Regional Transmission Plans.*
[6] This report uses the term "transmission projects" to include what others may describe as "transmission facilities."

1.2. Organization of this report

This report begins (Section 2) by introducing and providing background on factors that affect the development of transmission projects and that are illustrated by the case studies that follow in Section 3. Each case study in Section 3 begins with a brief description of the project, including its current status, followed by a discussion of specific factors that affected the project's development. These reviews are based entirely on publicly available information gathered from websites and news reports. The project developers have each been provided an opportunity to review and comment on the factual accuracy of the descriptions of their projects. Section 4 discusses barriers and incentives to project implementation, which can be associated with (or linked directly to) the non-regional-plan-related factors described in Section 2 that are illustrated in the projects described in Section 3.

2. Overview of Factors Affecting the Development of Transmission Projects

As noted in Section 1, we organize the factors that affect the development of the projects considered in this report into four broad categories: (1) issuance of a CPCN by state authorities; (2) routing, siting, and permitting of a transmission line (often involving preparation of an EIS by a federal or state agency; (3) public and stakeholder sentiment and involvement, especially in the form of organized action; and (4) economic or commercial factors that affect the need and/or financial viability of projects, which underlie and are affected by all three of the preceding factors.

2.1. State Approvals

A principal authority reserved to the states is the issuance of a CPCN for construction and operation of a transmission line.[7] Authority to grant a CPCN is most frequently under the jurisdiction of a state public utility commission (PUC) although in some states it is under the jurisdiction of another agency (e.g., a state department of natural resources or state energy office). In some states, jurisdiction is shared with more than one agency.

A CPCN is typically required for a transmission developer to construct facilities to transport electricity at transmission (and sometimes lower, sub-transmission) voltages within a state's borders. Issuance of a CPCN is based on a finding by the state authority that the proposed project is in the public interest. Public and stakeholder input are almost always considered in a state's CPCN process. How state authorities determine whether a project is in the public interest is a major factor affecting the development of projects. Generally speaking, the way in which public interests are affected by the expected economic impacts of a project within the state is a primary focus of a state's consideration. For projects that involve more than one state, differences among the involved states' CPCN policies and processes must also be addressed. We discuss these state determinations in relation to several of the case studies in this report.

Merchant transmission projects must also obtain a state permit to operate as a public utility within the state. To grant such a permit, the state agency considering this permit must usually make a public-interest finding similar to that described above.

If a project is included or selected for regional cost allocation in a regional transmission plan, that fact can support a state's finding that a project is in the public interest. In some instances, inclusion or selection creates a rebuttable presumption that the project is in the public interest. However, inclusion or selection in a regional transmission plan does not replace the need for an independent finding by the state that the project serves the public interest. The companion report to this one, Eto (2016), discusses processes by which projects are selected for or included in regional transmission plans.

[7] Some states use slightly different terminology to refer to what this report refers to as a CPCN.

2.2. Project Routing and Siting Involving NEPA Compliance

Routing, siting, and permitting for a transmission project is another process that, like the CPCN process, addresses how a project affects the public interest. In this instance, how the public interest is affected by the expected environmental impacts of a project on affected parties is a primary focus. Consequently, information gathering and decision making to support the routing, siting, and permitting process often takes place through the preparation of an EIS.

NEPA, which articulates the basic policy guiding the preparation of an EIS, requires environmental impact assessments for federal agency actions, federally funded activities, and federally permitted or licensed activities that have the potential to affect the environment. The rules codifying the law's requirements are promulgated by the Council on Environmental Quality. Some states have adopted state-level policies and supporting requirements for preparation of EISs (or similar documents) by state agencies.[8]

The purpose of an EIS is to enable timely and informed decision making by affected federal (or state) agencies regarding actions—such as the construction of a high-voltage transmission line—that could significantly affect environmental quality. The EIS fulfills this purpose by assembling and consolidating information on the public-interest needs that would be met by a project and the environmental (and related) impacts associated with siting and construction of a project. An EIS plays an important focusing role by articulating and assessing impacts associated with one or more alternative routes for a proposed transmission project.

Meaningful public involvement is required during all phases of EIS preparation, starting with the scoping phase and continuing through review of a draft. The EIS process culminates in the publication of a final EIS, which in the case of a transmission project proposes a recommended route, and, later, in the issuance a record of decision (ROD), which seeks to resolve any remaining disputes related to the environmental impacts addressed in the final EIS. The ROD describes both the final route for the project and all monitoring and mitigation activities that will be required as part of the project.

Preparation of an EIS can involve input by and coordination among many agencies—federal, state, tribal, and local—as well as the public and the project developer. In the federal EIS process, one federal agency is usually designated as the lead agency responsible for soliciting input from other federal agencies and other parties and for preparing the draft and final EIS and the ROD. Participation by cooperating agencies in a federal EIS process is voluntary. In some instances the process is co-led by more than one federal agency. In instances where a state EIS must also be prepared, it may be co-led by the federal and state agencies as a joint EIS process.

The degree and timeliness of participation of the parties throughout the process of preparing an EIS, as well as actions they take after issuance of the final EIS or even the ROD, can be major factors affecting development of transmission projects, as shown in the case studies in this report.

[8] As with CPCN processes, multi-state transmission projects must also address each state's EIS requirements.

A closely related factor affecting development of transmission projects is securing rights-of-way on private lands that a proposed line would cross. Usually such rights-of-way are obtained through direct negotiation between the developer and the landowner. However, developers may sometimes seek federal, state, or local exercise of eminent domain, which is the power of these entities to take private property for a worthy public use, such as, in the context of this report, the construction of a transmission line. The exercise of eminent domain is generally viewed as a last resort when other means for securing the use of private property have not succeeded. The prospect that a developer might seek exercise of eminent domain can be an important element of negotiations with private landowners. The extent to which other such means have been pursued and how or whether eminent domain may be exercised can become a significant factor affecting the development of projects.

2.3. Public and Stakeholder Involvement

As indicated in the above descriptions of state-led CPCN approvals and federal (and state) agency-led NEPA processes, public and stakeholder involvement is required. Public and stakeholder involvement can also surround, and often extend beyond, these processes.

Public involvement, especially in the form of organized public opposition to projects, has material effects on the outcomes of CPCN and NEPA processes. In the normal course of these processes, these effects are manifested by considerations or directions in final orders (i.e., the CPCN or ROD) that would not otherwise have been included.

At the same time, a second material effect of public involvement is the time required to ensure meaningful consideration of public and stakeholder input, such as the time required to evaluate new or modified routes. In some instances, time is required to resolve lawsuits and legal challenges brought by affected parties outside the formal CPCN or NEPA processes before the processes themselves can reach final decisions and orders. We recognize and do not criticize the essential role of public and stakeholder involvement in these processes and the right of parties to seek external legal avenues to pursue their interests. It is, however, also important to note that the passage of time means that other factors affecting a project can and will change. These changes (such as an economic recession that was not foreseen when a project was first proposed) can influence the ultimate development of a project, including sometimes resulting in a project's cancellation.

2.4. Economic and Commercial Circumstances

Economic and commercial considerations are a fundamental part of the justification or rationale for constructing a transmission project. Transmission planning often involves a host of economic assumptions and supporting analytic activities to demonstrate that a project is warranted. As described in Eto (2016), selection of a project for regional cost allocation in a regional transmission plan requires a finding that the project is more efficient or cost-effective than alternatives. Merchant transmission projects, alternatively, depend on market processes, such as solicitations, to secure the commercial commitments necessary to finance project development.

All economic and commercial considerations are anchored to the time when they are made. As time passes, the assumptions upon which these considerations rest can change. For example, the price of natural gas and the overall level of economic activity (e.g., load growth), among many other factors, may fall (or rise) between the time a project is conceived and the time it is built. In some instances, these changes may be so large that they undermine the economic or commercial viability of the project, and the project may be cancelled. In other cases, developers may find themselves competing to build projects that would meet the same or a similar need, with the result that one project wins while the other(s) fold. The long lead times associated with development of transmission projects increases their exposure to these factors.

3. Project Case Studies

This section of the report presents case studies of a selection of recent or pending transmission projects that illustrate the variety of factors affecting project development. Each case study begins with a brief description of the project, including its current status. The review then identifies specific factors affecting development that are exemplified by the project. Table 1 lists the projects reviewed in this report and the factors discussed in conjunction with each.

Table 1. Summary of Transmission Projects Reviewed

Project	Status	Development Factors Discussed
One Nevada Transmission Line (ON Line)	In service 2014	• Competing commercial interests
Susquehanna-Roseland Electric Reliability Project	In service 2015	• EIS process involving a single federal agency • Public/stakeholder engagement
Champlain Hudson Power Express (CHP Express)	Planned 2017	• State regulatory approval • Presidential Permit • Public/stakeholder engagement
Southline Transmission Project	Planned 2020	• Co-led federal EIS process
Great Northern Transmission Line	Planned 2020	• Federal and state coordination to prepare EIS • Presidential Permit • Public/stakeholder engagement
Grain Belt Express Clean Line	Planned 2021	• Multiple state regulatory approvals • public/stakeholder engagement
SunZia Southwest Transmission Project	Planned 2020	• EIS process involving multiple federal agencies
Mountain States Transmission Intertie (MSTI)	Canceled 2012	• EIS process co-led by two federal agencies • Public/stakeholder engagement • Changing economic drivers
Potomac-Appalachian Transmission Highline (PATH)	Canceled 2012	• Multiple state regulatory approvals • Public/stakeholder engagement • Changing economic drivers

3.1. One Nevada Transmission Line (ON Line) Project[9]

The ON Line project is a 231-mile, 500-kilovolt (kV) alternating current (AC) transmission line. At full buildout, the line is designed to transmit more than 2000 megawatts (MW) of power[10] between northern and southern Nevada. Construction began in 2010, and the line was energized in January 2014. The line is jointly owned by NV Energy (who operates the line) and Great Basin Transmission South, an affiliate of LS Power. The line and associated substation and telecommunication facilities cost approximately $550 million to construct.

[9] See References listed under "One Nevada Transmission Line (ON Line) Project."

[10] This transfer capacity is representative of the future line design with series capacitors (according to SWIP project). The point-to-point line rating is based on design characteristics and is not representative of the today's system capability.

The ON Line began as two projects that LS Power and NV Energy were pursuing independently, and, to a degree, in direct competition with one another. The project illustrates how competing commercial interests were eventually reconciled by an agreement between the two developers to merge two projects into one.

In 2005, LS Power acquired the development rights for the Southwest Intertie Project, which had been proposed to deliver power from Idaho (as a collection point for power from Idaho and the surrounding Northwest states) to the Las Vegas area (as a staging area for eventual export to California and the Southwest). As part of the project, LS Power also proposed to develop a coal-fired power plant near Ely, Nevada.

Figure 1. One Nevada Transmission Line (ON Line) Project

Source: U.S. Department of the Interior
https://www.doi.gov/sites/doi.gov/files/migrated/news/pressreleases/upload/10_15_10_GBT_Project_Map_010810-2.pdf

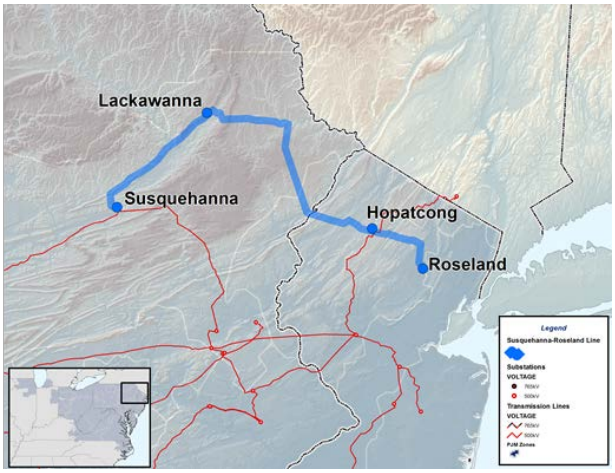
Separately and at approximately the same time, NV Energy, the parent firm of Nevada's two investor-owned utilities (IOUs), Sierra Pacific Power and Nevada Power, proposed to build a coal-fired power plant in approximately the same region of the state and build a transmission line to link its two utilities to one another.

Around 2009, both firms separately announced that they were suspending plans to build the coal-fired power plants near Ely, Nevada and instead would focus on developing their separate transmission lines from northern to southern Nevada.

In January 2010, the companies announced they had agreed to co-own and build a single line. In late 2010, a formal Transmission Use and Capacity Exchange Agreement was approved by FERC and the Nevada PUC. Construction began in February 2011. While the negotiations between the two developers that led to reconciliation and combining of their competing projects are not public, it appears clear that successful construction of the line was a result of their coming to agreement rather than pursuing their separate plans to construct independent, competing, and at least partially duplicative facilities.

3.2. Susquehanna-Roseland Electric Reliability Project[11]

The Susquehanna-Roseland Electric Reliability Project (Susquehanna-Roseland) is a 150-mile, 500-kV transmission line from the Berwick area in Pennsylvania to Roseland, New Jersey. The project was energized in sections, and the full line was placed in service on May 11, 2015.



The Pennsylvania portion of the project was built and is owned by PPL Electric Utilities (PPL); the New Jersey portion of the line was built and is owned by Public Service Electric and Gas (PSE&G). The total cost of the upgrade was $1.4 billion.

Figure 2. Susquehanna-Roseland Electric Reliability Project

Source: PJM http://www.pjm.com/planning/rtep-upgrades-status/backbone-status/susquehanna-roseland.aspx

The purpose of the Susquehanna-Roseland project was to upgrade the capability of the system to address the North American Electric Reliability Corporation's (NERC) thermal and voltage reliability criteria. The recommended upgrade consisted of (a) building a new 500-kV line in an existing 230-kV line right-of-way, and (b) upgrading one segment of an existing 230-kV line to 500 kV. In 2007, PJM projected that to maintain regional reliability these violations would need to be addressed by June 2012.

This project illustrates the timing issues that arise for projects seeking to obtain CPCNs from state authorities as well as needing to complete the NEPA process. Regardless of which process concludes first, the process that concludes last determines when construction can be completed. In this example, the time required to issue an ROD—specifically to address issues associated with the four miles where the project crossed federal lands—delayed the project so that it did not go into service until three years later than had been considered necessary in order for it to address reliability needs. PJM reports that it had to rely on special operational procedures to manage reliability issues until the project was completed. It also illustrates the important role played by mitigation measures undertaken by developers in order to gain final approvals from various stakeholders involved in or affected by the approvals required.

PPL obtained approval for its portion of the project from the Pennsylvania PUC in February 2010; following a challenge, the Pennsylvania PUC's approval was affirmed by the court in July 2011. PSE&G obtained approval for its portion of the project from the New Jersey Board of Public Utilities in April 2010.

[11] See References listed under "Susquehanna-Roseland Electric Reliability Project."

The pre-existing line crossed the Delaware Water Gap National Recreation Area and parts of both the Middle Delaware National Scenic and Recreational River and the Appalachian National Scenic Trail. All three areas are managed by the National Park Service (NPS).

In 2009, the developers requested a construction permit to expand an existing right-of-way for the approximately four miles where the line crosses these NPS lands in Pennsylvania and New Jersey. The NPS, as lead agency for the federal EIS process, conducted scoping meetings in early 2010; issued draft and final EISs in November 2011 and August 2012, respectively; and issued the ROD in October 2012. Routing was not a central focus of the NEPA process (because the new line was always proposed to follow the existing line's right-of-way). However, mitigation was a significant focus of the negotiations leading up to the ROD. Ultimately, the developers agreed to purchase land adjacent to the Delaware Water Gap National Recreation Area at a cost of at least $56 million and turn it over to the NPS, thereby expanding the recreation area.

In this example, the conclusion of the NEPA process followed the conclusion of the state CPCN processes by almost two years. The developers had, during this time, constructed large sections of the line on both sides of the small portion crossing NPS lands that was subject to the NEPA process.

3.3. Champlain Hudson Power Express (CHP Express) Project[12]

The CHP Express project consists of approximately 333 miles of high-voltage direct current (DC) line. The project is designed to bring 1,000 MW of power from the Canadian border to the New York metropolitan area. Transmission lines will be buried, either beneath waterways or along railway routes. All U.S. federal and state approvals have been obtained. Some Canadian approvals are still pending as of mid-2016. The project is expected to be placed in service in fall 2017.

The project is being developed as a merchant transmission line by Transmission Developers, Inc. and is expected to cost $2.2 billion.

The CHP Express project illustrates the role of proactive negotiation by the developer with key stakeholders in a state's CPCN process, aided by a design that placed the transmission line almost entirely underground.[13] It also illustrates the role of DOE when a transmission line is proposed that would cross an international border.

The developers initiated the CPCN process with the New York Department of Public Service (DPS) in March 2010. A number of public meetings were held in spring and fall 2010. Over the following months, the developers worked actively with stakeholders to provide information about the project and to discuss and address concerns that stakeholders raised. Aspects of the routing proposed for the project changed from the time of the initial application in direct response to concerns raised by stakeholders.

[12] See References listed under "Champlain Hudson Power Express Project."
[13] The CPCN process in New York is called Certificate of Environmental Compatibility and Public Need Pursuant to Article VII.

In summer 2011, twenty members of New York's Congressional delegation signed a letter urging favorable action on the project's application. In winter 2012, the developer, along with a number of New York stakeholders, submitted a joint proposal of settlement. The governmental parties included the cities of New York and Yonkers; the New York Departments of Environmental Conservation, Transportation, Agriculture and Markets, and State; the Office of Parks, Recreation & Historic Preservation; the Adirondack Park Agency; and the New York DPS. Three environmental and conservation groups were also included: Riverkeeper, Scenic Hudson, and the New York State Council of Trout Unlimited. The New York DPS issued the CPCN for the project in April 2013.

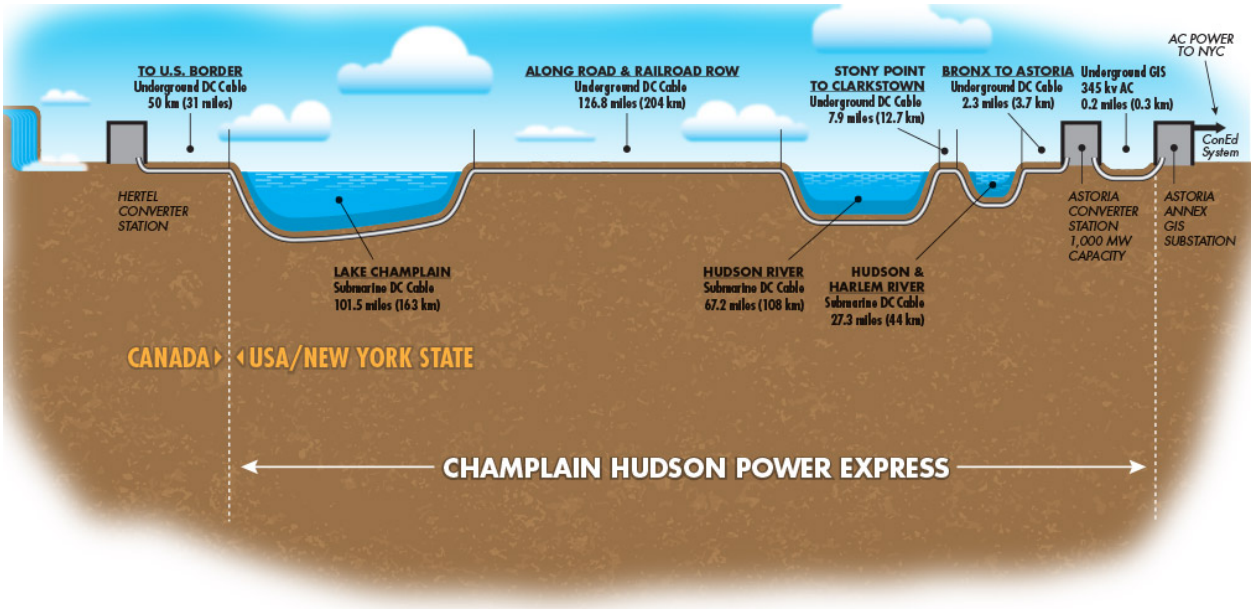


Figure 3. Planned Champlain Hudson Power Express Project
Source: Champlain Hudson Power Express Project Development Portal http://www.chpexpress.com/

The developers initiated a DOE Presidential Permit process in January 2010.The Presidential Permit process requires both favorable recommendations from the Departments of State and Defense and a finding that the project is in the public interest. DOE's findings on public interest consider both electricity grid reliability and environmental impacts. DOE, accordingly, was the lead federal agency for compliance with NEPA, and its findings on reliability impacts were informed, in part, by a study conducted by the New York Independent System Operator. DOE's findings on environmental impacts were contained in a ROD issued in October 2014, and the Presidential Permit for the project was issued in October 2014.

3.4. Southline Transmission Project[14]

The Southline Transmission Project consists of two proposed sections that together would transmit electricity across southern New Mexico and southern Arizona. One section involves new construction of

[14] See References listed under "Southline Transmission Project."

240 miles of double-circuit 345-kV lines in New Mexico and Arizona. The other section involves converting approximately 120 miles of existing single-circuit 115-kV lines owned by Western to double-circuit 230-kV lines in Arizona. The planned bi-directional transmission capacity is approximately 1,000 MW. The lines are expected to begin initial operation as early as 2018, with the complete project in service by 2020.

The project is being developed by Southline, LLC, a subsidiary of Hunt Power, LLP. As of mid-2016, Western was evaluating whether and to what extent it might participate in the construction, ownership, operation, maintenance, and/or financing of the project. The project is currently (as of mid-2016) estimated to cost $800 million.

The NEPA process for the Southline Transmission Project was conducted by two federal agencies acting as co-leads: Western Area Power Administration (Western) and the Bureau of Land Management (BLM). The project is an example of a comparatively short NEPA siting process in which the two agencies worked effectively together to identify routing issues and solve them in a timely and coordinated manner with many stakeholders spanning two states, specifically those in the Willcox, Arizona area.

Figure 4. Planned Southline Transmission Project

Source: Southline Transmission Project Fact Sheet http://www.southlinetransmissionproject.com/files/R19_Southline_Fact_Sheet_4_2016.pdf

Preliminary feasibility and design studies were conducted between 2009 and 2010, with representatives of the project participating in various regional transmission planning forums. Southline sponsored public outreach and workshops to develop routing alternatives in summer and fall 2011, prior to the NEPA process.

In addition to Western and BLM, seventeen agencies participated in the NEPA process as cooperating agencies: U.S. Army Corps of Engineers; Bureau of Reclamation; Department of Defense (DOD) Clearinghouse; U.S. Environmental Protection Agency; the Tohono O'odham Nation; Fort Huachuca Army Base; National Park Service; U.S. Forest Service (Coronado National Forest); U.S. Fish and Wildlife Service; Arizona Game and Fish Department; Arizona State Land Department; New Mexico Department of Game and Fish; New Mexico State Land Office; Cochise County, Arizona; Greenlee County, Arizona; Graham County, Arizona; and the City of Sierra Vista, Arizona. Notable in this process was the early-and-often collaborative approach that the development team and agencies adopted to work through routing and other siting issues, in particular those with the Tohono O'odham (tribal) cooperating agency participants as well as with local stakeholder and landowner participants.

The entire process spanned approximately four years, with public scoping started in 2012, and a draft EIS released in April 2014. The final EIS was released in November 2015, and the ROD was issued in April 2016.

3.5. Great Northern Transmission Line Project[15]

The Great Northern Transmission Line is a 224-mile, 500-kV AC transmission project. The project is designed to transport 883 MW of power from the Minnesota-Manitoba border to an end point near Grand Rapids, Minnesota and will interconnect with a new 500-kV AC transmission line that is being constructed in Manitoba by Manitoba Hydro. The project is expected to be completed in 2020.

The U.S. portion of the project is being developed by Minnesota Power, an ALLETE Company. The project is expected to cost $710 million.

The Great Northern project illustrates the practice of proactively engaging the public in conjunction with a pre-application process to reduce the time required to obtain state approvals. It also illustrates the efficiencies that can be gained by combining state and federal EIS processes[16]

Minnesota Power began conducting public information workshops related to the project in April 2012—many months before it submitted its October 2013 application for a Certificate of Need for the project to the Minnesota PUC. Minnesota Power continued to conduct public workshops after submission of its application, and the Certificate of Need was granted in June 2015.

[15] See references listed under "Great Northern Transmission Line Project."
[16] See https://www.whitehouse.gov/the-press-office/2014/05/14/fact-sheet-building-21st-century-infrastructure-modernizing-infrastructu.

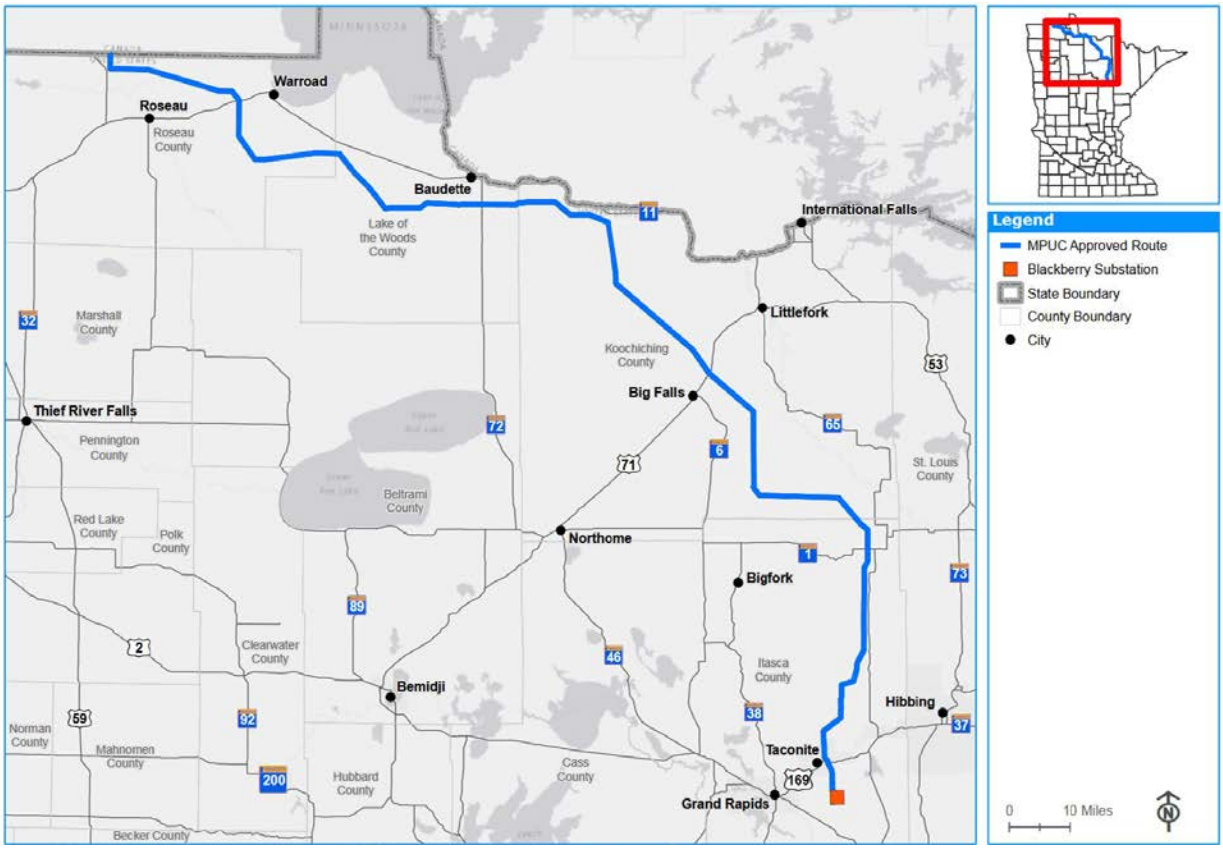


Figure 5. Planned Great Northern Transmission Line Project

Source: Great Northern Transmission Line MPUC Approved Route http://www.greatnortherntransmissionline.com/files/8114/5712/5554/MPUC_Approved_Route.pdf

A Route Permit is decided through a separate Minnesota PUC process, conducted jointly with the Minnesota Department of Commerce, which is responsible for preparation of the state's EIS as part of this process. The Certificate of Need establishes the size, type, and required end points of a project and must be issued prior to the issuance of a Route Permit. The sequence ensures that the Route Permit process focuses solely on issues related to the location of the project, not on issues related to the need for the project.

Minnesota Power filed its applications for both the Route Permit and Presidential Permit in April 2014 and continued to conduct public workshops as part of this process as well. In total, Minnesota Power reports that it conducted 75 public workshops in conjunction with the project. The Minnesota PUC granted the Route Permit in April 2016.

The required federal EIS for the federal Presidential Permit decision was conducted jointly with the Minnesota Department of Commerce's preparation of the state's EIS and was issued in October 2015.[17] It is notable that that the state EIS process has a one-year time limit that is set by state statute (with a

[17] See http://www.greatnortherneis.org/.

possible extension of three months). Because the federal EIS process was conducted jointly with the state process, the federal EIS review was conducted in accordance with the state's maximum 15-month review timeline.

A Presidential Permit from DOE is also required for this cross-border electricity transmission project. As of September 2016, DOE had not provided a date for issuance of the Presidential Permit.

In this example, all state authorizations and permitting required by the project took place over a span of approximately three years (with the exception of the Presidential Permit), in part because of extensive advance public outreach that reduced potential opposition and roadblocks to the project, and in part because the federal and state environmental review processes took place in tandem.

3.6. Grain Belt Express Clean Line Project[18]

The Grain Belt Express Clean Line is a 780-mile overhead DC transmission line. The project is designed to deliver 4,000 MW of power from western Kansas to Missouri, Illinois, Indiana, and neighboring states. The line is expected to be placed in service as early as 2021.

The project, which is being developed by Clean Line Energy Partners, is expected to cost approximately $2 billion.

The project illustrates the challenges that multi-state electric transmission line projects have in obtaining state regulatory approvals and the importance of project developers demonstrating to each state across which a line will extend that the line has benefits for that state.

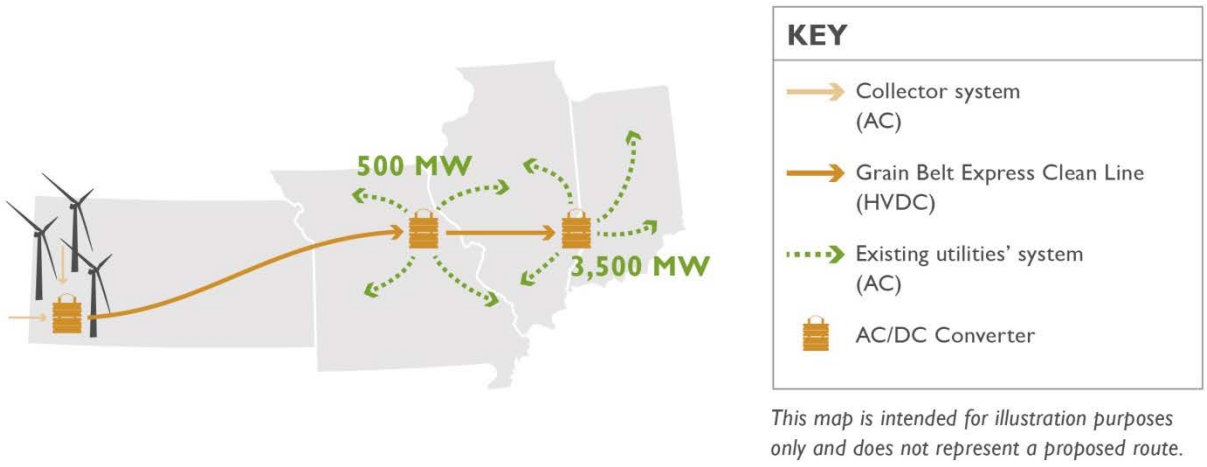


Figure 6. Planned Grain Belt Express Clean Line Project

Source: Grain Belt Express Clean Line, Project Description http://www.grainbeltexpresscleanline.com/site/page/project_description

[18] See References listed under "Grain Belt Express Clean Line Project."

The Indiana Utility Regulatory Commission issued an order granting Grain Belt Express public utility status in May 2013. The Kansas Corporation Commission issued an order granting public utility status and a separate order on siting, in December 2011 and November 2013, respectively. The Illinois Commerce Commission issued a CPCN to construct and operate the transmission line in November 2015.

However, the Missouri Public Service Commission (PSC) voted to deny the project's CPCN application in July 2015, concluding that the application had failed to prove that the project was needed, economically feasible, and would promote the public interest. The Missouri PSC found that need was not demonstrated because the project did not address a reliability need identified by the regional transmission planning process, and the project was not needed for Ameren Missouri (a large IOU in Missouri) to meet its Renewable Energy Standard (RES) because Ameren Missouri "plans to meet its need for additional wind energy through wind resources located within MISO [Midwest Independent System Operator], including areas in Missouri."[19] The Missouri PSC pointed out in its order that Clean Line Energy "did not submit the project to the MISO regional planning process for evaluation of need and effectiveness."[20] The Missouri PSC also determined that economic feasibility was not demonstrated because the developer's economic analysis was deemed incomplete and not definitive. The Missouri PSC concluded, "…the purchase of [renewable energy credits] by a Missouri electric utility is a more economical way of meeting the RES requirements in Missouri than by purchasing wind energy generated from a wind farm in Kansas and transmitted via the Project."[21] The PSC found that the project did not serve the public interest because of the two earlier findings.

As part of its analysis of the public interest, the PSC acknowledged the substantial opposition to the project expressed by business owners, farmers, and individual landowners across whose properties the project was proposed to cross. The Missouri PSC noted, "In this case, the evidence shows that any actual benefits to the general public from the Project are outweighed by the burdens on affected landowners."

Clean Line Energy subsequently filed a motion for a re-hearing later in July 2015, and the Missouri PSC denied the motion in August 2015. In June 2016, the Missouri Joint Municipal Electric Utility Commission approved a proposal to increase the public power agency's renewable energy supply by purchasing long-term transmission service on the Grain Belt Express Clean Line. Now that this transmission service agreement is in place with a Missouri customer, Clean Line Energy has indicated that it will file a new application for the project with the Missouri PSC in mid-2016.

[19] Missouri Public Service Commission, Report and Order, File No. EA-2014-0207, Page 12
[20] Missouri Public Service Commission, Report and Order, File No. EA-2014-0207, Page 12
[21] Missouri Public Service Commission, Report and Order, File No. EA-2014-0207, Page 16

3.7. SunZia Southwest Transmission Project (SunZia)[22]

The SunZia Southwest Transmission Project (SunZia) consists of approximately 515 miles of two separate but parallel 500-kV AC transmission lines.[23] SunZia is designed to connect and deliver electricity generated in Arizona and New Mexico to population centers in the Desert Southwest. SunZia's total transmission capacity has an approved rating from the Western Electricity Coordinating Council (WECC) of 3,000 MW in the AC configuration. The first transmission line and related substations are expected to be placed in service in 2021.

The project is being developed as a merchant transmission line by a consortium involving Salt River Project, Shell WindEnergy, Southwestern Power Group/MMR Group, TriState G&T, and Tucson Electric Power. The line is expected to cost about $2 billion.

The SunZia project illustrates some of the unique challenges faced by transmission projects in the western part of the United States where routing long-distance lines is likely to involve multiple non-private landowners, notably federal landowners/managers. As noted, siting and permitting involving federal lands generally requires preparation of an EIS to comply with NEPA.

The project passes through 185 miles of federal land, 220 miles of state trust land, and 110 miles of private land in Arizona and New Mexico. The BLM was the lead agency for NEPA compliance.

The challenges of preparing an EIS in these circumstances were twofold. First, the large number of parties that were involved increased coordination burdens for the lead agency (BLM); there were 14 cooperating agencies involved in the EIS preparation and review, including state agencies in both Arizona and New Mexico. Second, increased coordination also increased the time required to conduct an inclusive EIS process. Moreover, there were feedback effects. For example, the passage of time further increased coordination burdens as the participating entities' degrees of involvement changed during the 6.5-year-long NEPA process.

The federal and state agencies that participated in developing the EIS included Arizona Department of Transportation, Arizona State Land Department, Arizona Game and Fish Department, NPS, New Mexico Spaceport Authority, New Mexico State Land Office, U.S. Army Corps of Engineers, Holloman Air Force Base, Ft. Bliss (U.S. Army), White Sands Missile Range (WSMR) (U.S. Army), Ft. Huachuca (U.S. Army), U.S. Fish and Wildlife Service, DOD Energy Siting Clearinghouse, and the Bureau of Indian Affairs. Consultation also included other federal agencies and local, state, and tribal governments.

The chronology of the EIS process for SunZia was as follows: The federal application for right-of-way was submitted in September 2008. The scoping process began in May 2009, and the scoping report was issued in April 2010. The draft and final EIS were released in May 2012 and June 2013, respectively. The ROD was issued in January 2015.

[22] See References listed under "SunZia Southwest Transmission Project."
[23] The project has an optional design of one of these 500-kV transmission lines to be operated as a bipolar DC facility.

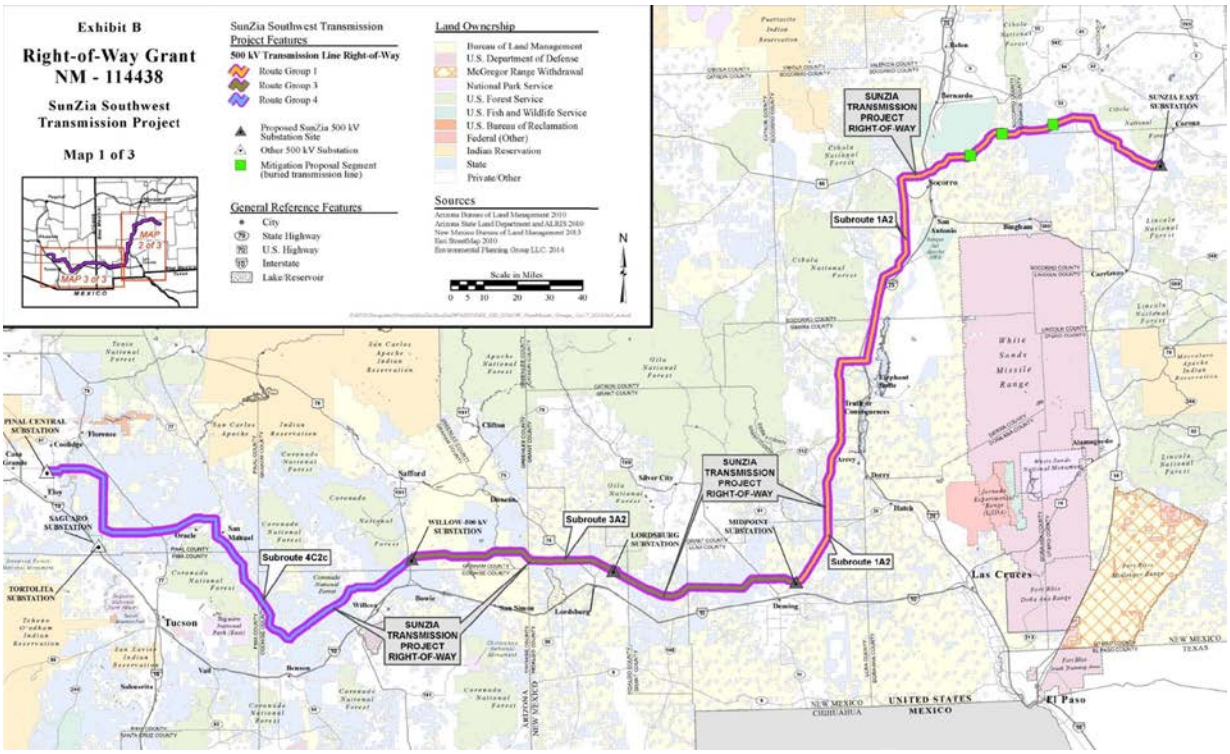


Figure 7. Planned SunZia Southwest Transmission Project

Source: SunZia Southwest Transmission Project http://www.sunzia.net/presentation_pdfs/mva_committee_sunzia_9_15_2015.pdf

The relative roles of the DOD Energy Siting Clearinghouse and WSMR in the NEPA process were notable. The Energy Siting Clearinghouse was established by Congress in 2010 to provide a single point of contact with DOD for energy project developers among others. The clearinghouse is empowered to coordinate a comprehensive, mission-compatible evaluation process. The BLM's preferred alternative in the draft EIS (released in 2012), in fact, conformed with a routing recommendation that was provided by the U.S. Army and requested of the BLM by the Energy Siting Clearinghouse. This same preferred alternative was carried forward into the final EIS, which was issued about a year later by BLM. This preferred alignment was located on a mixture of BLM, New Mexico state trust, and private lands roughly 36 miles north of the WSMR property boundary.

However, subsequent to the publication of the final EIS, WSMR took the position that the previously acceptable alternative suggested by both the U.S. Army and the Energy Siting Clearinghouse would be incompatible with current and future testing mission assignments at the range. By the time the ROD was issued in January 2015, the routing had been moved an additional three miles further north of WSMR and, among other things, SunZia was required to bear the expense of burying five miles of 500-kV transmission line in three separate segments. An undergrounding alternative at the Rio Grande had been analyzed in the EIS and had been deemed to be infeasible and unreasonable because of both cost and the additional environmental impacts on the river (when compared to overhead construction). Nonetheless, SunZia agreed to this mitigation, along with three other provisions, as part of a settlement

agreement to resolve WSMR's concerns. SunZia estimated that undergrounding 500-kV transmission lines in this terrain would cost from fifteen to twenty times more than equivalent overhead design and construction. This agreement delayed the permitting process because it required the preparation of a new federal environmental assessment to analyze the impacts of the buried segments. This analysis ultimately led to a finding of "No New Significant Impact."

3.8. Mountain States Transmission Intertie (MSTI) Project[24]

The MSTI project was initially proposed in 2006 as a 430-mile, 500-kV AC transmission line to deliver 1,500 MW of power from Montana to Idaho. The project was cancelled in 2012.

The developer was Northwestern Energy. The original stated objective of the line was to accommodate transmission service requests and to increase renewable electricity export capability for Northwestern Energy. The line was expected to cost $1 billion.

The MSTI project is an example of legal challenges to the joint state and federal NEPA process delaying preparation of the EIS. Although those challenges were eventually resolved, the developer's inability to secure adequate commercial commitments to utilize the project led to its cancellation prior to completion of the EIS.

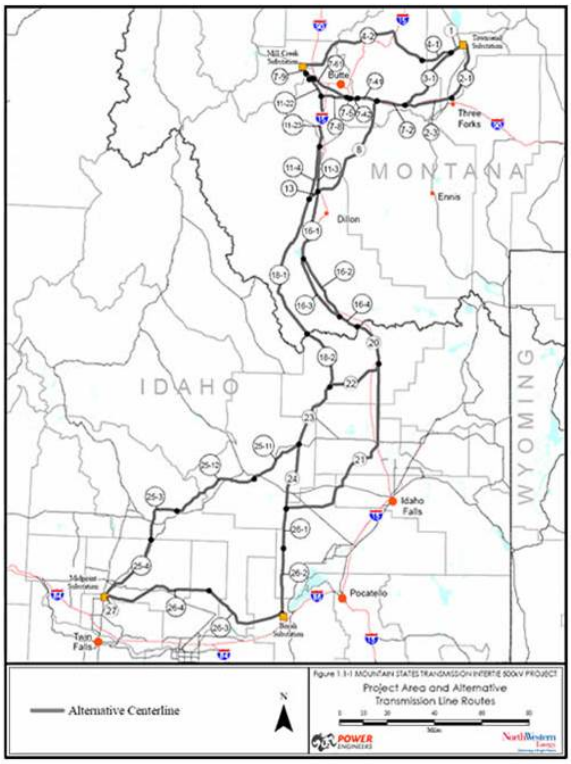


Figure 8. Mountain States Transmission Intertie (MSTI) Project (Cancelled)

Source: Mountain States Transmission Intertie Project (MSTI), accessed July 25, 2016 at https://sites.google.com/site/transmissionmap/Home/misti-general-information

The MSTI, as originally proposed by Northwestern Energy in 2006, was to be completed by 2013. Public opposition to the line claimed that, among other factors, the line would not benefit Montana electricity consumers because it would be used to export power out of state. Public concerns were also expressed that instead of only exporting renewable power generated in Montana, the line would also be used to export coal-fired power.

The draft EIS was expected in early 2009 but was delayed because of legal challenges related to potential impacts on endangered species and cultural resources. In 2010, Northwestern delayed the expected in-service date of the line by two years (to 2015). Northwestern Energy's 10-K filing for 2010 described, for the first time, risk factors associated with its transmission program—including aspects of the MSTI project.

[24] See references listed under "Mountain States Transmission Intertie (MSTI) Project."

Northwestern Energy's 2011 annual report indicated that the legal challenges, which delayed release of the EIS, had been resolved. Still, the EIS was not released that year or in 2012.

In January, 2012, Northwestern Energy announced that it had entered into discussions with Bonneville Power Administration (BPA) to participate in the project to serve BPA loads in southern Idaho. However, in October 2012, BPA announced that it had ranked other electricity supply options ahead of participation in the MSTI project, and Northwestern Energy subsequently announced it was halting development of the project.

3.9. Potomac-Appalachian Transmission Highline (PATH) Project[25]

The PATH project was proposed as a 290-mile, 765-kV AC transmission line. The purpose of the line was address a number of thermal and voltage reliability criteria issues on the 500-kV system in eastern PJM by bringing power from West Virginia, across Virginia, to the Baltimore–Washington DC region in eastern Maryland. The developers were subsidiary companies of Allegheny Energy (now First Energy) and American Electric Power. The estimated construction cost was $2.1 billion. The project was first identified in 2007 and was cancelled in 2012.

The PATH project is an example of a project that faced significant public opposition. In addition, the project required CPCNs from three state PUCs, and the decisions of the PUCs affected one another. Finally, four years after the need for the project was first identified, changes in the economy (both lower demand growth and low cost of natural gas) altered the assumptions upon which the original need was based, and the project was cancelled.

The project was identified by PJM in its 2007 Regional Transmission Expansion Plan, which said that the project was necessary to address reliability violations that would arise in 2012 as a resulted of forecasted load growth.

Public opposition to the project emerged through a variety of citizen and environmental groups organized in each of the three states.

Initial applications for state regulatory approvals to construct the PATH transmission line were filed with the Maryland PSC, Virginia State Corporation Commission (SCC), and West Virginia PSC in 2009. Throughout 2009 and into 2010, the applications were subject to numerous procedural and substantive challenges. In September of 2009, the Maryland PSC rejected the application as improperly filed. In October 2009, the Virginia SCC filed a motion to dismiss the application because of inadequate information on aspects of the project in Maryland. That same month, an attorney for the West Virginia PSC filed a motion to dismiss the application.

[25] See References listed under "Potomac-Appalachian Transmission Highline (PATH) Project."

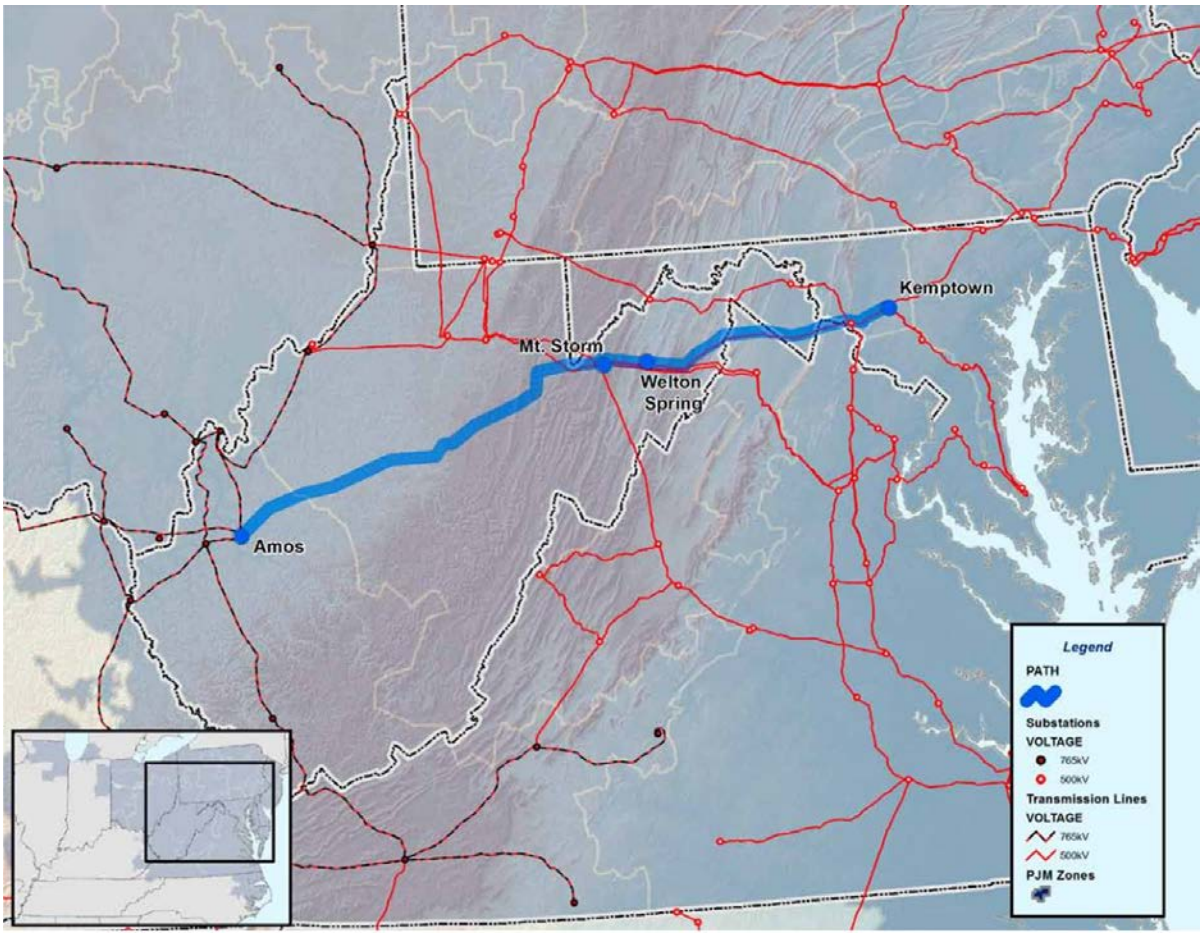


Figure 9. Potomac-Appalachian Transmission Highline (PATH) Project (Canceled)

Source: PJM 2010 Regional Transmission Expansion Plan, Page 91 http://www.pjm.com/~/media/documents/reports/2010-rtep/2010-section5.ashx

Subsequent PJM studies following development of the 2007 Regional Transmission Expansion Plan showed that the need for the project had shifted to 2013 and then later to 2014. In 2011, PJM said the need for the project had moved several years beyond 2015 because of reduced load growth following an economic recession. The PJM Board of Managers ordered the transmission owners to suspend work on the project pending a more complete analysis in 2011 of all upgrades in its regional transmission plan, and the project was terminated in 2012.

4. Barriers and Incentives

Based on the factors reviewed and illustrated in the case studies in the previous section, this section discusses barriers and incentives to the implementation of transmission projects. The factors considered arise outside regional and interregional transmission planning processes. Our discussion sometimes frames these factors as commercial risks that must be managed by transmission project developers. The development of a transmission project is a commercial venture involving investors who are prepared to incur significant, yet ultimately limited, up-front development costs in return for the opportunity to earn future profits from the sale of transmission services and/or a regulated return on invested capital. Adopting a developer's perspective enables us to look at the factors reviewed in this report as ones that affect either the cost or time required to construct a transmission project. The extent to which these factors represent barriers to the implementation of transmission projects is thus an assessment of whether these costs or time requirements are avoidable or necessary.

Finding 1: *Developers that engage early with stakeholders and the general public and respond meaningfully to address concerns they raise can pre-empt or at least mitigate the impacts of some forms of organized opposition to transmission.*

Organized public opposition to proposed transmission lines has frequently had a material impact on project development by adding time to siting and routing processes, and it has sometimes led or contributed to the cancellation of projects or to addition of mitigation measures that increase the project developers' costs. There are documented examples of project developers who have sought to reduce these costs and associated time requirements through up-front information sharing and joint (and early) development of mitigation approaches (including abandonment of early proposed and development of new routing options). The success of these activities has hinged largely on the extent to which they lead to meaningful engagement and tangible commitments to address public concerns over line routing.

Public concerns over siting and routing manifest themselves both within and outside of formal processes, such as state CPCN and federal NEPA proceedings. Organized public opposition to the proposed routing and siting of lines had a material impact on many of the projects reviewed in this report (e.g., PATH, Susquehanna-Roseland, MSTI, Grain Belt Express). In each instance, the developers had to commit significant time and corporate resources to address organized public opposition in the form of lawsuits and requirements established by elected officials.

By contrast, the Great Northern project illustrates how the developers' proactive public and stakeholder engagement process led to completion of the EIS for the NEPA process in less than two years. Proactive engagement enabled the project developers to hear and take into consideration public and stakeholder concerns *before* putting forth routing proposals. By this action, the developers signaled early on their openness to hearing public and stakeholder concerns. They further demonstrated their willingness to address these concerns by taking explicit account of them in their initial routing proposal.

CHP Express is a similar example of a developer working with a wide variety of affected parties in advance to negotiate routing and mitigation alternatives. By bringing a settlement agreement among the major parties into the New York DPS' proceeding, CHP Express's developers enabled New York DPS to rule on what was at that point a largely uncontested proposal.

The CHP Express and Great Northern examples contrast with the MSTI project's much longer process. MSTI's developers did not engage with the public and other stakeholders until after MSTI had made preliminary routing decisions. Thus, the NEPA process for that project involved simultaneously defending prior decisions while seeking to negotiate alternatives. Although meaningful alternatives were finally considered in the process, significant time was required to negotiate and develop these alternatives that might perhaps have been avoided if discussions with stakeholders and the public had taken place prior to routing proposals. (This pattern is not unique to MSTI and has also been seen in other projects.) In the MSTI project, the process was never completed because of commercial factors that led to termination of the project.

Finding 2: *The likelihood of completion for multi-state projects is increased if each involved state finds that the project will adequately address the public interests of the state.*

When a project is wholly contained within a single state, the range and coordination of issues that must be considered is comparatively straightforward. By contrast, for projects involving more than one state, coordination among multiple state proceedings can require more time and become more complicated, especially if some states seek to take into account the possible actions of neighboring affected states. Developers of projects involving multiple states must demonstrate to each state's satisfaction that the benefits and costs of the projects are fairly or reasonably aligned within the boundaries of each state. Successful project developers have ensured that there are identifiable project beneficiaries within each state from which approval had to be obtained.

Procedural issues can arise because of interdependence of decisions by one state upon those of another. In the case of the PATH project, one state found that its assessment required information from a neighboring state's assessment, which had not been completed. In an example not reviewed in this report, decisions of one state required another state to revisit earlier decisions it had already made.[26]

A similar coordination/timing issue arises when federal NEPA compliance (or a Presidential Permit) is required. CHP Express and Great Northern both demonstrated the feasibility of aligning federal processes to run in close sequential coordination (CHP Express) or in conjunction (Great Northern) with state approvals in order to reduce the total time required to complete both processes. Susquehanna-Roseland provides a contrasting example illustrating that, regardless, the process that concludes last, nevertheless, determines when a project can be completed.

[26] See U.S. Department of Energy. 2002. *National Transmission Grid Study, Issue Paper E: Transmission Siting and Permitting*. https://emp.lbl.gov/sites/all/files/doe-natl-trans-grid-papers_0.pdf

Bilateral agreements or other arrangements (such as interstate transmission siting compacts[27]) to coordinate the timing of proceedings among states reviewing independent CPCNs or with federal agencies ensuring NEPA compliance could mitigate some of these issues. Still, while a developer's motivation for such arrangements may be a given, the ability (or willingness) of states or federal agencies to modify their decision-making processes to facilitate coordination with one another is not a given. This is a result, in part, of agencies' requirement to ensure that their decisions and execution of their responsibilities for protecting the public interest are independent.

The state-centric public-interest issue that arises most vividly for multi-state transmission projects involves the so-called "fly-over" states. These states are situated between the states that are the starting and ending points for a long-distance transmission project. The initial decisions by the Missouri PSC to deny the CPCN application for Grain Belt Express exemplify this issue.

The public-interest issue raised by states in the middle is that, at bottom, they are being asked to bear significant portions of the cost or adverse impacts of a project, yet they do not believe they are being provided with sufficient opportunities to share in the benefits of the project. In the extreme, a state in the middle may conclude that, from its perspective, it has no need for the project, so the public interest of the state is not adequately served.

The costs in these instances may or may not be directly economic; that is, the ratepayers of the state may not be asked to help pay for the project. The costs may primarily involve land use within the state.[28] These issues are especially highlighted when high-voltage DC technology is proposed and infrastructure must be added at significant cost specifically to establish electrical "drop-off" points in states located between the end points of the project.[29]

The need to satisfy a middle state's public-interest requirements is a classic example of what economists describe as the role and importance of "side payments." In this instance, the gains from trade must be sufficient to cover side payments to affected parties who have standing but who would not otherwise benefit from the transaction. Thus, the situation faced by developers, such as those for the Grain Belt Express project, is tangibly and fundamentally (but not solely) commercial in nature. Notably, as discussed, the developers for Grain Belt Express recently reached an agreement to sell power from the project to an association of municipal utilities in Missouri and, based on this agreement, plan to re-file their request for state regulatory approval. It remains to be seen whether the fact of a Missouri entity signing an agreement that could be seen as demonstrating the public-interest value of the project in Missouri will result in the Missouri PSC approving the project on its third attempt in the state.

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[27] See, for example http://www.csg.org/NCIC/documents/Transmission%20Line%20Overview.pdf

[28] In other instances, such as when a state is being allocated costs through a regional transmission project selection process, the costs are indeed direct and economic.

[29] Notably, Grain Belt Express, which is a high-voltage DC project, proposes just such a drop-off point for 500 MW within the state of Missouri. In summer 2016, the developers of Grain Belt Express announced an agreement with an association of municipal utilities within the state of Missouri to deliver electricity from renewable sources over the line. They also announced plans to re-file their request for CPCN with the Missouri PSC.

Finding 3. *Efficient and consistent agency involvement is required for timely resolution of siting issues that arise as part of compliance with the National Environmental Policy Act.*

For transmission line projects involving federal lands, compliance with the National Environmental Policy Act (NEPA) involves a prescribed and deliberate sequence of open processes: scoping meetings, public reviews of both a draft and final EIS, and issuance of a Record of Decision (ROD). Because of their geographic scope, multi-state transmission projects can entail coordination among more than one federal agency, multiple state offices of a single federal agency, and likely also related state, tribal, and local agencies during the NEPA process. NEPA processes involving multiple agencies raise many institutional issues that sometimes result in significant mitigation costs and time requirements to obtain final approval for a route involving non-private lands.

The roots of these institutional issues can often be traced to (a) the diverse statutory missions of agencies, (b) the adequacy and competencies of the agencies' staff in terms of workload, turn-over, and prior experience in siting transmission lines, (c) the efficiency and ease of intra- and inter-agency information-sharing, and (d) the nature of agency decision-making processes (for example, the authorities of field offices versus central offices). There are documented examples of efficient, effective processes and coordination among and within agencies, but these are often overshadowed by well-publicized examples of delays and inconsistencies.

It is important to accept that statutory missions of the agencies involved in NEPA processes must always guide their decisions. The National Park Service, for example, required significant and expensive mitigation measures from the developers for the Susquehanna-Roseland project in order to gain its approval for completion of the portion of the line that crossed the Delaware Water Gap National Recreation Area, which it is mandated to protect. The Bureau of Land Management is required to balance competing interests regarding the use of federal lands, including but not limited to those of prospective transmission line developers.

Nevertheless, the efficiency of agency execution of its duties is always an appropriate focus. In this regard, the NEPA processes for Great Northern Transmission Project and Southline Transmission Projects were exemplary; both the commitment and professionalism of agency staffs, and the timely sharing of information. For the Great Northern Transmission Product, the lead federal agency worked expeditiously to conclude its deliberations, in part, to ensure alignment with the statutory timeline of its co-lead agency, the Minnesota Department of Commerce. BLM and WAPA, as co-leads for the NEPA process for the Southline Transmission Project worked effectively both with each other, but also jointly with the large number of cooperating agencies (each of whom advocate for their own interests and with varying degrees of involvement to the NEPA process) to issue an ROD for the project in 4 years.

Finally, coordination between field and central offices is also an area for on-going focus. As noted, in the NEPA process for the SunZia project significant negotiation over routing and mitigation concerns took place with WSMR *after* the final EIS was issued. Notably, the final EIS reflected the routing recommendations of the DOD's Energy Siting Clearinghouse, which was created by congress specifically

to represent DOD and to enter into binding agreements over routing on behalf of all of its facilities, including WSMR. Yet, as noted in the case study in the previous section, WSMR pressed for and reached agreement for further—and to the developer, expensive—undergrounding routing modifications following the release of the final EIS.

In recognition that, through NEPA compliance, federal agencies play a central role in siting transmission lines (and other types of infrastructure related to public transport), the federal executive branch and the Congress are directing more attention toward enhancing coordination and accountability among agencies.

The Energy Policy Act of 2005 established a national policy to enhance and increase coordination and communication among federal agencies with authority to site electricity transmission facilities. In 2009, DOE and eight other federal agencies with permitting or other federal responsibilities for the siting of electricity transmission facilities entered into a memorandum of understanding to establish a framework to improve coordination among project proponents, federal agencies, states, and tribes. In 2011, the president created a Rapid Response Team for Transmission to improve the performance of federal siting, permitting, and review processes. Lessons learned through this activity have informed a proposal for an Integrated Interagency Pre-application process that is currently the subject of a Notice of Proposed Rulemaking. Among other things, a pre-application process is expected to reduce the number alternative routes that must be considered and thereby improve the overall efficiency of the routing and siting process.

Most recently, in December 2015, Congress passed the Fixing America's Surface Transportation (FAST) Act, which creates a new entity—the Federal Permitting Improvement Council—to oversee cross-agency federal permitting and review processes. The council will rely on a permitting dashboard to track project-review timelines. The goal is promote the use of best practices among agencies and identify normative timelines to help guide agency reviews. These activities are intended to increase the efficiency, visibility, and accountability of agency reviews.

4.1. Conclusion

Developing a transmission project involves simultaneously managing two categories of commercial risk. One is the risk associated with securing the capital necessary to build the project. Eto (2016) focused on one example of capital risk: that associated with seeking regional cost allocation. The other category encompasses risks associated with the actual construction of a project. This report is focused on a key subset of these project-construction risks: the cost of satisfying the due process requirements of state and federal agencies involved in permitting and siting lines, which is often increased when there is organized public opposition to the project. These are necessary costs associated with transmission-line construction. Some can made more manageable through proactive actions by developers. Still others can be made more manageable through the actions of federal and state agencies to enhance the efficiency and accountability of their processes. Thus, while the project review process can be slow and add costs to project development, on the whole transmission lines are being built. Moreover, there are

promising signs that both groups are taking actions to improve the processes, both in terms of their duration and the quality of the decisions that get made. We found examples of merchant transmission projects successfully gaining needed approvals and being constructed. Their experiences, in particular, suggest that if the economics of potential projects are sound, someone will find a way to build them.

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