Updating and Extending the 2013 CARIS Database for Specific Project Evaluation

Timothy Duffy
Manager, Economic Planning
New York Independent System Operator

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KCC

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Update and Extension of CARIS Phase 1 Database for CARIS Phase 2

- **NYISO must update and extend the CARIS 1 database for Phase 2 studies**
  - *Economic Planning Process Manual, Section 1.2.6*
  - *CARIS 1 Base Case (2013-2022) updated and extended until 2032 for a total of 20-year study period*

- **CARIS 2 Base Case to be utilized in evaluation of specific Regulated Economic Transmison projects**
  - *Also available for use in optional Additional CARIS Studies*

- **Assumptions and preliminary results reviewed, and comments addressed with ESPWG on June 30th, July 24th and August 7th**

CARIS 1 Database Updates

- Generator unit additions/retirements
- NYCA TO Transmission projects
- Other capacity additions to maintain a representative system with respect to target reserve proxies
- Updated load forecast
- Updated fuel forecasts
- Updated emissions cost projections
- External generation updated. All material external transmission updates already reflected in CARIS 1 database.

CARIS Phase 2 Assumption Matrix

Parameter	Modeling for 2013 CARIS Base Cases	Modeling for 2014 CARIS 2 Base Cases
Peak Load	Based on 2013 Gold Book Baseline Forecast of Non-Coincident Peak Demand , including impacts of statewide Energy Efficiency programs (Table 1-2b)	Based on 2014 Gold Book Baseline Forecast of Non-Coincident Peak Demand , including impacts of statewide Energy Efficiency programs and solar retail PV (Table 1-2b)
Load Shape Model Energy Forecast	2002 Load Shape. Energy Forecast Baseline Forecast of Annual Energy, including impacts of statewide Energy Efficiency programs (Table 1-2a)	2002 Load Shape. Energy Forecast Baseline Forecast of Annual Energy, including impacts of statewide Energy Efficiency programs and solar retail PV (Table 1-2a)
Load Uncertainty Model	Only Base Level Forecast utilized; the impact of energy or peak forecasts may be utilized in scenarios	Only Base Level Forecast utilized; the impact of energy or peak forecasts may be utilized in scenarios
Generating Unit Capacities	Updated to reflect 2013 Gold Book winter and summer DMNC values	Updated to reflect 2014 Gold Book winter and summer DMNC values
New Units	Updated as per 2013 Gold Book (Application of inclusion rules identified in CRPP Manual, Section 4.1 and procedures)	Updated as per 2014 Gold Book (Application of inclusion rules identified in CRPP Manual, Section 4.1 and procedures)
Wind Resource Modeling	Units and capacities updated as per 2013 Gold Book. Wind resources are modeled based on unit capacities and synthesized wind shapes developed as part of 2010 Wind Study.	Units and capacities updated as per 2014 Gold Book. Wind resources are modeled based on unit capacities and synthesized wind shapes developed as part of 2010 Wind Study.
Non-NYPA Hydro Capacity Modeling	Updated as per 2013 Gold Book; unit output is modeled consistent with historic levels.	Updated as per 2014 Gold Book; unit output is modeled consistent with historic levels.
Special Case Resources	Not utilized in MAPS production cost modeling; incorporated in ICAP Metric calculation	Not utilized in MAPS production cost modeling; incorporated in ICAP Metric calculation
EDRP Resources	N/A for production cost modeling	N/A for production cost modeling
External Capacity – Purchases and Wheel-Throughs	Flows across schedulable and non-schedulable transmission lines are based on economics.	Flows across schedulable and non-schedulable transmission lines are based on economics.
Retirements	Updated as per 2013 Gold Book (Application of inclusion rules; specific assumptions concerning mothball announcement post-CRP; units with completed studies indicating that the unit is required for reliability are retained in the Base Case; units whose studies are pending are retained in the Base Case; others are excluded from the Base Case)	Updated per 2014 Gold Book and inclusion rules.

CARIS Phase 2 Assumption Matrix (Cont.)

Parameter	Modeling for 2013 CARIS Base Cases	Modeling for 2014 CARIS 2 Base Cases
Generator Outages	Scheduled to levelize reserves; as per the maintenance schedules in long term adequacy studies.	Scheduled to levelize reserves; as per the maintenance schedules in long term adequacy studies.
Gas Turbines Ambient Derate	Modeling utilizes summer and winter DMNC ratings for all units.	Modeling utilizes summer and winter DMNC ratings for all units.
Environmental Modeling Externalities Allowances	Allowance costs based on projected RGGI costs. SO_2 and NO_x consistent with 2011 CARIS2 Assumptions. SO_2 based on the CAIR price ($2.50 / Ton) escalated until 2016, at which point EPA-forecasted CSAPR prices were assumed to take effect as a proxy for MATS. NO_x based on the CAIR price ($60/Ton) escalated at rate consistent with natural gas price forecast.	Limits on emissions done through allowances, not hard limits.
Commitment and Dispatch Options Operating Reserves	Each Balancing Authority commits to serve its own load, firm transactions, and potential transfers Hurdle rates – flat Operating Reserves as per NYCA requirements.	Each Balancing Authority commits to serve its own load, firm transactions, and potential transfers Hurdle rates updated. Operating Reserves as per NYCA requirements.
Fuel Price Forecast	Bases updated to more heavily weight recent trends (2008-0.075, 2009-0.12, 2010-0.175, 2011-0.255, 2012-0.375); a third natural gas region added, encompassing zones F – I. The natural gas price forecast reflects near-term supply infusions into downstate region associated with the Spectra pipeline. Fuel oil and coal price forecasts are developed utilizing the EIA's annual forecast of national delivered prices. Regional bases are derived using EIA Form 923 data. The seasonality for fuel oils is based on analysis of daily prices provided by MMA. Coal has no seasonality.	Fuel forecasts updated based on same procedure.

CARIS Phase 2 Assumption Matrix (Cont.)

Parameter	Modeling for 2013 CARIS Base Cases	Modeling for 2014 CARIS 2 Base Cases
Cost Curve Development (including heat rates and emission rates)	CO2 Allowance costs based on projected RGGI costs with 2.5% annual growth beyond 2020. Utilizing SO2 and NOx allowance costs developed for 2011 CARIS 2 database. Current values are escalated based on forecasted natural gas price increases. Unit heat rates developed from vendor supplied data and fuel input data matched with MWh data for NYCA.	Unit heat rates and emission rates developed from vendor supplied data and fuel input data matched with MWh data for NYCA.
Local Reliability Rules	List and develop appropriate nomograms. Fuel burn restrictions, operating restrictions and exceptions, commitment/dispatch limits	List and develop appropriate nomograms. Fuel burn restrictions, operating restrictions and exceptions, commitment/dispatch limits
Energy Storage Gilboa PSH Lewiston PSH	Scheduling checked to conform to historical operations.	Scheduling checked to conform to historical operations.
Target Reserve Proxy	N/A	EPP manual procedure requires that the Target Reserve Proxy (TRP) be maintained through the study period. Generic capacity and Market-Based Solutions utilized to meet TRP.
Transmission System Model		
Power Flow Cases	As per CRP.	Updated to reflect TOTS projects.
Interface Limits Monitored/contingency pairs Nomograms Joint, Grouping Unit Sensitive Voltage	Data from the results of internal and external planning studies; vendor-supplied data; operational voltage studies; operational limits; transfer limit analysis for critical interfaces.	Data from the results of internal and external planning studies; vendor-supplied data; operational voltage studies; operational limits; transfer limit analysis for critical interfaces. Transmission upgrades (i.e., TOTS) required network and contingency changes.
New Transmission Capability	Updated as per 2013 Gold Book (Application of base case inclusion rules)	Updated as per 2014 Gold Book (Application of base case inclusion rules)

CARIS Phase 2 Assumption Matrix (Cont.)

Parameter	Modeling for 2013 CARIS Base Cases	Modeling for 2014 CARIS 2 Base Cases
Internal Controllable Lines (PARs,DC,VFT)	Optimized in simulation.	Optimized in simulation.
Neighboring Systems		
Outside World Area Models Fuel Forecast	Power flow data from CRP, "production" data developed by NYISO with vendor and neighbor input. Fuel forecasts developed utilizing same methodology as NYCA fuel forecasts.	Power flow data from CRP, "production" data developed by NYISO with vendor and neighbor input. Fuel forecasts developed utilizing same methodology as NYCA fuel forecasts.
External Capacity And Load Forecast	Neighboring systems modeled consistent with reserve margins in the RNA/CRP analysis. Neighboring systems data reviewed and held at required reserve margin.	Update external systems with projects under construction. Maintain minimum reserve margin for neighboring systems. Load and capacity of external areas fixed for 2023-2032.
System representation in Simulation	HQ modeled as fixed hourly schedule, synchronized with all other external injections. Full Representation/Participation - NYISO - ISONE - IESO - PJM Classic & AP,AEP,CE,DLCO, DAY, VP Proxy Bus Injection: HQ-NYISO, HQ-NE-ISO, NB-NEISO, HQ - IESO Transmission Only/Zeroed Out: MECS,FE,SPP, MAR, NIPS,OVEC,TVA, FRCC,SERC,ERCOT,WECC	HQ modeled as fixed hourly schedule, synchronized with all other external injections. Full Representation/Participation - NYISO - ISONE - IESO - PJM Classic & AP,AEP,CE,DLCO, DAY, VP Proxy Bus Injection: HQ-NYISO, HQ-NE-ISO, NB-NEISO, HQ - IESO Transmission Only/Zeroed Out: MECS,FE,SPP, MAR, NIPS,OVEC,TVA, FRCC,SERC,ERCOT,WECC Athens SPS treated as in-service from 2014 to May 2024 and out-of-service from June 2024 to 2032

CARIS Phase 2 Assumption Matrix (Cont.)

Parameter	Modeling for 2013 CARIS Base Cases	Modeling for 2014 CARIS 2 Base Cases
External Controllable Lines (PARs,DC,VFT, Radial lines)	A,B,C and J,K "wheel" Both sets set at 1000 (+/-100) imbalance monitored Ramapo (-1000 MW, +1000 MW) Norwalk (0, +200 MW) L33,34 (0 MW, +300 MW) PV20 (0 MW, +70 MW) Neptune and CSC optimized subject to "cost of use". Modified to reflect updated protocols, tariff and market operations, including NYISO Technical Bulletins and inter-control area operating agreements. Consistent with Technical Bulletin #152, MAPS commitment logic schedules 61% of Interchange Schedules across NY-PJM AC ties across Ramapo PARS. This is an increase from 41% and reflects the most recent PJM JOA.	A,B,C and J,K "wheel" Both sets set at 1000 (+/-100) imbalance monitored Ramapo (-1000 MW, +1000 MW) Norwalk (-200 MW, +200 MW) L33,34 (-300 MW, +300 MW) PV20 (0 MW, +70 MW) Neptune and CSC optimized subject to "cost of use". Modified to reflect updated protocols, tariff and market operations, including NYISO Technical Bulletins and inter-control area operating agreements. Consistent with Technical Bulletin #152, MAPS commitment logic schedules 61% of Interchange Schedules across NY-PJM AC ties across Ramapo PARS. This is an increase from 41% and reflects the most recent PJM JOA.

Database Update and Extensions

- **Forecasts**
  - *2014 Gold Book Load Forecast*
  - *Updated Fuel Price Forecast based upon EIA's 2014 Annual Energy Outlook*
  - *Allowance prices reviewed but not updated*

- **Transmission**
  - *Major transmission updates (i.e., TOTS) incorporated based on 2014 Gold Book*

- **Generating Capacity**
  - *Updated based on 2014 Gold Book and Retirement/Mothball Notices submitted by Generators as of May 1, 2014, subject to inclusion rules*
  - *Generic Capacity added to maintain representative system*

2014 CARIS 2 and RNA Databases

- **Due to distinct nature and tariff requirements of the CARIS 2 and RNA studies, there may be differences in the study base cases.**
  - *For example, 2014 CARIS 2 is built upon the final load flow from the 2012 RNA/CRP case*
- **The treatment of two specific resources should be highlighted.**
  - *Cayuga 1 and 2 are treated as in service in the CARIS base case; they are treated as out of service as of 7/1/2017 in the RNA*
  - *Selkirk I and II are treated as in service in the CARIS base case; out of service in the RNA*
  - *In both cases, units were retained in the CARIS 2 base case to maintain a reliable system*
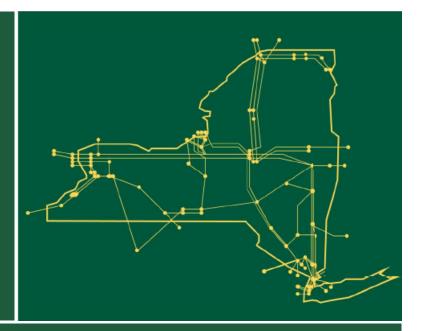
BIC Review and Comment

- ◆ **NYISO worked with ESPWG to establish assumptions to update and extend the CARIS 1 database**

- ◆ **CARIS procedures require BIC's review and comment on updated and extended CARIS 2 database to ensure voting beneficiary LSEs have an early opportunity to become aware of and provide input into CARIS assumptions**

- ◆ **No governance action is required from BIC**

The New York Independent System Operator (NYISO) is a not-for-profit corporation responsible for operating the state's bulk electricity grid, administering New York's competitive wholesale electricity markets, conducting comprehensive long-term planning for the state's electric power system, and advancing the technological infrastructure of the electric system serving the Empire State.

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