



June 3, 2026

Indiana Utility Regulatory Commission  
101 W. Washington St. #1500E  
Indianapolis, IN 46204  
URCComments@urc.in.gov

**Re: ACORE Response to IURC Request for Stakeholder Comments on ATT Study**

Dear Indiana Utility Regulatory Commission and Electric Power Engineer,

ACORE appreciates the opportunity to provide stakeholder comments on the advanced transmission technologies (ATTs) study being conducted by the Indiana Utility Regulatory Commission (IURC) with support from Electric Power Engineer (EPE). Properly defining ATTs and their benefits is important to evaluating them accurately and should result in further deployment of ATTs that will add value to the system. ATTs are infrastructure, hardware, and software options that cost-effectively increase the capacity and resilience of the transmission grid. They include grid enhancing technologies (GETs) like dynamic line ratings (DLR), advanced power flow controls (APFC), and topology optimization (TO) as well as high performance conductors (HPCs).

**About ACORE**

ACORE is a nonprofit organization with a diverse membership including utilities, developers, manufacturers, large loads, and banks. These comments were drafted as part of ACORE's Macro Grid Initiative and do not necessarily represent the views of all our members. The Macro Grid Initiative is focused on expanding and upgrading the nation's transmission network to ensure communities across the country have reliable and affordable electricity. ATTs are a valuable tool in the toolkit to expand the grid quickly and cost effectively. ACORE leads a national ATT working group and has worked with experts across the industry to issue several reports relevant to the questions posed by the IURC. ACORE commissioned EPE to develop one of these reports and feels confident EPE will do a comprehensive ATT report for IURC.

**Relevant ATT Reports Worth Reading**

ACORE will provide more detailed answers to each of the questions below, using the following resources:

- [Assessment and Evaluation of Grid Enhancing Technologies \(GETs\)](#): Prepared by EPE, addresses on how GETs should be included in operation and planning studies.
- [Incorporating GETs and HPCs into Transmission Planning Under FERC Order 1920](#): Prepared by Brattle Group and Grid Strategies, focuses on how ATTs meet the seven benefits outlined in FERC Order 1920, and the states' role in ensuring they're properly evaluated in regional transmission planning and facility selection.
- [Unlocking the Grid: A Playbook on High Performance Conductors for State and Regional Regulators and Policymakers](#): Prepared by AMP Coalition and Grid Strategies, highlights benefits and use cases, challenges to adoption, and state policy recommendations for HPCs.

- [Unlocking Power: A Playbook on Grid Enhancing Technologies for State and Regional Regulators and Policymakers](#): Prepared by Watt Coalition and Grid Strategies, documents benefits and best practices for GETs including dynamic line ratings, topology optimization, and advanced power flow controls.
- [Advanced Conductors on Existing Transmission Corridors to Accelerate Low Cost Decarbonization](#): Prepared by Grid Strategies, describes benefits, lessons from abroad, opportunities, and a line loss analysis for HPCs.

ACORE's answers throughout will take case studies and excerpts from these reports to highlight the various benefits of ATTs, but there are many more case studies included in these reports that are not included in our responses, so we encourage reviewing all resources in full.

### **IURC Questions:**

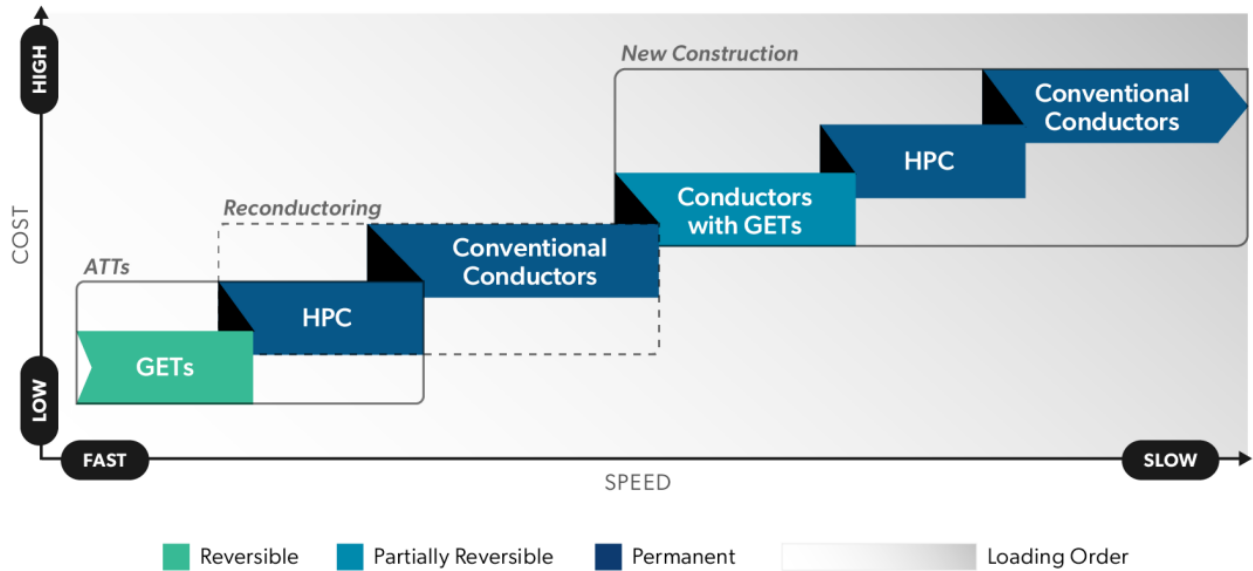
IURC's questions are in blue, with ACORE's answers in black.

- 1) The potential use or deployment of ATTs by public utilities to enable those utilities to:
  - a) safely, reliably, efficiently, and cost effectively meet electric system demand; and
  - b) provide safe, reliable, and affordable electric utility service to customers?

ATTs may not be the best solution for all transmission needs but should be considered first before pursuing new transmission if possible since they are lower cost and can be brought online more rapidly. Projects identified to address N-1-1 contingencies may benefit from ATT application. For example, if N-1-1 trigger creates constraints based on emergency ratings (thermal ratings), these lines may be candidates for dynamic line ratings. And if the contingency constraints only bind during certain times, topology optimization may also be useful. In addition, whenever reconductoring, rebuilding, or new line construction is proposed, a conductor-level analysis should be conducted to evaluate whether HPCs may be more cost-effective using line loss savings among other benefits. It is important that GETs are considered as a complementary option to new lines, not just a replacement, since they can serve as a bridge to create greater capacity as the new line is built and avoid outages.

A "rule of thumb" in evaluating solutions at a high level could be prioritizing GETs for transfer increase needs of 20% or less, reconductoring with HPCs for transfer increase needs of 50%-100%, and "right-sizing" opportunities for larger transfer increase needs. A time or schedule-based approach, such as prioritizing GETs for immediate needs, may also be viable. An illustrative loading order is highlighted in Figure 1.

**Figure 1: Illustrative Loading Order**



**Source:** [Incorporating GETs and HPCs into Transmission Planning Under FERC Order 1920](#)

- 2) The attributes, functions, costs, and benefits of various ATTs, including grid enhancing technologies and advanced conductors.

ATTs tend to be significantly lower cost than building new transmission and can be installed on a faster timeline. While they can't replace new transmission entirely, they may be able to reduce transmission build out to where it's really needed.

**Table 1: Summary of cost, capacity additions, and timeframe for ATTs**

Technology	Cost	Additional Capacity Unlocked	Timeframe for deployment
Reconductoring	\$600K-\$1M per mile	50-110% for advanced conductors	18-36 months
Dynamic line rating	\$45K-\$50K per mile* <sup>1</sup>	-8 to 40%	3-9 months
Advanced power flow control	\$200K to \$800K per MVar	20-30%	12-24 months
Topology optimization	Project specific	25-50% lower congestion cost, 50-75% fewer curtailment and related cost	0-12 months
New transmission	\$2M-\$6.5M per mile	Goes beyond what ATTs can do	7-10 years



**Source:** [BNEF and The Business Council for Sustainable Energy](#)

<sup>1</sup> Note: The linked resource I believe has an incorrect decimal place for this number saying it's \$450-500K. Another version of this table behind the BNEF paywall states the cost as \$45-50K, and that aligns more with industry experience.

GETs offer greater certainty in cost, scheduling, and building time. They are also complementary to existing equipment and are portable and reversible. This low cost and reversibility allow for low-regrets investments that can buy time before decisions for larger investments are made. Even if new transmission is planned in the future, GETs can serve as a bridge in the meantime to lower congestion.

Using the PPL case study summarized in Figure 2, the total cost and time to implement DLR is less than the per-mile cost range of rebuilding. Further, there are no outages required for installing DLR.

**Figure 2: Comparison of Potential Solutions for PPL on the Harwood to Susquehanna Path**

			
	Reconductor	Rebuild	Dynamic Line Rating
<b>Time to Implement</b>	2-3 Years	3-5 Years	~1 Year
<b>Downtime</b>	Extended Outages	Extended Outages	No Outages
<b>Cost</b>	\$0.5 Million per mile	\$2-3 Million per mile	<\$50 Thousand per mile*
<b>Est. Capacity Benefit</b>	+34%	+106%	+10-30%

\*<\$1 Million total cost on 20-mile line & longers lines are cheaper

**Source:** [Incorporating GETs and HPCs into Transmission Planning Under FERC Order 1920](#)

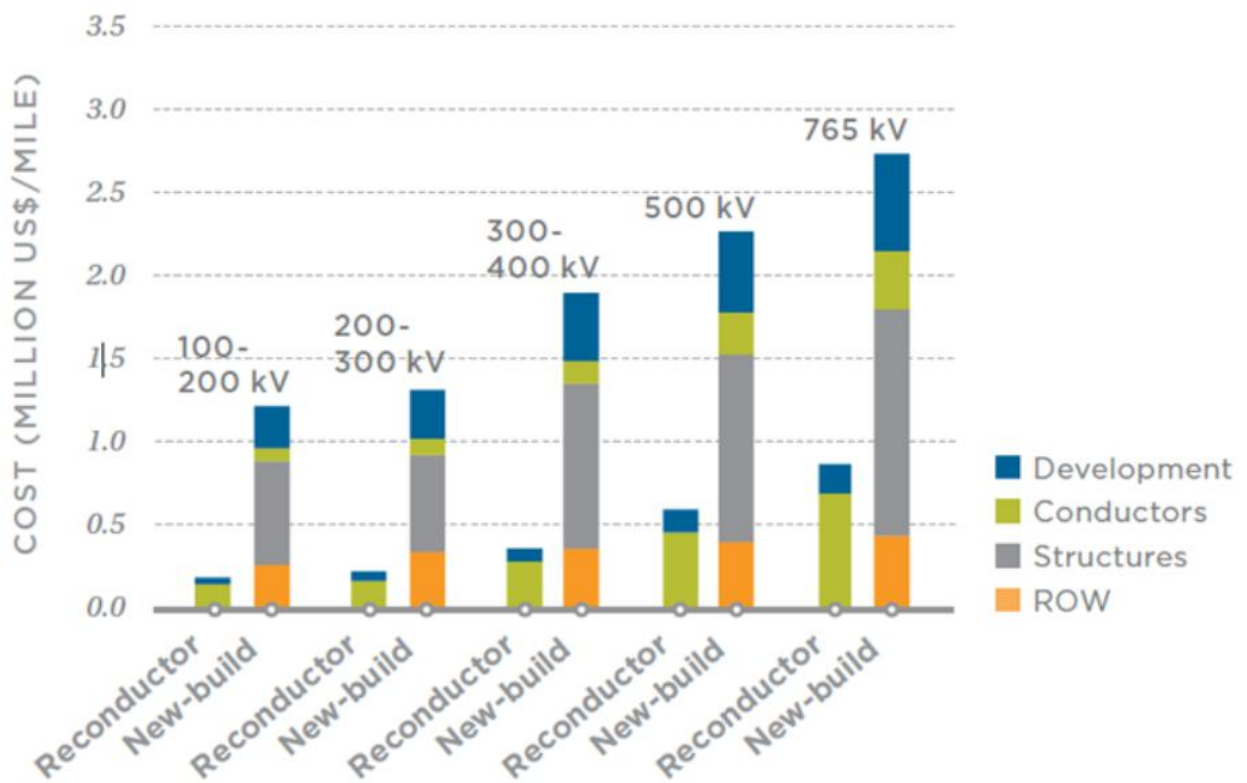
PPL reports that their DLR deployments have operated successfully since deployment and eliminated congestion (which was \$12 million in summer 2022) entirely on the Harwood to Susquehanna 230 kV path, resulting in a one-month payback period.

To properly capture the cost and attributes of installing HPC, the definition of a HPC is important. ACORE encourages defining conductors as HPCs that can increase transfer capacity while reducing line loss and thermal sag. Typically, the conductors most likely to do this are carbon or composite core. We encourage IURC to select a definition similar to [Ohio’s ATT report](#), which excludes aluminum conductor steel supported (ACSS) conductors. This definition is stronger than the Ohio legislative definition directing them to create the report, which we encourage Indiana to do as well in their IURC ATT report.

While it is true HPCs are higher cost than standard conductors when comparing just the initial conductor cost, they can result in overall lower capital costs because HPCs can reuse existing towers due to their lower thermal sag than standard conductors. Reconductoring with HPCs vs. rebuilding with standard conductors will result in lower total project costs since structure costs make up a larger portion of total project costs than conductors (see Figure 2).

Further, even if reconductoring is not possible due to structure health, factoring in the benefits of reduced line loss can result in a quick payback over the incremental HPC conductor cost, demonstrating the importance of evaluating the overall cost over a longer time frame. This is highlighted in more detail later in the comments in Table 4.

**Figure 2: Cost of reconductoring vs. rebuild at different voltage levels**



Source: [Incorporating GETs and HPCs into Transmission Planning Under FERC Order 1920](#)

- 3) Whether each particular technology does the following:
  - a) Increases transmission capacity.

See table 1.

- b) Increases transmission efficiency.

HPCs, defined correctly, increase transmission efficiency, with carbon and composite core having 20-30% lower line loss than standard conductors. A recent example from AEP shows that line loss

savings from HPCs can pay back incremental upfront costs compared to conventional conductors in less than 3 years. AEP presented an analysis to the Ohio House of Representatives Energy Committee that compared standard conductors—like aluminum conductor steel reinforced (ACSR) and aluminum conductor steel supported—to HPC like aluminum conductor composite core (ACCC) and TS Conductor. Screenshots of slides 9 and 10 from AEP’s presentation are below, and the full presentation is available here:

[https://ohiohouse.gov/committees/energy/meetings/cmte\\_h\\_energy\\_1\\_2026-03-18-0300\\_1169](https://ohiohouse.gov/committees/energy/meetings/cmte_h_energy_1_2026-03-18-0300_1169)

**Table 2: Conductor Cost Table (Screenshot from AEP analysis)**

<b>Conductor Comparison</b> (Ampacity calculations based on AEP East Summer conditions using SWRate software and IEEE 738-2012 - See TP-000786)						
Conductor Type		ACSR	ACSS	ACSS/TW	ACCC	TS Conductor
Code Name		Drake	Drake	Suwannee	Drake	1050 Drake
MOT	°C (°F)	150 (302)	250 (482)	250 (482)	200 (392)	200 (392)
Rating	amps	1,506	2,058	2,259	2,048	2,057
Diameter	in	1.108	1.108	1.108	1.108	1.108
Unit Weight	lbs/ft	1.094	1.0934	1.3165	1.0518	1.03254
Alumin. Area	kcm	795	795	960	1026	1,050
RBS	lbs	31,500	25,900	30,700	41,200	42,200
<b>Conductor Pricing</b>						
Pricing	\$/ft	\$ 2.3700	\$ 2.4000	\$ 3.0900	\$ 5.4800	\$ 4.9100
Amp @ MOT per Price	amp/\$	635	858	731	374	419
<b>Supporting Structure Pricing</b> (138kV Double Circuit Suspension)						
Total Structure Cost (M&L)	\$	\$ 38,926	\$ 38,926	\$ 38,926	\$ 37,271	\$ 37,271
Install Cost. Per mile	\$/mi	\$ 88,930	\$ 89,680	\$ 113,652	\$ 197,320	\$ 177,457
Install Cost. / amp / mile	\$/amp-mile	\$ 59.05	\$ 43.57	\$ 50.31	\$ 96.37	\$ 86.27

1.

**Table 3: Line Loss Analysis Table (Screenshot from AEP analysis)**

<b>Conductor Comparison</b> (Ampacity calculations based on AEP East Summer conditions - See TP-000786)						
CID		54649500	54649300	500053335	54649100	
Conductor Type		ACSR	ACSS	ACSS/TW	ACCC	TS Conductor
Code Name		Drake	Drake	Suwannee	Drake	1050 Drake
Diameter	in	1.108	1.108	1.108	1.108	1.108
Unit Weight	lbs/ft	1.094	1.0934	1.3165	1.0518	1.03254
Alumin. Area	kcm	795	795	960	1026	1,050
<b>First Year Line Loss Comparison</b> (Baseline: ACSR Drake, 138kV, Peak Load = 2,000 Amps, 50 mile line)						
Peak amps = 800 (LF = 0.6)	% reduction	-	2%	20%	25%	Comparable to ACCC
Losses (Difference)	MWh	19,982	19,491 (-491)	15,916 (-4,067)	14,987 (-4,996)	
Savings	(\$ / ft / year)	-	\$ 0.11	\$ 0.90	\$ 1.10	
Peak amps = 900 (LF = 0.6)	% reduction	-	2%	21%	25%	
Losses (Difference)	MWh	25,905	25,269 (-636)	20,549 (-5,356)	19,322 (-6,584)	
Savings	(\$ / ft / year)	-	\$ 0.14	\$ 1.18	\$ 1.45	
Peak amps = 1,000 (LF = 0.6)	% reduction	-	2%	21%	26%	
Losses (Difference)	MWh	32,854	32,049 (-805)	25,943 (-6,911)	24,354 (-8,500)	
Savings	(\$ / ft / year)	-	\$ 0.18	\$ 1.53	\$ 1.88	

2.

3.

Using the numbers highlighted in AEP’s analysis, Table 4 calculates how quickly line loss savings pay back incremental cost for HPCs. TS Conductor was the HPC selected because AEP said it was already their preferred conductor for reconductoring.

**Table 4: Summary of AEP Analysis, Calculated by ACORE**

	TS Conductor vs. ACSR	TS Conductor vs. ACSS	TS Conductor vs. ACSS/TW
1. Incremental Conductor Cost	\$2.54/ft	\$2.51/ft	\$1.82/ft
2. Incremental Line Loss Savings @ 800 peak amps (\$/ft/yr)	\$1.1/ft/yr	\$0.99/ft/yr	\$0.2/ft/yr
3. Incremental Line Loss Savings @ 1,000 peak amps (\$/ft/yr)	\$1.88/ft/yr	\$1.7/ft/yr	\$0.35/ft/yr
Simple Payback @ 800 peak amps	2.3 years	2.5 years	9.1 years
Simple Payback @1,000 peak amps	1.4 years	1.5 years	5.2 years

This analysis shows HPCs have a payback of 1.4-2.3 years compared to ACSR, depending on peak amps. The analysis only considers line loss savings, so it is conservative because it doesn't factor in the added benefits of expanded capacity. Even if higher capacity isn't required at the time of installation, installing ACSS or TS Conductor are still the better option for this line, and also future proofs the grid for future load growth. These HPCs can all be used for reconductoring or new builds instead of ACSR since they have low thermal sag.

This analysis shows HPCs' payback is 1.5-2.5 years compared to ACSS depending on peak amps. The analysis only takes into account line loss savings, so understates the benefits since it doesn't factor in the added cost of ACSS projects due to higher tower heights, potentially more towers, and wider right of ways due to sag. Importantly, this shows that even though HPCs have higher incremental conductor costs, they are actually a more affordable investment for this line, especially considering they often have a 50+ year life.

The savings from line loss are ultimately passed on to customers who do not pay for as much wasted energy. A national analysis of reconductoring with HPCs shows savings from line loss could generate over [\\$2.2 billion](#) in annual consumer savings.

c) [Reduces transmission congestion.](#)

Today, insufficient transmission capacity often means that the lowest cost energy can't reach cities or industrial sites that need power. One analysis shows GETs could save [\\$4-8 billion per year](#) in energy costs nationally in congestion savings, assuming a 40% reduction in congestion based on case studies.

d) [Reduces the curtailment of generation resources.](#)

ATTs reduce generation curtailment by either rerouting electricity away from congested lines (TO and APFC) or increasing capacity of a line (DLR and HPC). One example of this is a DLR system installed on two double-circuit 115 kV lines in upstate New York. This DLR project, along with five miles of circuit rebuilds, was projected to [reduce generation curtailments by over 350 MW](#) while further increasing the transfer capacity of the circuits by an additional 190 MW. With an estimated

cost of \$3.2 million, the project budget is less than the average cost of rebuilding just a single mile of a 115 kV line in the area. DLR avoided the need to rebuild 26 miles of transmission.

e) [Increases system reliability?](#)

ATTs can support reliability during planned outages. Both HPCs and DLR can reveal additional capacity on adjacent or interconnected lines, enabling system operators to reroute power efficiently and reduce congestion that could otherwise occur near the outage facility. APFC and TO could also help system operators route power away from the outage affected area. One example of this is in 2015, an [APFC vendor analyzed](#) the potential benefits of APFCs to support the construction of new transmission lines. The utility wanted to upgrade two 60 kV lines, both to 115 kV. Given the length and location of the lines (70 miles long over difficult terrain) and the need to replace the towers (from wood poles to steel towers), the estimated construction period was three and a half years. Taking out the two 60 kV lines required redispatch of generation, particularly in the summer season, to avoid overloading other nearby lines. The study found that the redispatch could be avoided by installing APFC devices and rerouting the flow from these otherwise overloaded lines. The annual costs of the APFC devices were estimated to be between \$1.5 and \$4 million. The savings from avoiding redispatch were estimated to be over \$20.5 million a year, therefore suggesting net savings of \$61.5 million to \$69.7 million over the construction duration period of three and a half years.

f) [Increases system resiliency?](#)

ATTs can provide greater resilience in several ways. First, ATTs can unlock additional generation capacity during extreme weather events. For example, during emergency conditions during Winter Storm Elliott in 2022, [SPP implemented two transmission switching solutions](#). The solutions increased transfer capacity into a major metropolitan area and released up to 845 MW of available but otherwise stranded generation, reducing the loss of load probability significantly during the storm. The transmission switching enabled 14 GWh of power to flow into the otherwise congested area. Two additional transmission switching solutions could have further increased transfer capability and released up to 600 MW of additional generation to the system, potentially releasing an additional 9 GWh of power. Additionally, [PJM emphasized](#) the value of several DLR deployments during Winter Storm Elliot, stating, “The DLR ratings on this line during the storm proved higher than the ambient adjusted ratings PJM would have operated to otherwise. Had PJM not had the higher dynamic line ratings, PJM would have had to take action to re-dispatch the system to maintain reliability. Such action would have been very difficult under the critical operating conditions.”

Additionally, ATTs can reduce ice buildup, as demonstrated by an [SPP analysis](#) of the benefits of flow control using transmission switching to heat lines during severe winter conditions to avoid icing. The study was performed using the January 2017 Winter Storm Jupiter conditions, when ice accumulation caused multiple transmission outages, some lasting over a full day. The study identified two transmission switching solutions that could have prevented or significantly relieved the ice buildup on selected critical lines while meeting reliability criteria. If implemented, this would have reduced the loss of load.

g) [Increases the capacity to connect new energy generation resources.](#)

High network upgrade costs often lead to projects dropping out of the queue, requiring restudies and increasing uncertainty around interconnection costs. By including ATTs in interconnection studies, more projects should move through the queue more smoothly. Reconductoring 25% of transmission lines that need to be replaced over the next decade with HPCs would enable the integration of [roughly 27 gigawatts](#) of new generation per year nationally. [A 2021 study by The Brattle Group](#) indicates deploying GETs in the Kansas and Oklahoma region of SPP can integrate twice the amount of generation as without GETs (2,580 MW vs. 5,250 MW), resulting in an annual production cost savings of \$175 million for a \$90 million investment (or payback in roughly half a year). This translates to over \$5 billion in production cost savings if results are extrapolated for the lower 48 states.

- 4) What is the potential of each ATT to be used or be deployed by public utilities to provide safe, reliable, and affordable electric utility service to customers in Indiana, considering existing and planned transmission infrastructure and projected demand growth?

While more transparent utility information would be required to fully answer this question, ACORE's answers to questions 1 and 2 answer this at a high level.

- 5) What potential reductions in project costs and project completion deadlines can be furthered by ATTs compared to traditional transmission infrastructure?

See Table 1.

- 6) What are potential ways to streamline the deployment of ATTs, including streamlined processes for permitting, maintenance, and upgrades?

Streamlining the deployment of ATTs requires the following:

- **Shift Utility and PUC Planning and Project Evaluations From a “Least Upfront Cost” to a “Maximum Net Benefits” Framework, with a Particular Focus on Energy Efficiency:** Policymakers and regulators can require evaluation of energy efficiency or line loss reduction benefits when determining what conductor to use. Energy efficiency and line loss reduction are two benefits not typically considered in utility decision-making. Such a requirement would help shift evaluations from a “least upfront cost” to a “maximum net benefits” evaluation. As the AEP example demonstrated, often least upfront cost does not directly translate to most affordable for customers.
- **Holistically Incorporate ATTs into Planning and Permitting Models:** Asset replacements are not generally integrated into broader planning for transmission expansion. Within transmission planning and development, decisions regarding conductors are often considered an engineering choice that occurs after planning. Given the additional benefits beyond basic ampacity requirements (e.g., reliability, efficiency, speed) HPCs can provide, considering them as a part of the set of transmission solutions developed in the planning context would help optimize planning results. Similarly GETs should be included in the planning process, as is outlined in the [Assessment and Evaluation of Grid Enhancing Technologies \(GET\)](#) report EPE wrote.
- **Develop an ATT Evaluation Methodology:** While many states have passed ATTs bills asking for evaluation of ATTs, most don't have an approved process to evaluate ATTs, resulting in evaluation that is not always as comprehensive as it could be. ACORE encourages ATTs to be evaluated using the seven benefits outlined in FERC Order 1920. This will allow them to

be more easily compared against traditional regional transmission investments. Ideally local transmission investments are also evaluated using seven benefits for comparison purposes. Ohio is in the process of developing an [ATT evaluation methodology](#) and just requested feedback on it. While there is room for improvement, their methodology is a useful example worth building from. ACORE would encourage IURC to follow a similar process ahead of ATT evaluation in IRPs with an opportunity for stakeholder feedback on the methodology. Further ACORE encourage IURC to request utilities share their full ATT analysis publicly, not just that the analysis was complete.

- **Make Permitting Changes to More Closely Align with Federal Exclusions for Reconductor and Rebuild Projects:** Generally, reconductoring projects require limited state-level permitting, potentially only a maintenance permit. However, because the grid is aging there are many lines that were built before environmental permitting was meaningfully required and any significant upgrade to the existing transmission line, including reconductoring, could lead to new state environmental permitting reviews. These new permitting requirements eliminate a significant benefit of reconductoring, which is the time savings compared to building a new line. In contrast, states can make analogous revisions to the [Department of Energy's categorical exclusion B4.13](#) that eliminates the need for environmental reviews for the reconductoring of existing transmission lines. GETs should similarly receive a clear categorical exclusion to streamline permitting.

7) [Are there any other aspects of ATTs that can assist the IURC to understand the potential role of ATTs in Indiana?](#)

As stated in the first answer, it is important to think about ATTs as a solution that not only can replace new transmission but can also complement it. Further, ATTs should not be seen as simply a congestion solution but instead be evaluated comprehensively for their various benefits (e.g. speed to power, line loss efficiency).

### **Conclusion**

ACORE appreciates the opportunity to provide comments on the IURC ATT report. ATTs are a valuable tool for improving affordability and supporting growing electricity demand, making robust and comprehensive evaluation critical to ensuring their full value is considered. We appreciate your consideration of these comments and welcome any questions or further discussion.

Respectfully submitted,

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