ESIG April Webinar - ESIG Webinar: Unlocking Interconnection Queues with Grid-Enhancing Technologies	
Question	**Answer**
Shouldn't we be applying similar technologies at the distribution level in order to increase hosting capacity and provide flexible demand to help variable DER?	Yes, we agree. Right now we are trying to increase the industry recognition of these technologies and therefore showcasing the benefits on transmission rather than distribution. Dramatic growth in distribution-level electrification and DER will only further push operators to adopt technologies that increase the overall controllability and utilization of the existing network (particularly because new line construction can be so challenging in more urban, distribution settings), hence opportunities for GETs at distribution voltages will likely be vast.
Can you speak on the reliability impacts of GETs? For example, how are DLRs and OPCs considered in operating procedures/special protection schemes?	GETs does provide reliability benefits. For example, SPP implemented an operating guide using the reconfiguration shown in slide 22 of the report. Technologies like power flow control are not typically considered for operating procedures/special protection schemes because they can be controlled at the local substation level. However, these technologies can alternatively be controlled within operating procedures/special protection schemes if non-local data were used as a control input.
Some of the grid enhancement technologies to be adopted by the utilities takes a long time (e.g, SmartWire over 15 years) ...barriers/mitigation steps?	Improving industry experience with device modeling, realigning transmission planning and operations prioritization with network efficiency, and sharing best practices will all facilitate broader use of GETs. Taking Smart Wires (founded in 2010) as an example, they now have a decade of power flow control installation experience in both the US and abroad. Like other GETs, Smart Wires has seen rapid adoption in markets with regulations that incentivize utilities to make the best use of their existing network, for example, in Latin America, UK, Europe, and Australia. Today, a number of US utilities are adopting these technologies and taking advantage of their rapid installation timelines – often 12 months or less from Notice to Proceed to Commissioning.
Can you give an estimate on how long the analysis took and the approximate budget amount?	The analysis took about 4 months and another month for release. We do not share commercially sensitive contract values.

What was the average DLR cap representing thermal overload of other equipment in substation your study?	We capped DLR benefits at 20%, assuming any increase beyond that could lead to overloading of other equipment. This assumption was based on industry experience of the DLR vendors. In reality it varies by the actual application.
How might storage as transmission be used in similar ways as the technologies you studied?	Storage can provide time shifting services, and typically not used to increase transfer capabilities as the GETs analyzed in the study. Therefore, the benefits provided may be of a different type.
Has a study like this being done in the CAISO market?	We are not aware of any that are public. We are aware that in 2016, Pacific Gas and Electric Company reviewed the construction and on-going operation and maintenance costs of Distributed Series Reactors as an alternative to mitigating the thermal overloading of a 230 kV line. CAISO is highly familiar with power flow control modeling and routinely evaluates economic and reliability proposals from TOs referencing this technology.
What is holding RTOs back from adopting these technologies?	The RTOs typically do not own transmission assets so it may be more of the transmission owners holding back due to the lack of incentives and the fact that innovation requires a concerted effort to be made. RTOs have an obligation to evaluate any project their member utilities bring forward, therefore they are not actively blocking integration of these technologies. It is in their best interest to suggest use of these technologies when the market benefits from these projects align with stakeholder goals/needs.
The answer to the uses of these technologies indicates they are clearly a niche and very limited market - do WATT understand this in their own business models.	It is not clear to us what is meant by "a niche and very limited market." GETs have been deployed to address a broad array of reliability and economic challenges, with clear benefits to ratepayers at highly advantageous cost-benefit ratios in systems across the world. From generator interconnections to bridge solutions, these technologies represent an important tool to cost-effectively manage the dramatic scale and speed of the energy transition. The WATT Coalition members are aware of the opportunities as well as the limitations regarding the use of their technologies to provide low cost and timely solutions to grid operating challenges to manage congestion.
When deciding what thermal power plants to model, did you think about modeling the influence of load to "soak up" the excess generation?	We modeled every thermal power plant that was included in the power flow cases (EMS snapshots received from SPP). Please elaborate what you mean by soak up.

Along these lines of flexible load, how far downstream (i.e. transmission node or substation) do you measure demand or voltage to align with supply?	We used state estimator snapshots from the SPP EMS, i.e., same data granularity available to RTO operations. Typically, those models include detail down to the 69 kV systems, sometimes 34.5 kV.
Do you consider deratings due to coincidence worst case weather conditions or just increasing average rating capacity?	We did find instances where applying DLR led to derating of line transfer capabilities and applied the lower ratings observed to the analysis. This conservative, but more importantly realistic, approach was taken to not overstate the benefits of GETs in this case study. One can consider this as a reliability benefit brought by awareness.
What is a realistic timeline for when grid enhancing technologies will be adopted by RTOs, such as SPP?	RTOs are already proactively learning how to model and develop solutions that incorporate these technologies both in planning and operational time horizons. With deployments across the country, the RTOs are rarely the primary limiting factor in technology adoption. For example, SPP in the last few years has implemented DLR pilots and performed case studies regarding topology optimization in a few months after approvals to proceed. Granted, these were research projects and not operational solutions. PPL in PJM has deployed DLR on two market efficiency projects to determine if traditional transmission expansion solutions are appropriate or can be deferred/displaced altogether based on a better understanding of lines' capabilities compared to traditional static ratings used in planning assessments. The time to install field equipment for GETs can be a matter of months, but updating existing operating systems may be required to incorporate data or settings into markets and operating systems. Note that the FERC NOPR on Managing Line Ratings will soon require ISO/RTOs to incorporate Ambient Adjusted Ratings into operations, and that same capability would support the use of DLRs too.