PPL companies

Revised NITS Capacity Proposal

Executive Summary

Louisville Gas & Electric Company and Kentucky Utilities Company (collectively "LG&E/KU") is proposing to modify the NITS Capacity process as is currently documented in the LG&E/KU Business Practice document (section 3.4.4.3) posted on OASIS. Specifically, the current study process may indicate the need for transmission upgrades, when in reality, the upgrades are not warranted.

Background

Prior to September 1, 2012, the Designated Network Resource ("DNR") – now referred to as NITS Capacity – value was not used in any Transmission Planning process at LG&E/KU. When TranServ became the Independent Transmission Organization ("ITO") on September 1, 2012, its planning staff indicated that maximum net output of each network resource in the power flow studies should be the DNR levels, based on their understanding of applicable NERC and FERC requirements. However, the current NITS Capacity process has the potential to result in unintended consequences.

For example, combustion turbines will typically have a single DNR capacity based on their higher winter ratings, however, using these higher winter ratings in a summer "DNR Capacity" model does not make sense as it may be physically impossible for a combustion turbine to generate the same amount of peak power in the summer-peak as winter-peak. Studies should include reasonable generator output levels for the respective model, otherwise, it can lead to erroneous study results and potentially unneeded transmission upgrade projects.

Transmission planning is founded on building and studying "worst case" condition models based on reasonable expected values for load levels, generation capacities, line ratings, firm transfers, etc., with the assumption that the system would operate adequately at all system conditions in between. It would be impractical, if not impossible, to model and plan the system at all possible combinations of system conditions. These "worst case" models have historically been a summer-peak model and a winter-peak model. These models were never meant to represent the entire summer or winter season, but rather a "peak" single hour condition for the corresponding season. It is not a requirement that these worst case models be built around a single ambient temperature criteria. For an example, a winter-peak model may use colder ambient temperature assumptions for loads and generator capacities than the ambient temperature assumption used for equipment ratings. The key is to build a reasonable worst case model for the appropriate season.

NERC MOD-032 standard requires Generation Owners to provide expected generation capacities to the Transmission Planner for use in model building. The LG&E/KU Transmission Planner uses the generation capacities as supplied by the GOs for the summer and winter-peak models. The standard also allows the Transmission Planner to request data as needed to accommodate the building of other required or desired models. It is important to note that the generating capacities supplied by the GOs for the summer-peak and winter-peak models via the MOD-032 data request may not in fact represent the maximum capability of the resource for all times of the year. This is particularly true for combined cycle resources and intermittent resources.

In order to address the shortcomings identified above, LG&E/KU have proposed a solution below.

NITS Capacity Proposal

The proposal is to modify the current "off-peak" model which is studied as part of the TEP, TSR and GI study processes. This modified off-peak model(s) will be based on the following:

- 70 degree ambient equipment ratings
- Generation capacity based on new MOD-032 data request at 60 degree ambient
- Load levels based on approximately 60-70 degree ambient temperature

The assumption is that the maximum expected capability of each unit will be represented in one of the models and studied appropriately. In essence, the off-peak model becomes a "worst case" model in which generation that is not modeled at its maximum in either the summer or winter-peak hour models, is tested at maximum in a more appropriate model and under appropriate TPL criteria (i.e., P0 – P7).

The NITS Capacity for each generating unit will be defined as the highest unit capacity provided for the requested ambient temperatures submitted via the MOD-032 data request over the 10 year period. This single-value unit capacity will not be used in any specific sensitivity study, but rather will be studied as described above in the appropriate year/model as submitted by the GOs in their annual MOD-032 data submittal.

Business Practices and Other Documents

The LG&E/KU Planning Guidelines, TSR Study Criteria, GI Study Criteria, and Business Practices documents posted on OASIS will be revised to describe the NITS Capacity process and how the customer will provide three temperature-based capacities for their respective generating resources.

The Business Practices document, in particular, will continue to state that a Network Customer can only operate in excess of the NITS Capacity by submitting a new Transmission Service Request ("TSR") on OASIS or under emergency conditions and that a generating unit should never exceed its Generation Interconnection Capacity (GIC). As is always the case, any real-time operations issues will be mitigated by the LG&E/KU Transmission Operations Desk and/or the RC.

It is important to note that this revised NITS Capacity proposal may result in a reduction of the current NITS Capacity of some units, however, it is reasonable to limit the NITS Capacity of a unit to the maximum forecasted capacity over the next 10 years as submitted via the MOD-032 data request. In the event of a reduction in the NITS Capacity of a unit(s), an updated NITSA will need to be executed reflecting the new value.

AFC Process

No changes will be required for the AFC process as it will continue to use generating capacities as modeled in the seasonal NTSG and LTSG models and as updated by information supplied via the SDX processes. TVA also currently receives unit commitment data from some LSEs which reflects the expected unit maximums for the next 14 days.

Additional Questions from the ITO:

- Please explain the difference between the off-peak model which is currently used in the TEP, TSR and GI study processes and the "modified NITS" off-peak model.
    - The 2017 TEP off-peak model was a spring light load model.
    - The 2018 TEP off-peak model will be a spring light load model and a new 60 degree model (described above).
    - The 2019 TEP off-peak model and beyond will be the 60 degree model (described above).
- Please explain how the generation scenarios tested as part of the TEP, TSR and GI study processes will be expanded to assure testing of all NITS capacities even when a generator is off-line in merit order in the study model.
    - The TO is agreeable to the dispatch scenarios provided by the ITO below. Importantly, the below list will be run with P1 transmission only. This will be tested against emergency ratings. These scenarios will be run using the ITO developed (TO tested) python code.

Dispatch Code	Definition
MBR_NITS	Maximized All Brown Units, scale all other LGE and KU Gens
MCR__NITS	Maximized All Cane Run Units, scale all other LGE and KU Gens
MDX__NITS	Maximized All Dix Dam Units, scale all other LGE and KU Gens
MGH__NITS	Maximized All Ghent Units, scale all other LGE and KU Gens
MHF__NITS	Maximized All Haefling Units, scale all other LGE and KU Gens
MMC_NITS	Maximized All Mill Creek Units, scale all other LGE and KU Gens
MOF_NITS	Maximized All Ohio Falls Units, scale all other LGE and KU Gens
MPR__NITS	Maximized All Paddy's Run Units, scale all other LGE and KU Gens
MTC_NITS	Maximized All Trimble Co Units, scale all other LGE and KU Gens
MZR_NITS	Maximized All Zorn Units, scale all other LGE and KU Gens
MBG_NITS	Maximized All Bluegrass Units, reduce import from "PJM"
MPS_NITS	Maximized All Paris Units, reduce import from "MISO"
MPD_NITS	Maximized All Paducah Units, reduce import from "MISO"

- Please explain how LG&E and KU will assure that all NITS capacities especially the local maximization of NITS capacity will be tested based on normal continuous equipment ratings when no contingency is modeled.
    - The TO is agreeable to the dispatch scenarios provided by the ITO below. These scenarios will be run using the ITO developed (TO tested) python code.

Dispatch Code	Definition
MBR_NITS	Maximized All Brown Units, scale all other LGE and KU Gens
MCR__NITS	Maximized All Cane Run Units, scale all other LGE and KU Gens
MDX__NITS	Maximized All Dix Dam Units, scale all other LGE and KU Gens
MGH__NITS	Maximized All Ghent Units, scale all other LGE and KU Gens
MHF__NITS	Maximized All Haefling Units, scale all other LGE and KU Gens
MMC_NITS	Maximized All Mill Creek Units, scale all other LGE and KU Gens
MOF_NITS	Maximized All Ohio Falls Units, scale all other LGE and KU Gens
MPR__NITS	Maximized All Paddy's Run Units, scale all other LGE and KU Gens
MTC_NITS	Maximized All Trimble Co Units, scale all other LGE and KU Gens
MZR_NITS	Maximized All Zorn Units, scale all other LGE and KU Gens
MBG_NITS	Maximized All Bluegrass Units, reduce import from "PJM"
MPS_NITS	Maximized All Paris Units, reduce import from "MISO"
MPD_NITS	Maximized All Paducah Units, reduce import from "MISO"

- Please explain whether or not the TVA AFC model will include the NITS capacity levels.
    - The TVA seasonal AFC models are built based on seasonal-peak generation capacities and as such contain generation capacities that are expected at those peak seasonal conditions. LSEs can, and do, update their generation capacities in the near-term. TVA pulls those capacities into the AFC model. The NITS Capacity levels will be reflected in these values when the units are capable.