Regional Transmission Planning Regimes

Acadia Center

Comparing New England's Long-Term Transmission Planning (LTTP) Process with FERC's Order 1920, "Building for the Future Through Electric Regional Transmission Planning and Cost Allocation."

For additional information, check out the accompanying blog post here.

TRANSMISSION BENEFIT TYPE	ORDER 1920 BENEFIT DEFINED	LTTP BENEFIT DEFINED	PLAIN LANGUAGE EXPLANATION AND ANALYSIS
1. TRANSMISSION INVESTMENT DEFERRAL	**Avoided or deferred reliability transmission facilities and aging infrastructure replacement**	**Avoided transmission investment**	
	Defined as: "the reduced costs due to avoided or delayed transmission investment otherwise required to address reliability needs or replace aging transmission facilities"	***Defined as:*** "the costs of reliability, **market efficiency** and aging infrastructure replacements that would no longer be needed or would be replaced by the Longer-Term Proposal."	***Plain Language:*** When new transmission gets built, it can help to defer future improvements needed for other aging facilities that would've otherwise needed to get fixed. The same line of logic goes for addressing reliability, where building new transmission can defer investments needed to improve infrastructure that affects the reliability of the grid. ***Analysis:*** The two benefits seem aligned, where the **only difference** is that LTTP will consider market efficiency as a monetary benefit in transmission deferral.
2. LOSS OF LOAD / RELIABILITY PLANNING	**Either reduced loss of load probability or reduced reserve planning margin**	**Reduction in expected unserved energy**	
	Defined as: "Benefit 2(a) – reduced loss of load probability: "the reduced frequency of loss of load events by providing additional pathways for connecting generation resources with load in regions that can be constrained by weather events and unplanned outages (if the planning reserve margin is not changed despite lower loss of load events), as well as improved physical reliability benefits by reducing the likelihood of load shed events." Benefit 2(b) – reduced reserve margins: "the reduction in capital costs of generation needed to meet resource adequacy requirements (i.e., planning reserve margins) while holding loss of load probability constant."	***Defined as:*** "The ISO will use the production cost model with generation forced outage rates added to the model. The ISO will use multiple weather years and outages per year to calculate expected unserved energy and its associated economic benefit".	***Plain Language:*** Note that under FERC's definition of the benefit, it is either reduced loss of load or reduce reserve planning that can be categorized as a benefit, but not both of them at the same time. 2a, reduced loss of load, is when transmission makes the grid more reliable by preventing outages and blackouts, either by transporting electricity across longer distances or by allowing new resources to connect to the grid and provide electricity. 2b, reduced reserve margins, is measured as the reduced amount of electricity needed to meet demand because transmission can help transport power to load centers. New transmission can help maintain resource adequacy. ***Analysis:*** The LTTP will model expected unserved energy, which is a measure of loss of load, to calculate the reliability benefits of new transmission.
3. PRODUCTION COST SAVINGS	**Production cost savings**	**Production cost and congestion savings**	
	Defined as: "Savings in fuel and other variable operating costs of power generation that are realized when transmission facilities allow for displacement of higher-cost supplies through the increased dispatch of suppliers that have lower incremental costs of production, as well as a reduction in market prices as lower-cost suppliers set market clearing prices."	***Defined as:*** "ISO will use a production cost model which will simulate a scenario with the proposed "Longer-Term Proposal" and a scenario without it, and quantify the production and congestion differences. "	***Plain Language:*** Production cost savings is the most widely used benefit metric in transmission. Production cost savings focuses on the costs associated with generating power in a certain area (factoring costs like fuel, O&M, etc) and how transmission can reduce costs by bringing in lower-cost generation that can displace higher-cost generation. ***Analysis:*** It will be important for ISO-NE to review the outputs of the production cost model with stakeholders and to make sure it's a transparent process, aligning with FERC requirements. The inputs into the production cost savings model will be important, to see how operating costs, fuel, and other boilerplate inputs are factored in. It is standard practice to run the model both with and without the expected transmission investments, so this makes sense on ISO-NE's part as a clear way to get production cost savings results.
4. LINE LOSSES	**Reduced transmission energy losses**	**Reduction in losses**	
	Defined as: "The reduced total energy necessary to meet demand stemming from reduced energy losses incurred in transmittal of power (i.e transmission) from generation to loads."	***Defined as:*** "The ISO will use powerflow models to establish losses across varied representations of system conditions. The difference between losses in the base case without the Longer-Term Proposal, and the case with the Longer-Term Proposal, will allow the ISO to ascertain the reduction in losses provided by a Longer-Term Proposal. The reduction in losses will then be modeled as a reduction in load in each hour of the production cost model to determine the value of reduced losses."	***Plain language:*** More transmission build-out can help minimize the amount of energy losses that take place moving power. For instance, building an extra transmission line to serve more load (customer demand) can help take off the stress from a singular old line that was overloaded and losing more energy mid transit. ***Analysis:*** ISO-NE modeling seems to align with FERC's definition, as their powerflow modeling will check losses both with and without the Longer-Term Proposal. FERC's definition seeks to quantify the reduction in total energy needed due to the reduction in losses along the transmission lines. ISO-NE's calculation meets this requirement.
5. CONGESTION	**Reduced congestion due to transmission outages**	**Combined into production cost savings benefit**	
	Defined as: "Calculates the reduction in production costs resulting from avoided congestion during transmission outages."	***Defined as:*** Combined into production cost savings benefit	***Plain Language:*** Congestion occurs when transmission lines become overloaded with power and are unable to carry more electricity. It can become worse when a transmission line experiences an outage, forcing more power onto neighboring lines. It is comparable to being stuck in traffic on the highway at rush hour. Congestion can cause ripple effects on the grid, like the curtailment of energy generation in moments where the transmission can't handle more power. It is reflected on the system through pricing, based on the supply and demand of available transmission capacity. ***Analysis:*** It is interesting that the LTTP process plans to combine congestion and production savings in this benefit. According to ISO-NE's filing, they will run the production cost model twice and "the production and congestion cost savings will be quantified as the difference in production costs between the two runs". Technically, this model that ISO-NE is proposing does not account for transmission outages, and how that ties to congestion pricing. By grouping production cost savings with congestion, ISO-NE might find itself in misalignment with FERC requirements.
6. WEATHER/ RESILIENCY OF SYSTEM	**Mitigation of extreme weather events and unexpected system conditions**	**Missing benefit from LTTP**	
	Defined as: "Calculates the reduction in production costs during extreme weather events and unexpected system conditions, such as unusual weather conditions, fuel shortages, and generation and transmission outages.	*Missing Benefit from LTTP*	***Plain Language:*** More transmission can improve grid resilience, especially during extreme weather events or on days with high demand for electricity which might disrupt power flow. Transmission cannot prevent these situations from occurring, but it can help the system be more adaptable by routing power in different directions and by compensating for other transmission outages that might occur due to these events. ***Analysis:*** It is important for ISO-NE to officially designate this as a benefit in its LTTP process, otherwise they will not be compliant with FERC Order 1920.
7. GENERATION CAPACITY COST SAVINGS	**Capacity cost benefits from reduced peak energy losses**	**Avoided capital cost of local resources needed to serve demand**	
	Defined as: "Calculates the benefit of using a transmission facility to reduce the investment in power plants needed to meet peak electric usage, for example, on very hot days. These savings would be passed on to customers through lower generation capacity costs."	***Defined as:*** "[ISO-NE will be] using a capacity expansion model to measure the difference in cost between a future scenarios with and without optimized transmission and generation."	***Plain Language:*** Additional transmission can carry power from cheaper sources of electricity, like wind and solar power, to cities and towns across New England. Cheaper clean power might be sited far away from the demand for electricity (for example, offshore wind), but transmission can carry that power and reduce investment in local power plants near a load center like a city. Additionally, consumers pay for some power plants that only operate a couple of hours per year to meet demand on the hottest or coldest days, and transmission can help reduce these costs. ***Analysis:*** It makes sense that ISO-NE is proposing to use a capacity expansion model for this analysis, given that different simulations of the generation mix will be critical to adequately calculate this benefit. It will be important for stakeholders to see the types of generation scenarios that ISO-NE uses, and to make sure that the last part of savings 'passing onto customers' are adequately addressed, as they are not currently referenced in the filing to FERC. It will also be critical for ISO-NE to model capacity cost savings, and not just energy costs generally.