STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

and

STATE OF MAINE
LAND USE PLANNING COMMISSION

IN THE MATTER OF

CENTRAL MAINE POWER COMPANY	)
NEW ENGLAND CLEAN ENERGY CONNECT	)
#L-27625-26-A-N/#L-27625-TG-B-N/	)
#L-27625-2C-C-N/#L-27625-VP-D-N/	)
#L-27625-IW-E-N	)
CENTRAL MAINE POWER COMPANY	)
NEW ENGLAND CLEAN ENERGY CONNECT	)
SITE LAW CERTIFICATION SLC-9	)
Beattie Twp, Lowelltown Twp, Skinner Twp,	)
Appleton Twp, T5 R7 BKP WKR,	)
Hobbstown Twp, Bradstreet Twp,	)
Parlin Pond Twp, West Forks Plt, Moxie Gore,	)
The Forks Plt, Bald Mountain Twp, Concord Twp	)

Pre-Filed Direct Testimony of Glenn S. Poole

February 28, 2019

Glenn S. Poole being duly sworn submits this pre-filed testimony as follows:

I. Executive Summary

Over the past two decades, New England has transformed its electric supply from predominantly heavy oil and coal to natural gas. This transition has resulted in tremendous improvements in electric sector emissions over that time period. There has also been significant additional use of natural gas for residential and commercial heating. However, the infrastructure that supplies gas to New England has not kept up with the increased demand.

Further exacerbating this situation is the fact that the Sable Island gas fields off Nova Scotia that were expected to supply natural gas to New England over the Maritimes and Northeast pipeline have depleted far sooner than was originally expected, which has only served to amplify the problem. The result is that in the winter, gas used for home and commercial heating utilizes much, at times all, of the natural gas pipeline transportation capacity, gas becomes scarce and prices have jumped by factors of 5 or more when cold sets in. This problem is unique to New England – it simply does not occur in any other parts of North America where there are paper mills against which the few remaining mills in Maine compete.

The problem of gas pipeline capacity is not only one of high winter prices. ISO New England ("ISO-NE"), the entity that operates the New England electric markets and transmission grid is concerned that, although there is ample generation capacity in New England, there will not be enough fuel available to sustain grid operation. ISO-NE is concerned that rolling blackouts will be unavoidable and has taken steps at FERC to stave off retirement of some plants that do have secure fuel. These steps come at an additional cost to consumers. ISO-NE has performed fuel security studies, which identify storage-based hydro like that in Quebec linked by transmission to New England as a huge help towards solving this problem

These high winter gas and electric prices have had a devastating effect on Maine ratepayers, especially the Maine paper industry. Several mills have permanently shut down and there are no mills left operating on the Penobscot River where once there were six.

Now, Maine has an opportunity to have a permanent electrical interconnection with the largest hydro-electric system in the world, Hydro Quebec. The one billion dollar cost for the construction of New England Clean Energy Connect ("NECEC") project will be paid for by the ratepayers in Massachusetts, as will the cost of its operation and maintenance. Massachusetts is

willing to pay these amounts in order to satisfy its desire to purchase over 1000 MW of emission free hydro-electric supply.

The result of this purchase and the construction of the NECEC project to deliver this electricity through Maine to Massachusetts will be to lower wholesale electric prices and gas prices in the entire New England region. It will also greatly improve winter fuel security in New England, reducing the likelihood of rolling blackouts.

This is a tremendous opportunity for Maine and its ratepayers and the benefits are substantial. In reviewing the NECEC proposal, therefore, I urge the Department to consider the following items:

1. The cost of the "no action" alternative to Maine energy consumers, and the energy benefits of NECEC operation in balancing costs and benefits of NECEC pursuant to the reasonableness criteria of 38 M.R.S.A. §8480-D(1); 38 M.R.S.A. §8480-D(3); Chapter 315; Chapter 335; Chapter 375 and Chapter 375 §15.

2. New England, including Maine, suffers from a harmful energy status quo. ISO-NE operates the region's electric transmission grid and its wholesale electricity markets. The need for NECEC and its significant benefits therefore tie directly to the serious challenges the New England grid and electric markets face today and for the foreseeable future.

3. While New England's deregulated generation fleet has transitioned substantially to natural gas fired powerplants, New England's highest in the nation reliance on oil has caused Maine entities with oil heat to also transition to natural gas. The result in cold weather when gas heating demand peaks is that virtually no gas is available for power generation in New England. This problem is compounded by the inability in recent years to expand New England's gas

pipeline capacity to access gas from the very low cost Marcellus reserves less than 300 miles from Boston.

4. The shortage of natural gas in winter also is compounded by the recent and pending retirements of nearly 5,000 MW of New England's base load oil, coal and nuclear generation capacity, close to one-sixth of total New England generating capacity, as well as the permanent closure of the Sable Island and Deep Panuke natural gas fields off eastern Canada.

5. All of these factors combine to highly increase the cost of natural gas, and therefore the cost of electricity in winter. Just as importantly, these factors are threatening the very reliability of the electric grid, as ISO-New England has now warned of serious risk of rolling brownouts and blackouts as soon as 2024.

6. These three factors – expensive gas, expensive electricity and the risk of intermittent electricity supply – are extremely harmful to Maine's pulp and paper mills, other manufacturers and other businesses, even beyond the obvious harm to other consumers. Other competitors outside New England don't face these risks and their consequences. These risk and consequences have contributed to the closing of several Maine paper mills.

7. CMP's NECEC directly reduces all three of these risks. It will materially lower the cost of electricity in New England. It will reduce the need for natural gas by producing over 1000 MW of virtually base load power, simultaneously replacing 1000 MW of generation that has retired, making our grid less reliable. Lower gas demand means lower gas and electricity prices as well. It doesn't matter that Maine isn't buying power across NECEC; what matters is that someone else is, and that it substantially increases New England's electricity supply. NECEC increases Maine's fuel security.

II. Introduction and Credentials

My name is Glenn S. Poole of Orrington, Maine. I am an independent consultant testifying on behalf of Intervenor Group 3. I grew up in Monson, Maine, graduated from Monson Academy and then graduated with high honors in 1971 from the University of Maine in Orono with a degree in Electrical Engineering. During college and for a short time after, I worked for Bangor Hydro Electric Company. I then spent 45 years in the pulp and paper business, most of it at the paper mill in Bucksport, Maine. During my time in Bucksport, I participated in or led many projects, including oil, coal, tire derived fuel, biomass and natural gas for power and steam. I took on a corporate role and became Corporate Energy Manager for Verso Corporation (Verso), dealing with Verso mills in Maryland, Minnesota, Wisconsin, Michigan and Maine, and dealing with the electric utilities and Regional Transmission Organizations serving those states. I retired from Verso in December of 2016 and have been consulting for Verso on energy-related matters across the company since.

In my role as Corporate Energy Manager for Verso, my duties included:

- Managing the purchases of all fuels and electricity;
- Managing all sales of energy and capacity;
- Management of all transactions involving Renewable Energy Credits and Regional Greenhouse Gas Initiative allowances;
- Developing energy-related capital investments and major maintenance projects
- Assessing the energy impact of all proposed capital investments;
- Representing Verso before the Federal Energy Regulatory Commission, state legislative bodies, and state regulators;
- Energy risk management and development of hedging strategies; and
- Energy budgeting.

In addition to my direct energy experience working in pulp and paper, I have acquired extensive energy and New England electric grid knowledge through participation in energy advocacy groups and on regional energy committees and boards.

Before I summarize that participation, though, it will be useful to provide some background on organizations that will come up repeatedly in my testimony, the Federal Energy Regulatory Commission (FERC), ISO New England (ISO-NE) and the New England Power Pool (NEPOOL). FERC is an independent federal agency that regulates, among other things, the transmission and wholesale sales of electricity in interstate commerce, as well as electric reliability. ISO-NE is "the independent, not-for-profit company authorized by FERC to perform three critical, complex, interconnected roles for the region spanning Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, and most of Maine."[1] Those roles are grid operation ("coordinate and direct the flow of electricity over the region's high-voltage transmission system"), market administration ("design, run, and oversee the billion-dollar markets that attract a large and diverse mix of participants to buy and sell wholesale electricity at the most competitive prices"), and power system planning ("do the studies, analyses, and planning to make sure New England's electricity needs will be met over the next 10 years").[2]

Finally, NEPOOL is the stakeholder voting organization that advises ISO-NE on all matters relating to New England's competitive wholesale electric market rules and transmission tariff design. Participants include generators, marketers, municipal utilities, transmission utilities, alternative energy providers, and consumers. It is through the NEPOOL stakeholder process that Participants develop positions on matters related to electricity markets and reliability. NEPOOL was voluntarily established in 1971 to coordinate New England's power system. In 1996, after FERC Orders 888 and 889 (which opened the interconnected transmission system owned and

[1] ISO-NE, "Our Three Critical Roles" website (viewed 2.20.19), available at https://www.iso-ne.com/about/what-we-do/three-roles/. ISO-NE's jurisdiction does not include portions of Aroostook County, which are interconnected only to New Brunswick Power in Canada.
[2] ISO NE, "Our Three Critical Roles" website (viewed 2.20.19), available at https://www.iso-ne.com/about/what-we-do/three-roles/.

operated by electric utilities to fair and nondiscriminatory access by independent generators—including Verso and its predecessors), NEPOOL proposed the creation of ISO-NE to independently manage the new open-access transmission system. Today, NEPOOL, ISO-NE, and FERC each play an important role in ensuring that New England has a competitively priced and reliable electricity supply—at least in theory.

With that background, my participation in advocacy groups and on regional committees and boards will make more sense. My advocacy became particularly focused in 1985, when Industrial Energy Consumer Group (IECG) was formed to lower and stabilize Maine energy costs. I served as IECG President or Vice President for many years. During my tenure, IECG participated in several important energy developments including:

- Energy deregulation in Maine (electric utilities divest generator assets);
- The creation of the Regional Greenhouse Gas Initiative;
- Full participation in the New England markets by Demand Response resources;
- Achieving consumer representation in a regional power pool for the first time; and
- Advocacy (still unsuccessful) for increased natural gas pipeline capacity into New England.

I also testified on behalf of IECG before the Maine Public Utilities Commission and the Federal Energy Regulatory Commission in a number of proceedings, including:

- *Re New England Power Pool*, 85 FERC ¶ 61,141 (1998); *Champion International Corporation and Bucksport Energy, LLC v. ISO-New England, Inc., New England Power Pool, and Central Maine Power Company*, 85 FERC ¶ 61,142 (1998) (relating to the appropriate interconnection standards for independent generators);
- *Re Public Utilities Commission, Investigation of Parameters for Exercising Authority Pursuant to Maine Energy Cost Reduction Act, 35 M.R.S.A. Section 1901*, Maine PUC Docket No. 2014-0071 (2015) (relating to the economic benefits that would be derived from construction of an interstate natural gas pipeline);
- *Re Bangor Gas Company, LLC, Request for Approval of Renewal of Multi-Year Rate Plan (35-A M.R.S. §4706)*, Maine PUC Docket No. 2012-00598 (2015) (regarding rate design issues);
- *Re Central Maine Power Company, Request for New Alternative Rate Plan ("ARP 2014")*, Maine PUC Docket No. 2013-00168 (2014) (regarding rate design principles for Central Maine Power);

- *Re Central Maine Power Company and Public Service of New Hampshire, Request for Certificate of Public Convenience and Necessity for Maine Power Reliability Program Consisting of Construction of Approximately 350 miles of 345 kV and 115 kV Transmission Lines,* Maine PUC Docket No. 2008-255 (2016) (regarding appropriate planning standards for electric transmission projects).

I remain an active participant in IECG today, as it continues to advocate for smart energy policy.

I began representing Verso at NEPOOL in 2010. My role expanded over time, and today, as a consultant to Verso, I represent Verso on the Participants Committee, the Markets Committee and the other NEPOOL Technical Committees. The Participants Committee "is NEPOOL's principal governing body, with authority to determine whether the organization supports changes in the ISO-NE Tariff, Market Rules, … or other procedures impacting the operation of the New England grid and the wholesale electric markets in New England … ."[3] The Participants Committee "is contractually tasked to represent NEPOOL's interests in regulatory and legal proceedings."[4] The Markets Committee "is responsible for reviewing and providing initial stakeholder input to ISO-NE and the Participants Committee on all changes to the design and operation of New England's wholesale electric markets."[5] As Verso's representative on these committees, I attend the monthly meetings, evaluate proposed changes to the market rules (whether by ISO-NE or other stakeholders), advocate for Verso's position, and vote accordingly. Currently, and of relevance later in my testimony, the Markets Committee is addressing ISO-NE's "interim" proposals to compensate generators for maintaining fuel inventory on the coldest days, as well as a longer-term proposal to deal with "fuel security."

Through my work with IECG and at NEPOOL, I have acquired a deep understanding of both the New England electricity and natural gas markets. Understanding these markets, and their

[3] NEPOOL, Annual Report 2018, at 28.
[4] NEPOOL, Annual Report 2018, at 29.
[5] NEPOOL, Annual Report 2018, at 30.

effects on reliability and prices, was critical to fulfilling my responsibilities as Corporate Energy Manager at Verso. It continues to be critical as I evaluate how these markets and market rule changes will affect Verso going forward.

In addition to my activities at Verso and through IECG, I was appointed by Governor Baldacci in 2009 to the inaugural Board of Directors of Efficiency Maine Trust and served as its board member representing the interests of industrials until 2013 when my term expired. I was also elected as the Chair of the Energy Resource Committee of the American Forest and Paper Association in January 2011 and served until October 2012.

III. Purpose of Testimony

The purpose of my testimony is to provide expert testimony addressing the energy-related benefits of the New England Clean Energy Connect project ("NECEC") from the perspective of an energy-intensive Maine manufacturer. For this purpose, Verso is just like most other energy consumers, just much larger. Energy benefits relate to the "reasonableness" standard that pervades the Natural Resources Protection Act, the Site Development of Location Act, and the various rules associated with those statutes. A common-sense approach to determining the reasonableness of any action balances the benefits of that action against its costs. In the case before the DEP today, I offer no opinion on the costs of the NECEC (i.e., perceived environmental impacts or harms), because I am not an environmental expert. My purpose is to urge the Department to consider and weigh appropriately the substantial energy benefits that will be delivered by the NECEC when determining whether its environmental costs are reasonable. My testimony relates to the following reasonableness inquiries:

Hearing Topic 1 ("Scenic Character and Existing Uses"):

- 38 M.R.S. §480-D (1) ("no unreasonable interference")
- Ch. 315 ("no unreasonable interference/adverse impact")

- Ch. 375 §14 ("no unreasonable effect")

Hearing Topic 2 ("Wildlife Habitat and Fisheries"):
- 38 M.R.S. §480-D (3) ("no unreasonable harm")
- Ch. 335 ("no unreasonable impact")
- Ch. 375 §15 ("no unreasonable disturbance")

Not constructing the NECEC (the no-action alternative) will perpetuate significant energy-related harm on Maine manufacturers (and all other Maine energy consumers alike) given New England's current energy circumstance. In that regard, my testimony will address the energy costs of not developing the NECEC given its specific purpose and need pursuant to Hearing Topic 3 "Alternatives Analysis."

IV. Energy-Related Costs and Benefits That Must Be Weighed in Making Reasonableness Determinations

a. Background: the Harmful Energy Status Quo in New England

During my time at and after my graduation from the University of Maine, I worked for Bangor Hydro Electric Company (now Emera Maine). This was right at the time NEPOOL was formed, and I attended some of the initial meetings of the NEPOOL committees. I left Bangor Hydro Electric Company in 1972 and started working at the Bucksport, Maine paper mill, owned by St. Regis at the time. Over the next 45 years I worked for the various owners of the mill, which included Champion International, International Paper, and Verso Corporation.

When I started at the Bucksport mill, there was about 25 megawatts ("MW') of generation located at the mill that directly served mill electricity demand. (Often the "use" of electricity is referred to as electricity demand or load.) By 2012, we had increased generation capacity to nearly 300 MW. I was directly involved in three major generation capacity additions, including being the project developer on a 175-MW combined-cycle gas turbine project with cogeneration. This project significantly increased generation at the mill, some of which was used to satisfy mill load,

the remainder being sold to the market by our project co-owner, Bucksport Energy. In the case of each capacity addition, additional on-site generation allowed us to take advantage of energy efficiency opportunities to better use the steam we produced (necessary to make paper) and to decrease our reliance on the region's electric grid. With the addition of the 175-MW gas turbine, significant emission reductions were also realized, as usage of #6 oil and coal decreased to nearly zero.

In 1972, energy was not a significant cost to mill operations. This was because New England generated much of its electricity using #6 fuel oil (called residual fuel oil), which cost only around $3.00 per barrel. Importantly, the cost difference between residual fuel oil in Maine and New England, and elsewhere in the U.S., and around the world was negligible then. Operating in Maine created no competitive disadvantage for the Bucksport mill or other similar mills across the state.

By 1985, though, the price of oil had increased by nearly 10 times, and energy became a far more critical cost to the Bucksport Mill and to all large energy users throughout Maine. With the increased price of oil, regions that relied more extensively on fuels other than oil (like hydro in Pacific Northwest (Bonneville) or Southeast (Tennessee Valley Authority)) developed a significant competitive advantage over more oil-dependent regions, especially New England. This was a contributing factor to our investments in electric generation capacity on-site, and to similar investments at the mills in Rumford, Jay, and Somerset.

In addition to making capital investments, St. Regis and other industrials invested time and money to form the Industrial Energy Consumer Group (IECG) in 1985. Through IECG, Maine manufacturers have advocated for lower energy costs in virtually every available forum, including FERC, ISO-NE, and the Maine Public Utilities Commission.

In the late 1990s, natural gas came to Maine from Nova Scotia and Quebec through two new pipelines. The Maritimes & Northeast Pipeline came down from Sable Island off of Nova Scotia through Maine connecting to existing New England gas infrastructure in Dracut, Massachusetts. The Portland Natural Gas Pipeline came down through Maine from Quebec, joining the Maritimes & Northeast Pipeline in Westbrook, Maine and continuing on to Dracut, Massachusetts as well. These pipelines changed the energy landscape in New England.

Over the next several years, five of the six New England states (the exception was Vermont) restructured their electric industries, removing generation from the vertically integrated electric utility monopoly and subjecting it to competition.[6] More efficient combined-cycle natural gas generators were able to take advantage of increased gas supplies into New England and quickly began out-competing inefficient legacy coal- and oil-fired generators that were constructed many decades earlier.[7] In 2000, natural gas accounted for 15% of the region's electricity generation, while coal and oil contributed a total of 40%; by 2018, natural gas produced 49% of the region's electricity, with coal and oil's combined contribution declining to just 2%.[8]

Besides being less expensive, natural gas is also far cleaner and more efficient than coal and oil, producing fewer air pollutants and more electricity per BTU of fuel input. Thus, as natural gas eroded coal and oil's electric market share, annual emissions fell considerably. From 2001 to 2017, New England annual emissions for sulfur dioxide, nitrogen oxides, and carbon dioxide

[6] ISO NE, "Markets" website (viewed 2.20.19), available at https://www.iso-ne.com/about/key-stats/markets/.
[7] ISO NE, "Resource Mix" website (viewed 2.20.19), available at https://www.iso-ne.com/about/key-stats/resource-mix.
[8] ISO NE, "New England Power Grid 2018-2019 Profile" available at https://www.iso-ne.com/static-assets/documents/2019/01/new_england_power_grid_regional_profile_2018-2019.pdf.

declined by 98%, 74%, and 34%, respectively.[9] If the story ended here, I would not be testifying. Sadly, it does not.

b. The Costs of Natural Gas Pipeline Constraints

For most of the year, New England's natural gas prices are at historically low levels, leading to historically low electricity prices and further emissions reductions due to burning natural gas rather than fuel oil or coal. But winter in New England is a different beast. Because New England produces no natural gas and because the gas fields off Nova Scotia are no longer producing natural gas, New England must import natural gas via a network of interstate pipelines or by tanker ship in the form of liquefied natural gas or LNG. The legacy pipeline network was designed and built long ago for local gas utilities to meet heating demand. Such gas utilities have a legal obligation to serve their customers (backstopped by regulators who ensure cost-recovery), so they are able to buy long-term rights to the space on natural gas pipelines to ensure their ability to serve. In the winter, when temperatures drop, and heating demand rises, gas utilities use up nearly all available pipeline capacity, leaving little to no fuel flowing over the pipelines for the region's new generator fleet—a fleet comprised of competing generators with no legal obligation to serve and no financial backstop to enable the purchase of new pipeline capacity (if it could ever be permitted in New England). To make matters worse, natural gas has become increasingly popular for heating in lieu of oil or propane, though New England remains the most oil-reliant region of country by a wide margin and is primed for even more gas conversions. While demand for natural gas in New England has grown precipitously for heat and electricity, the region's

[9] ISO NE, "New England Power Grid 2018-2019 Profile" available at https://www.iso-ne.com/static-assets/documents/2019/01/new_england_power_grid_regional_profile_2018-2019.pdf.

pipeline capacity has remained largely static, leading to severe wintertime pipeline congestion or constraints. The effects of these constraints manifest predominantly in the electric sector.[10]

Finally, the gas pipeline problem impacts only New England. On the coldest days of the year in other regions of the country such as the Pacific Northwest, the Upper Midwest, and the Southeast, where Maine's chief paper mill competitors are located, natural gas prices barely budge. Each of these regions is served with ample pipeline capacity that brings very cheap natural gas from the Marcellus and Utica regions in Western Pennsylvania and Ohio, the Dakotas, Texas, and the Oklahoma panhandle to their doors. Meanwhile, Maine and the rest of New England cannot get access to the lowest cost gas in the world, only 300 miles away in the prolific Marcellus Shale. Instead, this gas flows west into the Midwest and south into the Southeast where it feeds our competitors.

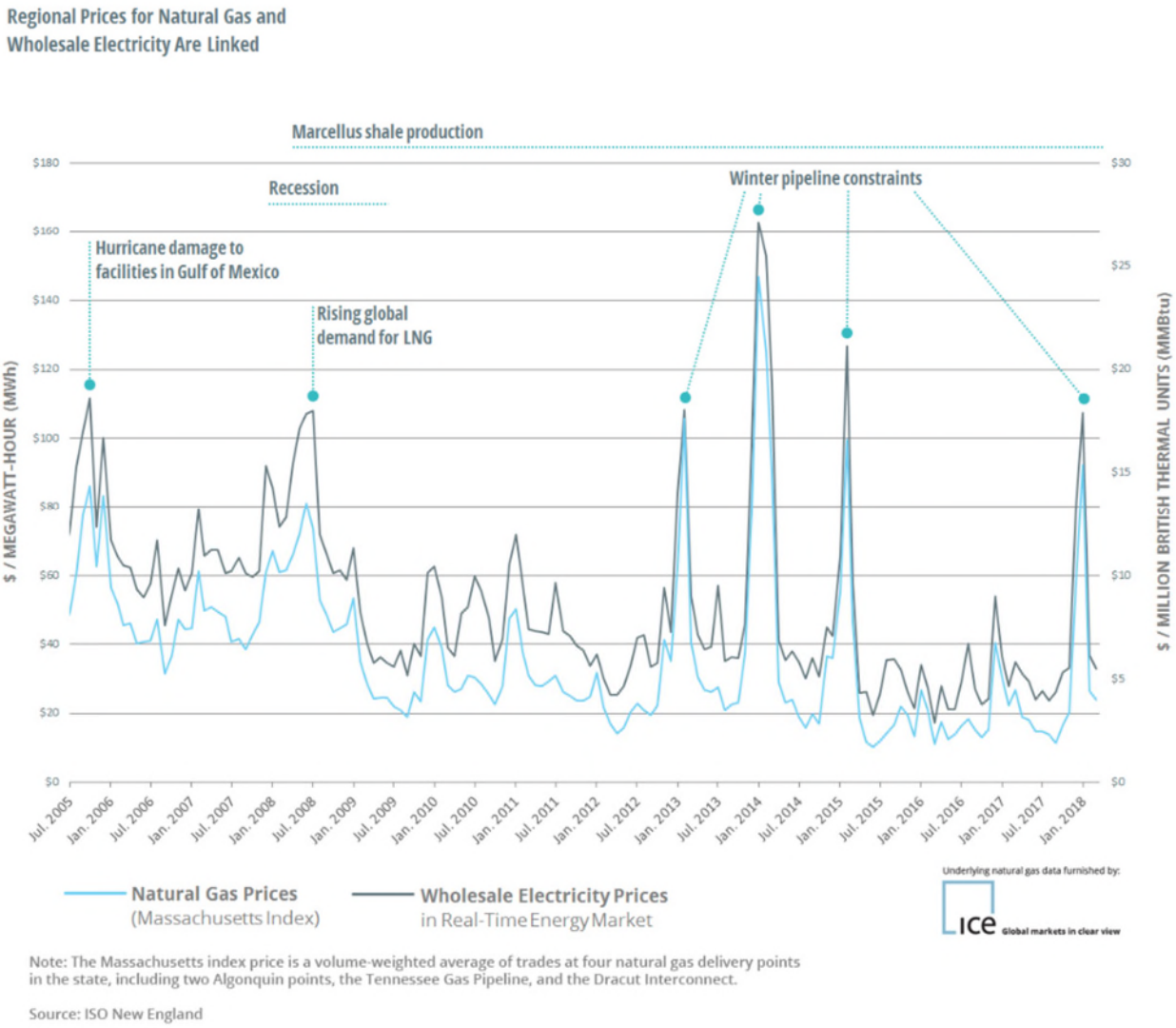
Natural gas pipeline constraints are devastating in myriad ways. They create extreme electric price volatility, pose a serious and growing electric reliability risk, cause increased electric sector emissions, and reduce the electric grid's ability to balance desirable intermittent solar and wind resources. ISO-NE describes each of these harmful effects on its "Natural Gas Infrastructure Constraints" website, attached hereto as Exhibit IG3-1-A.

I'd like to highlight some portions of this website. First, ISO-NE notes that "New England winters are unpredictable." Sophisticated energy consumers like Verso, account for winter risk by hedging, effectively buying winter "insurance". The problem is that insurance is expensive – and the cost of such insurance is directly related to the risks of price volatility. This only further adds to New England's disproportionately high annual energy costs. Even when winter is benign, Maine

[10] This problem is so severe in Western Massachusetts that local gas utilities have had to declare moratoria on new customer conversions and hook-ups.

manufacturers still pay the insurance that their sister mills outside of New England do not. Second, New England's geographic disadvantage (being "at the end of the pipeline") has created an additional electric reliability disadvantage. As I will discuss in more detail below, the lack of reliable natural gas supplies has led to those responsible for ensuring the lights do not go out to raise concerns about their ability to provide reliable electric service. This concern simply does not exist anywhere else in the country.. As long as management perceives a risk, it is real to Verso. When ISO-NE makes statements about New England's relatively more acute risks, it becomes increasingly hard to justify capital investment here. It is bad enough being at the "end of the pipeline" without year-round access to Marcellus Shale. Now, we're apparently at the "end of the transmission line" too with more risk of electric grid failure than our competitors face elsewhere. Finally, if the increasing risk of a "perfect storm" materializes, ISO-NE could be forced to order rolling blackouts. ISO-NE's alarming conclusion is that: "[w]ithout timely action and investment to address the region's fuel-security risk, the region should expect significant energy market price volatility when the gas pipelines are constrained. Plus, the region may soon be forced to take stronger—and likely costly—steps. … As a last resort, the region could have to retain some non-gas-fired generators that would otherwise retire. These may be older, expensive, and higher-emitting—a strategy that runs counter to the New England states' ambitious carbon-reduction goals." We all know that when blackouts are required, residential customers, government facilities, emergency care centers and the like will take precedence over large manufacturing companies.

The following graph shows the correlation between natural gas and electricity prices in New England and the effects of pipeline constraints, which can create the highest prices for electricity and natural gas in the world.



Note: The Massachusetts index price is a volume-weighted average of trades at four natural gas delivery points in the state, including two Algonquin points, the Tennessee Gas Pipeline, and the Dracut Interconnect.

Source: ISO New England

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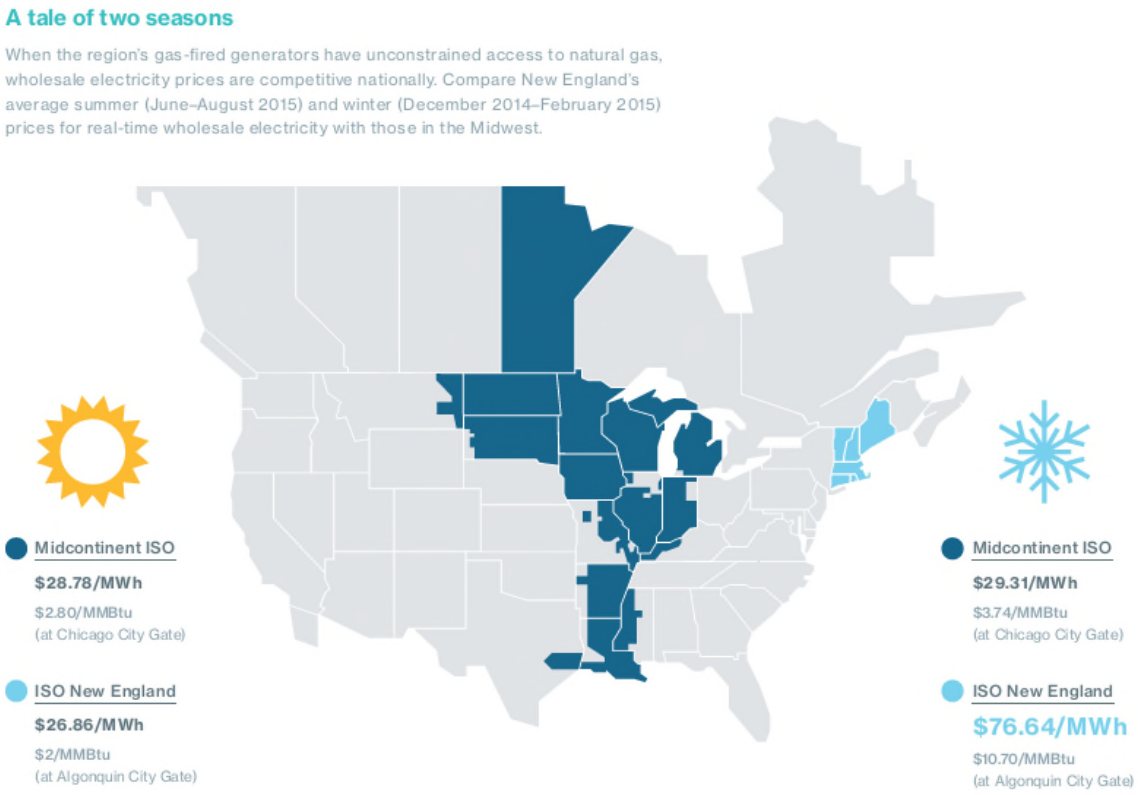
When natural gas pipeline constraints occur, the financial consequences to many Maine manufacturers can be devastating. Beyond our end-of-the-pipeline geographical disadvantage, physics plays a role. For example, simply put, turning wood into paper requires enormous amounts of energy. Even with many projects aimed at improving energy efficiency, high and volatile energy costs have become an increasingly heavy burden for many Maine industrials. Even those mills not

[11] ISO NE, "Markets" website (viewed 2.20.19), available at https://www.iso-ne.com/about/key-stats/markets/.

using natural gas cannot escape the consequences, since the price of natural gas is reflected in the price of electricity they surely use, in enormous quantities.

The problem crystalized in the winter of 2013-14, during the so-called "Polar Vortex," when heating demand for gas drove prices beyond anyone's wildest expectations. For example, as explained by ISO-NE, "gas price spikes during the frigid winter of 2013/2014 (December–February) led to a record-high average wholesale electricity price of $137.59/megawatt-hour (MWh) compared to just $27.58 MWh during the 2015/2016 'winter that wasn't.'"[12] On some cold winter days mills found themselves paying 20 times more for electricity than their sister mills were paying in the Pacific Northwest, the Upper Midwest, and the Southeast. Even in the less severe winter of 2014/2015, the impacts were staggering, as New England's average winter price for electricity tripled the winter price for electricity in the Midwest and everywhere else in the country.

[12] ISO NE, "Natural Gas Infrastructure Constraints," website (viewed February 20, 2018), available at https://www.iso-ne.com/about/regional-electricity-outlook/grid-in-transition-opportunities-and-challenges/natural-gas-infrastructure-constraints.



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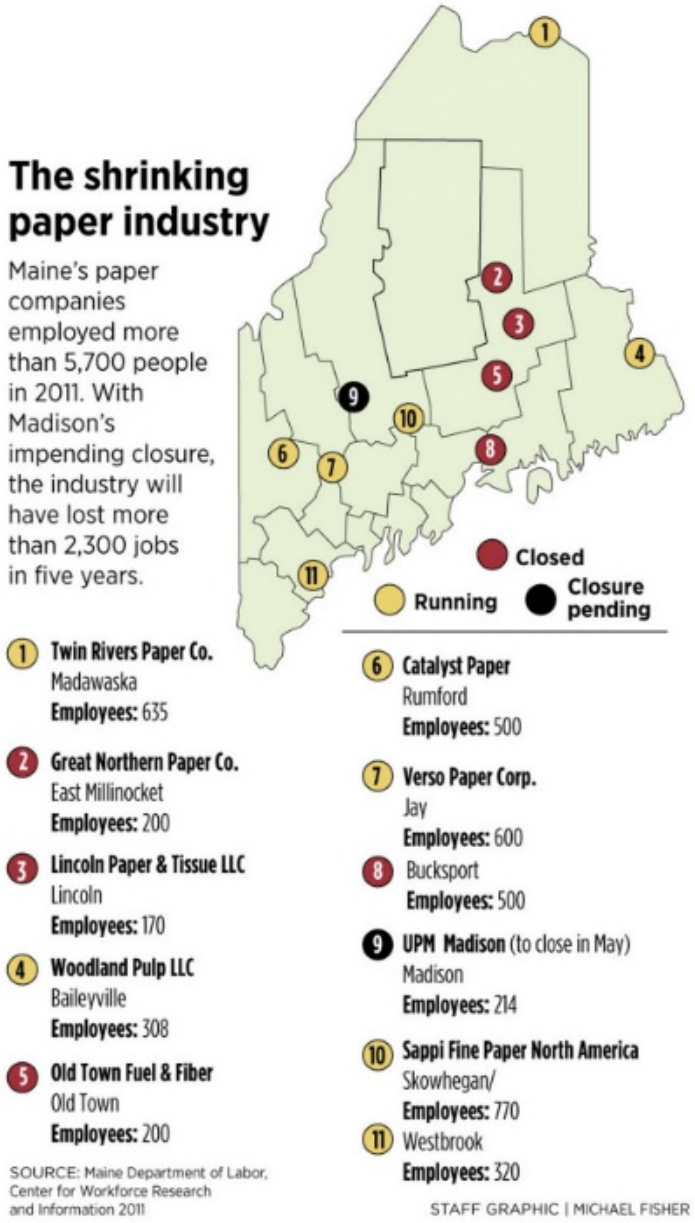
It may be hard for those not familiar with the operation of major manufacturers, such as paper mills, to fully appreciate the financial impact of pipeline constraints. By way of example, the electricity load of major paper mill may be 150 MW, which means in just one day, the mill may consume over 3.5 million kilowatt-hours of electricity. For perspective, that is equivalent to the annual electricity consumption of about 700 typical homes. The difference in prices noted above, between the three-month Polar Vortex winter months and those same months during "the winter that wasn't" is over $35 million worth of unexpected and thus unbudgeted costs borne by a mill.

[13] ISO New England, 2016 Regional Electricity Outlook, at 24.

For Maine industrials trying to budget energy costs, these incredible levels of uncertainty not experienced by competitors operating in any other place in the United States or Canada have made business decisions exceedingly complex. Uncertainty coupled with competitive disadvantage has become a major factor in both investment and operating decisions. Investment decisions are made many years in advance and operating decisions are made weeks in advance, neither of which is compatible with levels of uncertainty in New England's energy markets. To deal with this situation, some Maine mills were forced to idle during all or part of some winter months when either demand was soft (and other mills outside of New England could produce at a lower cost) or energy and other operating costs were expected to exceed product revenue. Idling a capital-intensive operation like a paper mill is an unsustainable approach, as product must be produced to cover all the capital and fixed operating costs. Many mills were not able to survive and ceased operation. Verso ceased operation of its Bucksport mill in December of 2014 and by 2016, all six paper mills that had once operated on the Penobscot River had shut down, including the four that had operated for decades shown in the chart below.[14] In 2016, the Madison, Maine paper mill owned by Madison Paper Industries and employing 214 Mainers closed, noting that energy costs were a major factor.[15]

The mills and other industrials that do continue to operate in Maine are still subject to high natural gas and electric prices and extreme price fluctuations driven by winter weather. This uncertainty is dangerous to an industry where the cost of energy can be as high as 25% of the total cost of production.

[14] Portland Press Herald, "Shutdown of Madison mill is state's fifth in two years," (March 14, 2016).
[15] Portland Press Herald, "Shutdown of Madison mill is state's fifth in two years," (March 14, 2016).



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Of course, it isn't just industrials that are hurt by natural gas pipeline constraints and energy price volatility, but in many respects, industrials serve as the "canary in the coal mine" because they consume so much energy. In fact, all electric and gas customers are subject to these high and

[16] Portland Press Herald, "Shutdown of Madison mill is state's fifth in two years," (March 14, 2016).

fluctuating prices on an almost proportionate basis, but they are typically served under retail contracts that mask wholesale volatility over a period of years. Moreover, because their monthly bills are relatively small, a large percentage increase is more easily overlooked.

The Maine Public Utilities Commission has stated, for example:

> It is estimated that wholesale electricity prices associated with Maine load were $185 million greater in the 2012/13 winter than in the winter of 2011/12, even though the 2012/13 winter was comparatively mild. More than two thirds of that total increase was attributable to just two months: January and February 2013. ISO-NE estimates that New England consumers paid $3 billion more for electricity during December, January and February of 2013-14 than they would have had adequate pipeline capacity from the south existed.[17]

It is worth nothing that the last figure cited applies to New England, of which Maine's demand is only around 9%, so roughly $270 million would be attributable to Maine electricity consumers. The point is that all Maine electric ratepayers were on the hook for over $450 million of excess electric costs caused by insufficient pipeline capacity in just two winters. They are still on the same hook – nothing has changed that would relieve them of this burden.

c. The Imminent New England Fuel Security Crisis

"Fuel security" risk is not merely a topic related to natural gas pipeline constraints, but a looming distinct challenge for all Maine energy consumers. ISO-NE describes the fuel security challenge gripping New England on its "Fuel Security for the Region's Generators" website, attached hereto as Exhibit IG3-1-B. I would like to highlight a few important aspects of that website, because they demonstrate the cost of not approving the NECEC.

[17] *Investigation of Parameters for Exercising Authority Pursuant to the Maine Energy Cost Reduction Act, 35-A M.R.S. §1901*, Order – Phase 1, at 15 (Me. P.U.C. Nov. 13, 2014) (internal citations omitted).

ISO-NE defines fuel security as "ensuring that power plants have or can get the fuel they need to run, particularly in winter" and characterizes fuel security as "the foremost challenge to ensuring a reliable power grid in New England."[18] ISO-NE has become increasingly concerned that, despite sufficient electric generation capacity to meet peak electricity demand, there will be insufficient fuel for that capacity to create electricity. It's like having three cars in your driveway with no gasoline and no way to get gasoline. The challenges are made worse by the fact that generators with the ability to store fuel (e.g., oil, coal, nuclear, liquefied natural gas (LNG)) are rapidly retiring due to economic and environmental pressures. The remaining stored-fuel generators have difficulty, especially in winter, replenishing their fuel stocks due to weather and global market forces. As this is occurring, New England is also rapidly transforming to a system that depends on electricity generated by resources that get their fuel "just-in-time" or whenever it is available (e.g., solar, wind, and pipeline natural gas), which exacerbates the problem. In the winter, at peak demand around 6:30 p.m., the sun is never shining, the wind might not be blowing, and if it's very cold, 100% of the region's natural gas pipeline capacity may be used up for heating.

To begin addressing "fuel security," ISO-NE performed a study, the "Operational Fuel-Security Analysis," in January of 2018. The study examined 23 possible future resource combinations and outage scenarios during winter 2024/2025 to determine whether there would be enough fuel to meet demand. Twenty-two scenarios required some sort of emergency action and/or resulted in reliability criteria violations by ISO-NE. Nineteen scenarios required some level of load shedding, meaning "rolling blackouts or controlled outages that disconnect blocks of customers sequentially." Major variables in the study included resource retirements, LNG availability, oil

[18] ISO NE, "Fuel Security for the Region's Generators" website (viewed 2.20.19), available at https://www.iso-ne.com/about/regional-electricity-outlook/grid-in-transition-opportunities-and-challenges/fuel-security.

tank inventories, imported electricity, and renewable resources. Notably, ISO-NE found "[r]obust levels of imported electricity from neighboring power systems are essential to continued power system reliability."[19] It concluded that:

> A resource mix with higher levels of LNG, imports, and renewables shows less system stress than the reference case. These scenarios, while based on resources dependent on uncontrollable factors—the global LNG market, the coincident winter demands of regions exporting power to New England, and weather—result in fewer hours of emergency actions, depletion of reserves, and load shedding. To achieve these levels of LNG, imports, and renewables, firm contracts for LNG delivery, assurances that electricity imports will be delivered in winter, and aggressive development of renewables, including expansion of the transmission system to import more clean energy from neighboring systems, would be required.[20]

Make no mistake about it – the phrase "expansion of the transmission system to import more clean energy from neighboring systems" means importing more electricity from Hydro Quebec over the NECEC line or any other line that can be built.

In its recent "State of the Grid" address, ISO-NE stated "[w]hile it will bring benefits, the evolving resource mix could also intensify the risk that there may not be enough energy to meet demand on the coldest days in winter. As the fleet shifts away from power plants with stored fuels to resources that depend on weather or just-in-time fuel deliveries, the risk of insufficient energy is likely to expand to other times of the year as well."[21] ISO-NE notes that emerging energy storage technologies will help during short-term emergencies (i.e., lasting several hours), but not for emergencies that last for days or weeks, like a typical cold snap or "Polar Vortex" winter. However, "[n]atural gas pipeline constraints and the variability of renewable resources create a need for "seasonal" energy storage that can provide energy security for extended periods. For the foreseeable future, seasonal storage will be provided by oil and LNG in storage tanks, as well as

[19] ISO-NE, "Operational Fuel-Security Analysis" (January 17, 2018), at 51.
[20] ISO-NE, "Operational Fuel-Security Analysis" (January 17, 2018), at 54 (emphasis added).
[21] ISO-NE, "State of the Grid: 2019," remarks and presentation, at 9 (February 20, 2019) (emphasis added).

imports from resources with onsite energy, such as hydro."[22] This quotation unquestionably refers to Hydro Quebec and additional transmission into New England, which at this point is only provided incrementally by NECEC.

Thus, for the foreseeable future until increased transmission is built to reliably import Canadian hydropower on the coldest days, fuel constraints will continue to sideline thousands of megawatts of natural-gas-fired generation that would otherwise meet electric demands. When that happens, ISO-NE will turn to power plants with stored fuel—specifically coal, oil, and LNG, if available—to meet demand. Emissions from these "stored fuel" generators will be higher than the region would otherwise experience, causing increases in carbon dioxide emissions that fly in the face of regional and Maine policy goals and laws aimed at mitigating climate change. Further, some of these generators have seasonal or annual emission limits which restrict their availability during the times they are needed most, thereby exacerbating the generation shortage and the probability of blackouts.

This is not a hypothetical or future situation; New England is facing this problem today. For example, when the Exelon Generation Company, LLC (Exelon) sought to retire Mystic Units 8 and 9 (fueled by LNG) in Boston Harbor, ISO-NE responded by petitioning FERC for waiver of several rules and to permit ISO-NE to offer Exelon an above-market contract for retention of those units based on ISO-NE's fear that winter grid reliability would be at risk.[23] Ultimately, FERC approved an above-market, cost-of-service agreement to keep Mystic Units 8 and 9 operational

[22] ISO-NE, "State of the Grid: 2019," remarks and presentation, at 17 (February 20, 2019) (emphasis added).
[23] *See* 164 FERC ¶ 61,003, *ISO New England Inc.*, ORDER DENYING WAIVER REQUEST, INSTITUTING SECTION 206 PROCEEDING, AND EXTENDING DEADLINES (July 2, 2018).

through 2024, at a cost of over $400 million, which will be paid for by all New England electricity consumers, including Maine manufacturers and other electricity consumers.[24]

Based on a finding that ISO-NE's Tariff "fails to address specific regional fuel security concerns … that could result in reliability violations as soon as year 2022," FERC also ordered ISO-NE to file interim tariff revisions that provide for further short-term, cost-of-service agreements as well as permanent tariff revisions "to better address regional fuel security concerns."[25]

ISO-NE is indeed proceeding further and further down this path. On December 3, 2018, FERC approved ISO-NE's interim proposal to use an out-of-market mechanism to address fuel security concerns.[26] At recent NEPOOL meetings I have attended, ISO-NE has proposed market rule changes that will provide additional compensation to generators that have fuel stored on cold winter days. One objective is to "[r]educe the likelihood that an (otherwise economic) resource seeks to retire because it is not fully compensated for its winter energy security attributes in the wholesale markets."[27] These proposed rule changes, along with the costs of keeping Mystic Units 8 and 9 operating, would create a cost to be borne by all electricity consumers in New England.

Although it is not large enough to fully resolve New England's fuel security issues, NECEC will help in address the problem without imposing additional costs for its fuel security benefits on New England consumers. Because the energy that will be transmitted over NECEC will be from hydroelectric units, NECEC will provide substantial fuel diversity and security benefits in hours

[24] *See* 165 FERC ¶ 61,267, *Constellation Mystic Power, LLC*, ORDER ACCEPTING AGREEMENT, SUBJECT TO CONDITION, AND DIRECTING BRIEFS (December 20, 2018).
[25] 164 FERC ¶ 61,003.
[26] See 165 FERC ¶ 61,202, ISO New England Inc., ORDER ACCEPTING COMPLIANCE FILING AND REQUIRING INFORMATIONAL FILINGS (December 3, 2018).
[27] ISO-NE, "Interim Compensation Treatment: Details of ISO's Interim Winter Energy Security Proposal" at 3 (February 5, 2019).

during which natural gas supply is constrained, such as peak winter hours. In this manner, it will provide a service similar to that of a small natural gas pipeline, effectively equivalent to the supply of gas necessary to serve a generator with a capacity of 1090 MW.

d. The Energy Benefits of NECEC

While the proposed NECEC project will not be a cure-all, it will significantly help Maine manufacturers deal with energy costs and uncertainty in several ways.

First, it is my opinion that that the NECEC will materially lower electricity prices in Maine. It stands to reason that injecting 1090 MW of firm hydroelectric supply around the clock for 20 years will depress electricity prices in Maine. The New England grid currently has approximately 31,000 MW of installed generation capacity. On an energy basis, the NECEC would provide 9,400 GWh/year to Massachusetts via a connection to the regional grid in Lewiston, Maine. This represents about 7.5% of the amount of New England's electricity demand. Just by virtue of its size and certain price certainty, NECEC will benefit Maine electric (and natural gas) consumers.

My opinion is shared by virtually every consultant that has examined this issue. For example, I have also reviewed reports by Daymark Energy Advisors ("Daymark") and London Economics International ("LEI") submitted as part of the Maine Public Utilities Commission's proceeding to determine whether to grant a "certificate of public convenient and necessity" to NECEC.[28]

In its report, Daymark calculated that the energy associated with the contract between HQ and the Massachusetts utilities would provide average annual benefits to Maine customers over

[28] Central Maine Power Company, Request for Approval of CPCN for the New England Clean Energy Connect Consisting of the Construction of a 1,200 MW HVDC Transmission Line from the Québec-Maine Border to Lewiston (NECEC) and Related Network Upgrades, Docket No. 2017-00232.

the 20 year contract of approximately $40 million, providing a net present value of energy market savings to Maine customers of approximately $454 million.[29] This would translate into an average price reduction of $3.38/MWh.[30] When the potential benefits of the uncommitted portion of the line are considered, the benefits to Maine consumers rise to $44 million per year (net present value $496 million, an average price reduction of $3.70/MWh.[31]

The Maine Public Utilities Commission retained LEI to prepare an independent analysis of the wholesale electricity market impacts of the NECEC ("LEI Report").[32] LEI "estimates that NECEC would provide Maine $346 million (in 2023 dollars) in wholesale electricity market benefits over the first 15 years of operation (2023-2037)."[33] Of the $346 million, LEI estimates that "$122 million is expected to come from wholesale energy market savings (average of $14 million per year in nominal dollars)."[34] I have no reason to doubt the conclusions of Daymark, but to err on the side of caution I will discuss the more conservative findings of LEI.

Again, LEI estimates about $14 million dollars in wholesale electricity savings per year for Maine consumers. The savings predicted by LEI is caused by price suppression, a phenomenon that can be explained by the construct and dynamics of the New England wholesale electricity market. If permitted to grossly oversimplify, let me try to explain.

Maine is part of a regional wholesale electricity market administered by ISO-NE. Wholesale electricity prices are one large component of the retail price that consumers like Verso

[29] Daniel E. Peaco, Douglas A. Smith and Jeffrey D. Bower, NECEC Transmission Project: Benefits to Maine Ratepayers – Quantitative & Qualitative Benefits (September 27, 2017) at p. 11, included as Exhibit 5 to CMP's initial filing in Maine PUC Docket No. 2017-00232 (the "Daymark Report").
[30] Daymark Report, at 11.
[31] Daymark Report, at 11.
[32] London Economics, *Independent Analysis of Electricity Market and Macroeconomic Benefits of the New England Clean Energy Connect Project*, public version (May 21, 2018) ("LEI Report").
[33] LEI Report, at 18.
[34] LEI Report, at 18.

pay for electricity. In the ISO-NE energy market, electricity generators compete each day to meet the region's demand. The generators bid (based primarily on their fuel costs) a price at which they would be willing to produce a certain quantity of electricity. ISO-NE collects the bids and stacks them up from lowest- to highest-cost, forming the supply "bid stack." Subject to certain constraints, ISO-NE dispatches generators from the bid stack in least-cost order until regional electricity demand has been met. The bid price of the last generator needed to meet demand, the marginal generator, sets the market-clearing price that all generators dispatched by ISO-NE receive for their output. The generators whose bids bid were too high, and thus were not dispatched, do not operate and receive no compensation. The generators whose bids were low, some as low as zero (or even negative), earn the differential between their bid and the market-clearing price as revenue.

The 1,090 MW of Hydro Quebec generation delivered into Maine over the NECEC will bid into the bid stack at $0/MWh. Bidding at zero, and being a price-taker, is the only way that the NECEC can ensure that it is selected by ISO-NE to be dispatched in every hour of every day throughout the year and therefore satisfy its contractual obligation to deliver energy to Massachusetts. This conclusion is supported by LEI, which states:

> Pursuant to Avangrid's commitment under the MA RFP, LEI assumed that NECEC delivers energy around the clock, totaling [redacted] GWh per year (spread evenly across all hours). LEI also assumed that the shippers on NECEC would offer as price takers in the wholesale energy market in order to fulfill their contractual obligations to Massachusetts. By virtue of these energy sales, other more expensive generation resources will not be dispatched and consequently, the market clearing price for energy (i.e., Locational Marginal Prices ("LMPs")) will decline ... .[35]

The energy delivered via the NECEC will displace electricity that would otherwise be supplied by higher-cost generators that must account for costs of fuel such as natural gas, oil, coal, or biomass. In every hour that this occurs, the market clearing price for electricity will be lowered by some

[35] LEI Report, at 18.

amount, depending on the marginal generator. Indeed, the energy delivered via the NECEC will displace the highest cost unit in every hour that it operates, lowering the market clearing price from the price bid by the displaced unit to the price bid by the next highest priced bidder not displaced by energy from the NECEC. Because the market clearing price is paid to all successful bidders, regardless of the price that they themselves bid, this represents a price reduction for every kilowatt hour sold in such hours.

This price suppression is well-timed and very important for Maine manufacturers. It will help level the playing field, as we compete with others across the U.S. While the extent of the price suppression is difficult to predict, there should be no doubt that it will occur. LEI's estimate is more conservative than Daymark's and well within the range of reason in my opinion.

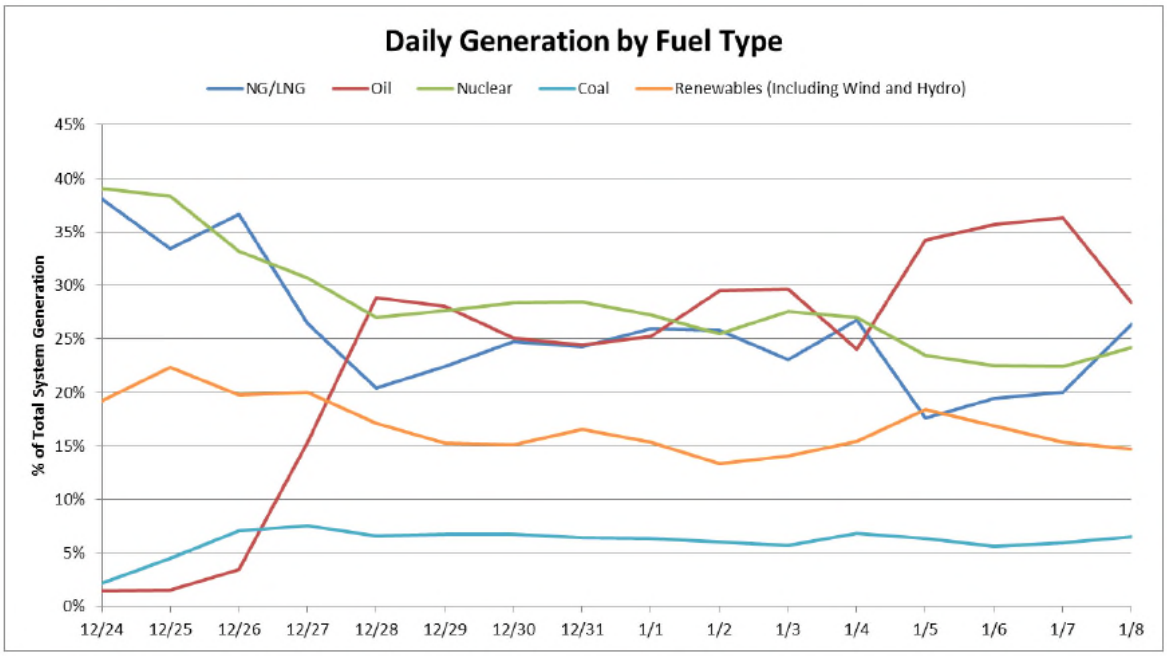
Further, beyond this direct electricity savings, for most of the year, the NECEC's incremental energy will displace natural gas on the margin. Natural-gas-fired generators set the real-time electricity price about 70% of the time.[36] 1,090 MW of hydro will thus displace one or more natural gas generators on the margin about 70% of the time. Those displaced generators will not be dispatched or consume gas, so demand for natural gas will decrease, which will alleviate pipeline constraints and reduce the price of gas transportation. Industrials who consume gas directly for their processes will benefit from the indirect price suppression of natural gas prices.

In the winter, when heating demand is so high that natural gas generators cannot operate due to pipeline constraints, the 1,090 MW of hydro will displace high-cost coal- or oil-fired generators, leading to electricity price suppression and substantial emissions savings. This will create the additional benefit of conserving storable fuels for extreme cold snaps, thus improving

[36] ISO NE, "Markets" website (viewed 2.20.19), available at https://www.iso-ne.com/about/key-stats/markets/.

regional reliability and reducing fuel security risk. Consider what happened during the severe cold snap experienced from about December 26, 2018 through January 8, 2018.

Daily Generation by Fuel Type (Percent of total)



[37]

Coal and oil generation jumped from about 2% to over 40% at times and over 30% for a 13-day period. Natural gas generation declined to under 20% at times and about 25% during the same 13-day period. During this stretch, New England's usable fuel oil stores were depleted from 68% to 19% in just eight days.[38] As noted by ISO NE, "[a]s gas became uneconomic, the entire season's oil supply rapidly depleted" and "[w]ith extended days of burning oil, several resources either had concerns about hitting federal and/or state emissions limitations or were impacted by emissions limitations." What would have happened if New England experienced just two or three more days

[37] ISO New England, "Cold Weather Operations: December 24, 2017 – January 8, 2018," slide 12 (January 16, 2018).
[38] ISO New England, "Cold Weather Operations: December 24, 2017 – January 8, 2018," slide 21 (January 16, 2018).

of frigid weather? The NECEC provides an additional level of insurance for Maine manufacturers—at no cost to us—if the next cold snap lasts longer than expected.

LEI, to some extent, has attempted to value this insurance. Its base price suppression calculation excludes extremes. To capture the potential insurance value that NECEC could provide LEI ran its market model for actual periods during which New England suffered extreme weather condition with and without NECEC.[39] LEI concluded that NECEC could have resulted, for instance, in $6.0 million in wholesale energy market savings for Maine between the five-day period from January 24-28, 2014, representing a 12% reduction in wholesale energy market costs during that period.[40] It performed a similar analysis for an extreme summer period, and found that NECEC could provide $4.3 million in wholesale energy market savings during such an event.[41]

In summary, the energy-related benefits of the NECEC line include the following:

- Price suppression and increased certainty in the energy market
- Price suppression and increased certainty in the natural gas market
- Reduced fuel security risk and emissions associated with oil- and coal-fired resources in winter

If the NECEC is not built, the benefits outlined above will not be realized. It also will send a message to industrials and others that, when the State of Maine had a chance to do something to help lower electric and natural gas prices and decrease the risk of the Maine business climate, it chose not to. The NECEC presents as opportunity to send a very different, and positive, message about Maine.

[39] LEI Report, at 11-12.
[40] LEI Report, at 12.
[41] LEI Report, at 12.

Dated at Orrington, Maine this 28th day of February, 2019

by: Glenn S Poole
Glenn S. Poole

State of Maine
Penobscot, ss

The aforenamed Glenn S. Poole did personally appear before me and made oath as to the truth of the foregoing pre-filed testimony.

Andrew Landry
Attorney at Law
Bar Number 3589