Climate Change Phase II Study
Scope, Method, and Inputs

NYISO ESPWG

February 27, 2020

Table of Contents

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ECONOMIC, FINANCIAL and STRATEGY CONSULTANTS

Context and Assignment

- The combination of changes to New York's climate and changes to power sector supply and demand from climate-focused law and policy may introduce new reliability considerations for the New York grid
  - New York's Climate Leadership and Community Protection Act (CLCPA) directs that:
    - By 2030, 70% of all electricity in the state will be provided by renewable resources ("70 x 30")
    - By 2040, the statewide electrical demand system will be "zero emissions;" meaning that 100% of all electricity be provided by carbon-dioxide free resources ("100 x 40")
  - These requirements will increase reliance on weather-dependent renewable resources
  - Trends towards electrification of heating and transportation may significantly impact the quantity and shape of electricity demand
  - Both demand and supply may be affected by impacts from climate change
- Question: What are the conditions and the risks associated with these factors in New York?

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Context and Assignment

- Analysis Group (AG) task:
  - Assess energy security for the New York Control Area ("NYCA") electric grid for a forward-looking period under various assumptions and scenarios related to the impact of climate change
  - Provide a report documenting the approach and findings
- Conditions to review:
  - Extended periods in three seasons (winter, summer, off-peak) in a future year (2040)
  - Deterministic assessment based on forecasts of demand, supply and storage
  - Identify circumstances (if any) under which resources are insufficient to meet load plus reserves absent emergency actions, for NYCA and relevant load zones/regions
  - Evaluate energy adequacy under a wide range of future scenarios related to weather and power system configurations

Table of Contents

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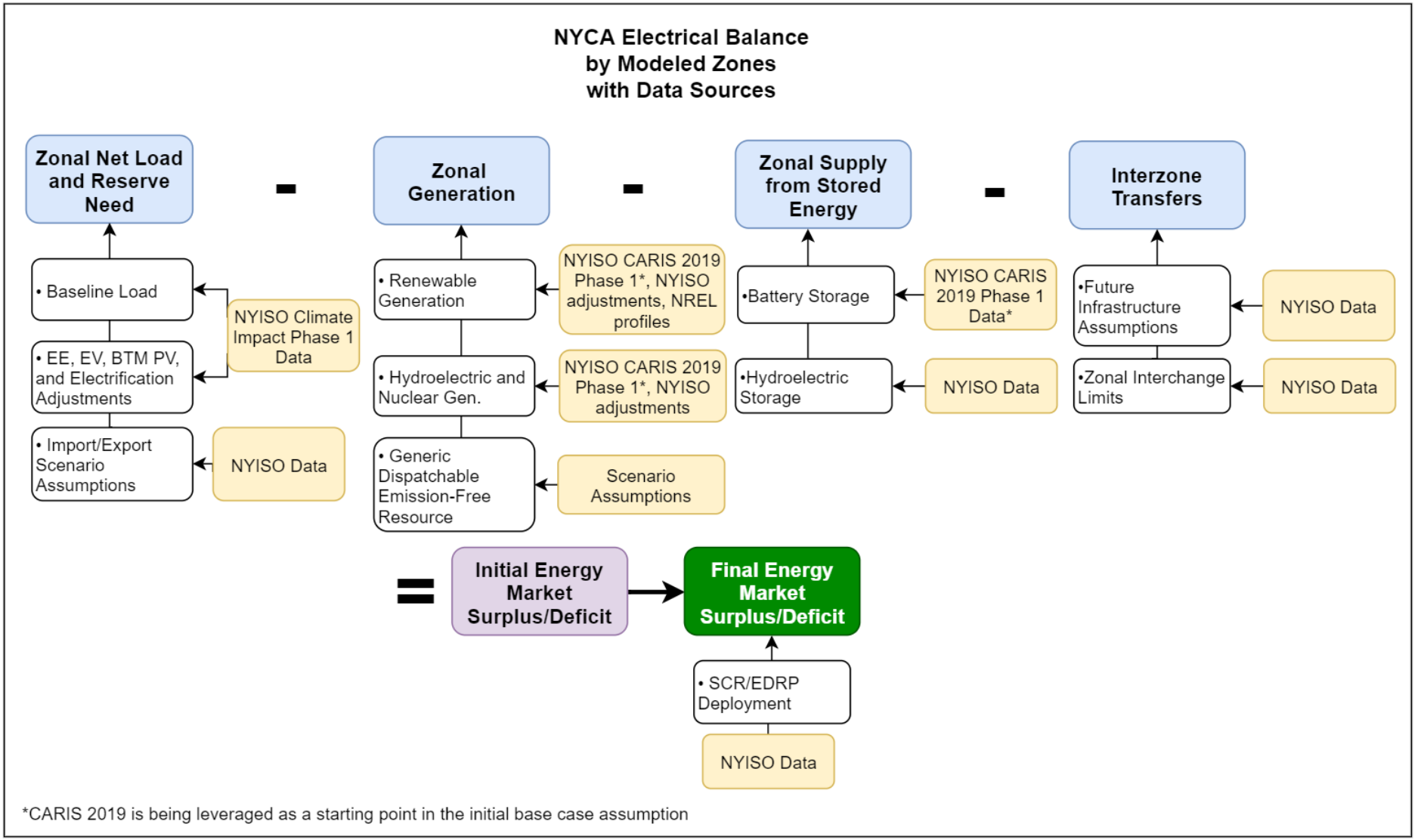
Model Overview

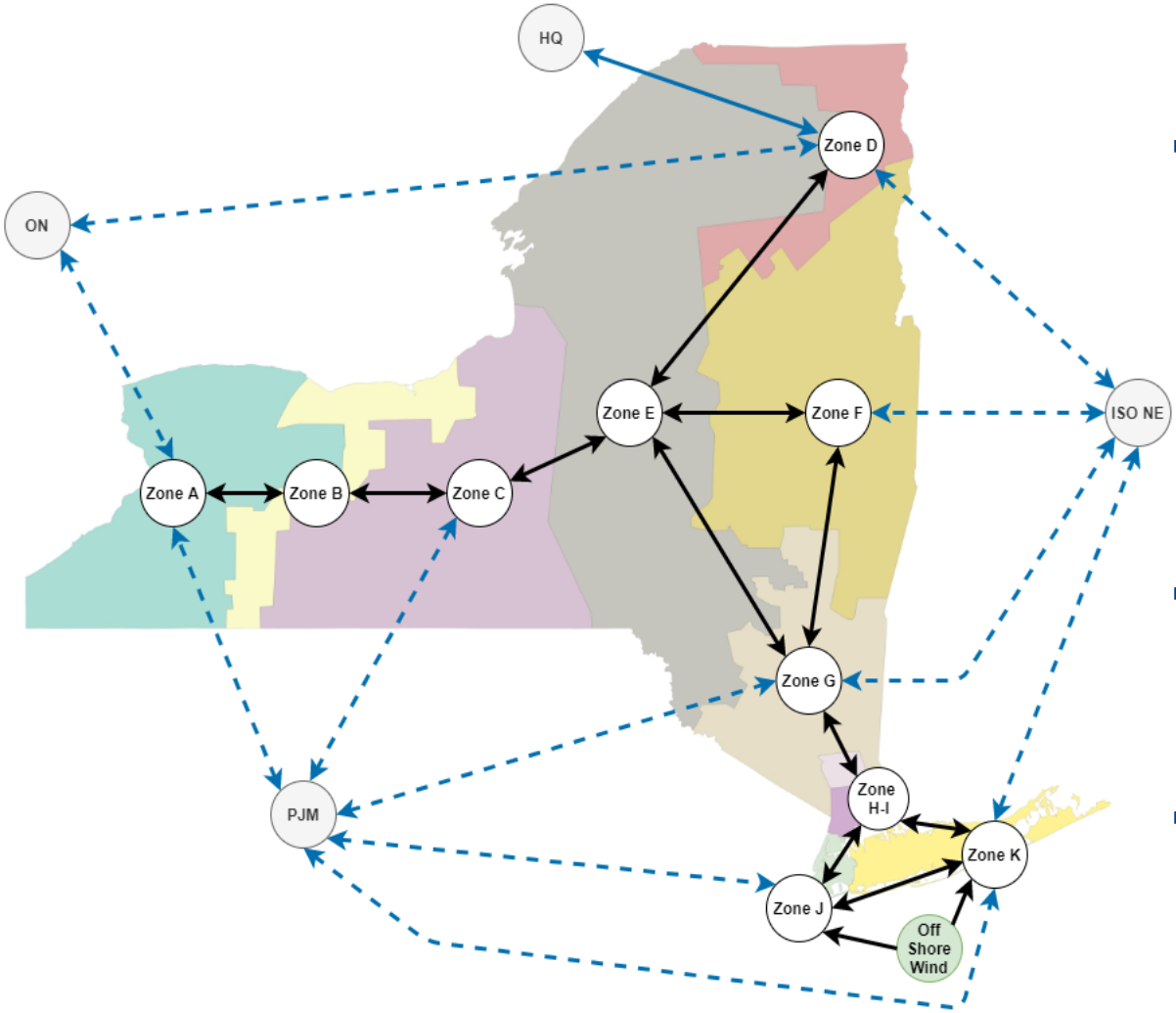
- Modeling Year: 2040
- Three modeling periods: Winter, Summer, and Off-peak
- Proposed modeling time frame: 30 days per period
- Quantitative deterministic model – "stacking order" analysis
  - *Not* a production cost or transmission security modeling exercise
- Resource starting assumptions consistent with 2019 CARIS Phase 1 "70x30" case, adjusted for potential 2040 conditions
- Hourly electric demand during normal conditions based on Climate Impact Phase I load forecasts, which adjust for increases in:
  - Behind the meter PV
  - Electric vehicle demand
  - Energy efficiency
  - Heating and cooling electrification
- Model compares hourly generation and storage discharge to hourly load plus reserves, accounting for inter-zone transmission constraints

Model Setup Diagram: Electric Balancing



- Public information sources used for renewable generation profiles

Model Setup Diagram: Electric Order and Zones



- Load and generation will be aggregated by NYISO zone
- Transmission modeling will include potential transfers between all 11 zones, with expected line limits in 2040
  - Includes Western NY and AC Public Policy Transmission
- Will assume N-1 Normal Transfer Criteria limits between all zones
- Model will include nested reserve zones

Model Overview

- Initial assumption is no fossil generation, consistent with CLCPA rules for 100% carbon free resources by 2040
  - Considering scenarios with certain alternative low/no-carbon combustion fuels, such as renewable natural gas or biodiesel
  - Will also consider scenarios involving various levels of imports, depending on assumed carbon impact

Table of Contents

Potential Model Scenarios and Assumptions

- Terminology
  - We use “scenarios” to indicate reference case and alternative assumptions with respect to demand, resources, and policies
  - We use “physical disruptions” to represent unexpected/additional losses of power system generation or infrastructure (power plants, transmission facilities)
  - Assumptions and scenarios will be combined into a manageable number of “cases” (model runs) that span the range of potential futures
- *Scenarios* - examples
  - Reference Case
  - State Policy Case – State Clean Energy Standards are met
  - CLCPA Case – State Policy Case plus additional electrification
- *Physical Disruptions* - examples
  - Loss of power plant capacity
  - Reduced wind/solar output
  - Extreme heat/cold
  - Reduced hydro output from drought
  - Transmission failures
  - Major storms

Table of Contents

Next Steps

- Analysis Group/NYISO
  - AG to complete model development
  - AG to work with NYISO to complete and input model data/assumptions (with stakeholder input)
  - Run model cases, generate tabular/graphical results
  - Draft report, final report
  - Present to stakeholders at various stages
- Proposed Schedule
  - Today: AG presentation of high-level overview of model structure and inputs
  - April 2020: AG discussion of feedback on proposed assumptions and scenarios
  - May 2020: Continued discussion of assumptions and scenarios
  - June 2020: AG presentation of initial analysis findings
  - July 2020: AG presentation of final findings
  - September 2020 AG Final Report

Contact

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