**UNITED STATES OF AMERICA**
**BEFORE THE**
**UNITED STATES INTERNATIONAL TRADE COMMISSION**

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| **Renewable Electricity: Potential** | **)** | |
| **Economic Effects of Increased** | **)** | **Investigation No. 332-574** |
| **Commitments in Massachusetts** | **)** | |

# COMMENTS OF WIRES

WIRES[1] respectfully submits these comments to the United States International Trade Commission (USITC) investigation of New England and Massachusetts strategies to increase renewable energy and the impact of renewable electricity imports.

WIRES submits these relevant case studies which may provide insights into the potential economic effects of inter-regional transfers of renewable energy. We appreciate the opportunity to submit comments regarding the role of the high voltage transmission grid and the importance of regional interconnections in the integration of high levels of renewable energy resources.

## I. COMMUNICATIONS

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## II. BACKGROUND

On January 20, 2020 the House Committee on Ways and Means requested the USITC "conduct an investigation and prepare a report under section 332(g) of the Tariff Act of 1930 regarding the potential economic effects of increased renewable energy commitments in New England and Massachusetts and the role of renewable electricity imports in meeting these commitments."[2]

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[1] WIRES is an international non-profit coalition of investor-, publicly-, and cooperatively-owned electric transmission providers and developers, transmission customers including renewable energy developers, service and technology companies, construction firms, and regional grid organizations, formed in 2006 to promote investment in electric transmission through development and dissemination of information about the Nation's need for a stronger, well-planned, and environmentally beneficial high-voltage transmission system. This filing is supported by the full supporting members of WIRES but does not necessarily reflect the views of the RTO/ISO associate members of WIRES. Information about WIRES' Members, core principles, and activities is available at www.wiresgroup.com .

[2] Letter Richard E Neal, Chair House Committee on Ways and Means to The Honorable David Johanson, Chairman, U.S. International Trade Commission, dated January 20, 2020.

WIRES' vision is for "a robust and effective twenty-first century, high-voltage electric transmission system in North America" and our mission includes promoting "robust and effective transmission solutions to economic, environmental, and reliability challenges." To that end, we have supported landmark studies on the benefits of transmission and its vital role in enabling the integration of renewable energy. We urge USITC to consider this work in its investigation.

## III. DISCUSSION

### A. Electricity Market in New England

The Commonwealth of Massachusetts is part of the broader New England electricity market. That market is highly integrated, which among other things allows for electricity to be generated and transmitted across the region for the benefits of customers in the six New England states. ISO New England (ISO-NE) is the independent operator of the regional power grid and the regional electricity market. ISO-NE operates the regional electric system on a 24-hour, seven-day-a-week basis, administers the region's electricity market, and oversees planning for the New England transmission system.

There is no doubt that Massachusetts and, more broadly, New England are in the midst of a rapid transition toward a clean-energy future. Over the last two decades, New England's electricity sector has made a significant contribution to emissions reductions in the region, a direct result of billions of dollars of private investment in transmission and efficient, low-emitting power resources. Air emissions from New England generators have fallen dramatically over the last two decades: from 2001 to 2017, annual emissions for sulfur dioxide, nitrogen oxides, and carbon dioxide declined by 98%, 74%, and 34%, respectively.[3] In Massachusetts, greenhouse gas emissions decreased by 21% since 1990.[4]

Despite the enormous progress to date, state climate goals will require continued progress. By midcentury, every state in New England aims to cut economy-wide greenhouse gas emissions by at least 80% over 1990 levels. Massachusetts has established a 2050 statewide emissions limit of net zero greenhouse gas emissions. Meeting these goals will require a massive buildout of clean energy resources - replacing fossil generation with low-carbon, clean energy, including onshore wind, offshore wind, solar, and hydro, building new infrastructure (e.g. storage) – and building transmission essential to deliver the output.

### B. The Grid- an International Strategic Asset

The electric grid can serve as a strategic international asset. Over fifty years ago the value of strong interconnections to Canada in continental energy security and resilience was recognized. Increasingly the importance of such interconnections for meeting state and regional goals for renewable energy is also being recognized. In 2018, WIRES submitted comments to the Federal Energy Regulatory Commission (FERC) regarding grid resilience in Regional Transmission Organizations and Independent System Operations. Therein WIRES noted:

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[3] See https://www.iso-ne.com/about/key-stats/air-emissions.

[4] See https://brattlefiles.blob.core.windows.net/files/17233_achieving_80_percent_ghg_reduction_in_new_england_by_20150_september_2019.pdf.

> "As far back as the 1965 blackout that affected 30 million customers in the eastern United States and Canada, the recommendation has been to move toward more connected systems. The official report on the 1965 blackout states, "Isolated systems are not well adapted to modern needs either for purposes of economy or service" and recommended "… an acceleration of the present trend toward ***stronger transmission networks within each system and stronger interconnections between systems*** in order to achieve more reliable service at the lowest possible cost."[5]
>
> "The 1965 blackout was an illustration of the lack of interconnectivity, but following the blackout, the **transmission capacity was increased within and between New England, New York, and the mid-Atlantic regions, greatly improving the power system's reliability and resilience.**"[6]

Investment in the transmission grid produces significant economic benefits and as the USITC undertakes a quantitative analysis of the potential economic effects of reaching Massachusetts' goals and commitments for renewable electricity sourcing, WIRES encourages the USITC to take a broad view of the economic impacts of transmission networks and interconnections.

In 2011, WIRES commissioned a report that examined transmission infrastructure investments in the United States and Canada through 2030 and the associated employment and economic benefits.[7] In that report, the authors determined that "**building a truly 21st Century electric transmission grid represents a major potential source of job creation over and above the long-term economic and reliability benefits of a more robust grid**. While perhaps obvious, it is a matter worth emphasizing. Transmission is the 'great enabler' of competition and new technologies, and, by integrating generation and load, it creates wealth and enhances productivity. But even the simple act of constructing an adequate power system creates and sustains employment."

That report estimated the benefits attributable to transmission investment in the US and Canada.[8] The analysis showed U.S.-wide transmission investment would create $30 billion to $40 billion in annual economic activity (sales and resales of goods and services) and support 150,000 to 200,000 full-time jobs ("full-time equivalent" or "FTE" jobs) each year over this 20 year period. Canadian transmission investments through 2030 would average C$5 billion annually and support between 20,000 and 50,000 fulltime jobs annually.

As explored in the 2013 WIRES report "The Benefits of Electric Transmission," traditional approaches to estimating the benefits of transmission interconnections were largely based on the fuel savings which would result. In that report[9] additional cost savings, reliability savings, deferred generation capacity investments, increased market competition and other benefits are identified.

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[5] "Recognizing the Role of Transmission in Electric System Resilience" by The Brattle Group, May 9, 2018; an attachment to WIRES comment on FERC Docket No. AD18-7-000 (Grid Resilience in Regional Transmission Organizations and Independent System Operators) submitted May 9, 2018 quoting the Federal Power Commission, "Report to the President on the Power Failure in the Northeastern United States and the Province of Ontario on November 9-10, 1965," December 6, 1965. p. 43 (emphasis added).

[6] Ibid, page 10, emphasis added.

[7] "Employment and Economic Benefits of Transmission Infrastructure Investment in the U.S. and Canada", prepared by Pfeifenberger, Johannes and Delphine Hou for WIRES, May 2011.

[8] Ibid page i.

[9] See Judy Chang, Johannes Pfeifenberger, J. Michael Hagerty, The Benefits of Electric Transmission: Identifying and Analyzing the Value of Investments, Prepared by The Brattle Group for WIRES, July

This report provides additional examples[10] of studying economic impacts of major transmission infrastructure using a "more fully articulated set of transmission benefits". These examples show that the traditionally estimated production cost savings are only a portion of the total benefits, that the types and relative importance of other benefits are project-specific, and that the transmission benefits considered would vary by RTO.[11]

Since that report was prepared, evaluating the comprehensive benefits of all grid services has become even more important considering the importance of transmission in achieving public policy objectives and the development of new technologies such as grid-connected energy storage.

To address industry changes since the 2013 report on the benefits of transmission, WIRES commissioned a report[12] (the ScottMadden report) to conduct a region-by-region assessment of challenges posed by changing energy resources and growing preferences for renewables. It examined the transmission implications of clean energy targets, increasing electrification, and the need for a more resilient North American electric power system. Broadly, this report found that transmission expansion to create a larger grid footprint provides advantages for both integration of all types of generation and resilience. With respect to New England, the report found that ambitious clean energy goals in the region create opportunities for increased electricity imports from Canada. It would also increase resilience, particularly during extreme cold weather events when gas used for electricity generation may be constrained.[13]

### C. Example of Benefits of Cross-Border Trade and Transmission Development

The Notice of investigation and scheduling of a public hearing asks for relevant case studies that provide insights into the potential economic effects of imports of hydroelectricity. WIRES offers the following four case studies from both North America and Europe to inform the ITC investigation.

First, it is important to note that there are multiple existing transmission connections between New England and Canada and that these produce benefits for customers throughout New England. Electricity imports flow from Canada into Vermont, Massachusetts and Maine. These connections interconnect the regions and facilitate the purchase and sale of electricity with neighboring control areas - Hydro Québec and New Brunswick. Under normal circumstances, New England is a net-importer of power from Canada - in 2019, about 75% of net imports into New England were from the Canadian provinces.[14] These imports allow the delivery of electricity at a lower cost by displacing more-expensive native generation and thus New England customers benefit from lower overall costs than using only native supply.

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2013, Table ES-1, p. v
https://cleanenergygrid.org/uploads/WIRES%20Brattle%20Rpt%20Benefits%20Transmission%20July%202013.pdf
[10] Ibid page 8.
[11] Ibid page 30.
[12] "Informing the Transmission Discussion, A Look at Renewables Integration and Resilience Issues for Power Transmission in Selected Regions of the United States", ScottMadden, January, 2020 https://wiresgroup.com/wp-content/uploads/2020/01/ScottMadden_WIRES_Informing-the-Transmission-Discussion_2020_0113_FINAL.pdf
[13] Ibid Regional Transmission Summary – ISO-New England, Page 4 and Regional Transmission Summary – ISO-New York ISO, Page 5.
[14] ISO-NE 2019 Annual Markets Report at page 10. See https://www.iso-ne.com/static-assets/documents/2020/05/2019-annual-markets-report.pdf.

Second, researchers at MIT's Center for Energy and Environmental Policy Research recently examined the role of Canadian hydropower in helping to meet state decarbonization goals in the Northeastern U.S. (including New York).[15] Generally, the authors found that increased transmission ties between Canada and the Northeastern U.S. would produce significant value for each region. More specifically the research finds that, in a low-carbon future, shifting utilization of existing hydro and transmission assets toward a two-way trading of electricity to balance intermittent U.S. wind and solar generation reduces power system cost by 5-6% depending on the level of decarbonization. This envisions exports from Canada during periods of renewable scarcity in the Northeast (drawing down reservoir levels in Quebec) and Canadian imports of energy during periods of relatively high renewable output in the Northeast (leaving Quebec reservoirs to recharge). The MIT researchers also found that state goals for zero-emission electricity in New England and New York will be achieved at a lower cost if transmission with Quebec is expanded. The authors found that new transmission delivers electricity cost savings for customers at levels of significant decarbonization. Additional transmission ties between Canada and the Northeast will reduce power system costs across New England, New York, and Quebec in various deep decarbonization scenarios.

Third, a landmark study by MISO[16] shows the impact on the Midwest of new hydro generation in Manitoba, Canada, combined with a new 500 kV transmission interconnection from Manitoba to Minnesota.[17] The benefits cited included:

- Desirable interaction between hydro generation in Manitoba and wind power in northern MISO (hydro smooths out wind power variations)
- Additional low-variable cost energy from Manitoba reduces market price for energy (Load Cost Savings (2027): $183-$1302 Million/year)
- High cost generators in MISO run less often and use less fuel (Production Cost Savings 2027): $227-$455 Million/year)

To put these projected economic benefits in perspective, the total estimated cost of the U. S. portion of the new 500 kV interconnection, the Great Northern Transmission Line, was on the order of $700 million (2013 dollars).[18]

The MISO study illustrated how innovative approaches at a RTO, Canadian investments in new hydropower resources, and both Canadian and U.S. investment in transmission infrastructure could provide multiple benefits to the RTO footprint: access to low cost Canadian hydro renewable energy, access to Canadian hydro reservoir energy storage and access to fast acting energy resources (which help the RTO compensate for abrupt changes in the output of renewable energy resources in its balancing area). In general, these types of benefits are relevant to some of the challenges being

[15] See: http://ceepr.mit.edu/files/papers/2020-003-Brief.pdf.
[16] Study available at:
https://cdn.misoenergy.org/Manitoba%20Hydro%20Wind%20Synergy%20Study%20Final%20Report117083.pdf
[17] Slide 7, Panel on "Thinking About the Grid as a Strategic Asset, An Enabler, and Problem Solver" with speakers including D. Prowse, Manitoba Hydro on "Cross Border Trade."
https://www.youtube.com/watch?v=YEeIZG8ZpRQ
[18] Page 3, FERC ruling for Midcontinent Independent System Operator, Inc. and ALLETE, Inc.; Docket No. ER16-118-000, ORDER ON TRANSMISSION RATE INCENTIVES, (Issued December 17, 2015).
https://www.greatnortherntransmissionline.com/assets/documents/ALJ_CNOrder_20150316_forweb.pdf

addressed by the New England and Massachusetts strategies to increase renewable energy and reduce CO2 emissions.

Finally, the ScottMadden Report studied European transmission development in response to greater development of renewable resources, which may be a view into the future in North America. That report notes that Europe has increased transmission interconnections to integrate a variety of renewable energy sources and has mandated increasingly strong international interconnections to facilitate economical energy transfers and the growth of renewables: Europe has been expanding its transmission grid to aid in integrating hydro, offshore wind, and onshore wind as it seeks to meet European Union power sector emissions targets.[19]

The ScottMadden report also identified energy storage as one of the key developments in the electric industry transformation and noted the energy storage implications of increased cross-border electricity trade with Canada, which has massive energy storage in the form of hydro reservoir storage. Furthermore, developing the transmission grid to include all renewable resources, including access to fast acting energy resources such as hydro helps compensate for abrupt changes in the output of more intermittent renewable energy resources in any regional balancing area.

Europeans have recognized the benefits of connecting hydro-rich areas with other areas with a very different resource mix. For example, the Norwegian Centre for Environmental Design of Renewable Energy has stated[20] that: "the increase in intermittent electricity production from wind and solar power has shown that the power system will have a growing demand for flexibility and energy storage… by 2050, the need for storage in West-Central Europe will reach about 23 TWh in the month with lowest wind and solar power production… If Europe were to buy batteries (like Tesla Power Wall) to reach a household energy storage comparable to the energy content of Norway's largest reservoir Blåsjø (7.8 TWh), Europe would have to invest 40-50 trillion NOK [4-5 trillion USD]…". To put energy storage quantities in a North American context: models that studied pathways to achieve an 80% reduction of greenhouse gas emissions by 2050 in the US Northeast assumed that 240 GWh of storage (30 GW of 8 hour storage) would be needed.[21] While large compared to the amount of grid-connected battery storage in the world,[22] this amount pales in comparison to the total amount of reservoir energy storage in Quebec (177 TWh).[23]

EU interconnections that increase cross-border transmission capacities in Europe deepen market integration, strengthen security of supply and ensure the necessary infrastructure will be in

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[19] ScottMadden Report, Interregional Considerations at page 10.

[20] Page 7, "HydroBalance Roadmap for large-scale balancing and energy storage from Norwegian hydropower; Opportunities, challenges and needs until 2050" available at: https://www.researchgate.net/publication/327509568_HydroBalance_-_Roadmap_for_large-scale_balancing_and_energy_storage_from_Norwegian_hydropower

[21] Table 7, "Deep Decarbonization in the Northeastern United States and Expanded Coordination with Hydro-Québec
April 2018"; https://irp-cdn.multiscreensite.com/be6d1d56/files/uploaded/2018.04.05-Northeast-Deep-Decarbonization-Pathways-Study-Final.pdf

[22] The total existing Global Electro-chemical and Li-Ion Battery bulk grid storage is 3.9 GWhr according to the DOE Global Energy Storage Database http://energystorageexchange.org/ accessed 2019-02-01.

[23] Table A2.2 E, page 36 "A Decarbonized Northeast Electricity Sector: The Value of Regional Integration ", Institut De L'Energie Trottier, http://energie.hec.ca/wp-content/uploads/2018/06/ScopingStudy_NortheastHydroModelling_13june2018.pdf

place to underpin the achievement of the renewable energy target for 2030,[24] which are similar to goals for the U. S. Northeast.

## III. CONCLUSION

We extend our thanks to the USITC for this opportunity to provide input to the investigation of New England and Massachusetts strategies to increase renewable energy including the impact of renewable electricity imports. WIRES envisions a robust and effective twenty-first century, high-voltage electric transmission system in North America that will make critical contributions to economic growth, technological advancement, consumer benefits and the transition to a low-carbon electricity system. We urge the USITC to avail itself of the studies and educational forums which WIRES has supported to further that vision.

In our work, we are continually reminded of the challenges and opportunities of a changing resource mix, of uncertainties in the increasing electrification of our economy, of the impact of policies for increased renewables, and we are also well aware of the difficulties typically encountered in the timely planning, cost allocating, routing, permitting and building of major electrification infrastructure within the U.S. When an international boundary is crossed and the processes to ensure prudency, meet environmental regulations, conform to government policies and align with political objectives at both federal, state, regional and local levels in two nations are involved, it is more than doubly challenging. But studies, European experience and our own experience in North America have shown that enhanced infrastructure to facilitate increased cross-border electricity trade is a key strategy to the implementation of increasing levels of wind and solar energy resources.

We look forward to the USITC analysis of New England and Massachusetts strategies to increase renewable energy and the impact of renewable electricity imports.

Respectfully submitted,

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[24] Page 14, European Commission, Communication on Strengthening Europe's Energy Networks, COM (2017) 718 (Nov. 23, 2017) https://ec.europa.eu/energy/sites/ener/files/documents/communication_on_infrastructure_17.pdf