Honorable Michelle L. Phillips
Secretary to the Commission
New York State Public Service Commission
Empire State Plaza, Agency Building 3
Albany, NY 12223-1350

RE: *Proceeding on Motion of the Commission to Implement Transmission Planning Pursuant to the Accelerated Renewable Energy Growth and Community Benefit Act*,
Case Number 20-E-0197

Dear Madam Secretary:

The WATT Coalition is a group of companies interested in facilitating the adoption of advanced technologies on the US electric transmission system that improve reliability, lower cost, and accelerate decarbonization, benefiting American citizens and businesses. The WATT coalition has seven members, these companies offer technologies including Advanced Power Flow Control, Dynamic Line Ratings (DLR), and Topology Optimization, combined under the umbrella term used by the US Federal Energy Regulatory Commission (FERC) of Grid Enhancing Technologies (GETs). Rather than respond to all the questions asked by the DPS staff in its February 3, 2021 issuance, WATT comments are limited to a specific area of expertise and where the coalition can best add value to the Commission's decision making in this proceeding. The WATT members are listed below:

Ampacimon is a global leader in grid monitoring solutions that utilize patented sensors and software to increase the capacity of transmission and distribution assets. Their dynamic line rating systems, with grid monitoring sensors and software, have been deployed worldwide.

Heimdall Power provides cost-efficient dynamic line rating-based solutions to support data-driven decision-making for operations and planning of high-voltage overhead power lines. Their sensors and software optimize power grid utilization by maximizing power line capacity, control, and uptime. Real-time and forecast insights allow for swift detection of issues & predictive maintenance, and increased flexibility through energy flow & bottleneck analysis.

Lindsey Manufacturing Company provides innovative and cost saving products to the global electric utility industry. Lindsey is an industry leader in transmission line monitors and software for measuring and forecasting dynamic line ratings and line capacity. They produce a variety of other systems designed to enhance grid resiliency and optimize distribution networks.

LineVision provides utility solutions that leverage advanced sensors and analytics to increase the capacity, flexibility, and reliability of overhead lines. Their non-contact monitoring systems provide real-time situational awareness and anomaly detection, unlock additional capacity on existing lines, and provide condition-based health analysis to optimize asset management and grid reliability.

NewGrid is a software firm that provides transmission topology control tools and services. NewGrid's software enables flexible grid operations by identifying transmission reconfigurations to reroute power flow around congested facilities (it is, in a sense, a "Waze" for the grid), thereby increasing the transfer capability of the grid and delivering savings and increased reliability and resilience.

Smart Wires develops and implements technologies that advance the delivery of electricity around the world. With their technology, electric utilities can maximize transfer capacity on their grids, creating a more flexible and efficient network. Their power flow control technology dynamically controls transmission line reactance to direct power away from overloaded lines onto lines with spare capacity.

WindSim has developed a wind farm design software based on computational fluid dynamics that optimizes wind turbine placement. Using accurate simulations, WindSim software can more realistically capture terrain effects on wind conditions than many traditional technologies. WindSim Power Line (WPL) is a state-of-the-art forecast solution for overhead line operations and provides transmission owners an enhanced view of the conditions of their transmission lines by modeling wind at high-spatial resolution and computing thermal interactions (using IEEE-738) for every transmission span on which the system is deployed.

Grid Strategies LLC serves as the convener of the WATT Coalition.

GETs can move GWs, save billions of dollars for consumers and abate tens of millions of metric tons of CO2 in the next 5 years, if adopted on a national scale. The evidence in this section, all substantiated by publicly available data, establishes that projects using commercially available GETs help utilities cost-effectively accelerate the energy transition. GETs help utilities get more from their existing infrastructure and unlock capacity on today's network. Leveraging GETs to unlock network capacity yields outsized benefit by allowing greater deliverability of existing renewable generation and by simplifying the network upgrades associated with new generation interconnection. This simplification results from fewer expensive, long-lead new line builds and reconductors, which are often delayed by extensive permitting and land acquisition processes.

This response aims to provide assurance that each of the technologies named above are commercially available, operationally reliable, and an important part of any energy transition toolkit and recommendations for what the New York PSC can do to ensure that consumers receive the benefits offered by these technologies.

Advanced topology control is optimization software that identifies reconfigurations of the transmission grid to reroute power flow around congested or overloaded transmission elements. The reconfigurations are implemented through switching on/off existing high voltage circuit breakers using existing infrastructure for communications and control. System operators in different jurisdictions employ this software to optimize flows on the meshed transmission network. For example, National Grid Electricity System Operator (NGESO), the UK system operator, optimizes the configuration of the UK transmission grid working with Transmission Owners to redirect "flows to parts of the network with capacity."[1] By doing so, the additional transfer capability achieved by the UK grid can exceed 1000 MW over interface constraints[2] that are similar in nature to New York constraints such as the Central East interface. In the U.S., ERCOT uses advanced topology control analyses to support operations planning functions, including to improve grid reliability and resilience by mitigating the impacts of transmission contingencies.[3] SPP has reported increases in constraint capacity exceeding 20% by the use of optimal reconfigurations for a number of constraints, and has used them to relieve the top four transmission constraints in its footprint in 2019.[4] A utility in MISO reported using advanced topology control to mitigate congestion and overloads during the Polar Vortex event of 2014 that had increased the cost of electricity in the affected areas by over $15 million during a 10-week period.[5]

Power flow control technologies push or pull power away from overloaded lines and onto underutilized corridors in the transmission network. Advanced power flow control expands on this function with enhancements such as faster deployment, easy scaling to meet the size of the need, or being redeployable when needed elsewhere on the grid. The latest intelligent hardware leverages VSC (voltage source converter) technology that has been proven for more

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[1] "Transmission Thermal Constraints Management Information Note," National Grid ESO, July 2018, p. 4, https://www.nationalgrideso.com/sites/eso/files/documents/National%20Grid%20Transmission%20Thermal%20Constraint%20Management%20information%20note_July%202018.pdf.

[2] R. MacLaren, P. Ruiz and J. Caspary, "New Constraint Management Techniques for Meshed Transmission and Active Distribution Networks," CIGRE UK Technical Webinar, Dec. 2020, https://drive.google.com/file/d/1Hz4cwnUXdpAUW-1COGCqrW4AuhMtRR8u/view.

[3] P. Ruiz, J. Caspary and L. Butler, "Transmission Topology Optimization Case Studies in SPP and ERCOT," FERC Tech. Conf. on Increasing Day-Ahead and Real-Time Market Efficiency and Enhancing Resilience through Improved Software, Docket No. AD10-1222-011, June 2020, https://ferc.gov/sites/default/files/2020-06/W3-1_Ruiz_et_al.pdf

[4] Southwest Power Pool (SPP) State of the Market 2019, p. 199, fig. 5–10, https://www.spp.org/documents/62150/2019%20annual%20state%20of%20the%20market%20report.pdf

[5] B. Tsuchida and R. Gramlich, Improving Transmission Operation with Advanced Technologies: A Review of Deployment Experience and Analysis of Incentives, The Brattle Group, June 2019, p.14, https://brattlefiles.blob.core.windows.net/files/16634_improving_transmission_operating_with_advanced_technologies.pdf.

than 20 years at high-voltage applications including STATCOMs, HVDC and variable-speed wind power applications. Leaders from across the industry agree that power flow control is an established, reliable, advanced technology. In reference to an installation in 2019 which unlocked 95 MW on the UK distribution network and saved customers £8 million, Ian Cameron, Head of Innovation at UK Power Networks said, "*At its heart, this is a story of optimization. It continues to forge the path towards renewable energy, while saving money for our customers. It's the key to unlocking extra capacity in a safe, cost-effective, and fast way. This successful trial demonstrates our business ethos of innovation and disruption; implementing smart technologies to reach the UK's target to reduce CO2 emissions by 80% by 2020 and Net Zero by 2050*."[6] Commenting on power flow control deployments in 2020 where advanced power flow control is unlocking 1.5 GW of transfer capacity on the UK transmission network and is saving customers more than £387 million, David Wright, Director of Electricity Transmission and Chief Electricity Engineer at National Grid Electric Transmission (UK), explained, "*This is an example of our commitment to deliver clean and affordable energy for our customers. We have already completed several innovation projects and have been impressed with [the] technology and professionalism. I can see a world very soon where power grids everywhere become more intelligent, digital and controllable. NGET will be a leader in this transition and it's inevitable that technology like [this] will be a big part of this future.*"[7] This technology has been proven on grids across Australia, Europe, Latin America and the US as well.[8]

Dynamic Line Rating (DLR) is a combination of hardware and software that sets a transmission line's loading limit based on monitored ambient conditions rather than a fixed, static limit. DLR generally results in increased capacity due to cooling conditions (wind) and also identifies instances when flows should be reduced to ensure safe and reliable operation (extreme heat or other conditions). Oncor Electric Delivery Company (Oncor) showed that a sizeable amount of congestion mitigation could be obtained with as little as 5 to 10% increase in capacity over the existing line ratings.[9] Oncor estimated that DLR technologies deployed on 5% of ERCOT transmission lines, would yield approximately $20 million in savings from congestion reduction, equivalent to a 3% reduction in congestion costs. AEP and the Southwest Power Pool (SPP) identified opportunities for a DLR system on a 2.1-mile segment of a transmission line that could save approximately $18,000 during just 5 hours of real-time grid congestion, equating to several million dollars annually. In 2017, AEP tested a DLR system which showed increased capacity over ambient-adjusted ratings over 90% of the time.[10] Elia, the Belgium transmission system operator, studied DLR systems on eight of ten critical transmission interconnectors with France and the Netherlands during the winter of 2014–2015.[11,12] After this initial study, Elia deployed a utility-wide DLR system on 30 transmission lines, helping them increase exchange capacities with their surrounding countries (France, Netherlands, Luxembourg, and Germany). In a single 4-hour period, Elia identified $0.26 million of congestion savings provided by the DLR system deployment, which enabled 33 MW of additional import.

Technology and Transfer and Deployment

1. How can the Commission accelerate implementation of these advanced technologies in New York?

It has been the WATT coalition's experience worldwide that a combination of regulator-mandated directives with clear success metrics and highly targeted incentives are the most efficient mechanism to ensure advanced transmission technologies are quickly and extensively used on bulk and local transmission lines. In this section, WATT details requirements and mandates for DPS to consider as a near-term approach to effect change. Perspectives on incentives are shared later under question 5.

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[6] https://www.ukpowernetworks.co.uk/internet/en/news-and-press/press-releases/Technology-powers-45000-homes-with-renewable-energy.html

[7] https://www.tdworld.com/overhead-transmission/article/20973449/national-grid-makes-power-flow-control-deal-with-smart-wires

[8] https://www.epri.com/research/products/000000003002019771

[9] https://www.smartgrid.gov/files/SGDP_Transmission_DLR_Topical_Report_04-25-14_FINAL.pdf

[10] https://watttransmission.files.wordpress.com/2018/10/cigre-gotf-2018-ngn-pjm-aep-linevision-final.pdf

[11] https://watttransmission.files.wordpress.com/2018/01/ampacimon-dynamic-ratings-increase-efficiency_belgium-transmission-grid.pdf

[12] http://www.ampacimon.com/wp-content/uploads/2016/09/Cigre_C2_PS1__20161.pdf

By ensuring a clear regulatory mandate, the DPS can accelerate adoption of advanced transmission technologies to achieve decarbonization goals and other policy initiatives. Such initiatives include environmental justice and equity for disadvantaged communities. Rapid progress toward a more flexible, dispatchable, efficient, and cost-effective grid can help overcome some of the technical barriers impeding more community-level stakeholder involvement in their energy needs.

Some examples of relevant success metrics DPS can consider include: MW transfer capacity between zones, MW renewables integrated, MW industry electrified, MWh avoided curtailment, grid utilization percentage compared to rating, metric tons per year of GHG reduction, dollars of congestion charges, and smart grid indicators. Establishing metrics ensures transparency on the goals New York has for each region and provides real-time results regarding how successful New York has been in meeting those goals or where there are areas for further development.

GETs can help increasing the utilization of all circuits while maintaining system reliability. GETs bring the added benefit of providing more granular control over line dispatchability once installed. However, one major challenge with the current New York transmission planning and operations processes is the lack of formal requirement for utilities to maximize the efficiency of the existing network.

The Commission could directly effect a change in today's processes by adding a requirement within the Article VII process to include GETs as an evaluation alternative (more detail to follow in the response to Question 2).

Alternatively, the Commission could work with other New York stakeholders to effect change. One approach could be to work with the NYISO to adopt a requirement for utilities to evaluate GETs in every reliability, generation interconnection, and economic project submission, as well as in ongoing transmission operations to support transmission service. The Commission could urge a filing to FERC under Section 205 of the Federal Power Act for tariff modifications in these areas, or intervene in individual cases where the option should be considered. The updated tariff could also compel utilities to publish specific data about the evaluation, including capital and ongoing maintenance costs for alternatives, timeline for installation, associated transmission outage requirements for installation, and land or footprint requirements. This public review will ensure the utilities are conducting appropriate due diligence on GETs and are consistently working to achieve DPS goals of network efficiency and flexibility.

2. **How should utility local transmission and distribution (LT&D) planning processes incorporate consideration of these advanced technologies?**

The Commission should formalize a loading order approach to transmission planning that requires LT&D utilities to demonstrate they are first optimizing, then upgrading and only then expanding the network. As mentioned previously, utilities' approach to maximizing system efficiency has historically been ad-hoc (and has rarely included a comprehensive evaluation of proven technologies like GETs), but this is partially driven by the lack of requirements or mandates to do so.

Currently, when utilities seek to construct new facilities, they must demonstrate a need for the project and consider alternative routes through the Article VII process. WATT suggests extending this 'demonstrating alternatives' requirement by mandating that, prior to pursuing reconductors, rebuilds, line upgrades, and new lines, utilities demonstrate due diligence conducted in exploring GETs as an alternative. Requiring the utilities to include a GETs alternative as part of their standard alternatives analyses will ensure LT&D utilities are considering Grid Enhancing Technologies.

GETs can quickly and inexpensively unlock transmission capacity for renewable integration and increase system flexibility once deployed. This enhanced flexibility and dispatchability, which can be implemented in a fraction of the time of traditional system upgrades, will improve system upgrade and expansion plans. By resolving grid constraints in the near-term, GETs will enable faster and lower cost achievement of the state's energy goals. In a matter of a few years, true widespread GETs implementation in New York could transform the grid and demonstrate meaningful progress on the path to 100% renewable energy generation.

Such approaches are widely used to ensure utility planning is aligned with consumer and regulatory goals for network efficiency. Other markets have adopted similar transmission planning loading order mandates, including the German NOVA principle, described by transmission operator TransNetBW as "grid optimisation first, then grid strengthening before any further grid expansion."[13]

3. How can New York ensure that utilities will integrate these new technologies swiftly and effectively into their planning and operations?

The above sections discuss requirements that could be placed on the utility planning and project process, which is one way to ensure rapid technology integration in the planning timeframe. Output-based regulation can facilitate use of technologies and strategies to meet aggressive targets rapidly, efficiently and cost-effectively. The metrics described previously, which focus on cost-effective renewable integration, will publicly demonstrate that those utilities which wholeheartedly embrace all proven technologies are supporting New York target achievement, while those that reject GETs will have difficulty securing project justification.

In the operations timeframes, the Commission could require utilities to use GETs when beneficial and to periodically report on such use and its impacts (e.g., on a quarterly basis). The reporting may include the number of deployed systems for hardware technologies such as advanced power flow control and dynamic line ratings, as well as a high-level description of how they are used and metrics on their estimated impacts (e.g., increased transfer capability). For a software technology such as advanced topology control, the report could summarize how and for what processes the technology is being used, how frequently reconfigurations are deployed, and estimated impacts. In addition, the Commission could enable and invite stakeholders to comment on the reported utility practices.

There is meaningful impact that can be accomplished with requirements, but WATT encourages the DPS to consider a balanced 'carrot' and 'stick' approach to effectuate the most enduring change. For comprehensive, long-term market impact, WATT suggests a combination of requirements, output-based regulation and appropriate financial incentives that encourage quicker or lower-cost achievement of these outcomes to produce the best results. Please see question 5 for more detailed perspective on a potential approach to incentives.

4. What key consideration and/or process elements could help such a process[14] to increase the rate of successful deployment of advanced technologies? Should the Commission establish such a process?

In addition to the process described above wherein utilities would be required to demonstrate that they have evaluated GETs, WATT recommends facilitating a process that allows market participants the opportunity to propose and fund (while giving utilities a Right Of First Refusal, or ROFR) GETs projects that improve their connections. To avoid giving unintended preferential treatment to incumbent LT&D utilities, criteria for selecting solutions, relevant technical data (power flow cases, assumptions, etc.), alternatives evaluation, and rationale for selected solutions must be made readily available to all potential respondents. In essence, this approach aims to create a level playing field for all solutions, without providing an information asymmetry advantage to the network owner. This could be accomplished by requiring all prospective respondents to utilize identical cases, assumptions, forecasts, etc. and instituting a public review process for alternatives evaluation and approval. The process could also allow market participants to fund the upfront capital cost of technology solutions, after providing utilities ROFR. Funding entities could then be reimbursed over a period of time, at which point the assets would be placed into the incumbent LT&D utility rate base, or transmission service credits could be contracted with the funding entity to offset the upfront capital cost.

[13] https://www.transnetbw.com/en/world-of-energy/nova-principle

[14] The process identified in the Case 20-E-0197 comments of February 3, 2021 was: "To identify high-priority locations where advanced transmission technologies could quickly and cost-effectively provide un- bottling benefits on the existing grid, the PSC could implement a process through which renewable generation owners and developers would be able to provide information on particularly constrained locations. This information could then be made public, such that either the utilities or advanced technologies vendors could propose cost-effective solutions to address the constraints."

5. The Initial Report (at page 52) discusses the application of incentive regulation schemes (such as shared savings approaches) to encourage advanced technology deployment. Is an incentive necessary or appropriate to encourage rapid deployment of advanced technologies on the distribution and local transmission systems? What key considerations should apply?

Thus far, WATT has provided suggestions for New York to institute requirements and mandates because this is a rapid approach to effect change. Taking a more long-term view, developing an incentive structure is likely a more effective means to overcome current disincentives for utilities to deliver a more efficient grid. However, incentives require more deliberate and complex regulatory structures, which will take time to establish. Should New York agree that the long-term view is worth pursuing, in lieu of or in conjunction with the requirements mentioned previously, WATT recommends a competitive shared-savings incentive be implemented to encourage advanced technology deployment. Such a mechanism is most likely to drive utility behavior in support of regulatory goals for renewable integration, lower customer costs, and overall network efficiency. WATT companies develop projects around the world. Work in the United Kingdom, Australia, Colombia, Germany, Canada, and many other jurisdictions has provided a unique insight into how shared savings can be justified and implemented to reduce customer rates, accelerate renewable generation integration and address myriad regulatory goals.

Traditional regulatory financial recovery mechanisms primarily reward transmission owners on the size of their capital investment rather than on the benefits they produce. Transmission owners are not incentivized to pursue congestion-reducing projects since they often receive little if any of the benefit, which is usually passed through to market participants and eventually to consumers. Therefore, today's rules benefit transmission owners that invest in transmission infrastructure, not transmission efficiency.

Because transmission owners are rewarded for investment and not efficiency, large projects with large returns naturally are more attractive to them. This is despite the fact that a smaller project may have a higher benefit-to-cost (B:C) ratio and may have a greater impact on improving system efficiency. Transmission owners understand the benefits that low-cost, high efficiency solutions can bring to their business and customers, but the cost-of-service approach means transmission owners currently have little or no incentive to identify and pursue these projects. Given well-crafted incentives, transmission owners are likely to embrace these solutions to everyone's benefit.

WATT recommends a competitive shared-savings incentive. This proposal offers the largest upside to utilities and consumers and will most effectively encourage the adoption of GETs. Transmission owners should share the upside that they create, as opposed to the market participants bearing the full upside and downside of congestion. By sharing a portion of the upside, the utilities and their shareholders will benefit directly from finding these cost-reducing projects for their customers and therefore will prioritize pursuing these projects.

There are subtle differences in the rules under which shared-savings incentives can be implemented. In the UK for example two important players worked together to deliver significant market and customer benefit. National Grid Electric Transmission (NGET) is the owner of the high-voltage electric transmission network in England and Wales. The Office of Gas and Electricity Markets (Ofgem) is a non-ministerial government department and independent National Regulatory Authority. NGET and Ofgem came to agreement on the measurable outputs for the NGET price control period, including: transmission capacity released, generation connected and asset replacements. NGET also agreed on an efficient price for delivering these outputs. If NGET deliver these outputs for less than the agreed upon price, the savings are split roughly equally between customers and NGET shareholders. If delivery is achieved for more than the agreed upon price, consumers and shareholders also split the overage burden equally. NGET was thereby incentivized to constantly seek the most efficient solutions to deliver the outputs. This ability to outperform regulatory allowance led NGET to evaluate and develop innovative solutions, including each of the three GETs. [15,16,17]

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[15] https://www.nationalgridet.com/document/131776/download

[16] http://www.smarternetworks.org/project/nia_nget0169/documents

[17] https://www.nationalgrideso.com/sites/eso/files/documents/National%20Grid%20Transmission%20Thermal%20Constraint%20Management%20information%20note_July%202018.pdf

The shared savings framework in the UK has been successful in helping utilities manage uncertainty and reduce costs for consumers, all while supporting progress on aggressive regulatory targets.

A competitive shared-savings approach is not hard to implement. This approach leverages the same processes, calculations and approaches that ISOs/RTOs use today in their economic planning processes. Ultimately, the competitive shared-savings approach offers a market-driven answer to “how large should the reward be” as opposed to the blanket treatment applied by other schemes. WATT has been engaged with FERC for the past two years to propose a shared-savings structure that is workable under new and proposed regulations and welcomes the opportunity to collaborate with the PSC, if the PSC continues their exploration of how a shared savings mechanism could work in New York. Based on experience globally and in the US, the WATT coalition is confident that we could add value to industry discussions on this topic and look forward to doing so if and when the PSC engages deeper on this topic.