

PSNH Powerline Change Application

Special Use Permits WTM0759 and WTM0771

November 4, 2013

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE

POWERLINE CHANGE APPLICATION

NOVEMBER 4, 2013

Proposal Description

Public Service Company of New Hampshire (“PSNH”) applies for a powerline change pursuant to Section VII(K) (hereafter “Powerline Change Application” or “Application”) of the terms and conditions of PSNH’s existing Special Use Permits WTM0759 and WTM0771 (“PSNH SUP”) from the United States Forest Service (“Forest Service” or “USFS”). Through the Powerline Change Application, PSNH seeks authorization from the Forest Service to relocate those portions of PSNH’s 115 kV X178 transmission line (“Existing PSNH Line”) within the existing right-of-way through the White Mountain National Forest (“WMNF”) authorized by the PSNH SUP within Forest Service jurisdiction (the “Existing PSNH SUP ROW”). PSNH also notifies the Forest Service of its intent to relocate those portions of the Existing PSNH Line governed by easements privately held by PSNH (“Existing Private Easements”). (Herein this application refers to the relocation of the X178 line in the WMNF as the “Relocation” regardless of the relevant ownership interest and the relocated portions of the X178 on the WMNF as the “Relocated PSNH Line.”)¹ See Exhibit 1, 2, 3 (Maps). PSNH proposes the Relocation solely to facilitate the proposed Northern Pass Transmission Line. The Relocation would only occur upon the Northern Pass Transmission Line’s receipt of all regulatory approvals in a manner that necessitates the Relocation.

6.01 miles of the Existing PSNH Line are located along Existing PSNH SUP ROW and 4.55 miles are located along the Existing Private Easements. The Relocation will move the Existing PSNH Line approximately 45 feet (keeping it within the Existing PSNH SUP ROW and the Existing Private Easements). See Exhibit 1, 2 (Maps). The Relocation will occur within the Existing PSNH SUP ROW and the Existing Private Easements, including those portions of the Existing Private Easements in Stark (the “Stark Easement”). See Exhibit 2. For the Stark easement, PSNH and Northern Pass will relocate the relevant portions of the existing 115 kV O154 (formerly W179) line approximately 40 feet, rather than 45 feet, but will remain within the Stark Easement. PSNH requests authorization for relocation for those portions of the Existing PSNH Line located within the Existing PSNH SUP ROW and provides notice for those portions of the Existing PSNH Line located within the Existing Private Easements.²

¹ For clarity, this Application refers to the combined PSNH ROW created by the PSNH SUP and the current PSNH easements through the WMNF as the “Current WMNF PSNH ROW,” the right-of-way authorized only by the PSNH SUP as the “Existing PSNH SUP ROW,” and the current PSNH easements as “Existing Private Easements.” “Relocation” refers to the relocation activities within the Current WMNF PSNH ROW (on the Existing PSNH SUP ROW and the Existing Private Easements). “Relocated PSNH Line” refers to the entire relocated line throughout the WMNF (i.e. within the Current WMNF PSNH ROW). “Existing PSNH Line” refers to all portions of the 115 kV X178 and 115 kV O154 (formerly W179) transmission lines found in the WMNF.

² During the most recent renewal of the PSNH SUP, the areas covered by the Existing Private Easements were inadvertently included as part of the area covered by the PSNH SUP. The Forest Service has acknowledged previously that legally no SUP is required for activities within the Existing Private Easements. See *Minard Run Oil Co. v. U.S. Forest Serv.*, 670 F.3d 236, 243, 251 (3d Cir. 2011); Forest Service Manual (FSM) 2734.2 (setting forth the Forest Service policy for granting road and trail rights-of-way on Forest Service lands and providing that “[t]he holder of outstanding rights perfected on acquired land prior to Forest Service acquisition ... may exercise those rights without obtaining a special use authorization, unless the document creating the rights provides for an additional authorization”). As a result, PSNH is providing notice only as to the proposed Relocation on the Existing Private Easements.

PSNH proposes the Relocation solely to facilitate the proposed Northern Pass Transmission Line, a transmission line that will deliver 1,200 MW of competitively priced, clean, low-carbon, base-load power (approximately 98% hydropower) from Québec to New Hampshire and the rest of New England. As such, this Application is related to the Northern Pass Transmission Line's Department of Energy ("DOE") Presidential Permit application and its amended Forest Service SUP application, which are the subject of ongoing analysis pursuant to the National Environmental Policy Act ("NEPA"). All environmental impacts associated with the Relocation are effects from the Northern Pass Transmission Line and thus PSNH understands that the NEPA analysis for the Northern Pass Transmission Line will be relied upon by the Forest Service as it evaluates this Powerline Change Application. Northern Pass Transmission LLC ("Northern Pass") will conduct the proposed Relocation on behalf of PSNH. Northern Pass will also bear all expenses and furnish all resources for the Relocation.

Given the related nature of the two projects, this Application is consistent with and contains much of the same information provided in the September 5, 2013 Northern Pass Transmission Line Amended SUP Application (the "Northern Pass Amended SUP Application"). The Relocation will not have any impacts on the environment outside of the impacts described in the Northern Pass Amended SUP Application. As a result, this Application frequently cross-references the Northern Pass Amended SUP Application. This Application also includes updated descriptions regarding (a) temporary work areas needed for construction and (b) description of natural gas reliance in New England.

PSNH and Northern Pass will also relocate the existing PSNH transmission line within other portions of the existing right-of-way outside of the WMNF, as part of the effort to reduce the height of the transmission structures and maximize the use of existing right-of-way. In the HVDC portion of the Northern Pass Transmission Line, Northern Pass will relocate approximately 51 miles of existing 115 kV lines (inclusive of those located within the WMNF) and 12 miles of 34.5 kV lines. For the 345 kV AC portion of the Project, Northern Pass will relocate approximately 16 miles of existing 115 kV lines and five miles of 34.5 kV lines.

The Relocation will require the installation of new transmission line structures as described in more detail below with respect to the WMNF. As described below, PSNH proposes to use tubular steel monopole structures for the Relocated PSNH Line.

If the Forest Service approves this Application, PSNH will submit, as required by the PSNH SUP, construction, development, and operating plans consistent with the Relocation.

Structures and facilities

Transmission structures

The Relocated PSNH Line will have 89 transmission structures in the WMNF – 36 fewer than the Existing PSNH Line. PSNH proposes to use tubular steel monopole structures for the Relocated PSNH Line. Exhibit 4 shows this structure type.

The monopole structures for the Relocated PSNH Line will be approximately two to four feet in diameter at the base, tapering to approximately one to two feet in diameter at the top. Angle structures for the Relocated PSNH Line will be anchored to concrete foundations approximately three to five feet in diameter. Tangent structures, in contrast to angle structures, will typically be constructed with direct-embed foundations in which a hole is drilled three to four feet in diameter, part of the monopole structure is placed in the hole, and the voids are then backfilled with native soil or an engineered crushed

rock. During the detailed design process, other foundation designs may be considered where they might improve constructability, reduce environmental impacts, or achieve other benefits. The transmission structures will have arms that support insulator strings, conductors, and overhead shield wire. Exhibit 6 shows a typical cross section of what the proposed PSNH and Northern Pass structures will look like post construction.

The structure heights of the Relocated PSNH Line will range from 70 feet (1 structure) to 115 feet (1 structure). The majority of the Relocated PSNH Line structures will have heights between 88 and 97 feet. *See* Exhibit 5 (showing the height of all Relocated PSNH Line structures to be constructed on the Existing PSNH SUP ROW and the Existing Private Easements, including the Stark Easement). Exhibit 4 compares a typical Existing PSNH Line transmission structure to a typical Relocated PSNH Line transmission structure.

The Relocated PSNH Line will be co-located with the Northern Pass Transmission Line. The majority of Relocated PSNH Line structures will be spaced approximately 500 to 700 feet apart; maximum spacing will be approximately 850 feet. Spacing will be at approximately the same distances as the structures associated with the Northern Pass Transmission Line, and as a result will minimize visual impacts. The distance between structures will depend on the terrain and the height of the structures.³

Northern Pass has prepared six visual simulations of the Relocated PSNH Line, attached as Exhibit 7. The simulation locations for the Relocated PSNH Line and Northern Pass Transmission Line were selected to convey to the public what the Relocation and Northern Pass Transmission Line will look like from key vantage points and public viewing areas in the WMNF. Members of the public, the project team, the Appalachian Trail Conservancy, and LandWorks (a visual impacts consultant) suggested the locations for these and other simulations located on Northern Pass's website.⁴ They selected, among others, locations considered to have local, state, or national significance as scenic or recreational resources and locations within conserved landscapes.

Northern Pass is developing a visual impact assessment that will include an assessment of the visual impact of the Relocated PSNH Line.

Physical specifications

The Relocated PSNH Line will follow the path of the Existing PSNH Line and cross a total of 10.5 miles within the WMNF, including along the Existing Private Easements. The Relocated PSNH Line will remain within the footprint of the Current WMNF PSNH ROW.

All roads built for the Northern Pass Transmission Line and the Relocation will also remain within the Current WMNF PSNH ROW. As noted above, these roads will be generally located where the existing access roads are today, approximately 16 feet in width. They will be improved only to the extent

³ In the Northern Pass Amended SUP Application, Northern Pass requested authorization to relocate the existing gravel helicopter landing pad located within the Current WMNF PSNH ROW to one of two possible nearby locations. *See* Northern Pass Amended SUP Application Item 7(b)(2); *see also* Northern Pass Amended SUP Application Exhibit 8. If the Forest Service authorizes such relocation, PSNH will also use the relocated gravel helicopter landing pad for maintaining the PSNH line.

⁴ <http://northernpass.us/visual-simulations.htm>

needed to accommodate equipment and vehicles required for off-road construction. The total length of access roads within the WMNF for the Relocation and the Northern Pass is proposed to be 10.5 miles (including those on the Existing Private Easements). The proposed access roads are shown in Exhibit 8. No roads outside the Current WMNF PSNH ROW will be constructed or used; rather, special construction techniques will be used to minimize the impact on the WMNF. These techniques will include construction during winter periods when the ground is frozen (most notably the Bog Pond area in Lincoln), the use of construction matting, and the use of helicopter construction. All of these techniques are designed to prevent or minimize wetlands impacts.

Together with the Northern Pass Transmission Line, the Relocation will require some additional clearing and grading in order to construct, operate and maintain the new structures. Generally, as noted in the Northern Pass Amended SUP Application, the Current WMNF PSNH ROW will have to be cleared to a 150' width. Based on an analysis of 2010 New Hampshire Department of Transportation aerial photography and input from Northeast Utilities Transmission field personnel, the Current WMNF PSNH ROW is currently cleared as follows:

1. With the exception of the instances below, the Current WMNF PSNH ROW cleared width is in the neighborhood of 130 feet;
2. The ¼ mile ROW section adjacent to Interstate 93 covered by PSNH SUP FIA-136 is cleared to approximately 120 feet in width; and
3. In a 2.6 mile section near the Kinsman Trail (SUP FIA-120) the ROW cleared width ranges between 75 to 100 feet in width.

For the additional clearing needed, vegetation will be removed from the Current WMNF PSNH ROW using mechanical methods. Forested vegetation will be removed using low-impact tree clearing. Low-impact tree clearing incorporates a variety of approaches, techniques, and equipment to minimize site disturbance and to protect wetlands, watercourses, soils, rare species and their habitats, and cultural resources. Appropriate erosion and sediment controls will be deployed as necessary. Where removal of woody vegetation is required, vegetation will be cut flush with the ground to the extent possible. Except for rare instances where prevented by topographic constraints, trees will be felled parallel to and within the Current WMNF PSNH ROW to minimize the potential for off-ROW vegetation damage. Care will be taken to maintain vegetation along stream banks and within wetlands to the extent possible. During and after construction, off-ROW trees that could pose hazards to the integrity of the transmission lines will be identified and removed following consultation with the local Forest Service office. This is consistent with the terms of the PSNH SUP, which requires PSNH to remove all dead snags and trees leaning toward the Existing PSNH Line adjacent to the Existing PSNH SUP ROW.

Term for Proposed Activities

The PSNH SUP will expire per the current terms at midnight on December 31, 2036.

Duration and timing of construction

The Relocation will take approximately six to nine months of active construction to complete. The Relocation will occur in phases at various times over a two-year period within the total time frame necessary to construct the Northern Pass Transmission Line. As noted above, construction that could affect wetlands will be timed to minimize wetlands impacts.

The construction will involve a series of steps that will occur over the 24 month timeframe. Relocation will involve tree clearing in certain areas, foundation construction, new structure installation,

and finally installation of the line conductor. Once the new sections of PSNH line are installed, the existing line will be removed. The construction steps will proceed in parallel with the construction activities associated with the Northern Pass line to the greatest extent possible.

Temporary work areas needed for construction

Northern Pass and PSNH will seek to minimize the area needed for temporary work areas, but the Relocation, along with construction of the Northern Pass Transmission Line, will require some temporary work areas to carry out the construction within the WMNF. Establishing these temporary work areas in proximity to the Relocation will minimize the potential for inconvenience or nuisance effects to the public (e.g., as a result of the movement of equipment, manpower, and supplies to and from the Current WMNF PSNH ROW along public roads).

The temporary work areas in the WMNF will likely consist of a combination of crane pads, temporary storage areas, staging areas, and wire-pulling areas. Northern Pass will also construct construction lay-down areas outside the WMNF. The construction-related areas include:

- *Construction Lay-Down Areas.* These are staging areas for equipment prior to installation. They will range in size from approximately 1 acre to approximately 5 acres. It is anticipated that most laydown areas will be occupied for several months. No construction laydown areas will be located in the WMNF.
- *Crane pads* are used to stage structure components for final on-site assembly and to provide a safe, level work base for the construction equipment used to erect transmission structures. Within the WMNF, crane pad areas would be located, as needed, within the Current WMNF PSNH ROW at individual transmission structure locations where the means of access to transport cranes is available. These pads can vary in size depending on specific requirements for each structure, but they could range between 5,000 and 14,000 square feet. In the WMNF, all crane pads will be limited to the Current WMNF PSNH ROW.
- *Temporary storage areas* are used to store material, equipment, and supplies and are typically between 2 to 5 acres depending on the exact use of the site. In the WMNF, all temporary storage pads will be limited to the Current WMNF PSNH ROW.
- *Staging areas* are used to temporarily stockpile materials for construction closer to the worksite and are typically less than 2 acres. In the WMNF, all staging areas will be limited to the Current WMNF PSNH ROW.
- *Wire Pulling Areas.* These are areas where the cable must be tensioned for installation. These areas will typically be within the Current WMNF PSNH ROW, but occasionally they will be just off the Current WMNF PSNH ROW where necessary to accommodate angle points along the transmission route. It is estimated that they will be approximately 100 feet by 200 feet in size and that they will be used for a period of only 1-2 weeks. In the WMNF, the transmission line has only six angle points where wire pulling may extend modestly beyond the Current WMNF PSNH ROW, at each side of the angle point.

The number and location of these temporary work areas has not yet been determined.

All work done in construction lay-down, crane pads, temporary storage areas, staging areas, and wire-pulling areas will be done in accordance with all required permits and other applicable authorizations, including to the extent they may be applicable, the Clean Water Act, the National Historic Preservation Act, and the Endangered Species Act. In addition, Northern Pass and PSNH will design all

temporary work areas to avoid and minimize impacts to wetlands, streams, and archeological resources wherever possible.

Technical and Financial Capability

Both PSNH and Northern Pass have the technical and financial capacity to complete the Relocation. PSNH is a wholly-owned subsidiary of Northeast Utilities, which is the largest public utility holding company in New England, with more than 3.6 million electric and natural gas customers and operating more than 4,500 miles of transmission lines. PSNH has held Special Use Permits or other Forest Service authorization for the Existing PSNH SUP ROW for many decades, demonstrating its financial and technical capacity. PSNH is New Hampshire's largest utility, serving more than 490,000 customers around the state. It operates power plants with a total capacity of 1,150 MWs, and its resource mix is more than 20% renewable. It operates more than 14,000 miles of power lines – a combination of transmission and distribution lines, and it has annual revenues in excess of \$1 billion.

Northern Pass, which will bear the expense and furnish the resources to effect the Relocation, is also owned by Northeast Utilities. Specifically, Northern Pass Transmission LLC, a New Hampshire limited liability company in good standing in New Hampshire, is wholly owned by NU Transmission Ventures, Inc., which is, in turn, a wholly-owned subsidiary of Northeast Utilities.

In conducting the Relocation, PSNH and Northern Pass will draw on the proven resources of Northeast Utilities, which has highly developed expertise in the design, siting, and construction of high voltage transmission systems within their service areas in Connecticut, Massachusetts, and New Hampshire. In the last ten (10) years, Northeast Utilities has invested over \$3 billion in major new transmission projects. For example, in 2008, to improve electric reliability and reduce costly congestion charges to customers in southwest Connecticut, Northeast Utilities successfully completed \$1.6 billion in upgrades, spanning more than 109 miles of the electric grid serving the region. These transmission upgrades have saved customers more than \$600 million since they were completed. Those projects won a 2008 Platts Global Energy Award for “Energy Construction of the Year.” In addition, Northeast Utilities won the 2009 Edison Award from the Edison Electric Institute (“EEI”). The Edison Award, EEI's highest honor, recognizes U.S. and international electric companies for outstanding leadership, innovation, and advancement of the electric industry. More recently, Northeast Utilities received approvals for and commenced construction of the \$700 million Greater Springfield Reliability Project.

Reasonable Alternative Routes and Modes

The only practical alternative to the Relocation is the No-Action Alternative; however, in order to be thorough, PSNH describes another theoretical alternative below. As noted previously, the purpose of the Relocation is to facilitate the construction of the Northern Pass Transmission Line in the same corridor as the Existing PSNH Line through the WMNF. If the Forest Service chooses any alternative other than the Northern Pass proposal to construct a new overhead line within the Current WMNF PSNH ROW for the Northern Pass Transmission Line, PSNH will not pursue the Relocation and the Existing PSNH Line will remain in its current location.

No-Action Alternative

The No-Action Alternative is not relocating the portion of the Existing PSNH Line that runs through the WMNF. This would mean that the Northern Pass Transmission Line would not be co-located

with the Existing PSNH Line in the Current WMNF PSNH ROW. While this would eliminate the need to relocate the Existing PSNH Line within the WMNF and reduce the direct impacts to resources from the Relocation in the WMNF, the No-Action Alternative could in fact create far more environmental impacts overall. The Northern Pass Amended SUP Application addresses the specifics of such alternatives in Item 13(b).

Wider Right of Way

A theoretical alternative to the Relocation is the expansion of the right of way through the WMNF. This expanded right of way would accommodate both the Existing PSNH Line and the Northern Pass Transmission Line. However, this would require PSNH and Northern Pass to clear a much wider area in the WMNF than co-location. Neither PSNH nor Northern Pass has requested this option, even in the alternative, and do not in fact support this alternative because the increased surface disturbance would create significantly more impacts than co-location.

Alternative Structure Designs

There are a variety of transmission structure types that Northern Pass and PSNH could employ. Structures can vary both in height and design, and differing designs may be selected at different locations to address operational, environmental, and aesthetic interests. In designing the Relocation and Northern Pass Transmission Line, Northern Pass, and PSNH are working to minimize impacts of the line, recognizing that minimizing one impact can increase another. For example, if lower structures are used, more structures are required. The lower structures may reduce the visual impacts of the line for some viewers, but the increased number of structures could increase wetlands or other on-the-ground impacts in certain areas.

As described previously in this Application, Northern Pass and PSNH have selected tubular steel monopole structures for the Relocation. This type of structure is appropriate to use for the Relocation because of the available space in the Current WMNF PSNH ROW, steel monopoles are typically used for new 115 kV lines, and steel monopoles require less maintenance in the WMNF than other materials used for 115 kV structures (like wood). Exhibit 4 shows this structure type.

Necessity to Cross Federal Lands

The Relocation will follow the Existing PSNH Line within the Current WMNF PSNH ROW and will not create any new crossings of federal land. In approving the existing PSNH SUP, the Forest Service has already authorized PSNH to cross federal land within the Existing PSNH SUP ROW. In addition, like the Existing PSNH Line, the Relocated PSNH line will cross the Appalachian Trail only on the Existing Private Easements. Thus, the Relocation will not cross any areas of the WMNF other than those already authorized under the PSNH SUP or allowed by the Existing Private Easements.

Similar Projects

As described in this Application, Northern Pass Transmission LLC, a PSNH affiliate, has proposed to construct the Northern Pass Transmission Line within the Current WMNF PSNH ROW. PSNH is proposing this Relocation in order to effectuate the co-location of the Northern Pass Transmission Line within the Current WMNF PSNH ROW. Northern Pass will bear the expense and furnish the resources to effect the Relocation.

Costs of Project and Economic Feasibility

The total cost for the re-build of the 115 kV lines within the WMNF is \$14,400,000 or \$1.27M per mile. PSNH will not bear any of these costs. Northern Pass incorporated the cost of the Relocation into its description of total project costs in Item 15 of the Northern Pass Amended SUP Application.

Cost of Alternative

The No-Action Alternative would have no costs to PSNH. The No-Action Alternative would result in significant costs to Northern Pass, as described in Northern Pass Amended SUP Application Item 15 (Costs of Project and Alternative). Moreover, there would be significant societal costs if Northern Pass was unable to complete the Northern Pass Transmission Line, as described in Northern Pass Transmission Line Amended SUP Item 15 (Public Benefits of Project) and below.

Public Benefits of Project

The Relocation will allow the Northern Pass Transmission Line to be co-located within the Current WMNF PSNH ROW. The public benefits of co-location include avoiding the need for a separate right of way for the Northern Pass Transmission Line that would have greater visual, surface, water, and recreational impacts.

Other benefits of the Relocation are associated with the development of the Northern Pass Transmission Line itself because the purpose of the Relocation is to facilitate construction and co-location of the Northern Pass Transmission Line within the WMNF. The Northern Pass Transmission Line will deliver 1,200 MW of competitively priced, clean, low-carbon, base-load power (approximately 98 percent hydropower) from Québec to New Hampshire and the rest of New England. It will provide low-carbon, affordable energy to over 1 million homes. The Northern Pass Transmission Line will benefit PSNH customers and other utility customers in New England by improving New Hampshire's and New England's fuel diversity mix, lessening dependence on natural gas by providing a reliable baseload source of low-carbon energy at competitive prices for the long-term, reducing risk to the available fuel supply to the electric generation fleet on very cold winter days, and reducing power price volatility on both very hot and very cold days.

Specifically, the Northern Pass Transmission Line will help satisfy the requirements and goals of several important state and regional climate policies, including:

- New Hampshire Climate Action Plan
- Regional Greenhouse Gas Initiative's greenhouse gas emissions reduction targets
- New England Governors' Renewable Energy Blueprint

The Northern Pass Transmission Line has other important benefits as well. For example, it will help to respond to the nearly 8,300 MW of potential coal- and oil-fired generation retirements that ISO-New England ("ISO-NE") faces between now and 2020.⁵ In addition, it will increase fuel diversity in New England, which has become increasingly dependent on natural gas for power generation. The

⁵ ISO New England's Strategic Transmission Analysis, New England Electricity Restructuring Roundtable: Generation Retirement Study & 2020 Resource Options, at 4 (June 14, 2013), *available at* http://www.iso-ne.com/pubs/pubcomm/pres_spchs/2013/final_rourke_raab_061413.pdf.

region's current heavy dependence on natural gas raises serious questions about the reliability and affordability of power because, in the winter, the gas is also needed for home heating and industrial uses.⁶ Indeed, the region's dependence on natural gas has grown substantially in just the last several months with the announcements of the planned shutdowns of Brayton Point, the region's largest coal-fired generating station, at 1497 MWs, and Vermont Yankee, a 620 MW nuclear plant.⁷ At the same time, because generators will not commit to the long-term contracts necessary to finance new pipeline construction, no new gas delivery capacity sufficient to meet the needs of gas-fired generation is being added in New England, thus increasing the vulnerability of the power supply situation and causing generators to propose reliance on old, inefficient, high carbon oil-fired generation as a back-up resource.⁸

The region will derive still further benefit from the fact that the 1,200 MW of power that the Northern Pass Transmission Line will deliver will be competitively priced. As of 2010, the Northern Pass Transmission Line was expected to reduce the wholesale price of power throughout New England by between \$206 million and \$327 million annually.⁹

Power flows from the Northern Pass Transmission Line will be base-load, not intermittent in the way that wind and solar power are. The Northern Pass Transmission Line may avoid or defer the need to construct new fossil fuel plants and associated transmission projects that would otherwise be required to produce an equivalent quantity of reliable power. Moreover, the Northern Pass Transmission Line will reduce the "social costs of carbon." An interagency working group of eleven federal agencies, including the Department of Energy, recently concluded that the "social cost of carbon" has a 2015 value of

⁶ In testimony before the NH House Energy and Commerce Committee Subcommittee on Energy and Power on March 19, 2013, the President of ISO-NE pointed out that, without any unusual demand or weather conditions, in January and February 2013, the region experienced serious physical constraints in moving needed natural gas into the region and that wholesale electricity prices rose 100% and 300% respectively above 2012 levels for those months when generators could not get fuel to run. Testimony at 6, *available at* <http://docs.house.gov/meetings/IF/IF03/20130319/100527/HHRG-113-IF03-Wstate-vanWElieG-20130319-U1.pdf>. Commissioner Michael Harrington of the New Hampshire Public Service Commission explained that, during both months, New Hampshire "came very close" to having rolling blackouts "because of the natural gas shortages. David Brooks, *New England Came Close to 'Rolling Blackouts' in January and February Snowstorms*, THE NASHUA TELEGRAPH, Mar. 17, 2013, *available at* <http://nashuatelegraph.com/business/997183-464/new-england-came-close-to-rolling-blackouts.html>; *see also* ISO-NE Internal Market Monitor, *2012 Annual Markets Report*, at 3 (May 15, 2013), *available at* http://www.iso-ne.com/markets/mkt_anlys_rpts/annl_mkt_rpts/2012/amr12_final_051513.pdf (explaining that "[t]he region's use of natural gas for about half its electric energy has revealed both operational difficulties in coordinating the purchase and delivery of the fuel that generators need each day and the potentially insufficient infrastructure to supply all the natural gas the region's residential, commercial, industrial, and electric sectors demand during peak periods.").

⁷ Matthew L. Wald, *Vermont Yankee Plant to Close Next Year as the Nuclear Industry Retrenches*, THE NEW YORK TIMES (Aug. 27, 2013); Alex Kuffner, *New owners to shutter outmoded Brayton Point Power Station in 2017*, PROVIDENCE JOURNAL (Oct. 8, 2013).

⁸ *E.g.*, *New England May Face Price Spikes: Spectra*, MEGAWATT DAILY at 13 (October 9, 2013); *Marcellus Gas About to Enter New York City, but New England Is a Tougher Sell*, ENERGY WIRE (October 16, 2013).

⁹ *LMP and Congestion Impacts of Northern Pass Transmission Project*, at 31 (Dec. 7, 2010) *available at* <http://www.puc.nh.gov/Regulatory/CASEFILE/2010/10-261/TRANSCRIPTS-OFFICIAL%20EXHIBITS-CLERKS%20REPORT/10-261%202012-05-08%20EXH%20TRANSCANADA-5%20LMP%20AND%20CONGESTION%20IMPACTS%20OF%20NORTHERN%20PASS%20TRANSMISSION%20PROJECT%20FINAL%20REPORT.PDF>.

between \$12 and \$109 per ton of CO₂ emitted.¹⁰ Approval of Northern Pass will result in the avoidance of up to 5 million tons of CO₂ each year. Over just the first ten years of the project, using the social cost of carbon measure, failure to approve the Northern Pass Transmission Line would result in lost benefits valued at between \$600 million and \$5.45 billion dollars.

In its various rulings on the Northern Pass Transmission Line, the Federal Energy Regulatory Commission (“FERC”) recognized the important benefits the Northern Pass Transmission Line will provide. For example, FERC noted that the Northern Pass Transmission Line “does not limit competition; in fact, we find that it does the opposite and increases competition by offering New England customers an additional supply resource.”¹¹ In a subsequent decision, FERC also recognized other benefits the Northern Pass Transmission Line will bring to the region, noting that it will “reduce[] price volatility and lower locational marginal prices” in New England.¹²

FERC also identified a number of specific benefits to the regional power grid. It noted, for example, that the Northern Pass Transmission Line “will reduce congestion between Quebec and New England and facilitate integration and delivery of low-cost hydro-electric power. In addition, we find that with the addition of hydro-electric power to the base case, the existence of the [Northern Pass Transmission Line] will help mitigate overloads.”¹³ Finally, FERC commented that the Northern Pass Transmission Line “will include making available up to 1,200 MW of hydro-electric power previously unavailable from Quebec. The [Northern Pass Transmission Line] will not only diversify New England’s power supply mix, but it will also allow more energy imported from Quebec to be delivered during peak hours when marginal generation costs and market-clearing prices are highest.”¹⁴

In its recent report titled “Quantifying the Value of Hydropower in the Electric Grid: Final Report,” the Electric Power Research Institute (“EPRI”) noted that hydroelectric resources “contribute significantly to the reliability of the grid in terms of energy, capacity, and ancillary services.”¹⁵ Among the specific potential hydropower benefits the EPRI report identified are: addressing other generation and load variability; providing scheduling that helps to optimize energy and ancillary services; providing fast regulation response; and, as noted above, adding generation diversity. The Northern Pass Transmission Line is able to contribute positively to the New England grid in each of these respects.

The Northern Pass Transmission Line’s use of high-voltage, direct current (“HVDC”) technology also offers important benefits. Because it is asynchronous with the alternating current (“AC”) portion of the grid, the direct current (“DC”) link will provide system support and may be able to limit the effects of a cascading blackout. Under most operating conditions, it also experiences lower line losses (loss of power in the transmission process) over like distances compared to an AC line of similar voltage.

¹⁰ U.S. Government Interagency Working Group on Social Cost of Carbon, *Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866* at 3. (May 2013).

¹¹ *Northeast Utils. Serv. Co. & NSTAR Elec. Co.*, 129 FERC ¶ 61,279 at P 22(2009).

¹² *Northern Pass Transmission LLC*, 134 FERC ¶ 61,095 at P 5(2011).

¹³ *Id.* at P 26.

¹⁴ *Id.* at P 40.

¹⁵ EPRI, *Quantifying the Value of Hydropower in the Electric Grid: Final Report*, at 2-4 (Feb. 2013), available at <http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=00000000001023144>.

The Northern Pass Transmission Line will bring significant economic and fiscal benefits to New Hampshire both during its construction phase and throughout the period the Northern Pass Transmission Line is operational. The Northern Pass Transmission Line will create an estimated 1,200-1,500 New Hampshire jobs during project construction. Among the jobs that will be created are construction and forestry jobs, as well as professional and technical services jobs.¹⁶ New economic activity in retail, accommodation and food services and other sectors is also expected, adding approximately \$56 million to \$69 million annually to New Hampshire household earnings during the construction phase.¹⁷ The Northern Pass Transmission Line will also reduce energy costs for New Hampshire customers, saving New Hampshire residential and business customers \$20 to \$35 million annually. This in turn is expected to result in the creation of an additional 200 jobs in New Hampshire each year the line is in operation.¹⁸

Once the Relocation is complete and the Northern Pass Transmission Line is operational, the Northern Pass Transmission Line will add significantly to the tax base for both the State of New Hampshire and the 31 municipalities in which Northern Pass Transmission Line facilities will be located. Northern Pass Transmission Line property values will contribute approximately \$28 million dollars in new tax revenues annually in the form of local, county, and state education taxes for the towns through which the Northern Pass Transmission Line will pass. Over the 40-year life of the Northern Pass Transmission Line Transmission Service Agreement with Hydro Renewable Energy, Inc., the added tax revenues to the state and local governments could total as much as \$1.1 billion.¹⁹

Probable Effects on Population

By facilitating the construction of the Northern Pass Transmission Line through the WMNF, the Relocation will contribute to positive socioeconomic effects. The Northern Pass Transmission Line will lead to an estimated \$28 million a year in additional tax revenues in New Hampshire, to towns that are struggling today to provide basic services. Those tax revenues can be used for schools, public safety, and to help maintain the infrastructure of New Hampshire. New Hampshire will also see additional positive economic benefits in the form of energy cost reductions from the Northern Pass Transmission Line. In fact, a study by Charles River Associates on the impact of the Northern Pass Transmission Line estimates a wholesale energy cost reduction to New England of \$200-300 million (New Hampshire savings of \$25-30 million).²⁰

¹⁶ Proposed Northern Pass Transmission Project Economic Impact Update: Estimated New Hampshire Jobs During 3 Year Construction Phase, at 4 (Apr. 2011), *available at* http://www.northernpass.us/home/uploaded_file/Job_Impact_Study_April_2011_Final.pdf. The New Hampshire State Building and Construction Trades Council has stated that the Northern Pass Transmission Line will bring “overwhelming economic benefits to New Hampshire and countless local communities,” and that “one of the biggest benefits of the Northern Pass project is its need for in-state labor.... New Hampshire’s loggers, builders, equipment operators and laborers can all fill essential roles in the construction of the transmission line.” Joe Casey, *Ignore the Northern Pass Fear and Rhetoric*, N.H. BUS. REV., Feb. 11, 2011, *available at* <http://www.nhbr.com/February-11-2011/Ignore-the-Northern-Pass-fear-and-rhetoric/>.

¹⁷ Preliminary Economic and Fiscal Impacts of the Proposed Northern Pass Transmission Project, at 3 (Oct. 2010), *available at* http://www.northernpass.us/pdf/NH_Economic_Impact_Study.pdf.

¹⁸ Proposed Northern Pass Transmission Project Economic Impact Update, Estimated New Hampshire Jobs During 3 Year Construction Phase, at 1 (Apr. 2011).

¹⁹ This estimate assumes that tax rates remain at current levels.

²⁰ *LMP and Congestion Impacts of Northern Pass Transmission Project*, at 34 (Dec. 7, 2010).

In addition, the influx of money into New Hampshire generated by new jobs and companies that are drawn to the area for robust and renewable power will help stimulate the economy. As discussed above, the Northern Pass Transmission Line will also improve New Hampshire's and New England's fuel diversity mix and provide a reliable source of low-carbon energy at competitive prices for the long-term, with enough renewable energy to power 1 million homes. In its 2012-2013 Regional Profile, ISO-NE reported that, for 2012, natural gas represented 43% of generating capacity and 52% of energy delivered. This is up sharply from just a few years ago. The same report indicates that, at the start of 2013, most of the 5,000 MWs of proposals for new generation resources were for natural gas generation.²¹ As explained in the Charles River Associates report that was filed by Northern Pass with the Federal Energy Regulatory Commission:

The [Northern Pass Transmission] Project would reduce the reliance on natural gas and so reduce the risk of service interruption to either heating or electric customers. Annually, the [Northern Pass Transmission Line] is expected to free up 24.7 TCF on natural gas to the New England market which will increase reliability in both the power and natural gas markets.²²

The Charles River Associates report also concluded that the Northern Pass Transmission Line will displace less efficient and more polluting gas and oil fired steam generation plants. Construction of the Northern Pass Transmission Line will increase the local tax base and provide approximately 1,200-1,500 jobs during construction. Further evaluation of socioeconomic effects will take place during the NEPA review process.

Environmental Effects

(a) Air Quality

The Relocation is unlikely to have any significant negative impacts on air quality. Though construction will result in some fugitive dust emissions, no significant negative air quality impacts are anticipated. Rather, the Northern Pass Transmission Line will bring clean energy to New Hampshire and New England, thereby substantially decreasing carbon dioxide emissions and other emissions associated with fossil fuel sources. Potential effects on air quality from the Northern Pass Transmission Line and the Relocation together will be further evaluated during the NEPA review process.

(b) Visual Impacts

The Relocated PSNH Line will have 89 transmission structures in the WMNF – 36 fewer than the Existing PSNH Line. As described above, PSNH proposes to use tubular steel monopole structures for the Relocated PSNH Line.

The monopole structures for the Relocated PSNH Line in the WMNF will be approximately two to four feet in diameter at the base, tapering to approximately one to two feet in diameter at the top. Angle structures for the Relocated PSNH Line will be anchored to concrete foundations approximately three to five feet in diameter. The transmission structures will have arms that support

²¹ ISO New England Inc., New England 2012-13 Regional Profile (February 2013).

insulator strings, conductors, and overhead shield wire. Exhibit 6 shows a typical cross section of what the proposed PSNH and Northern Pass structures will look like post construction.

As described above, the structure heights of the Relocated PSNH Line throughout the WMNF will range from 70 feet (1 structure) to 115 feet (1 structure). The majority of the Relocated PSNH Line structures in the WMNF will have heights between 88 and 97 feet. *See* Exhibit 5 (showing the height of all Relocated PSNH Line structures to be constructed on the Existing PSNH SUP ROW and the Existing Private Easements). Exhibit 4 compares an average Existing PSNH Line transmission structure to an average Relocated PSNH Line transmission structure.

The Relocated PSNH Line will be co-located with the Northern Pass Transmission Line. The majority of Relocated PSNH Line structures will be spaced approximately 500 to 700 feet apart; maximum spacing will be approximately 850 feet. Spacing will be at approximately the same distances as the structures associated with the Northern Pass Transmission Line, and as a result will minimize visual impacts. The distance between structures will depend on the terrain and the height of the structures.

Northern Pass has prepared six visual simulations of the Relocated PSNH Line within the WMNF, attached as Exhibit 7. The simulation locations for the Relocated PSNH Line and Northern Pass Transmission Line were selected to convey to the public what the Relocation and Northern Pass Transmission Line will look like from key vantage points and public viewing areas in the WMNF. Members of the public, the project team, the Appalachian Trail Conservancy, and LandWorks (a visual impacts consultant) suggested the locations for these and other simulations located on Northern Pass's website.²³ They selected, among others, locations considered to have local, state, or national significance as scenic or recreational resources and locations within conserved landscapes.

Northern Pass and PSNH are developing a visual impact assessment for the Northern Pass Transmission Line and Relocation which will include an assessment of the visual impact of the Relocated PSNH Line within the WMNF.

Other Environmental Impacts

The Relocation will have no other potential environmental impacts outside of those described in in the Northern Pass Amended SUP Application.

Potential impacts to surface and ground water quality and quantity are discussed in Northern Pass Amended SUP Application Item 17(c). Potential impacts to the control or structural change on any stream or other body of water are discussed in Northern Pass Amended SUP Application Item 17(d). Potential noise impacts are discussed in Northern Pass Amended SUP Application Item 17(e). Potential impacts to the surface of the land are discussed in Northern Pass Amended SUP Application Item 17(f). Probable impacts to fish, plantlife, wildlife, and marine life, including threatened and endangered species are described in Northern Pass Amended SUP Application Item 18(a).

²³ <http://northernpass.us/visual-simulations.htm>

Hazardous Materials

The Relocation will not produce hazardous materials, or require storage of hazardous materials within the WMNF. The Relocation will move and replace the Existing PSNH Line within the WMNF to provide space for the Northern Pass Transmission Line. The Existing PSNH Line structures have been treated with creosote, an EPA-registered pesticide used as a wood preservative for above- and below-ground wood protection treatments, as well as for treating wood in marine environments. Creosote is regulated as a Resource Conservation and Recovery Act (“RCRA”) hazardous waste, but treated wood waste has not been classified as hazardous waste under the federal RCRA program. With the Relocation, disposition of the existing utility structures will be addressed in a manner consistent with all applicable legal requirements. Disassembly of the existing structures, or installation of new facilities, may also require the use of commercially available solvents (*e.g.*, WD-40). All use of such solvents will follow Best Management Practices, as well as state and federal regulations for storage, transport, use, and disposal.