JOINT UTILITIES
OF NEW YORK

CGPP: Generation Siting Methodology

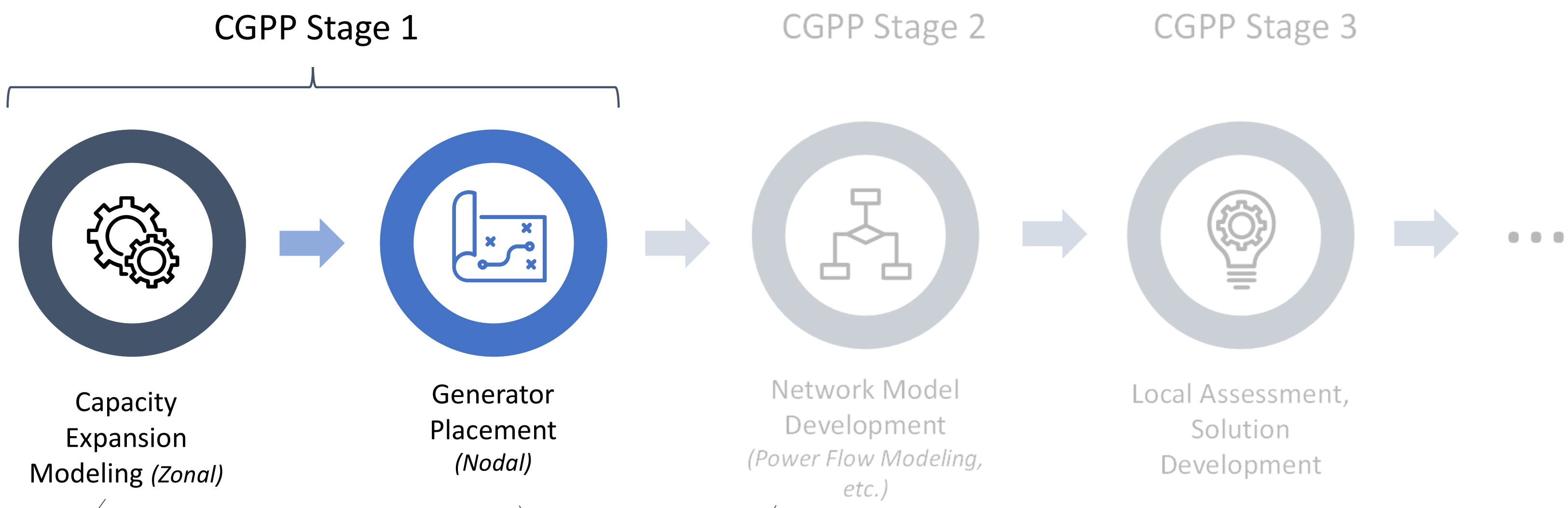
June 17, 2024 EPPAC Meeting

NYSEG nationalgrid Orange & Rockland Rockland Electric Company conEdison PSEG LONG ISLAND Central Hudson RG&E

Agenda

- High-level context: practicable siting methodology
- Zonal to nodal placement of generation specified in capacity expansion modeling
  - Sequence of considerations
  - Process
- Land use constraints, proximity to transmission
- Siting DER
- Q&A

Siting Methodology: Generator Placement



Planning methodology co-optimizing generation capital cost and production cost to determine a least cost future generation capacity buildout under various planning scenarios using detailed generation, transmission, load, and cost data, forecasts, and policies. *(NYISO)*

Nodal placement (*i.e.*, at the bus level, reflecting headroom, land use constraints, *etc.*) enables a power flow model to examine the grid to identify where transmission congestion is likely to occur.

Zonal to Nodal Placement: Sequence of Considerations

- CGPP objective: determine least-cost investment and dispatch solution
  - Placement within DACs to be monitored closely throughout the analysis
- Requirement: Placement of resources identified in the capacity expansion modeling work (NYISO)
  - *E.g.*, 1200 MW blocks, ~15 GW of solar PV in Zone E, *etc.*
  - Block sizes may be smaller on the lower voltage/115kV system
- Initial development: NYISO Interconnection Queue
  - But: what proportion of the queue is shed naturally as the economics become clear?
  - Model all interconnection queue projects at stage 6 or later.* Consider simplifying the models to aggregate generation to the POI instead of the full model build out with all the extra collector buses and discrete generators.

* *Known physical feasibility considerations will apply to queue projects at stage 6 or later.*
Queue reform may affect the way this methodology is applied. The JU plan to model sufficiently advanced interconnection queue projects: Stage 6 (Approved SRIS) or later in the preceding process; a passed infeasibility screening and cluster study in the new process. The JU will attempt to simplify models to aggregate generation to interconnection locations to avoid a full model build out with all the extra collector buses and discrete generators.*

Zonal to Nodal Placement: Sequence of Considerations (continued)

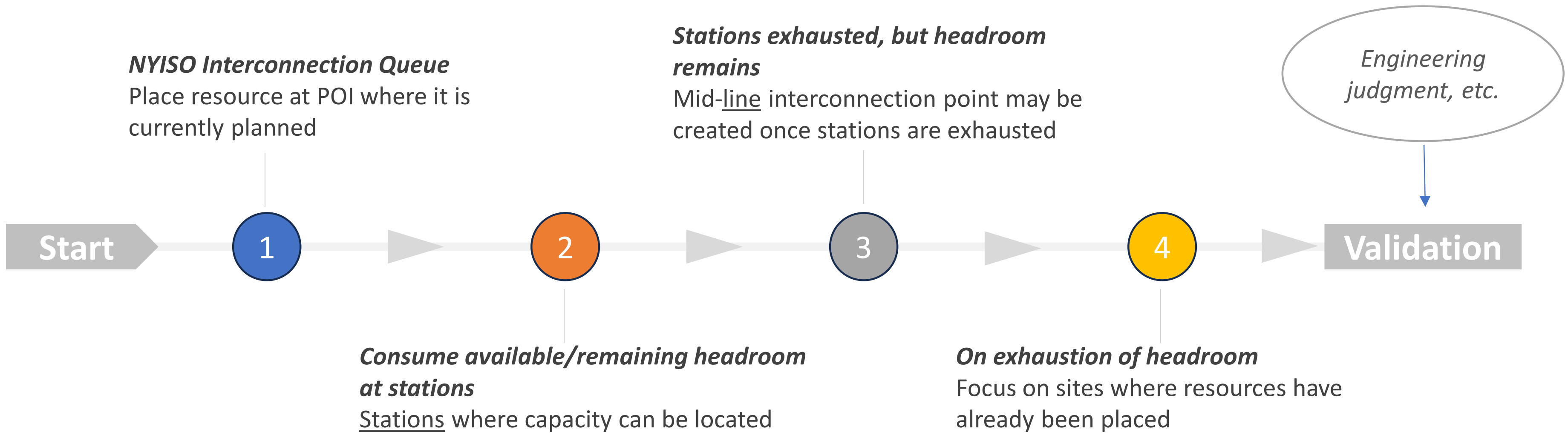
- NYISO Interconnection queue (continued)
  - Evaluate the split between projects in the queue (in each zone) by voltage level:
    - Apply this as an assumption for siting capacity from the buildout scenarios
    - *Example*: based on review of the NYISO queue, resources *beyond* the queue could be placed in Zone X: 40% at 345kV, 60% on lower-voltage system
- Renewables, DEFRs: should different approaches apply?
  - JU Methodology:
    - Same approach but for placement in DACs, *i.e.*:
      - Renewables and fuel cells may be placed in DACs
      - However, no *new* combustion units will be placed in DACs
    - Combustion DEFRs may be placed at existing fossil (combustion) facilities
      - Up to the existing nameplate capacity
      - Incremental capacity may *not* be sited in a DAC

Zonal to Nodal Placement: Sequence of Considerations (continued)

- Guardrails: size of individual projects at a single location
  - JU Methodology*:
    - ***Minimum resource type block size of 100 MW***
    - ***Maximum aggregate amount of generation at any location*** *(Note: storage would not offset these maximum capacity levels; these levels would cap the capacity of storage.)*
      - 600 MW at 115kV (3000A); 700 MW at 138kV (3000A); 1200 MW at 230kV (3000A); 2400 MW at 345kV (4000A)
- Coordination between the utility/utilities and developers
  - JU Methodology: Assume perfect coordination (i.e., developers build in the locations the JU identify in the study); solutions will unlock generation at specific locations, which will be made public in Stage 6, headroom updates, etc. subject to CEII limitations.

* *Subject to the profile of specific locations. Resource land-use considerations (e.g., for utility-scale PV) must be considered as well.*

Siting Methodology Illustrated



(Detail on each of these steps appears on the next slides.)

Zonal to Nodal Placement: Process

1. Start with NYISO interconnection queue
   - Place all resources at Stage 6 or later at the POI at which that project is currently planned
   - Supply curve data and county-level capacity expansion results to be considered
     - Example: skip a resource if it is located in an area that is already saturated to levels of Cap Ex models
2. Consume available/remaining headroom on transmission/local transmission buses*
   - Prioritized set of stations (county by county) where capacity can/should be located
   - Criteria for prioritization:
     - Existing/planned stations that are expandable
       - Existing generation resources retired/retiring
         - Note*: Re-powering is assumed within the State Scenario, specifically for hydrogen combustion*
       - Stations with space
     - Evaluate stations that may have headroom, but are not physically suitable for interconnecting resources
       - Interconnect to any lines that lead to that station and that have line-level headroom

** For this CGPP cycle, the Joint Utilities will use headroom calculations presented in the Feb 1, 2024 update filing.*

Zonal to Nodal Placement: Process (continued)

3. Once *stations* are exhausted, look at *line* locations
    - Is the system able to accommodate additional capacity?
    - Assumptions re: renewable capacity factor (simultaneous)
    - Identify locations where a mid-line interconnection point may be created
        - Interconnection points are assumed to be 3-breaker ring bus
        - Up to summer LTE rating of the existing line

4. On exhaustion of available headroom:
    - Place incremental resources at sites where resources have already been placed, but the interconnection threshold for a given location (*noted on slide 6*) has not yet been reached
    - Apply engineering judgement:
        - Consider: population density, flood zones, state parks/lands, etc. to select locations
        - Siemens strong bus analysis; screen out areas where interconnection is unlikely to be feasible

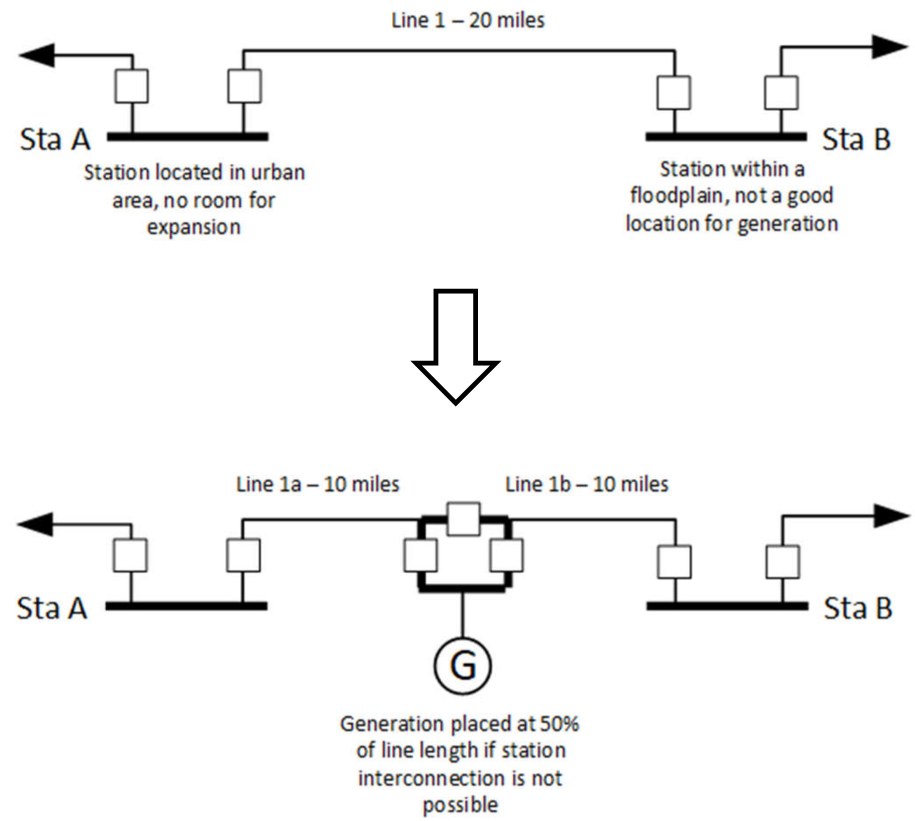
5. Post-placement check

Use available tools (e.g., supply curve, etc.) to validate placements

- Assumptions may need to change in the course of analysis of Step 3 (line location) decisions

Proximity to Transmission

- Challenge: Many stations are not expandable, but available land does exist
  - JU approach: Bisect lines, place generation on new lines so that it does not need to be placed at specific stations
- Evaluation of land-use constraints/restrictions
  - Based on NYSERDA Integration Analysis
- Upstate: Place large capacity bundles along existing lines, generally proximate to switching stations



Siting DER

- DER modeled separately as a reduction in load in power flow models
- DER siting assumptions will be informed by utilities' hosting capacity calculations and other tools

EXAMPLE:

- This forecast for solar resources is integrated into the load forecast for Scenario 2.
- It reflects a modification to the CaC 2022 Scenario 2: Strategic Use of Low-Carbon Fuels “High End Use Flexibility" load forecast.

Solar Roadmap Base	2030	2035	2040	2045	2050
A-F	7,196	9,773	12,608	16,001	20,038
GHI	1,118	1,208	1,307	1,426	1,567
J	754	1,009	1,290	1,625	2,025
K	1,231	1,511	1,819	2,188	2,626
Total	10,299	13,501	17,023	21,239	26,256

Q&A