Day-Ahead Window Optimization Study

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Federal Energy Regulatory Commission
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Overview

- **Study Highlights**
- **Background**
- **Model Framework & Setup**
- **Results**
- **Conclusion**

Study Highlights

- **This study was motivated by the question of whether the Day-Ahead market could be better optimized by shifting the operating period through changing the electric day start times**
- **The analysis looked at several metrics, such as:**
  - ***changes in production cost***
  - ***unit commitment***
  - ***energy marginal costs***
  - ***import/export transactions***
- **The results show that shifting the Day-Ahead window will have:**
  - ***Marginal impact in energy marginal costs, unit commitment, and production costs***
  - ***Significant impact in import/export transactions across successive days***
  - ***Generators with long minimum run times would be incentivized to change their bidding behavior***

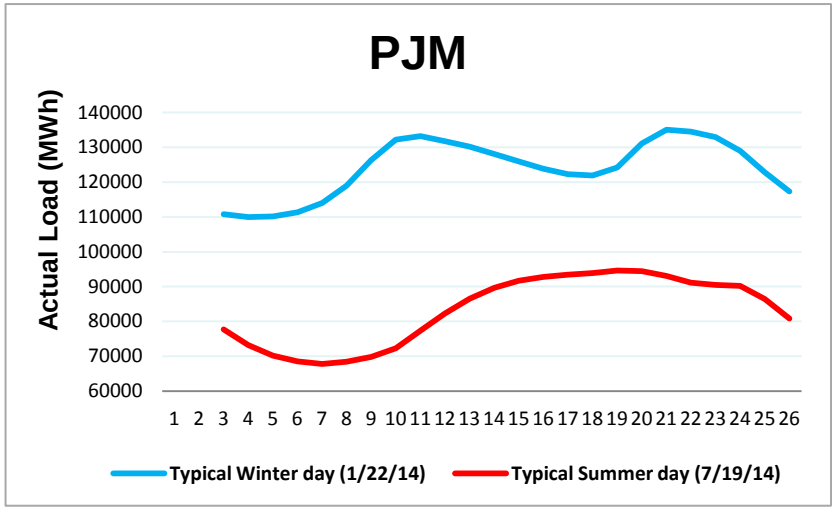
Background

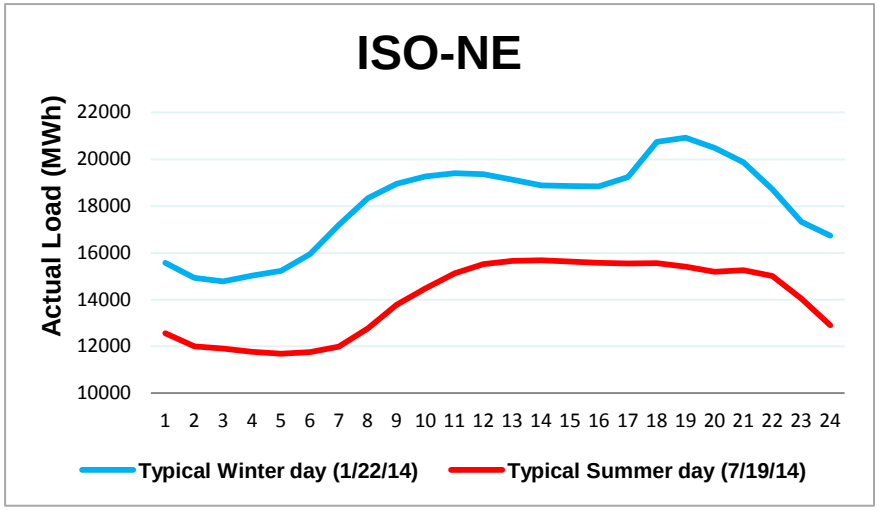
- **Fundamental question**

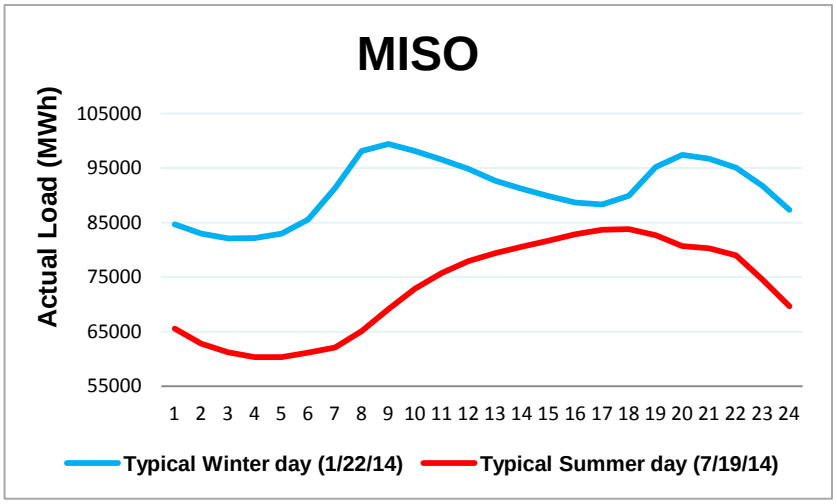
  Given the resource mix and the NY electricity market's traditional load pattern, what is the ideal window of operation in order to optimize dispatch?

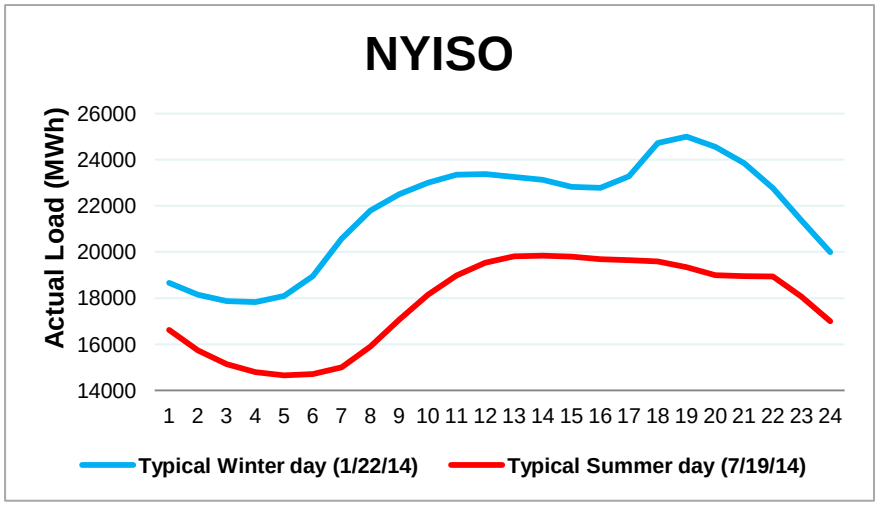
- **Potential benefits**
  - ***Better market efficiency in terms of optimum use of generating resources***
  - ***Optimal production minimization***
  - ***Benefits of better alignment between gas market and electricity market***

Typical Load Profiles

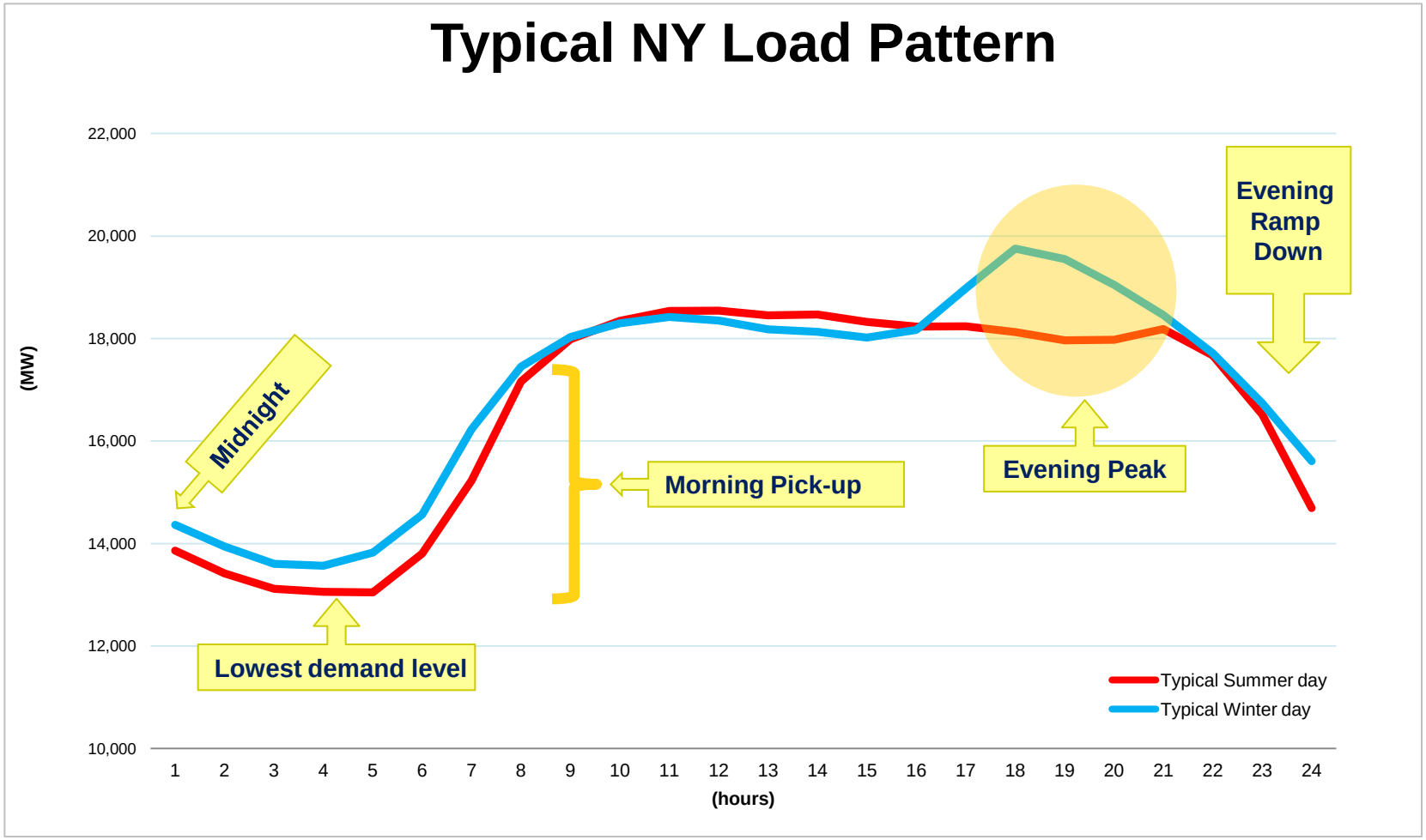






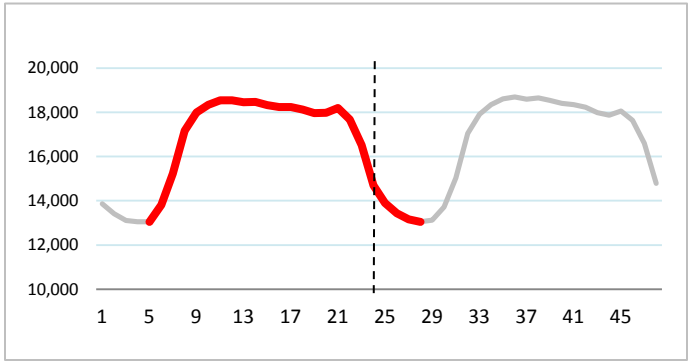


In New York

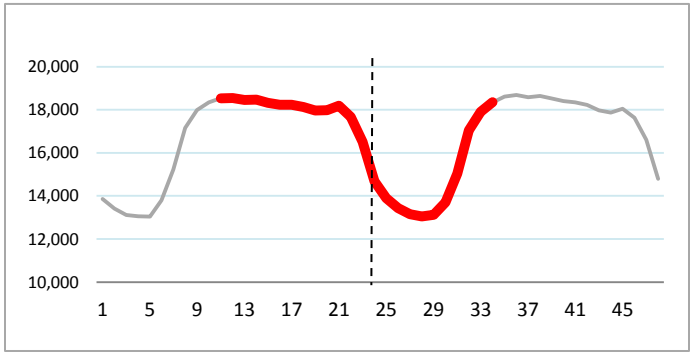


Alternative NY electric days

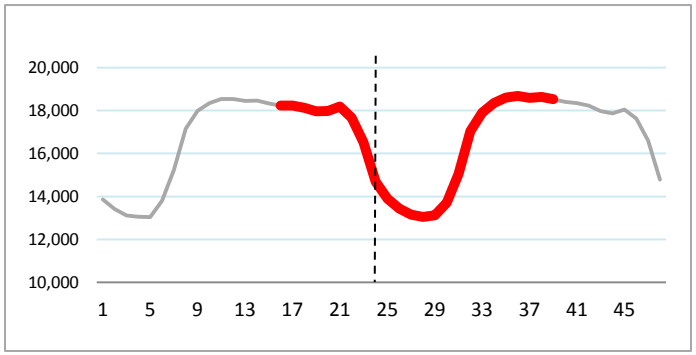
Summer



Alternative electric day: 04:00 – 03:00

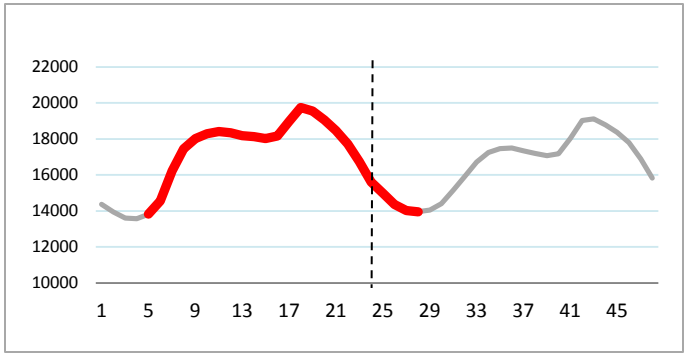


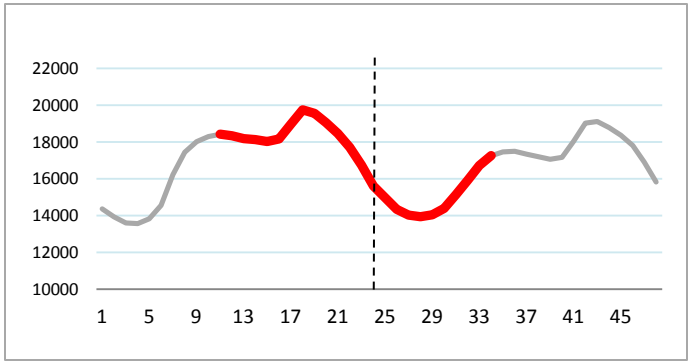
Alternative electric day: 10:00 – 09:00

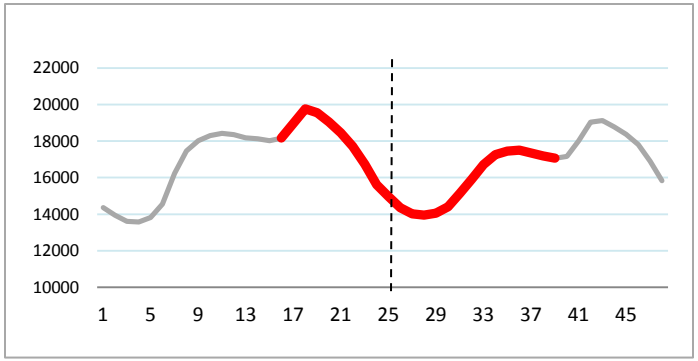


Alternative electric day: 15:00 – 14:00

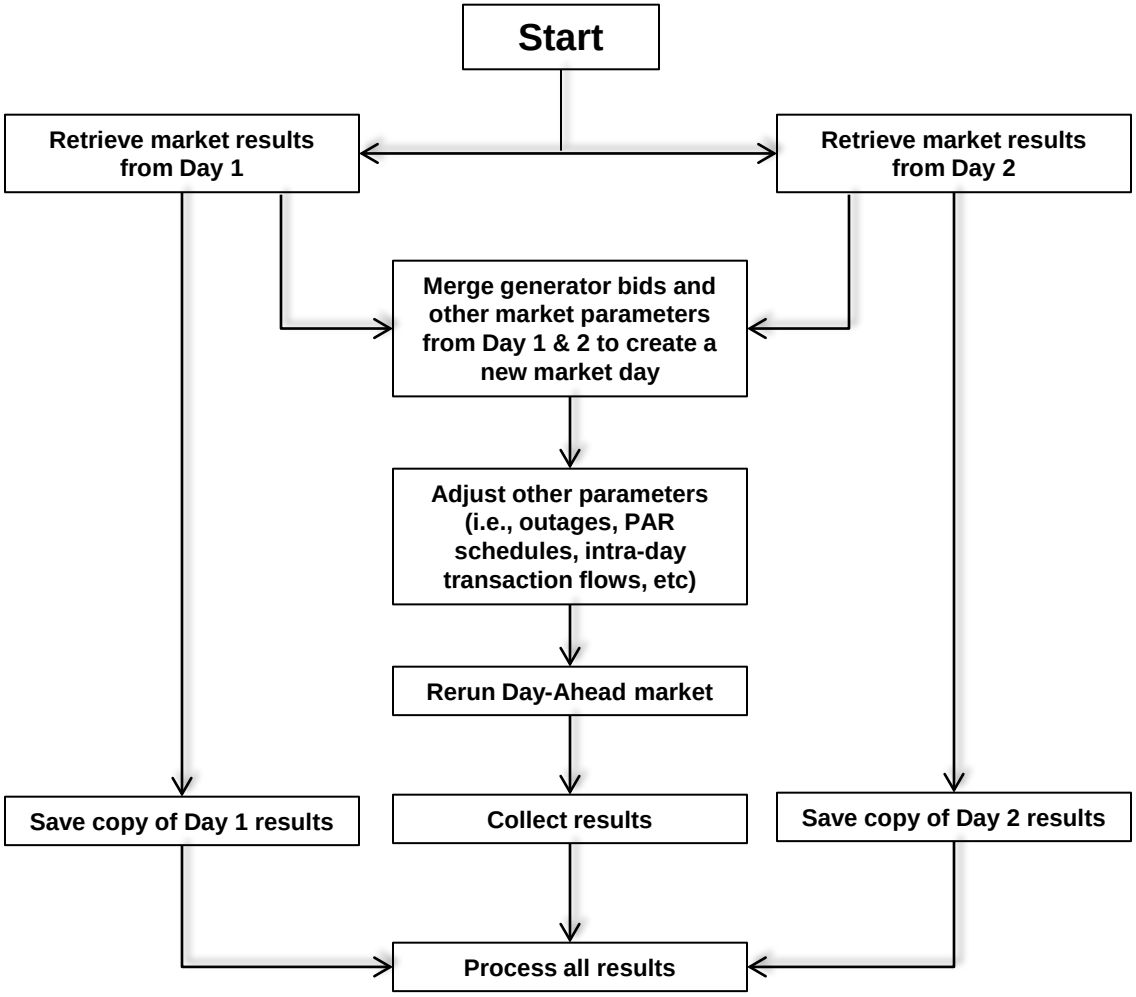
Winter







Study Framework

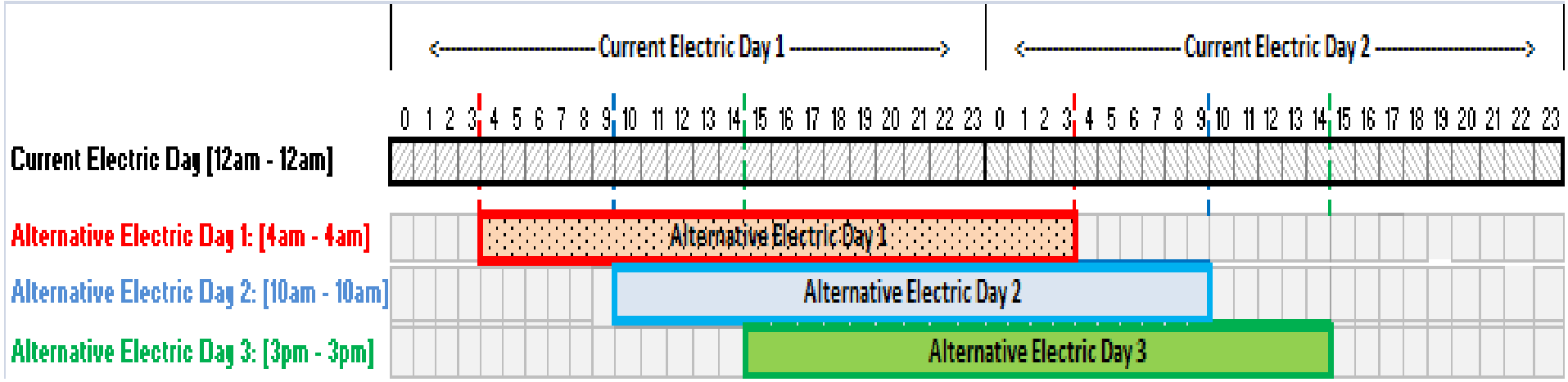


Study setup

- **Create an alternative electric market day by merging bids and other market data from two consecutive days**
- **No market parameters are changed, only shifted by start time interval**
- **Bidding behavior is not simulated**
- **Only Day-Ahead market is studied, no Real-Time impacts are evaluated**

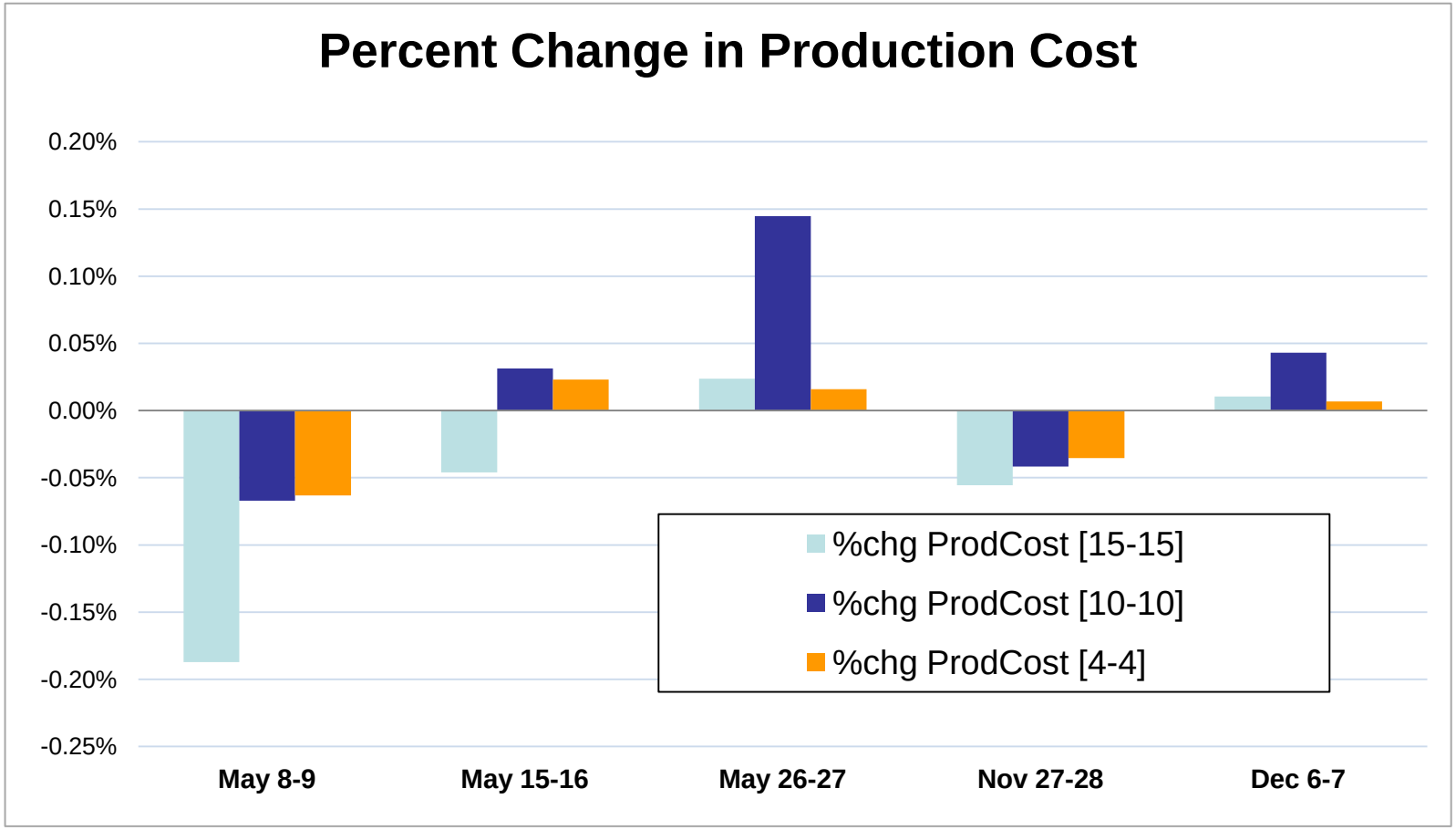
Case Studies

- **Independent days:**
  - ***Case 1****: alternative electric day of 04:00 – 03:00 (EST)*
  - ***Case 2****: alternative electric day of 10:00 – 09:00 (EST)*
  - ***Case 3****: alternative electric day of 15:00 – 14:00 (EST)*
- **Consecutive days:**
  - ***Case 4****: 1 week of consecutive alternative electric days of 10:00 – 09:00 (EST)*
- **3 Summer Days (May 8–9, May 15–16 and May 26–27)**
- **2 Winter Days (Nov 27–28, Dec 6–7)**
- **1 summer week: May 8–14**

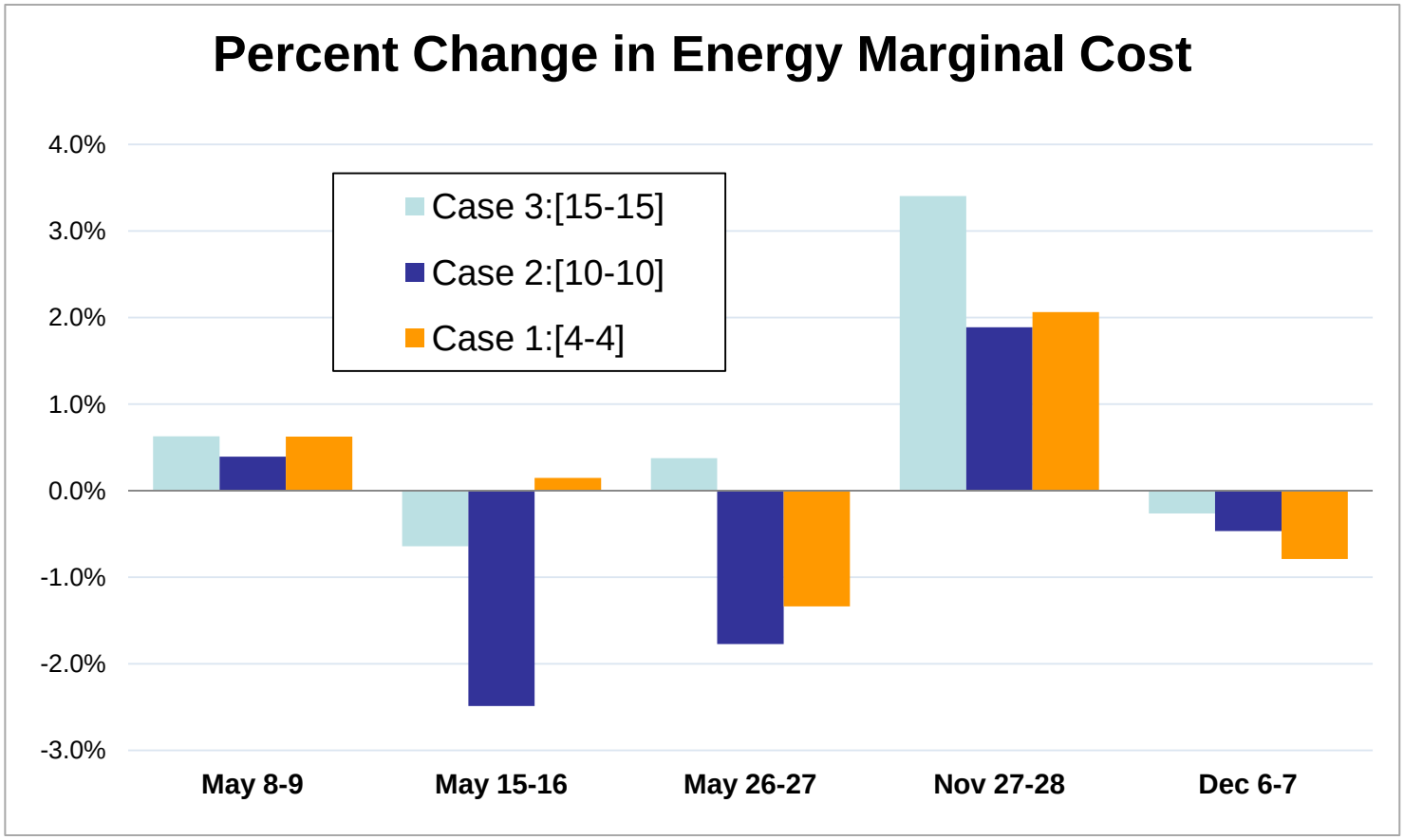


Study Results

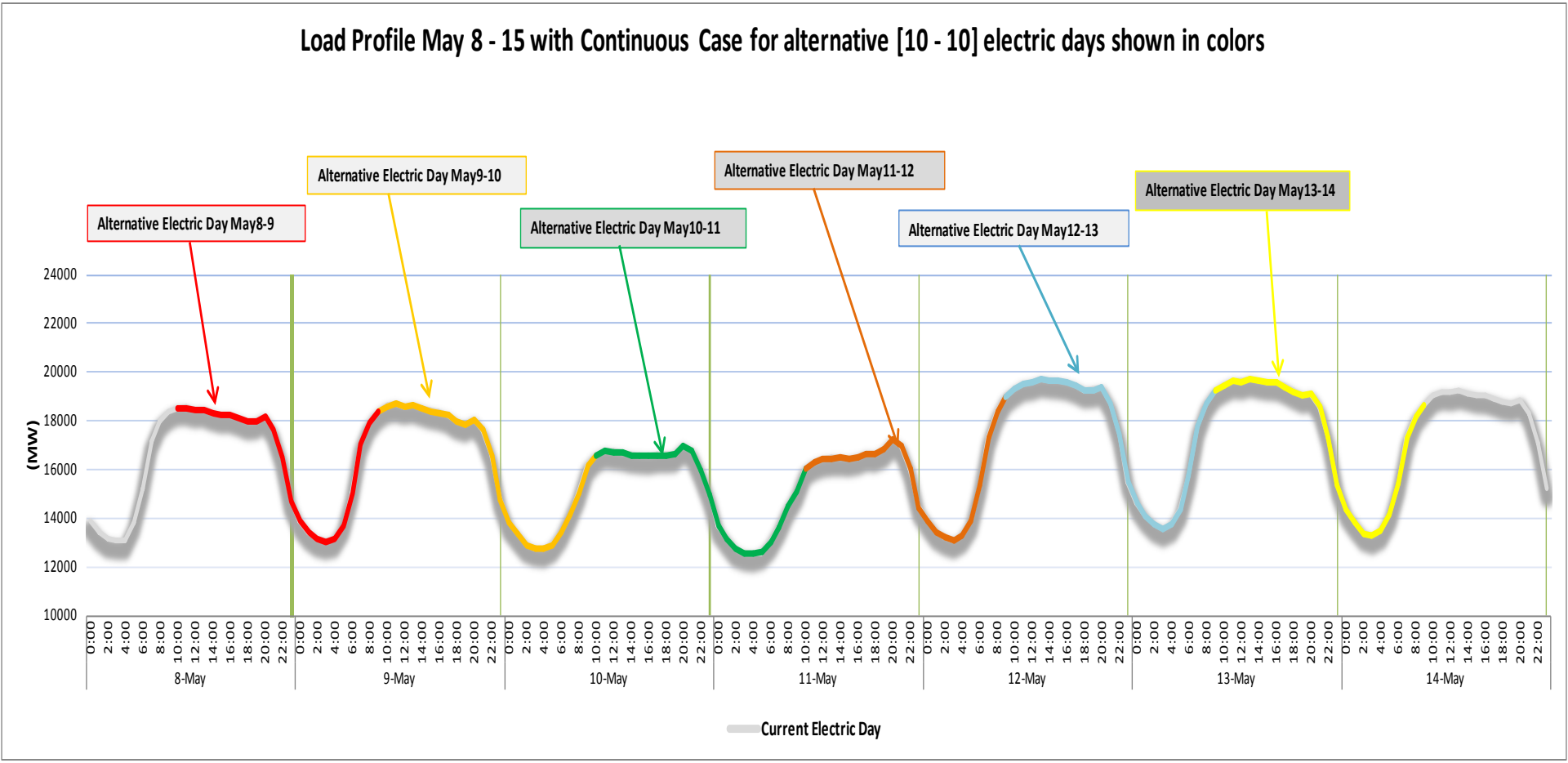
Minimal production cost impact



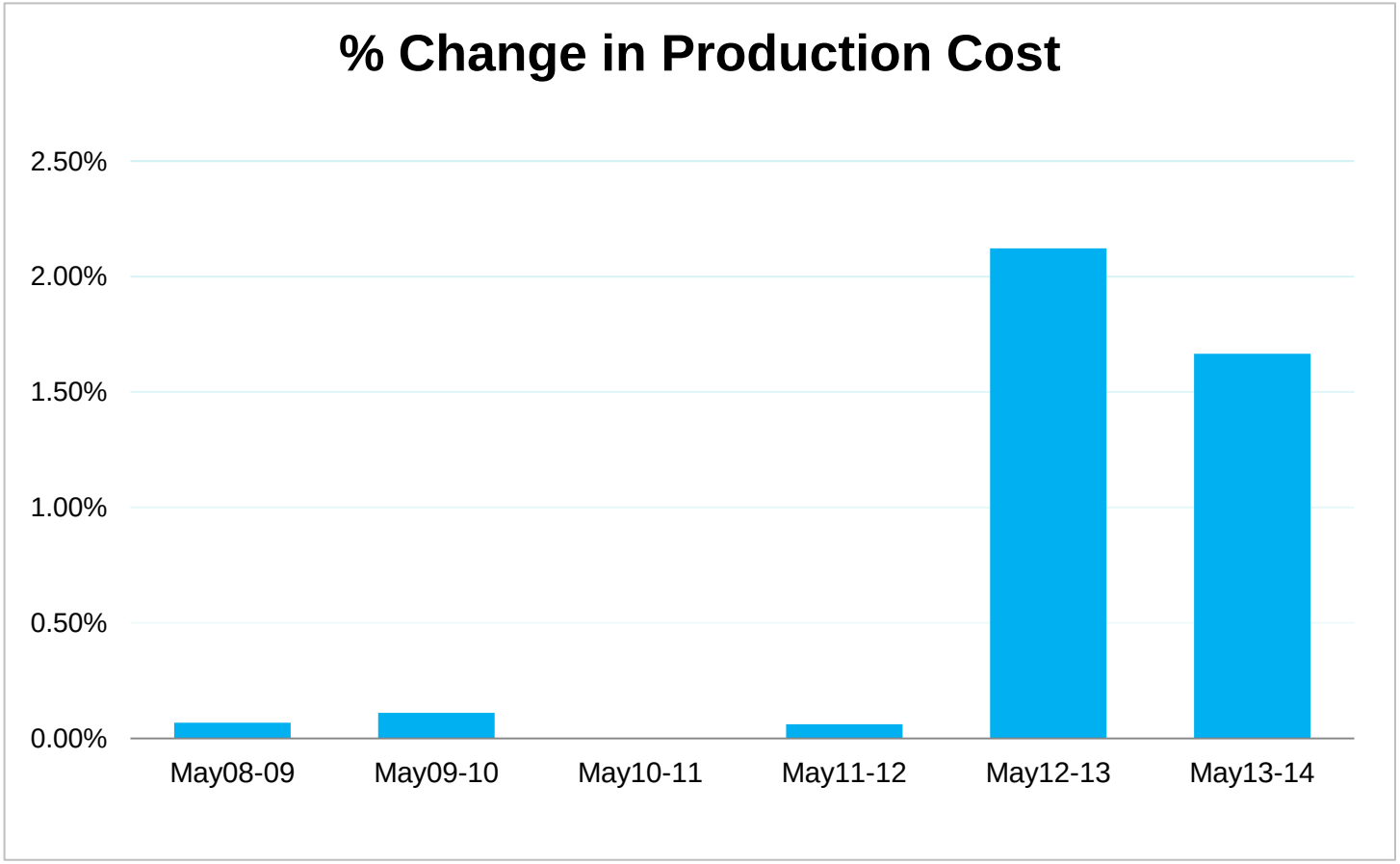
Minimal energy marginal cost impact



Case Study - Continuous Days



Minimal system production cost impact

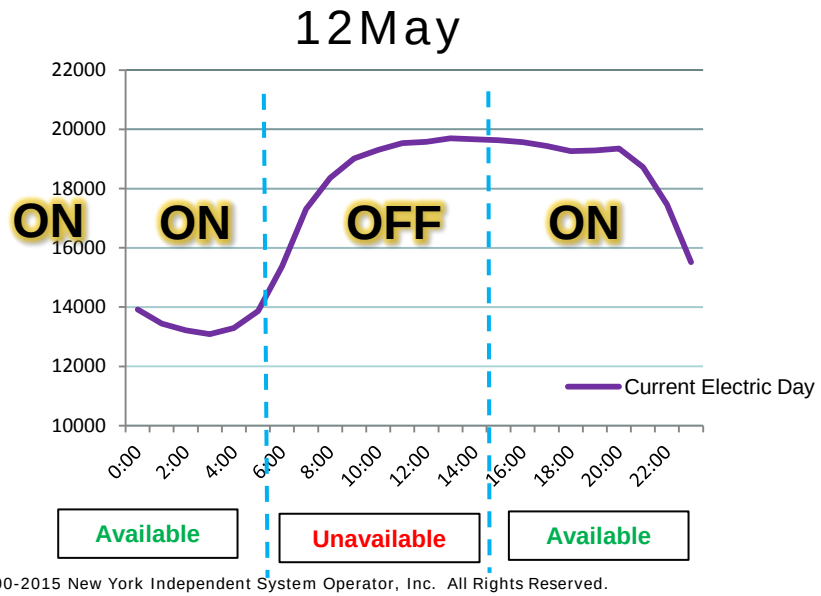


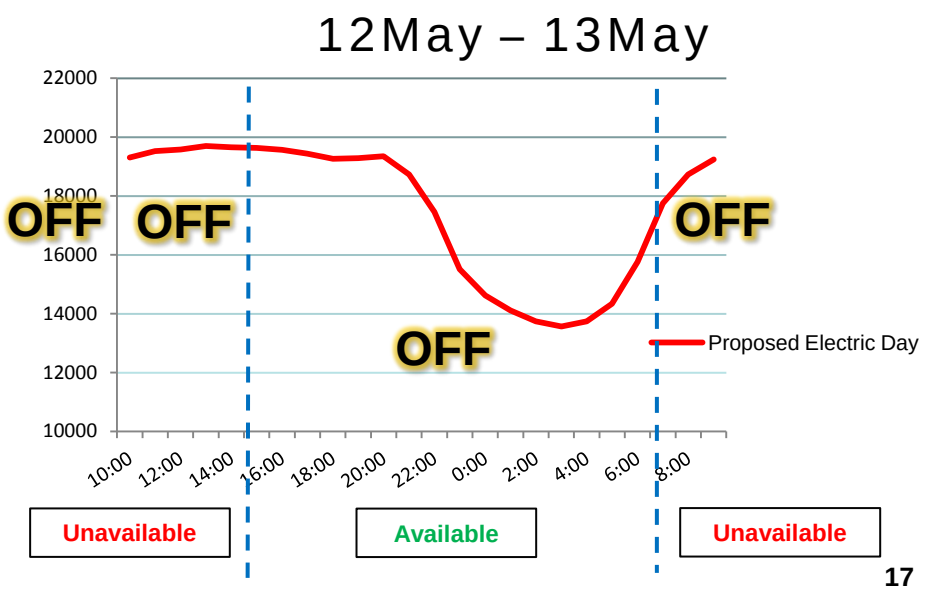
Unit Commitment

- **Shifting the Day-Ahead window has a significant impact on generator commitment and maintenance schedules, especially units with long minimum run time**
- **Currently, these units tend to avoid late starts by bidding higher costs toward the end of the electric day**
- **In the Day-Ahead window 10am – 10am scenario, these units are expected to bid higher costs during the morning pickup to avoid starting late in the electric day**
- **As a result, the potential savings from changing the electric day may be understated because the study strictly enforced unit commitment parameters but could not account for changes that unit owners could have made in response to the changed timing of the electric day**

Example of Unit with long minimum run time

- **Baseload unit**
  - ***Operating Max MW: 1.5 MW***
  - ***Min Gen: -$100,000***
  - ***Minimum Run Time: 24 Hours, Minimum Down Time: 1 Hour***
- **Unit Available: 05/08/14-05/11/14**
- **Unit on maintenance: 05/12/14 06:00-15:00 and 05/13/14 06:00-15:00**





Import/Export Transactions

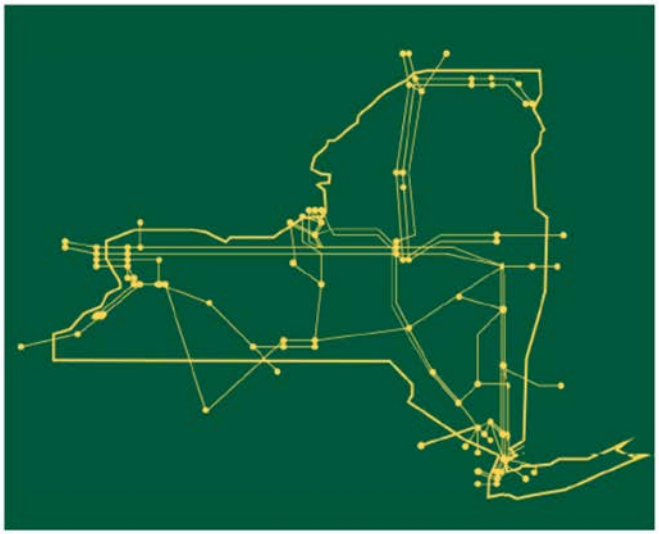
- **Day-Ahead transactions roll over to Real-time**
- **Transaction IDs change across two days**
- **RTC windows near the end of the day span across 2 days**
- **Comparatively higher volume of transactions at the end of the Day-Ahead window in 10am – 10am scenario may impact RTC performance**

	RTC Transaction Schedules @ Transition Points			
	Current Electric day	Proposed Electric day	DIFF	% DIFF
May8-9	192	224	32	17%
May9-10	209	248	39	19%
May10-11	192	198	6	3%
May11-12	176	228	52	30%
May12-13	184	219	35	19%
Average	191	223	33	17%

Conclusions

- **This study explores the impact on the NY Day-Ahead market of various electric day start times**
- **The findings show that:**
  - ***The load profile 'seen' by the optimization is different (peaks and valleys)***
  - ***Overall, there is not a significant impact in terms of production cost, energy marginal prices, and generator commitments, if bidding behavior remains unchanged.***
  - ***Generators with long minimum run time are most impacted***
  - ***The number of import/export transactions will increase in the transition periods. This will have a potential impact on the performance of the Real-Time market***

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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