

BOUNDLESS ENERGY, LLC'S RESPONSE TO THE REQUEST FOR INFORMATION BY THE NEW YORK ENERGY HIGHWAY

Background

On April 11, 2012, the New York Energy Highway Task Force (Task Force) issued a request for information (RFI) about expanding New York's Energy Infrastructure. The Task Force indicated at the April 19, 2012 meeting for respondents that it was interested in a new kind of energy planning, with particular focus on a "bias for action." Boundless Energy, LLC (Boundless) welcomes the opportunity to provide information to the Task Force on four (4) transmission projects which Boundless proposes as crucial components of a Twenty-First Century Infrastructure Plan.

I. Respondent Information

Name: Boundless Energy, LLC

Address: 203 Redstone Hill, Plainville, CT 06062

Primary Contact Name: E. John Tompkins, President

Primary Contact Address: 203 Redstone Hill, Plainville, CT 06062

Primary Contact Telephone: (860) 747-0497

Primary Contact Email: ejt@trmc.com

Boundless was incorporated in 1996 as a developer of non-utility transmission and generation projects. Boundless was the original developer of the Neptune Regional Transmission System's high voltage DC cable connecting PJM with Long Island (Neptune Project), having conceived and pursued the concept of multiple Northeast submarine HVDC interconnections in 1997 before joining with the other partners in 2000 to form Atlantic Energy Partners, the ultimate developer. Boundless is one of Neptune's shareholders as a limited partner.

An early Boundless project was a 550 mW combined cycle gas turbine in the City of Westbrook that required innovative electrical and gas interconnections. Despite competition from several other similar projects in the same area, the Westbrook project prevailed and went on line in 2001.

Since independent merchant transmission development won regulatory approval, most of Boundless' work has been in the area of merchant HVDC electric cable projects, for which it has served both as the originator and technical designer of interconnection concepts that go beyond "extension cords" to incorporate significant network reliability, stability and enhanced capacity.

For the Neptune Project, Boundless originated the concept of the New Jersey to Long Island interconnection, performed initial project sitting and interconnection evaluations and undertook the initial marine routing environmental analysis. Most significantly, Boundless devised the innovative interconnection concept at the LIPA Newbridge Road substation that obviated LIPA's prior interconnection capacity limitations. Boundless also performed the initial project scoping work with the New York Independent System Operator (NYISO) and PJM and final interconnection analysis that interconnected the Neptune Project with very low interconnection costs.

In concert with Sea Breeze Power Corporation, Boundless has developed the international Juan De Fuca Cable Project, a 550 mW HVDC submarine cable and converter system linking Port Angeles, Washington and Victoria, British Columbia. This project has attained all principal international permits, including a U.S. Presidential Permit, completed environmental impact statement (EIS), a Canadian National Energy Board Certificate of Convenience and Necessity and Environmental Clearance, U.S. Army Corps of Engineers combined water quality/wetlands permits and all British Columbia and Washington State governmental permits/approvals. The project is "shovel ready," and was initially accepted into Department of Energy's Phase 2 (Innovative Projects) loan guarantee application process. The JDF project is currently in negotiations with regional utilities on an innovative revenue sharing concept for the new transmission service without an increase to existing customers.

Other current projects being developed by Boundless and Sea Breeze include West Coast Cable, a 1600 mW DC cable project between Oregon and California and an interconnecting cable project from Northwest British Columbia, both under path rating review by the regional reliability agency, WECC. Individually, the principals of Boundless have decades of project development, financing, permitting and management experience including New England HVDC and AC transmission and biomass energy plants.

Boundless has been a force for innovative interconnections and the early application of world class best available technology for twenty years. A small group of engineers with decades of utility and EPRI experience, the group understands the regulatory environment and culture of the modern American utility. It is focused on addressing the seams of service territories and regions in a comprehensive way that benefits the systems being connected on multiple levels.

Boundless seeks to find high value gaps and specific needs of existing systems that may be leveraged into superior load serving systems by the application of creative thinking and thorough understanding of the systems and their operational needs. The much acclaimed Neptune Project, the one large HVDC undertaking in North America that finished on time and within its \$660 million budget, is the prime example. Boundless

respects the requirements of the investor owned utilities as well as the role of the large public utilities. It considers the generation and distribution functions, and how they can all best be aided by an innovative, technically-based transmission owner working under the FERC mandates, as it seeks select specific opportunities for its expertise to help build the system that will best serve the nation in the 21st Century.

II. Project Description: Four Projects

A. Project One: Third Leeds – Pleasant Valley Circuit Alternative

1. Material Energy Planning Principles.¹ It is well known today that New York’s electric transmission network was established to support the needs of the respective utility service territories. Thus, much of each utility’s transmission was constructed within the company’s service territory and served only to supply the company’s customers. Even after the formation of ISOs and cooperative system planning, system planning was based on utility needs and not an open market situation that exists today.

While New York’s transmission system is being operated today on a statewide – even regional basis, the limitations from its origins still create major problems for the transmission grid. In particular, there are numerous constraints on the transmission grid’s ability to deliver power from one part of the state to another. Moreover, renewable energy can often only be produced in limited geographical locations, so that delivery of that power to the grid and then on the grid throughout the state is limited. A major means of measuring these limitations is congestion cost.² Boundless proposes that a valuable metric for the Task Force in evaluating projects submitted in response to the RFI is the extent to which the proposed projects will reduce congestion cost at the lowest cost. This is often expressed as a cost benefit test and is a specific way of measuring how to make the transmission grid more efficient.

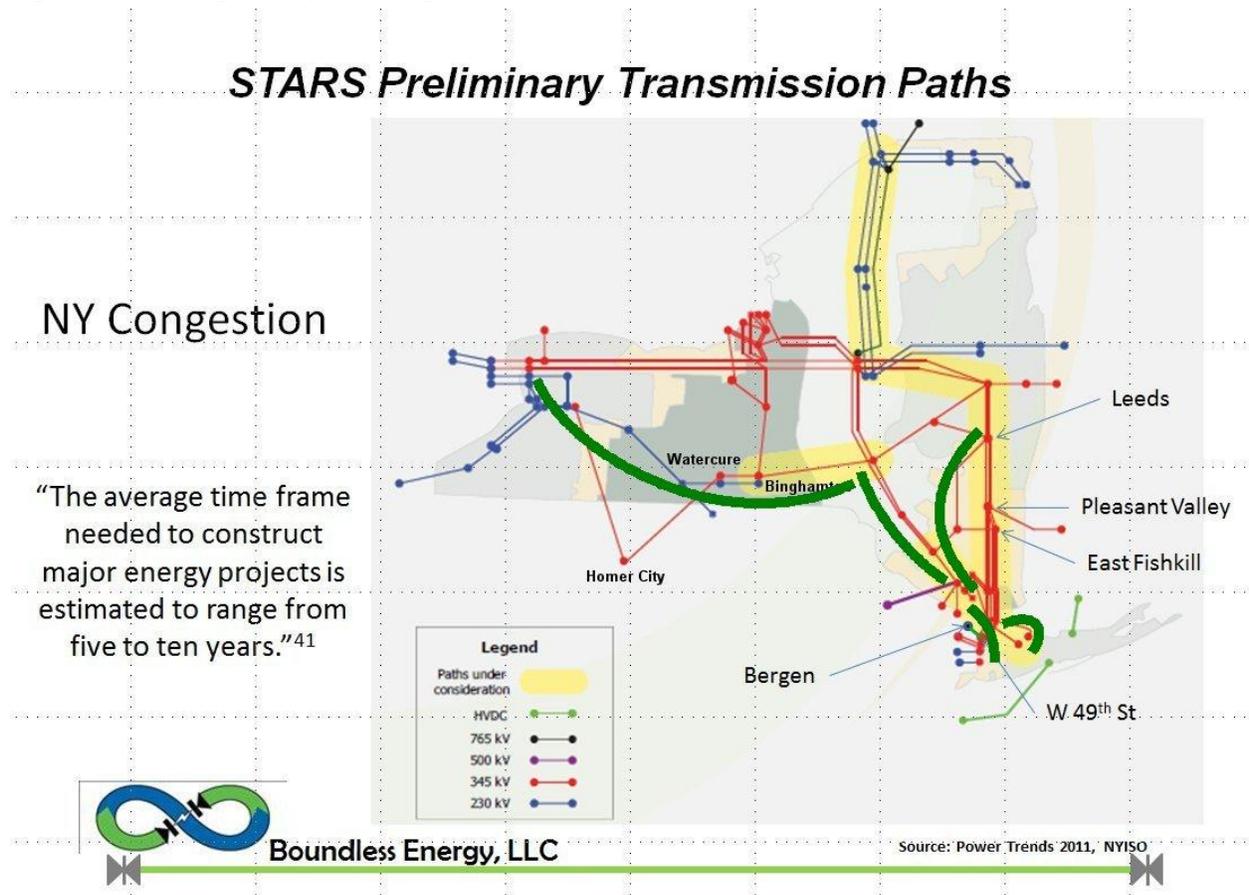
Like the automobile highway system, an entire highway is rarely totally congested. Rather the automobile may travel at the speed limit for most of the distance with only a few problem areas. Likewise the electrical transmission system is not fully loaded or congested everywhere and solving a few of the congested areas is much better than constructing an entirely new highway that may actually harm the existing

¹ These planning principles, of course, apply not only to Project One, but to the other three projects identified in this response.

² Another potential limitation on the transmission grid is the impact on its reliability as a result of transmission bottlenecks. Much of this type of limitation, however, has been resolved by utilities and the (NYISO over the years in order to maintain a reliable system.

system due to contingencies that the electrical system must be designed to withstand. As indicated on the diagram below, the existing system could be made stronger by balancing the flows on the major interfaces.

To achieve this balance there are new Smart Grid devices that can help change flows, but the most important objective to achieve is to upgrade existing facilities to equalize the existing corridors. For instance as the diagram shows, there are several large 345 kV transmission lines east of the Hudson River and only one transmission pathway west of the Hudson River. Likewise, there are major lines from West to East along the New York Thruway, and only one parallel 345 kV line in Southern New York through Binghamton. The West to East interfaces are critical, because they are parallel high voltage lines in PJM. Again the best way to optimize the existing lines is to equalize the capability of the parallel corridors.



A second material energy planning principle is that proposed projects should support and enhance the existing grid where possible, as opposed to constructing large, stand alone projects. While the Task Force did not address the New York utilities’

STARS³ report at the April 19, 2012 meeting for respondents, it is apparent from the report that a number of transmission facilities need to be replaced or upgraded. Thus, proposed transmission projects should address the shortcomings in the existing transmission grid, as reflected in recent studies of what should be upgraded.

A third material planning principle is that new projects should enhance the overall grid, by increasing the grid's stability and robustness. Some projects, taken individually, may have attractive features, but do little to enhance the grid in which they serve. Small attention to this consideration when a new transmission line is under review can have major positive impact on its parent system.

A major point that Boundless and others tried to bring out with questions and comments at the April 19, 2012 meeting for respondents was that if the right plans are pursued, the enhancement of the existing transmission system will change -- if not eliminate -- some price/load zones. Because there is unused power north and west of New York City the equalization of rates between NYISO price/load zones (e.g., reduced costs in Zones J and K) will not cause substantial increases in other Zones.

2. Description of Project⁴

- (a) Type of Project: Transmission
- (b) Size of Project: 1,000 to 1,500 mWs
- (c) Location of Project: NYISO Zone G – Hudson Valley, Ulster and Orange Counties
- (d) Fuel source and availability of fuel/infrastructure: components of new transmission are generally available from multiple suppliers
- (e) Operational Date: 2015
- (f) Upgrade of existing facilities from north of Leeds Substation south to below East Fishkill Substation

3. Project Justification. The NYISO's Congestion Assessment and Resource Integration Study (CARIS) identifies the existence of significant transmission congestion. Three of the most bottlenecked regions are: (a) the Central -- East interface, (b) Capital District -- Leeds transmission facilities and (c) Leeds --Pleasant Valley transmission facilities. These three congested areas, together, are easily the leading cause of transmission congestion in New York State. The NYISO has proposed

³ New York State Transmission Assessment and Reliability Study (STARS).

⁴ Because of the Task Force's decision to allow only public filings in response to the RFI, it will not be possible to provide all of the information which Boundless would like to provide to the Task Force.

upgrading a transmission line from Leeds to Pleasant Valley by adding a third circuit crossing the Hudson River to address at least a portion of this congestion. The most recent CARIS study reveals, however, that the cost benefit ratio for the NYISO option does not meet the acceptable level of 1.0.⁵ While a new corridor is permitted, it will still be a weak corridor compared to the existing system.

The crucial aspect of Boundless' project is its innovative suggestion that the congestion problem identified by the CARIS report can be resolved in more than one way. Instead of building new transmission facilities across the Hudson River, from the Leeds Substation (on the west side) to the Pleasant Valley Substation (on the east side), it is more economical to upgrade and expand existing transmission facilities completely on the west side of the Hudson River. Such a plan would reduce the cost of congestion comparable to the cross-Hudson River new circuit proposal, but at much less cost. It would also accomplish a portion of the rebuilding of existing lines which the utilities have identified in the STARS report. Boundless' proposal is referred to in this response to the RFI as the "Third Leeds – Pleasant Valley Circuit Alternative Project." Importantly, it would resolve most of the Central -- East interface problem by routing energy from the Central zone down the strong Marcy South pathway, the way the system was originally intended to do from the hydroelectric resource in western New York.

This proposed Third Leeds – Pleasant Valley Circuit Alternative Project, which consists of a series of small components, would coordinate with at least one, and possibly two, transmission projects under consideration by New York transmission owners or developers. Thus, the proposed Third Leeds – Pleasant Valley Circuit Alternative Project would connect with a second and distinct transmission upgrade project being undertaken by Consolidated Edison Company of New York (Con Edison). Con Edison's project runs from the Rock Tavern Substation to the Ramapo substation, both of which are on the west side of the Hudson River. Con Edison proposes to add a second 345 kV circuit between these substations. This project is under regulatory review at this time and is scheduled to be in service during the second half of 2016.

Moreover, if a transmission upgrade were ever constructed connecting the HTP Project (now under construction) with the New York transmission grid west of the Hudson River, the proposed Third Leeds – Pleasant Valley Circuit Alternative Project north of Rock Tavern would create a veritable "super highway" of high voltage transmission lines from the NYISO's Zone G to New York City, making use of a transmission corridor entirely distinct from the existing power lines into New York City

⁵ 2011 CARIS, P. 6.

on the East Side of the Hudson River. The fact that this new major power corridor is separate from the existing north – south transmission lines running south from Pleasant Valley would “balance” the State’s transmission facilities on the East Side of the Hudson and with the new transmission facilities on the West Side of the Hudson River and, thus, make the transmission system much more stable than at present.

Boundless plans to submit this Third Leeds – Pleasant Valley Circuit Alternative Project to the NYISO to learn the specific amount of congestion which will be reduced, on a statewide basis. Projects which provide this relief from congestion should be compared on the basis of how cost effective each project is – how much congestion relief for how much money. Boundless believes that the NYISO study will show that Boundless’ Third Leeds – Pleasant Valley Circuit Alternative Project is more cost effective than competing options, including Champlain-Hudson Express (which is far more expensive with less benefits) and the proposed HVDC line terminating at Indian Point.

4. Financial. Boundless anticipates that the Third Leeds – Pleasant Valley Circuit Alternative Project will be graded by the NYISO (in the NYISO’s study using the CARIS database) to have a cost benefit ration in excess of 1.0. Boundless currently plans to request NYISO approval of the Third Leeds – Pleasant Valley Circuit Alternative Project under the NYISO’s recent tariff provisions governing projects which have system economic benefits. Specifically, Boundless is currently planning to request that the Project be voted on by NYISO market participants and, if a sufficient voting percentage approval is obtained, to build the project as a rate base project. This has the advantage of avoiding free riders when a project is contracted for by a single buyer, even though other potential buyers will also benefit without paying for the project.

In the absence of a satisfactory vote of approval by NYISO market participants, however, it may be practical for Boundless to enter into a contract with a load serving entity (as a buyer).

5. Permit Approval Process. Recognizing the current low demand environment, Boundless has not started regulatory approval proceedings, nor has it conducted the necessary State of New York environmental studies which will be necessary before the Third Leeds – Pleasant Valley Circuit Alternative Project can be constructed. However, Boundless has done its own environmental analysis on projects and commonly uses Ecology & Environment for formal submittals as it did with the Neptune Project. Also, because this Project will use in most cases existing right of way Boundless anticipates that the licensing issues will be considerably less contentious and expensive than a new transmission corridor.

As in the case of the Neptune Project, Boundless' ability to reach out to the environmental community with solid data on the benign nature of our proposals has allowed Boundless to succeed with the remarkable record of having no environmental opposition. In fact, we are proud to have received acclaim from many normally hostile public sources, resulting from the nature of Boundless' technology and from the effort to listen and adapt to expressed concerns, both in the Neptune Project and in the current Juan de Fuca project on the West Coast.

Because of our track record of achieving the only major HVDC cable project to finish on time and on budget, we have access to several experienced and well endowed financial groups that specialize in energy and the more narrow merchant transmission financing. Boundless has been accompanied at numerous meetings with one major such financial institution which some Task Force members have witnessed.

6. Additional Information – Much of the information concerning this project is comparable to other projects. Boundless has included information below when it the project is distinct from other projects.

- Projected In-Service Date – 2015.
- Construction – Minimum time compared with other projects, most of the ROW will be in existing utility ROWs.
- Financial -- Boundless works with several experienced investment funds and financing entities.
- Environmental -- Minimum impacts.
- Socio-economic – Minimum impacts.
- Property – Minimum impacts.
- Interconnection – Optimum with lowest cost.

B. Project Two: North River Express Project

1. Description of Project⁶

(a) Type of Project: HVDC Voltage Source Converter Technology Transmission Cable Circuit

(b) Size of Project: 1100 mWs

(c) Location of Project: NYISO Zone G – Hudson Valley, Rockland County to Zone J – New York City

⁶ Because of the Task Force's decision to allow only public filings in response to the RFI, it will not be possible to provide all of the information which Boundless would like to provide to the Task Force.

(d) Fuel source and availability of fuel/infrastructure: components of new transmission are generally available from multiple suppliers

(e) Operational Date: 2016

2. Project Justification. The North River Express Project is a dedicated merchant project proposal that Boundless has been vetting for about a year and has received much interest and support. It would use an HVDC system with a series of converters to enter the Hudson in Rockland County and carry 1,100 mW to 1,600 mW into the heart of Manhattan. A variant of this project was submitted to the LIPA RFP. The estimated cost is well less than half of the proposed Hudson Champlain project, while it uses all New York generation and infrastructure and provides sufficient capacity and stability to begin the serious undertaking of reconsidering the nuclear generation in the Hudson Valley. Although the details of this project must remain confidential, Boundless has discussed this project with many of the members of the Energy Highway Task Force, and will be happy to brief Task Force in more detail when asked.

While the value of new power capacity in New York City is presently is less than the cost of construction, this situation is not likely to continue indefinitely. This is particularly true in the event that the necessary licenses for two nuclear power plants operating at Indian Point are not extended. There will be a critical need for new power delivery into New York City from regions other than Indian Point. While Con Edison's existing transmission circuits can carry some replacement power if Indian Point were to close, not all the replacement power will originate at Indian Point. Boundless proposes a transmission project using underwater cables from a point in the mid-Hudson River valley (Zone G) to an interconnection with Con Edison's system on the East River in Zone J. These cables would use a proprietary design discovered by Boundless.

3. Financial. Boundless works with several experienced investment funds and Financing entities.

4. Permit Approval Process. While the permitting process has not begun, a portion of the route parallels one or more projects (e.g., Champlain Hudson Express) for which permitting has already been conducted. In addition, because the project will consist of underground cables, it is expected that the permitting will be less difficult than for an overhead line. It may, therefore be possible to accelerate the permitting process.

5. Additional Information – Much of the information concerning this project is comparable to other projects. Boundless has included information below when it the project is distinct from other projects.

- Projected In-Service Date – 2016

C. Project Three: Converting Existing Long Island Cables Project

1. Description of Project

- (a) Type of Project: HVDC Voltage Source Converter transmission cable circuits.
- (b) Size of Project: 3,300 mWs which minus the existing AC ratings will provide an increase of at least 2,000 mW on a fully controllable basis.
- (c) Location of Project: NYISO Zone I Rockland and Westchester Counties to Zone K – Long Island
- (d) Fuel source and availability of fuel/infrastructure: components of new transmission are generally available from multiple suppliers
- (e) Operational Date: 2017.

2. Project Justification. Existing AC cable circuits exist between Westchester County and Long Island. The use of Voltage Source Converter technology will provide considerable system operational benefits. These cables could be converted from AC operation to DC operation, with a substantial increase in power capacity. Boundless is currently seeking a patent for its new method of converting an existing AC circuit to DC in order to double or triple the AC Rating. Two patents currently exist, held by colleagues of Boundless, which allow for conversion of three-wire AC circuits to DC operation that will increase the capability of the circuit by 30% to 50%. The fundamental theory behind this conversion is discussed in EPRI documents which can be provided. This change, as noted, produces a significant increase in the capacity of the cables. There is a need for resources on Long Island and the ability to reduce the North-South power flow limits by going around -- and not through -- Zone J.

3. Financial. Boundless works with several experienced investment funds and financing entities.

4. Permit Approval Process. Because this project makes use of existing cables and rights of way, permitting should be non-controversial.

5. Additional Information – Much of the information concerning this project is comparable to other projects. Boundless has included information below when it the project is distinct from other projects.

- Construction – Minimum time compared with other projects, most of the ROW will be in existing utility ROWs.
- Socio-economic – Minimum impacts

D. Project Four: Renewable Energy Transfer Project

1. Description of Project

(a) Type of Project: Transmission.

(b) Size of Project: 345 kV transmission lines, 1,500 MWs single circuit or 2,500 mWs double circuit with Smart Grid devices.

(c) Location of Project: Convert existing low voltage lines in Southern New York, roughly parallel to the existing major West to East transmission lines parallel to the New York Thruway in central New York to higher voltage

(d) Fuel source and availability of fuel/infrastructure: components of new transmission are generally available from multiple suppliers

(e) Operational Date: 2017 or 2018.

(f) Existing low voltage lines in Southern New York, roughly parallel to the existing major West to East transmission lines parallel to the New York Thruway in central New York would be converted to higher voltage, most likely 345 kV. While this project might be constructed using HVDC Light technology, it is probably more economical to use standard AC transmission technology, as this project will involve interconnections with several AC substations.

2. Project Justification. Much of the renewable energy projects in New York State are located in the western part of the State. Moreover, to the extent that New York authorizes advanced recovery of shale gas, there is likely to be increased supplies of natural gas in the western part of the State. These developments would be enhanced by transmission upgrades of the West to East transmission lines. In particular, the new pipelines carrying the shale gas and underground cables for this project could provide New York with a highly reliable power backbone.

3. Financial -- Boundless works with several experienced investment funds and financing entities.

4. Permit Approval Process -- Because this project will use existing ROWs, the permitting will be shorter than if an entirely new transmission ROW were created.

5. Additional Information -- Much of the information concerning this project is comparable to other projects. Boundless has included information below when it the project is distinct from other projects.

- Projected In-Service Date -- 2017 or 2018.

- Technical -- Single or Double circuit 345kV AC lines in existing ROW's replacing old circuits that are approaching their useful life. This Project will allow the introduction of Smart Grid devices to control the power flows.

- Construction – Involves new towers additional Smart Grid devices on exist West to East corridor lines.

- Operational -- Smart Grid flow control devices to be used for balancing with other circuits. There are added benefits of reducing the possibility of the last regional blackout from MISO through PJM.

- Socio-economic – Minimal with existing ROWs.

- Environmental -- Minimal with existing ROWs.

- Property -- Minimal with existing ROWs.

- Interconnection -- Reduces problems between adjacent control areas (ISOs/RTOs) by solving problems of parallel flows in PJM & NYISO for west to East flows.