

Day-Ahead Window Optimization Study

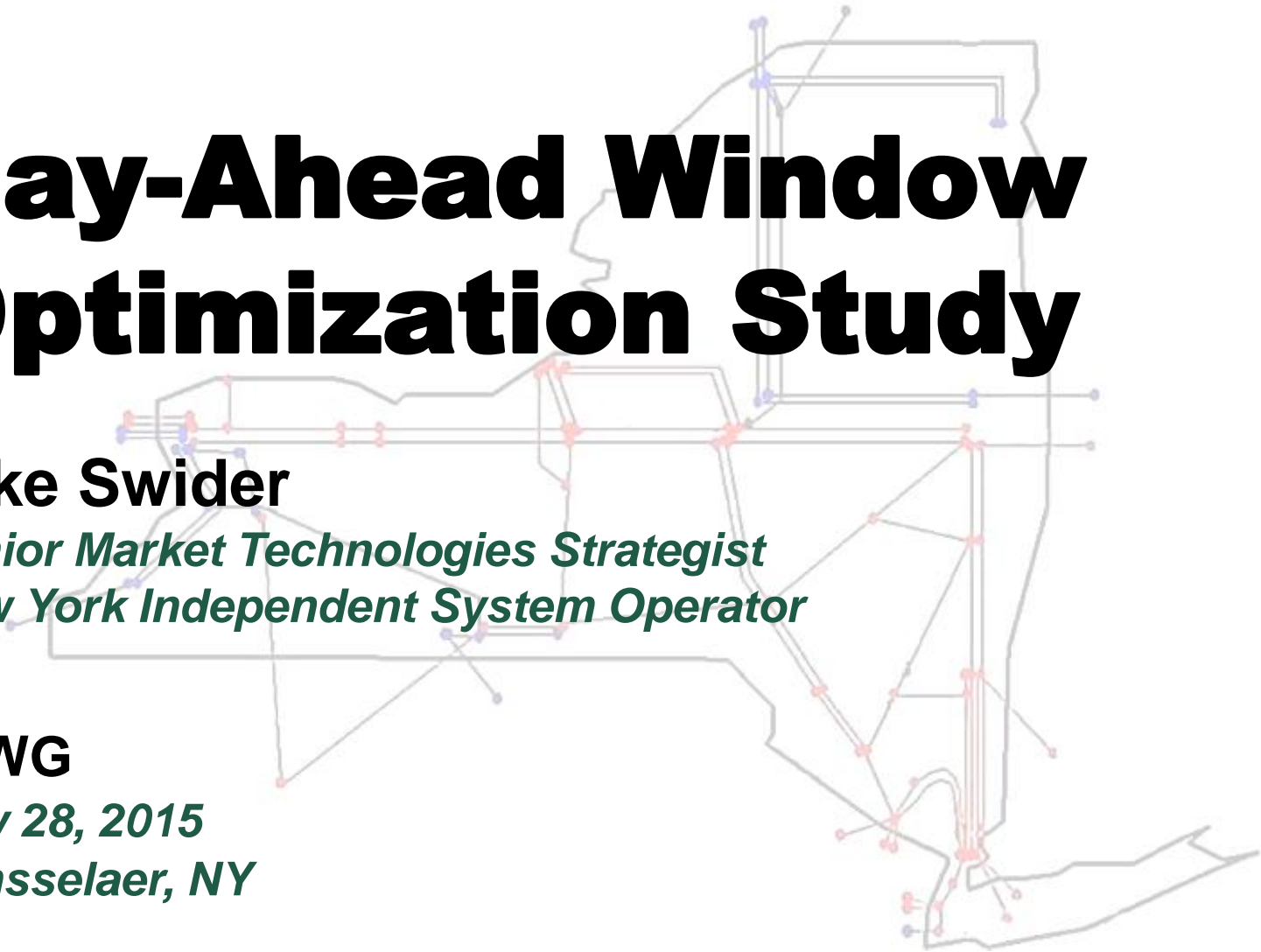
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MIWG

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Rensselaer, NY



Overview

- ◆ **Technology Development Group**
- ◆ **“DAWO” Study Highlights**
- ◆ **Background**
- ◆ **Model Framework & Setup**
- ◆ **Results**
- ◆ **Conclusion**

Technology Development Group

- ◆ **New group in Market Structures with multiple roles:**
 - *Research – Study and explore market technologies that may be feasible and beneficial in the NYISO market product portfolios*
 - *Prototyping – Support project design through simulations and analysis to validate the completeness and accuracy of requirements and robustness of the technology*
 - *Consumer Impact Analysis – Support Consumer Liaison in evaluating market impacts to consumers before projects are implemented*
- ◆ **Manager: Dr. Muhammad Marwali**

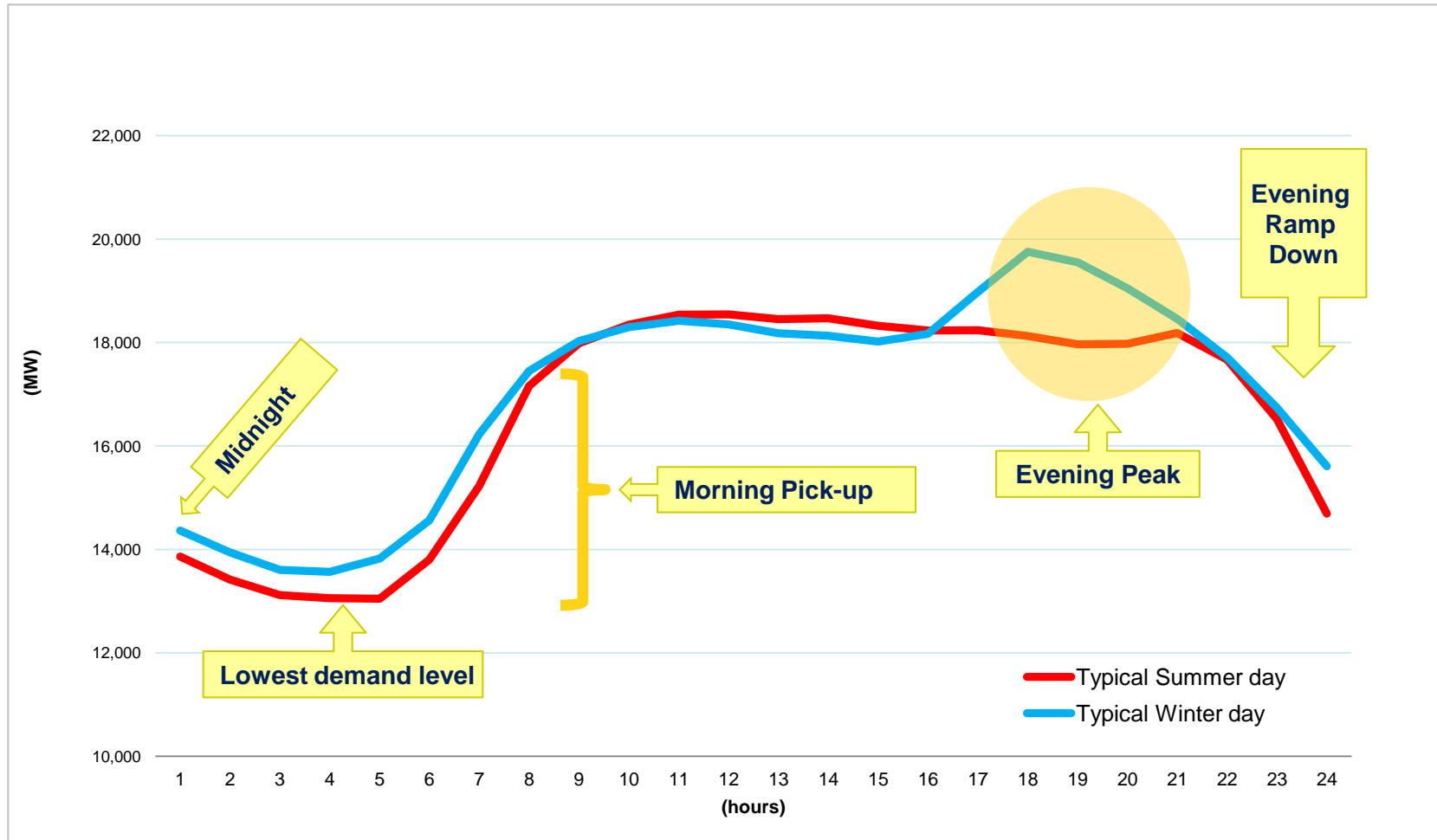
“DAWO” Study Highlights

- ◆ Study was motivated FERC electric-gas coordination initiatives
- ◆ Evaluated 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*
- ◆ Preliminary results show that shifting the Day-Ahead window will have:
 - *Small 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 typical 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*
 - *Production cost minimization*
 - *Benefits of better alignment between gas market and electricity market*

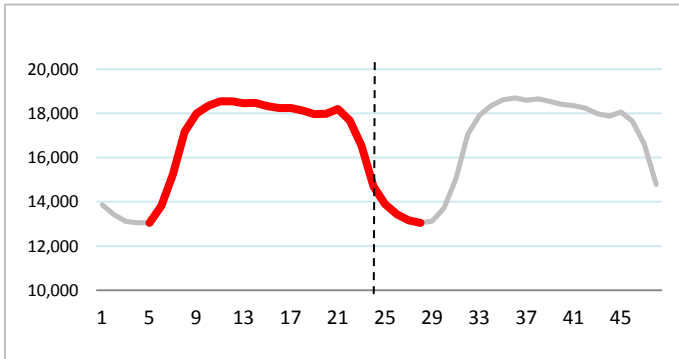
Typical NY Load Patterns



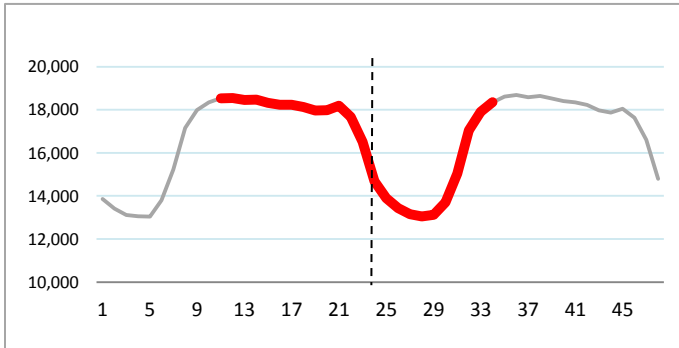
Alternative NY electric days



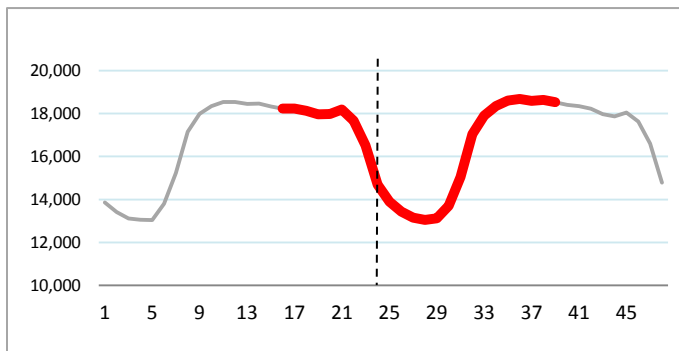
Summer



**Morning
load pickup
case: 04:00
- 03:00**

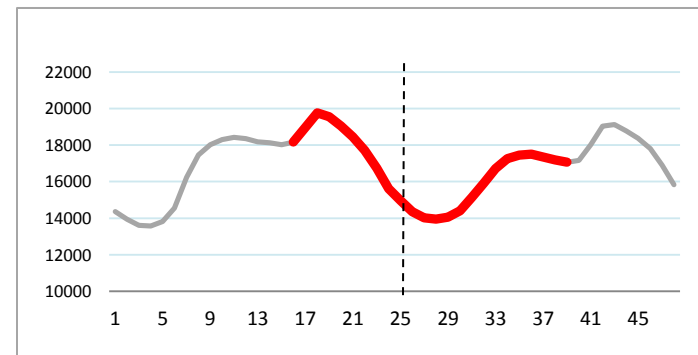
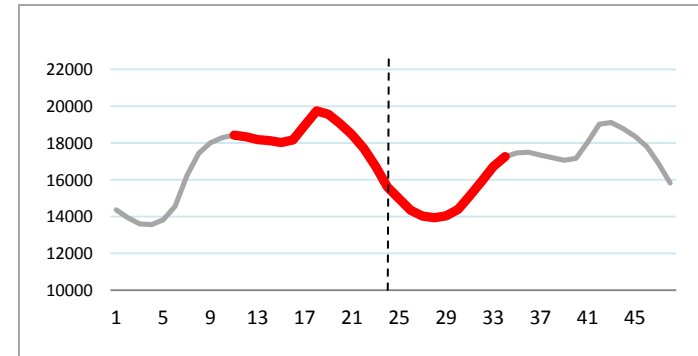
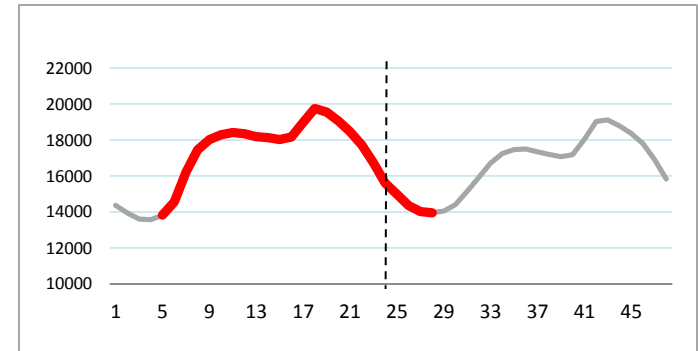


**Gas day
case: 10:00
- 09:00**

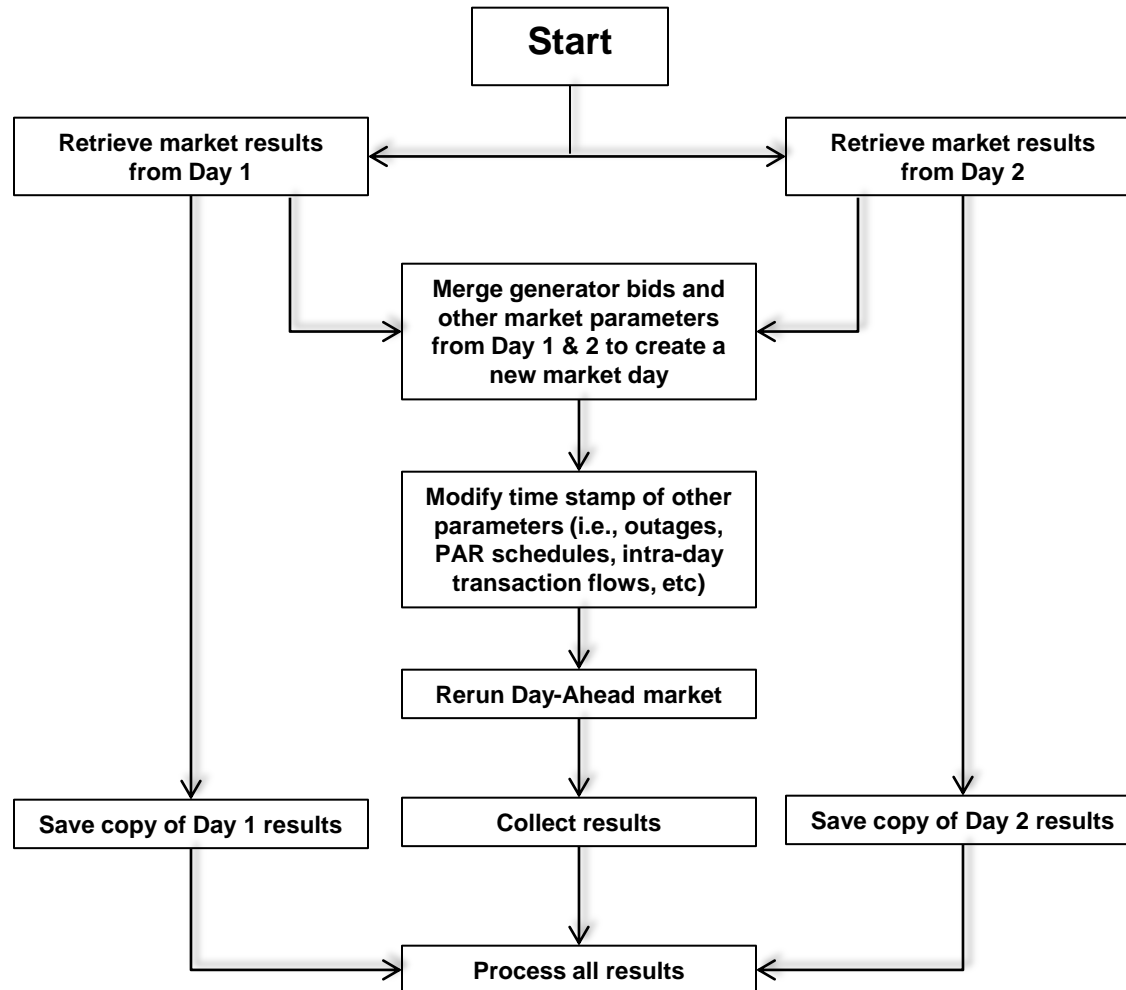


**Afternoon
load pickup:
15:00 -
14:00**

Winter



Study Framework

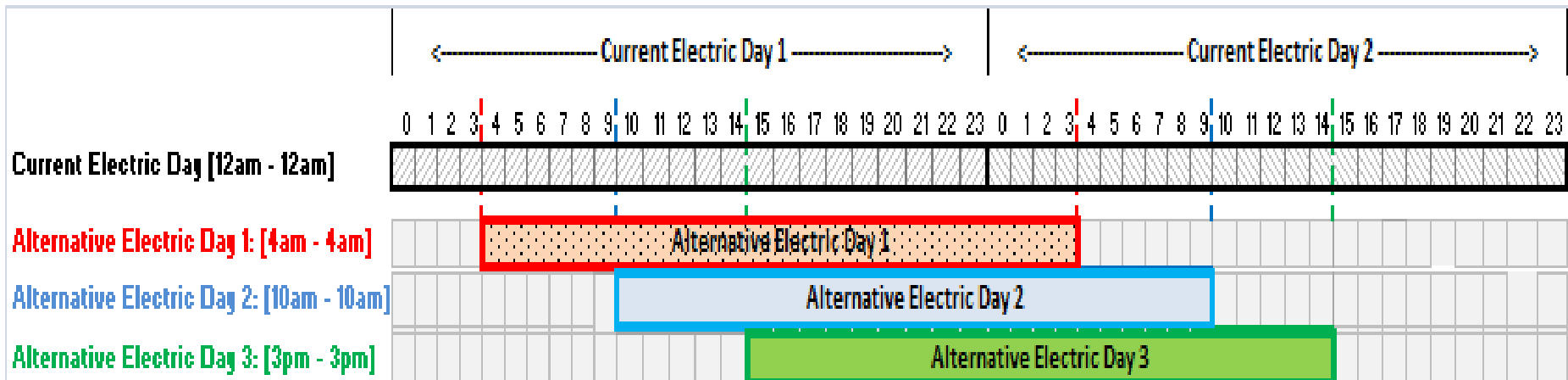


Study Setup

- ◆ **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**

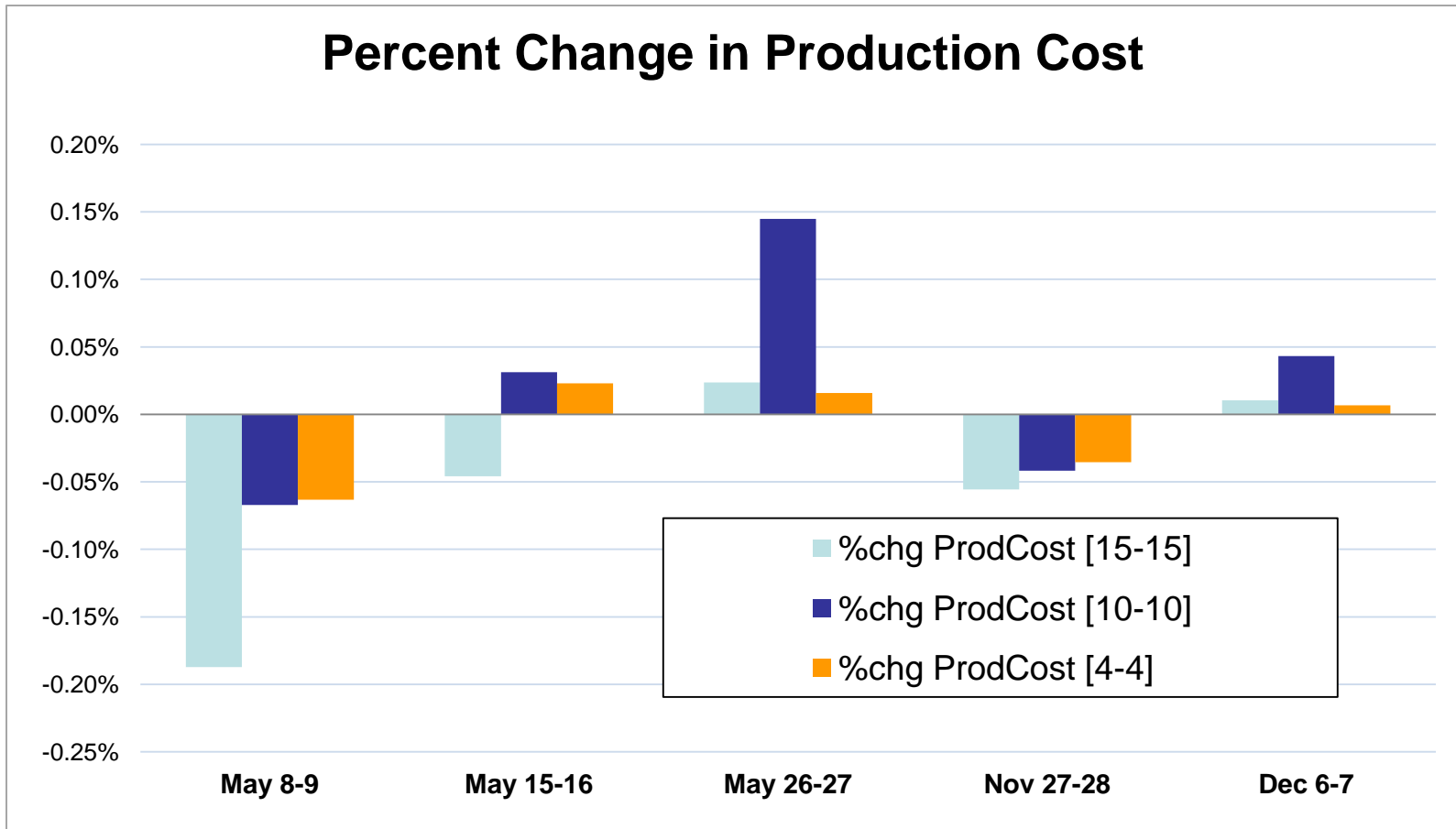
Case Studies

- ◆ Independent days:
 - Case 1: “morning load pickup” 04:00 – 03:00 (EST)
 - Case 2: “gas day” 10:00 – 09:00 (EST)
 - Case 3: “afternoon load pickup” 15:00 – 14:00 (EST)
- ◆ Consecutive days:
 - Case 4: 1 week of consecutive gas day cases 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)

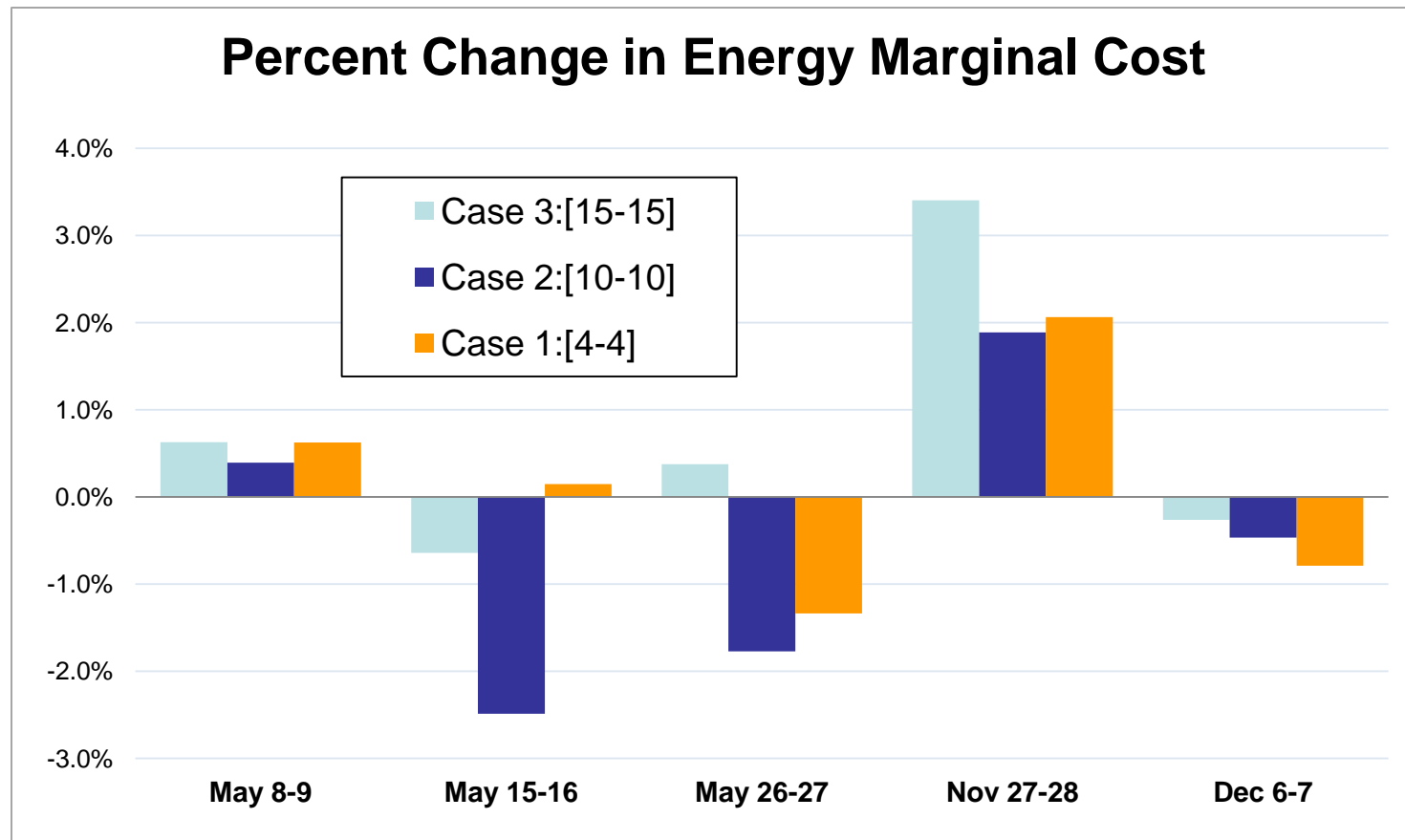


Study Results

Minimal production cost impact

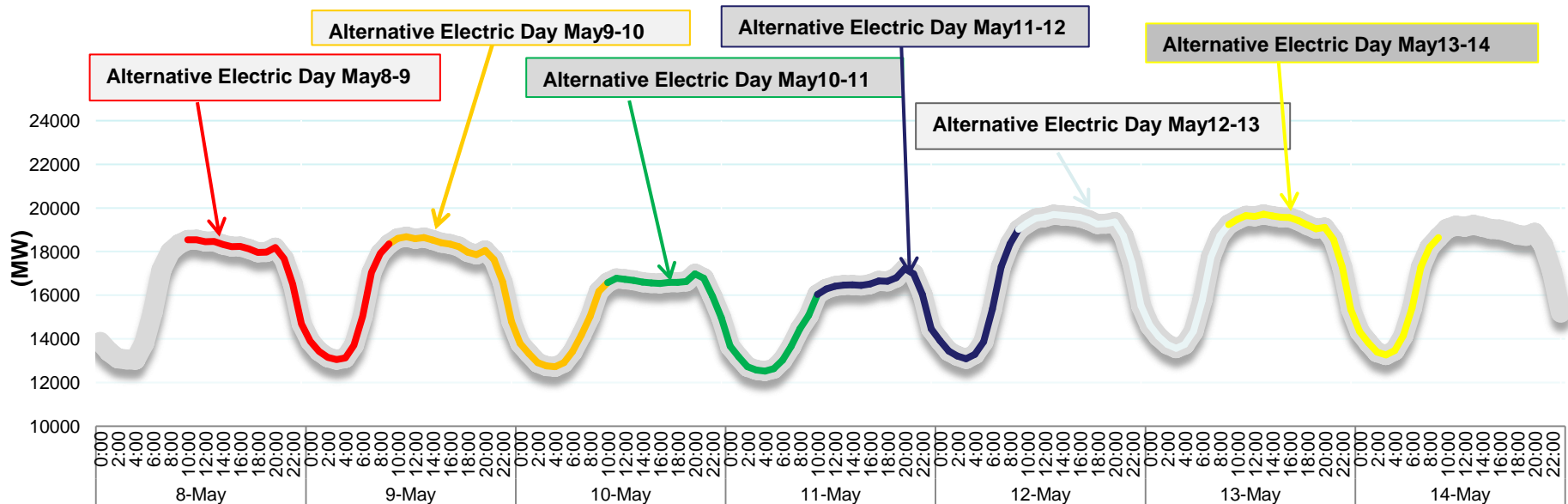


Minimal marginal cost impact

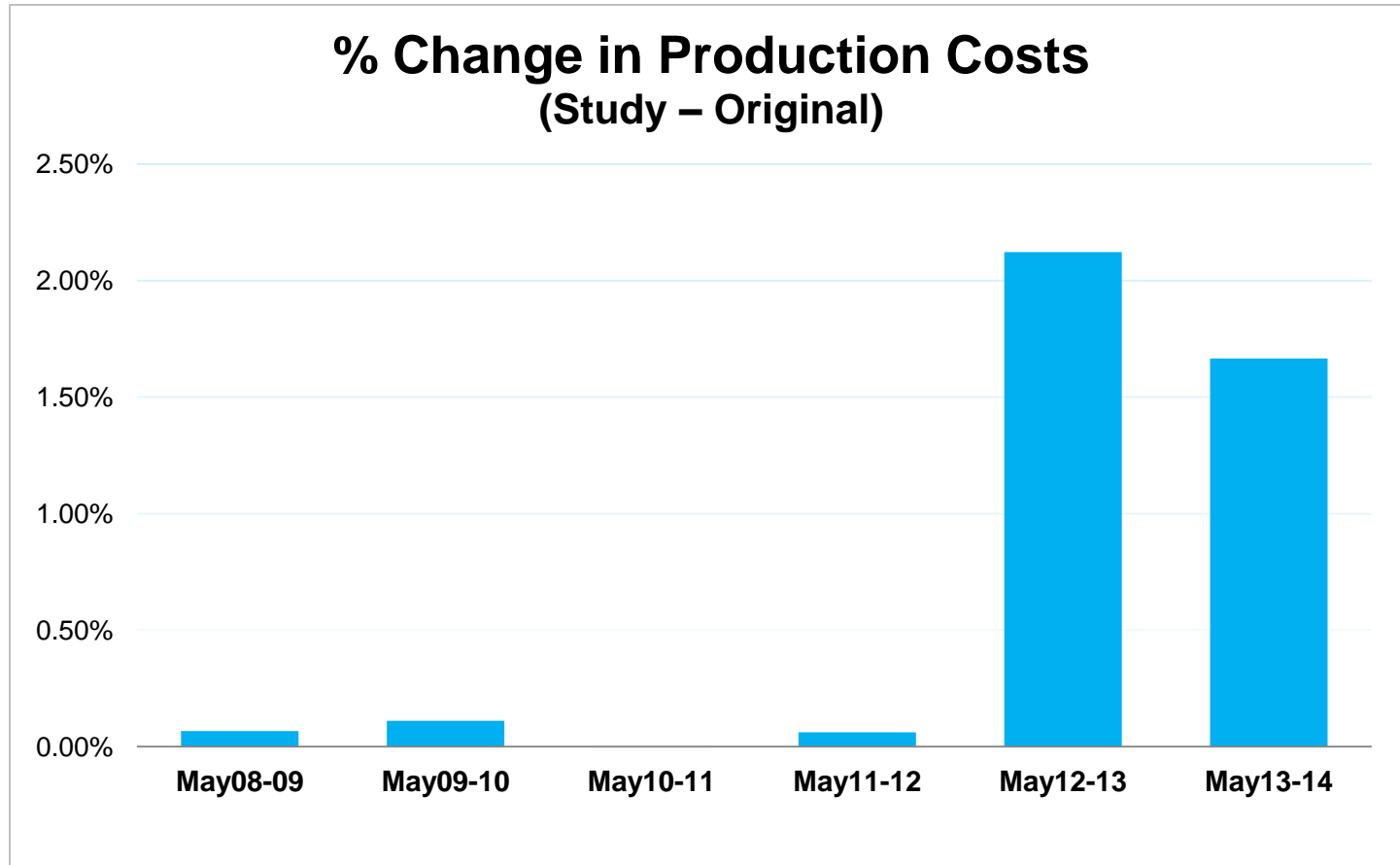


Case Study – Continuous Days

Continuous commitment for gas day case [HB10 - 9] May 8 - 15



Minimal production cost impact

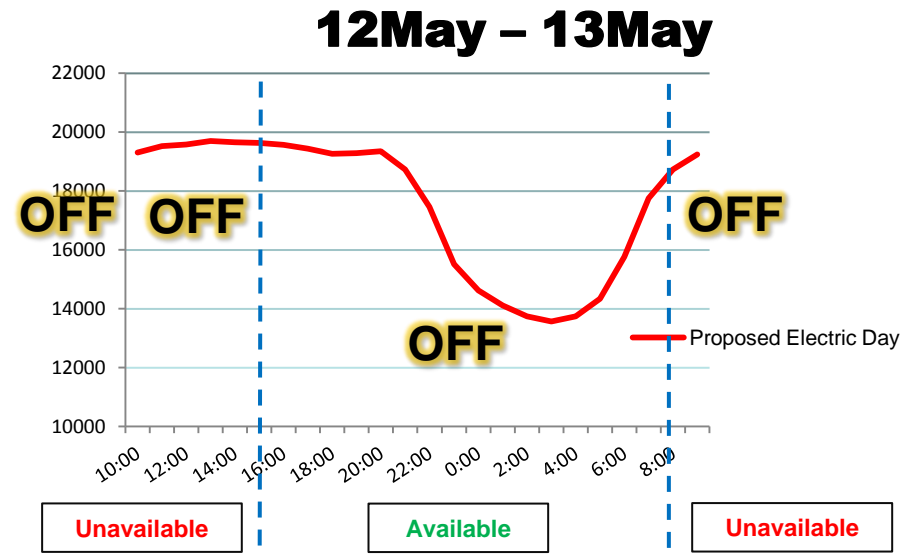
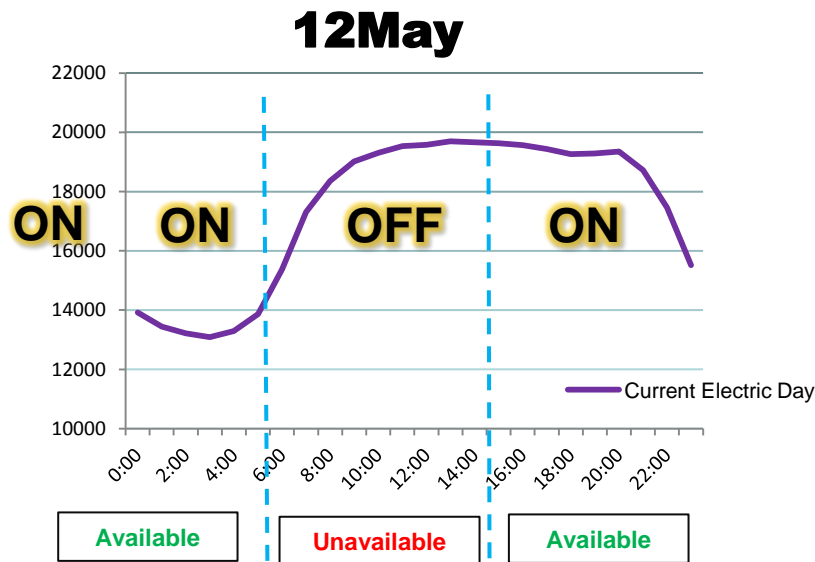


Unit Commitment

- ◆ **Shifting the Day-Ahead window has an impact on generator commitment and maintenance schedules, especially units with long minimum run time**
- ◆ **Long min-run units tend to avoid late starts by bidding higher costs toward the end of the electric day**
 - *The NYISO does not enforce minimum run or minimum down time across two market days*
 - *In the gas day (10am – 9am) 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

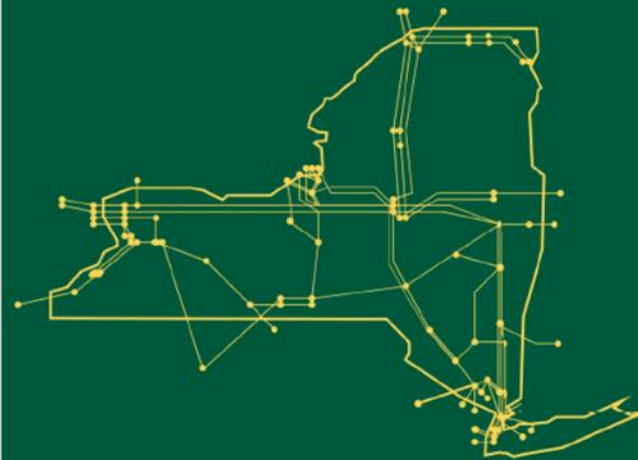
- ◆ Comparatively higher volume of transactions at the end of the Day-Ahead window in 10am – 9am scenario may impact RTC performance

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:
 - *Study did not show 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 would be expected to change their bidding behavior*
 - *Increased volumes of import/export transactions during the transition periods could potentially impact 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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