UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Building for the Future Through	**)**	**RM21-17-000**
Electric Regional Transmission	**)**	
Planning and Cost Allocation and	**)**	
Generator Interconnection	**)**	

WATT COALITION COMMENTS
August 17, 2022

The WATT Coalition ("WATT") appreciates the opportunity to provide perspectives on the Federal Energy Regulatory Commission's ("the Commission") April 21, 2022 Notice of Proposed Rule Making (NOPR) in the above-captioned proceeding. In this response, WATT details the need for greater consolidation of Transmission Planning categories and support for the Commission's proposed requirements to incorporate Grid Enhancing Technologies (GETs) in transmission planning.

We agree with the NOPR's statement that "Since Order No. 1000, commercially available technologies to make transmission systems operate more efficiently or cost-effectively have greatly advanced."[1]

We agree with NARUC that an effective transmission planning process should maximize the use of existing transmission and build new transmission only where necessary or economic, asserting that the transmission planning process needs a clear pathway for consideration of alternative transmission solutions, including GETs.[2]

We agree with many wholesale customers such as TAPS, which urged the Commission to "[m]ake more explicit the mandate to consider GETs as part of regional planning processes," noting that Order 1000s requirement to consider non-transmission alternatives "appears insufficient to ensure robust consideration of GETs in the planning process."[3]

I. The WATT Coalition

The Working for Advanced Transmission Technologies (WATT) Coalition is a trade association supporting wide deployment of Grid-Enhancing Technologies (GETs), to accelerate the clean energy transition and lower energy costs. Members include grid technology, renewable energy, and investment companies. Dynamic Line Ratings determine the true, real-time capacity of power lines. Advanced Power Flow Control allows operators to reroute power to lines with available capacity. Topology Optimization identifies the best grid reconfigurations to reroute flow around bottlenecks. In operations, these technologies reduce congestion costs and improve economic dispatch, situational awareness and reliability. In planning, they reduce the time, cost

[1] NOPR P267.
[2] NARUC ANOPR comments at 9.
[3] TAPS ANOPR comments at 2.

and complexity of integrating new generation and load. More information about the Coalition is available at watt-transmission.org.

II. Comments

We respond to specific NOPR proposals and questions below, beginning with those specific to Grid-Enhancing Technologies (sections 1-5) and also including responses to broader issues raised in the NOPR (sections 6-15).

1. Requirement to consider DLR and APFC

The NOPR states: "[W]e propose to require that public utility transmission providers in each transmission planning region more fully consider in regional transmission planning and cost allocation processes two specific technologies: the incorporation into transmission facilities of dynamic line ratings and advanced power flow control devices." (P272)

As the NOPR states: "[T]he consideration of new technological innovations in regional transmission planning processes could help ensure that these processes are identifying more efficient or cost-effective regional transmission facilities and in turn, that the Commission-jurisdictional rates are just and reasonable."

WATT appreciates that the requirement for consideration as written in the NOPR could be an effective regulatory tool to increase the use of GETs in the U.S., but strongly suggests that this language be detailed and strengthened to achieve the pace and scale of change necessary to quickly drive down costs for consumers and ensure the most cost-effective generation resources can quickly connect to the grid. Order 1000 is a prime example of a well-intentioned requirement for action in the consumer interest that has failed to create the desired outcomes.

A. Potential interaction between requirement and incentives

While the requirement for consideration in the NOPR represents a "stick" approach to regulatory change, Docket No. RM20-10-000 (Electric Transmission Incentives Policy Under Section 219 of the Federal Power Act) includes significant stakeholder support for the shared savings incentive proposal presented by WATT, representing the "carrot" approach. Several reasons were put forth in this docket for the inadequacy of solely instituting a requirement for GETs such as the one suggested in the NOPR. These included the fact that utilities are not incentivized to pursue congestion-reducing projects since they receive none of the benefit and that they must ultimately balance between competing interests of customers and shareholders.

Acknowledging that an incentive and a requirement for GETs are not mutually exclusive, WATT believes that any "stick" (requirements) will be more effective when combined with the "carrot" (incentives) to drive the outcome FERC is aiming for. Such an incentive rulemaking may or may not be taken forward in a separate filing, underscoring the importance of trying to counteract the regulatory misalignment limiting GETs adoption by implementing the strongest possible language in this NOPR. The preferred GETs requirement provision should be crafted to ensure compliance will include meaningful evaluation and consequential implementation where GETs are expected to solve operational constraints or reliability challenges, achieve public policy goals, and/or save consumers money. An overly generic and broadly interpretable provision on

the other hand could lead to failure by utilities to adequately consider such technologies, resulting in rates that are unjust and unreasonable, **therefore FERC should amend the "more fully consider language" as described in this response.**

B. Specific potential requirements for evaluation of APFC and DLR

Advanced Power Flow Control (APFC) is categorized as a Flexible AC Transmission System (FACTS) device. FACTS devices are routinely installed for 40+ year lifetime applications, and given improvements over legacy technologies in packaging, controls, and reliability, APFC is an ideal solution in the medium and long-term transmission planning timeframe. APFC is easily modeled in transmission planning software and simulation by adjusting the reactance of a given circuit of interest. When installed, these devices effectively change their circuit's power flows and can be controlled by system operators to be "always on" or activate based on specific system conditions. The applications for APFC implementation are diverse as a result of their modularity, ability to redeploy, high-level of control, substation placement flexibility and both capacitive and inductive capabilities, as well as their cost-effectiveness relative to other solutions. Consumers will benefit from just and reasonable rates with the consideration of APFC in transmission planning processes. Specifically, WATT believes that FERC should clarify the "fully consider" requirement (P272) in the following ways.

A. APFC solutions generally provide outsized consumer benefits compared to traditional approaches to infrastructure upgrades when modeling results indicate a thermal overload within 50% of the line rating, therefore **FERC should clarify the "fully consider" requirement (P 272) to specifically require evaluation of APFC for thermal overloads that fall within 50% of the line rating.**
B. As TPs are attempting to prioritize major construction works, APFC can provide near-term economic and reliability relief to manage costs to consumers and meet NERC requirements, ensuring network security. **Once TPs have identified a long-term solution (ex. new line) with an in-service date beyond 5 years, FERC should require TPs to demonstrate evaluation of APFC as a low-cost, stop-gap, near-term solution to be implemented until the long-term solution is in place.**
C. APFC can resolve temporary system flow changes by rerouting power around the neighboring circuits, which mitigates the need for power delivery interruption or high dispatch costs borne by consumers. As is common practice, FERC should require TPs to evaluate the outage implications that their construction and maintenance project will create, **and when costs are projected to exceed $5M, FERC should require TPs to evaluate the use of mobile APFC to resolve or reduce the economic impact from the outage constraints.**
D. By utilizing scaled deployments of APFC to rebalance flows along existing circuits with spare capacity, new load connections can be completed much more rapidly (12 months) and adjusted incrementally to mirror actual growth, providing added consumer protection by avoiding reliance on the uncertain 10+ year load growth projections that are typically cited to justify new lines. **Thus, FERC should update the "fully consider" language to specifically require evaluation of APFC technology for network upgrades associated with new load connections.**
E. Attributable to APFC device design, several utility system studies have verified that APFC effectively avoids Sub-Synchronous Resonance (SSR) events, by managing

stability issues and maintaining the proper voltage profile on long AC lines. **FERC should therefore update the "fully consider" language to direct TPs to universally reframe APFC as the Business-as-Usual solution for series compensation projects and for voltage stability management on 100+ mile AC transmission lines.**

WATT recognizes that in the current regime of reliability-only planning, little information about the future resource mix is incorporated so DLR is rarely identified as a viable solution. However, in the future when transmission planners are required to perform more economic long-term planning than they do today, they will likely find many hours of the year when inefficient curtailment and congestion occur. These may be shoulder or off-peak periods, but these time periods do matter if the goal is just and reasonable rates for consumers. During these periods, it is often the case that high wind production causes congestion at the same time as transmission lines can be dynamically rated higher than static ratings due to high wind speeds and lower temperatures. There may be many transmission paths where the costs of a new line are too high to justify the investment, but DLR and other GETs can provide economic and reliability value. Consumers will be better off, and rates will be just and reasonable, if the transmission system included DLR such that lower cost energy can be delivered. PPL is deploying DLR capabilities this summer to address historic and projected market congestion needs expected to occur in PJM.

In Docket No. AD22-5-000 (Implementation of Dynamic Line Ratings), multiple intervenors including PJM introduced a threshold to meet for DLR implementation should FERC decide to require DLR immediate implementation.[4] Since evaluation is a prerequisite for implementation, the same congestion threshold should be referenced in this NOPR. **Therefore, when criteria as defined by PJM Comments are met, FERC should require TPs to evaluate the use of DLR in parallel to the requirements of FERC Order No. 881 and its 3-year compliance timeline.**

The NOPR states: "[W]e propose to require that public utility transmission providers in each transmission planning region consider for each identified regional transmission need whether selecting transmission facilities in the regional transmission plan for purposes of cost allocation that incorporate dynamic line ratings or advanced power flow control devices would be more efficient or cost-effective than transmission facilities that do not incorporate these technologies." (P 274)

WATT supports the proposal that DLR and APFC be considered where they may be more efficient or cost-effective than other options. The requirement should also apply in any case where transmission delivery capacity would be valuable but the costs of a new line are not justified. As the resource mix and the bulk power system evolves, Regional Planners are Transmission Service Providers need to duly consider GETs to address reliability violations which have traditionally been solved with long lead-time transmission expansion projects.

The NOPR states: "[W]hen evaluating transmission facilities for potential selection in the regional transmission plan for purposes of cost allocation, the public utility transmission providers in the transmission planning region must also consider whether incorporating dynamic

[4] Motion for Leave to Comment and Comments of PJM Interconnection, L.L.C. under AD22-5.

line ratings and advanced power flow control devices as part of any potential regional transmission facility would be more efficient or cost-effective." (P 274)

WATT supports the proposal that DLR and APFC be considered as part of any potential regional transmission facility.

2. Shorter Term Planning Requirement

The NOPR states: "We propose that this requirement apply in all aspects of the regional transmission planning processes, including the existing regional transmission planning processes for near-term regional transmission needs and Long-Term Regional Transmission Planning, as proposed in this NOPR." (P 274)

WATT supports the proposal that the requirement to consider DLR and APFC apply in all aspects of the regional planning process including the existing planning processes for near-term regional needs as well as long-term needs.

WATT also recommends that in addition to DLR and APFC, Topology Optimization also be required to be incorporated into planning processes. Topology optimization is an excellent solution for application in the Operations timeframe because it relies on operational adjustments of existing equipment, (e.g., opening or closing circuit breakers, or adjusting the setpoint of flow control devices including phase shifting transformers, APFC and HVDC converters), which are effectively no- or low-cost actions that take very little time to implement. Regional planners and Transmission Service Providers need to consider GETs to address reliability needs and capture economic opportunities to improve grid efficiencies and not rely exclusively on long lead-time transmission expansion projects as potential solutions to address future grid needs. Long-range planning is not just about maintaining compliance with existing reliability requirements, but needs to consider public policy needs to support efficient grid operations based on expected system conditions.

The time period of the requirement should explicitly include the operational planning time frame. Applicable GETs solutions in this timeframe include Topology Optimization (due to its reliance on existing equipment and ease and speed of implementation), DLR (as deployments can be implemented in quickly, and expected system conditions and DLR impacts can have high certainty in this timeframe) as well as redeployment of modular APFC or deployment of mobile modular APFC, which can also be performed quickly. In Operations Planning, GETs consideration should focus on frequently observed constraints or constraints that are likely to emerge and facilities that could provide reliability or resiliency benefits during stress scenarios for the grid (e.g., extreme weather events). The consideration requirement could be applied to the top 5 or 10 most costly or critical constraints on a quarterly basis, as well as mitigation for planned outages that are anticipated to have significant congestion impacts.

In the operational time frame, we recommend that market participants be able to request the use of GETs. To ensure that GETs can be effectively considered in operations planning, the evaluating authority should be required to respond to a proposal for GETs from a market participant within a defined period of time. Market participants requesting a Topology Optimization reconfiguration to mitigate market congestion should be guaranteed a quick

turnaround for evaluations, potentially in line with the timing of outage requests from TOs. If the requested reconfiguration is feasible and shows better market efficiency results than the alternative used by the RTO, it should be implemented to deliver savings to transmission users.

3. Transparency

The NOPR states: "the evaluation process must culminate in a determination that is sufficiently detailed for stakeholders to understand why a particular transmission facility was selected or not selected in the regional transmission plan for purposes of cost allocation. This process must now include the consideration of dynamic line ratings and advanced power flow control devices and why they were not incorporated into selected regional transmission facilities." (P 275)

WATT supports the requirement for detailed information to be provided to market participants and policy makers in order to determine whether GETs were provided sufficient opportunity to solve system needs cost effectively. This requirement should apply to topology optimization as well, especially in the nearer term time frame. Such information should include modeling assumptions, contingency analysis results, asset age/condition, environmental and footprint constraints, etc. WATT members have recent experience even in the most transparent of RTOs with an inability to determine the source of congestion, which means neither consumers, GET vendors, nor other stakeholders can reasonably determine which solutions may make sense.

4. Set of technologies

The NOPR requires consideration of DLR and APFC, and states "We also seek comment on whether there are other transmission technologies serving a transmission function that should be considered in regional transmission planning and cost allocation processes." (P 277)

WATT supports the requirement of considering DLR and APFC, and urges the Commission to include Topology Optimization as well. WATT supports Topology Optimization to identify preferred base system topology for long-term planning analyses, including to determine through an optimization process when a facility near the end of its life should be retired as opposed to rebuilt, or when other facilities should be operated as normally open.

WATT also suggests that in any final rule, FERC remove the language detailing types of APFC found in footnote 437 (P 270). Transmission Providers are familiar with APFC and WATT sees no benefit in FERC establishing either an exhaustive or non-exhaustive list of APFC examples in said final rule.

5. System incorporation of GETs

The NOPR states: "[W]e seek comment on whether non-RTO/ISO transmission planning regions should be required to update their energy management systems or make other similar changes if dynamic line ratings are identified as a more efficient or cost-effective transmission facility selected in the regional transmission plan for purposes of cost allocation." (P 277)

The WATT Coalition supports a requirement in the final rule that transmission providers be required to update their energy management systems and make similar changes when DLRs are identified as more efficient or cost-effective solution to a transmission need. Dynamic line ratings should be implemented at the utility and ISO/RTO level for every area that sees congestion during operations. While current planning methodologies are typically limited to static line ratings, operational Dynamic Line Ratings are already being successfully implemented in certain markets such as ERCOT and should be considered as a low-cost solution to increase renewable penetration on the grid. All transmission providers should be made to upgrade their energy management systems and keep them consistent across all transmission providers to accommodate for the latest technologies, including those Grid Enhancing Technologies like Dynamic Line Ratings that require modification. APFC and Topology Optimization do not require modifications to existing EMS used by RTO or non-RTO regions but would benefit from the increased flexibility of DLR-enabled EMS.

6. General proactive long-term planning approach

The NOPR proposes the following requirements: "(1) use a transmission planning horizon no less than 20 years into the future in developing Long-Term Scenarios and reassess and revise those scenarios at least once every three years; (2) incorporate a set of Commission-identified categories of factors that may affect transmission needs driven by changes in the resource mix and demand into their Long-Term Scenarios; (3) develop a plausible and diverse set of at least four Long-Term Scenarios; (4) use "best available data" (as defined in the Specificity of Data Inputs section below) in developing their Long-Term Scenarios; and (5) consider whether to identify geographic zones with the potential for development of large amounts of new generation." (P 91)

WATT supports the general proactive long-term planning approach in the NOPR. It is especially important to incorporate "best available data" on future generation. Just as all planners strive to estimate load, including demand and energy profiles which is inherently uncertain, it is important to estimate using best available data.

7. Multi-benefit planning

The NOPR provides a set of 12 benefits that may be included in benefit-cost analysis and form the basis of plans, but does not require that all of them be considered.(P182-186)

WATT supports requiring a minimum set of benefits be considered in all regions' plans. We suggest that all twelve be at least considered, but only those that pass an initial screening for significance should undergo the thorough study and quantification required for planning and cost allocation. We recognize that many transmission lines and assets provide benefits in some but not all of the categories, and the studies required can be expensive and time-consuming.

Planning processes need to address regional needs and should not be limited to a set of benefits predefined in a FERC NOPR. Planning should not be viewed as a legal obligation with a check off of a box to demonstrate compliance with a specific tariff requirement but should be flexible to expand metrics as appropriate to address future needs for each region or planning footprint. However, the requirement for all regions to consider a minimum set of benefits will ensure nationwide that rates are just and reasonable.

8. Cost allocation

The NOPR proposes that the benefits used for cost allocation be explained, but not necessarily align with the benefits used for planning. It says, "we propose for consideration a list of Long-Term Regional Transmission Benefits described above for public utility transmission providers to apply in Long-Term Regional Transmission Planning and Cost Allocation processes. In addition, we propose to require that public utility transmission providers identify on compliance the benefits they will use in any ex ante cost allocation method associated with Long-Term Regional Transmission Planning, how they will calculate those benefits, and how the benefits will reasonably reflect the benefits of regional transmission facilities to meet identified transmission needs driven by changes in the resource mix and demand." (P326)

WATT supports a requirement in the final rule that the benefits used for cost allocation align with the benefits used for planning.

9. Planning factors and best available data

The NOPR states: "we propose to require that public utility transmission providers incorporate, at a minimum, the following categories of factors into the development of Long-Term Scenarios: (1) federal, state, and local laws and regulations that affect the future resource mix and demand; (2) federal, state, and local laws and regulations on decarbonization and electrification; (3) state-approved utility integrated resource plans and expected supply obligations for load serving entities; (4) trends in technology and fuel costs within and outside of the electricity supply industry, including shifts toward electrification of buildings and transportation; (5) resource retirements; (6) generator interconnection requests and withdrawals; and (7) utility and corporate commitments and federal, state, and local goals that affect the future resource mix and demand." (P104)

WATT supports these factors. It is important to begin and expand the planning for the actual future generation mix rather than continue ignoring it. Planners cannot plan well if they ignore known and knowable information about the future resource mix.

10. Frequency of Planning

The NOPR proposes: "we propose to require that public utility transmission providers develop Long-Term Scenarios at least every three years." (p97)

WATT reminds the Commission that there are certain transmission technologies and assets that are faster to deploy than typical long distance high voltage new lines. It would therefore be just and reasonable to include interim reassessments to consider opportunities for beneficial deployment of these technologies. An annual review of the Regional Long-Term Transmission Planning process should be required in the off-years to correspond with the cadence of reliability and economic planning, including the establishment of a fast-track process for solutions with a lead-time under 12 months and capital cost of less than $50M.

11. Portfolio approach

The NOPR states, "We propose to afford public utility transmission providers in each transmission planning region the flexibility to propose to use a portfolio approach in the evaluation of benefits of regional transmission facilities through their Long-Term Regional Transmission Planning." (P233)

WATT urges the Commission to require a portfolio approach in the final rule, and not just "allow" it. We also suggest that portfolios should include consideration of grid enhancing technologies.

12. Selection criteria

The NOPR proposes: "(1) transparent and not unduly discriminatory criteria, which seek to maximize benefits to consumers over time without over-building transmission facilities, to identify and evaluate transmission facilities for potential selection in the regional transmission plan for purposes of cost allocation that address transmission needs driven by changes in the resource mix and demand, consistent with the discussion below; and (2) a process to coordinate with the relevant state entities in developing such criteria." (P241)

WATT urges the Commission to require a methodology of maximizing net benefits. It would be unjust and unreasonable to ignore benefits or costs in the assessment of options.

A good example is that of Australia's transmission planning approach (RIT-T). There, the process includes a Project Assessment Draft Report (PADR). The PADR lists all the alternatives with their net present value, ranked 1-5 based on consumer benefit. Unless there is a very good reason, option 1 will be the preferred solution. An example PADR provides clear cost, benefit, and scenario analysis results for 4 investment options.[5] The proposed preferred option utilizing modular power flow control (detailed in Table 1 and Table 2) was shown to have both the lowest cost and greatest market benefit compared to Option 1 and the other options.

[5] https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/Victorian_Transmission/2019/VNI-RIT-T/Victoria-to-New-South-Wales-Interconnector-Upgrade-RIT-T-PADR.pdf

Table 1 Credible options tested in detail through the PADR analysis

Option [A] (PSCR reference)	Description	Capital cost, $M, (2019-20)
Option 1 (equivalent to Option 1 of PSCR)	**ISP base option** • One new 500/330 kV transformer at South Morang Terminal Station. • Re-tensioning the 330 kV South Morang – Dederang transmission lines, as well as associated works (including uprating of series capacitors) to allow operation at thermal rating. • 330 kV Upper Tumut - Canberra line upgrade	97.5
Proposed preferred option **Option 2[B]** (equivalent to Option 1 of PSCR)	**ISP base option with modular power flow controllers** • One new 500/330 kV transformer at South Morang Terminal Station. • Re-tensioning the 330 kV South Morang – Dederang transmission lines, as well as associated works (including uprating of series capacitors) to allow operation at thermal rating. • Install modular power flow controllers on both 330 kV Upper Tumut – Canberra and 330 kV Upper Tumut - Yass lines.	80.5
Option 3 (equivalent to Option 2a of PSCR)	**Additional higher capacity upgrades in New South Wales** • One new 500/330 kV transformer at South Morang Terminal Station. • Re-tensioning the 330 kV South Morang – Dederang transmission lines, as well as associated works (including uprating of series capacitors) to allow operation at thermal rating. • Bring forward one leg of HumeLink, a new 500 kV line between Snowy and Bannaby including connection into existing 330 kV network, as proposed under TransGrid's RIT-T for reinforcing Southern New South Wales[C].	609.5 (102 in bring-forward cost terms)[D]
Option 4 (equivalent to combination of Option 3a and 3b of PSCR)	**Additional higher capacity upgrades in New South Wales and Victoria** • Two new 500/330 kV transformers at South Morang Terminal Station. • New 330 kV South Morang - Dederang line • Bring forward one leg of HumeLink, a new 500 kV line between Snowy and Bannaby including connection into existing 330 kV network, as proposed under TransGrid's RIT-T for reinforcing Southern New South Wales[C].	1,042 (534 in bring-forward cost terms)[D]

Table 2 Weighted net market benefit (NPV terms)

Option	Option Cost ($M) – NPV	Gross market benefit ($M) – NPV	Weighted net market benefit ($M) – NPV
Option 1 – ISP base option	84	354	270
Proposed preferred option **Option 2 – ISP base option with modular power flow controllers**	68	354	286
Option 3 – Additional higher capacity upgrades in New South Wales	447	634	187
Option 4 – Additional higher capacity upgrades in New South Wales and Victoria	763	711	-53

13. Scenario analysis for economic and reliability projects

The NOPR seeks comment on "whether public utility transmission providers should be required to incorporate some form of scenario analysis into their existing reliability and economic regional transmission planning processes to identify more efficient or cost-effective transmission facilities than are identified through those processes today." (P90)

WATT supports a final rule requirement that transmission providers be required to perform scenario analysis in their existing reliability and economic planning programs.

14. Voluntary funding

The NOPR seeks comment on voluntary funding by state entities or interconnection customers. (P252)

WATT supports voluntary funding. WATT supports the NOPR's proposal to allocate costs to all beneficiaries, and then in addition, allow states, utilities, or interconnection customers to voluntarily fund additional transmission.

15. Stakeholder engagement

The NOPR provides for meaningful input for stakeholders. (PP109-111)

WATT supports transparency and participation in transmission planning on scenarios, inputs, needs, and solutions.

III. Conclusion

WATT believes the recommendations above will make rates just and reasonable by appropriately incorporating Grid-Enhancing Technologies. We appreciate the opportunity to provide comment on the NOPR.

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Signed,

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