Dress Will Be Business Casual

Agenda

Northeast Power Coordinating Council, Inc.
2015 General Meeting

"Maintaining Reliability"

Albany Marriott
189 Wolf Road
Albany, NY 12205
(518) 458-8444

1:00 PM to 5:00 PM – Wednesday, December 2, 2015

Welcome & Opening Remarks

Harvey Reed, NPCC Chairman of the Board

Edward A. Schwerdt, NPCC President & CEO

Reforming the Energy Vision

Raj Addepalli
Managing Director of the Office of Electric, Gas & Water
New York State Public Service Commission

BREAK

Ontario Experience

Kim Warren
Vice-President, Market and System Operations and COO
Ontario Independent Electricity System Operator

2015/2016 Winter Programs

Wes Yeomans
Vice President of Operations
New York ISO

John Norden
Director of Operations
ISO-New England

Closing Remarks

Philip A. Fedora, Assistant Vice President of Reliability Services
NPCC

NORTHEAST POWER COORDINATING COUNCIL, INC.
1040 AVE. OF THE AMERICAS, NEW YORK, NY 10018 (212) 840-1070 FAX (212) 302-2782

Northeast Power Coordinating Council, Inc. (NPCC)

Antitrust Compliance Guidelines

It is NPCC's policy and practice to obey the antitrust laws and to avoid all conduct that unreasonably restrains competition. The antitrust laws make it important that meeting participants avoid discussion of topics that could result in charges of anti-competitive behavior, including: restraint of trade and conspiracies to monopolize, unfair or deceptive business acts or practices, price discrimination, division of markets, allocation of production, imposition of boycotts, exclusive dealing arrangements, and any other activity that unreasonably restrains competition.

It is the responsibility of every NPCC participant and employee who may in any way affect NPCC's compliance with the antitrust laws to carry out this commitment.

Participants in NPCC activities (including those participating in its committees, task forces and subgroups) should refrain from discussing the following throughout any meeting or during any breaks (including NPCC meetings, conference calls and informal discussions):

- Industry-related topics considered sensitive or market intelligence in nature that are outside of their committee's scope or assignment, or the published agenda for the meeting;
- Their company's prices for products or services, or prices charged by their competitors;
- Costs, discounts, terms of sale, profit margins or anything else that might affect prices;
- The resale prices their customers should charge for products they sell them;
- Allocating markets, customers, territories or products with their competitors;
- Limiting production;
- Whether or not to deal with any company; and
- Any competitively sensitive information concerning their company or a competitor.

Any decisions or actions by NPCC as a result of such meetings will only be taken in the interest of promoting and maintaining the reliability and adequacy of the bulk power system.

Any NPCC meeting participant or employee who is uncertain about the legal ramifications of a particular course of conduct or who has doubts or concerns about whether NPCC's antitrust compliance policy is implicated in any situation should call NPCC's Secretary, Ruta Skucas at 202-530-6428.

REV UPDATE:
Northeast Power Coordinating Council 2015 General Meeting

December 2, 2015


Reforming the Energy Vision
Regulatory Proceeding

TODAY'S AGENDA

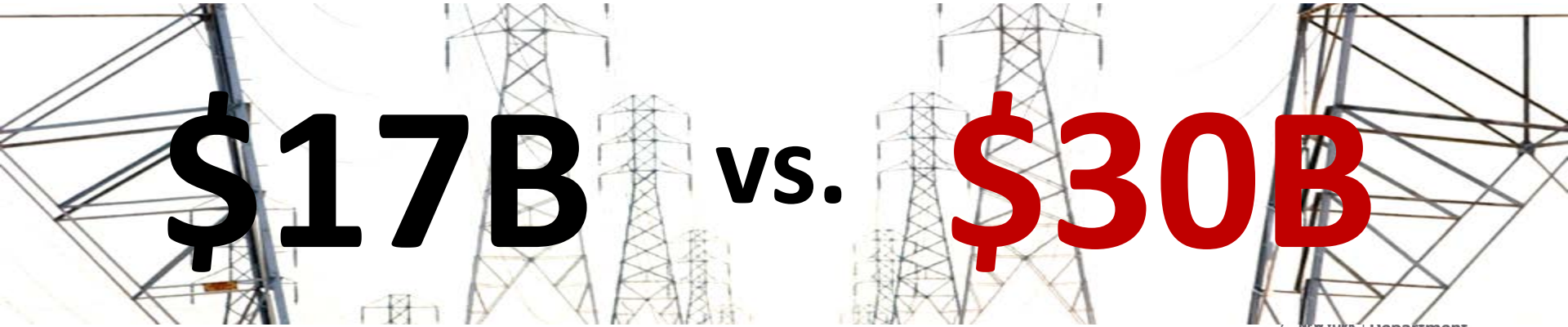
- Why we need to rethink energy policy
- What we're driving towards
- Progress to date

WHY: CURRENT INDUSTRY TRENDS

- Energy Sales Growth Slowing (2015-2025 Forecast 0%)
- Peak Load Growth Increasing (2015-2025 Forecast 0.48% per Year)
- Historically Low Natural Gas Prices
- Storage and Other Technology Commercializing
- Solar and Other Renewable Energy Costs Declining
- Customer Engagement to Manage Bills Increasing
- Investment in Aging Infrastructure and Technology to Support DER Integration Still Required

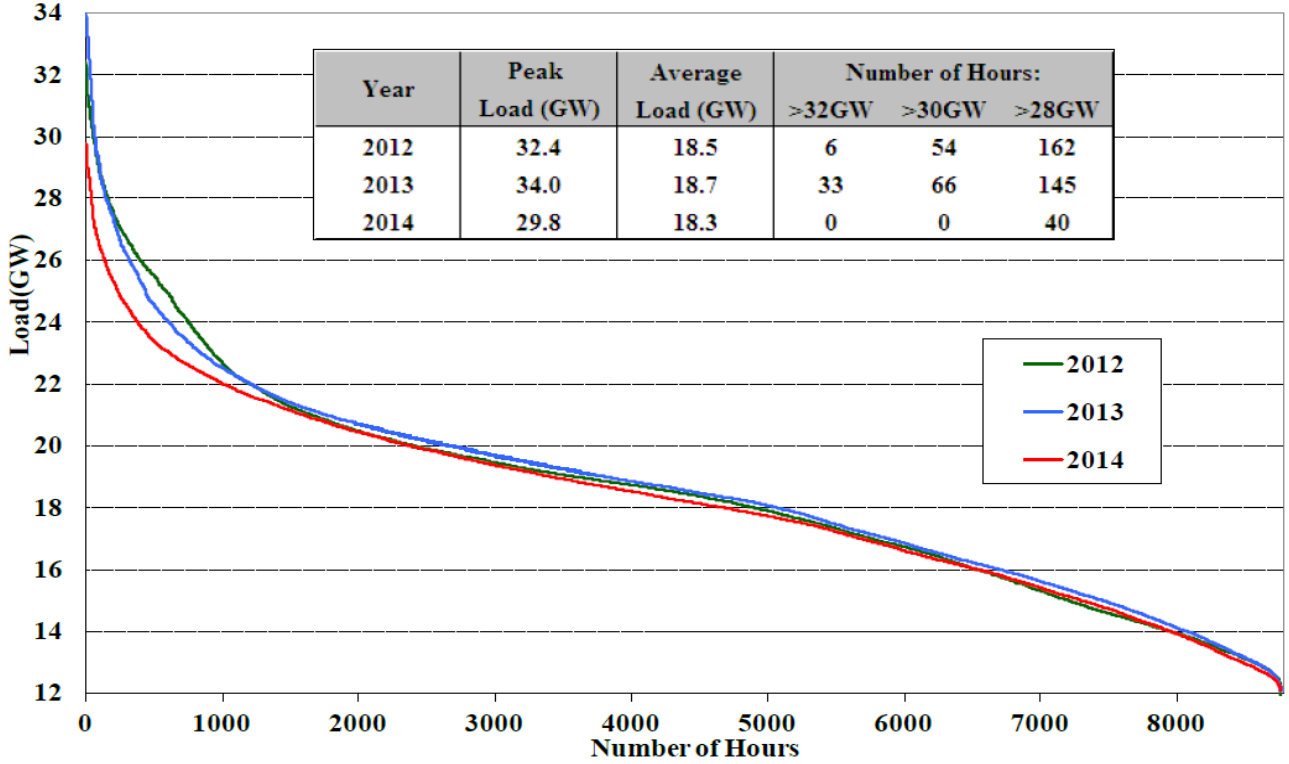
WHY: CURRENT TRAJECTORY

Over the past ten years, utilities spent $17 billion to maintain our electric power grid. We predict that number to jump to $30 billion over the next decade.



Capacity utilization of New York's electric grid was 59% a decade back, is 54% now, and projected to decline to 51% in the next decade

Load Duration Curves for New York State
2012 - 2014



Year	Peak Load (GW)	Average Load (GW)	Number of Hours: >32GW	>30GW	>28GW
2012	32.4	18.5	6	54	162
2013	34.0	18.7	33	66	145
2014	29.8	18.3	0	0	40

Source: 2014 State of the Market Report for the NYISO Markets by Potomac Economics

NEW YORK STATE OF OPPORTUNITY. Department of Public Service

WHY: BAD OUTCOME FOR PUBLIC POLICY

- ❑ Higher costs for customers
- ❑ Poor quality of service
- ❑ Forgone economic growth
- ❑ Inadequate progress on emissions reductions

WHAT: REFORMING THE ENERGY VISION

REV is New York's comprehensive plan to enable self-sustaining clean energy markets at scale and build a cleaner, more resilient, and affordable energy system.

- What Do We Want and Need?
  - ✓ Affordability
  - ✓ Resilience and reliability
  - ✓ Customer choice, control and value
  - ✓ Clean energy, emissions reductions
  - ✓ Economic development, jobs

PSC's Reforming the Energy Vision Proceeding is about:

Empowering customers to better manage energy…

…through animating markets for distributed energy resources…

…in order to drive toward higher efficiency, lower environmental impacts and increased affordability.

NEW YORK STATE OF OPPORTUNITY. Department of Public Service

REV's regulatory process is a component of Gov. Andrew M. Cuomo's overall strategic energy plan; part of a broader transformational program in NY

NEW YORK STATE OF OPPORTUNITY. Reforming the Energy Vision

NY GREEN BANK
A DIVISION OF NYSERDA

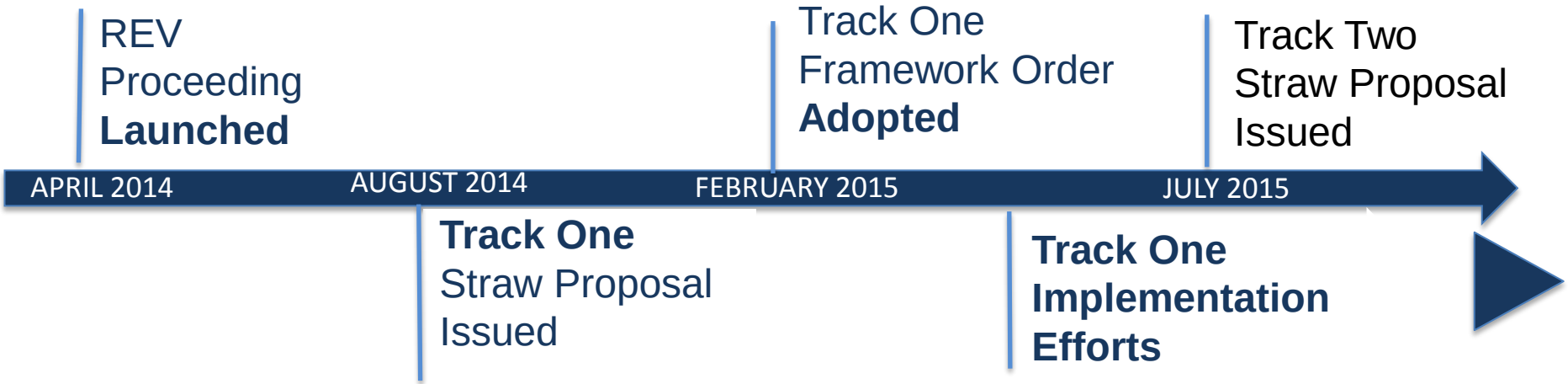
The NY-Sun Initiative
Solar Powering New York

BuildSmartNY

Regional Greenhouse Gas Initiative
an initiative of the Northeast and Mid-Atlantic States of the U.S.

ChargeNY.com
Taking charge of our destination!

REV's first major order was adopted on February 26, 2015, deciding policy, launching important implementation activities and setting the stage for rate issues.



Unprecedented interest, engagement, and strong stakeholder support has helped shape REV

- **295** stakeholder parties
- **2** technical conferences
- **7** working groups
- **2,053** comments
- **750** town hall meeting participants in 8 cities

REV's Framework Order: Overview

NEW YORK STATE OF OPPORTUNITY. Department of Public Service

Business-as-usual is no longer an acceptable option for New Yorkers

CHALLENGES:

- Aging infrastructure
- Poor system efficiency
- Flat load growth
- Climate change

OPPORTUNITIES:

- Rapidly falling technology costs
- Rise of the digital economy and new capabilities from IT
- Proliferation of new business models to create customer value

Historical regulatory approach and utility business models are not well adapted to address challenges and capture opportunities

"Utilities, and this Commission, could respond to [the challenges facing the industry] by clinging to the traditional business model for as long as possible, relying on protective tariffs, regulatory delay, and other defenses against innovation.

Alternatively, we can identify and build regulatory, utility, and market models that create new value for consumers and support market entrants and this new form of intermodal competition—in other words, embrace the changes that are shaking the traditional system and turn them to New York's economic and environmental advantage.

We decisively take the latter approach."

—REV Framework Order

In the face of these trends, NYS has set out several policy objectives for the future of NY's electricity system

- Enhanced customer knowledge and tools to support bill management
- Market animation and leverage of customer contributions
- System wide efficiency
- Fuel and resource diversity
- System reliability and resiliency
- Reduction of carbon emissions

REV sets out the State's vision of a transformed electricity system that will meet these policy objectives

- Reorient the electric industry and the ratemaking paradigm toward a customer-centered approach that harnesses technology and markets.
- Use distributed energy resources as a primary tool in the planning and operation of electric distribution systems, to achieve optimal system efficiencies, secure universal, affordable service, and enable the development of a resilient, climate-friendly energy system.

The Framework Order addresses 4 foundational building blocks:

1. Establishing the Distributed System Platform (DSP)
2. Engaging customers
3. Animating the market
4. Meeting environmental objectives

REV's Framework Order: Details

1. Establishing the DSP:

DSP

- Intelligent network platform
- Obligation and incentive to support DER
- DER providers as customers and partners
- Fair, open, and transparent transactive markets

DSP Responsibilities

- Integrated system planning
- Grid operations
- Market operations, structure & products

DSP Provider

- Utilities will be the DSP providers
- Represents an expansion of existing obligation
- Will be supported through Track Two business model changes

2. Engaging Customers:

- Create a vibrant digital marketplace (e.g. Amazon for power products and services) to inform and encourage transactions
- Support low- and moderate-income customers
- Ease interconnection
- Increase the informational value of customer bills
- Implement key customer protections

3. Animating the Market:

Goal: create market confidence and build the DER asset base in the near-term

System Data

- DSIPs will provide system planning information
- DSP will provide system data at granularity and timeliness appropriate for market
- Utilities can charge fees for value-added data analysis

Market Power

- Utilities cannot own DERs except in very limited cases
- Consider functional separation
- PSC monitoring & recourse
- Create market oversight committee

Early Actions

- Demand response tariffs
- Demonstration projects

4. Meeting Environmental Objectives:

- **Energy efficiency**
  - 2015 targets are a minimum for 2016
  - Increased flexibility and responsibility for utilities
  - Focus on market transformation curve
- **Large-scale renewable energy**
  - New REV track (LSR track) created – options paper filed June 1
- **Clean Energy Standard (current topic)**

REV Roadmap

The Track One Order represents one step on a transition path to REV:

Initial implementation steps

Demonstrate progress, build market confidence, answer questions needed to move forward *Underway*

Utility DSIP plans

Identify needed investments, strategies, and action plans to build the DSP market and underlying infrastructure *Due Jun 2016*

Track Two

Translate the REV vision into specific business model, incentive rate-making and rate design strategies with public involvement

Rates straw proposal in July 2015

Initial implementation steps are underway:

- Demand response tariff offerings
- Demonstration projects
- Market Design and Platform Technology working groups
- Benefit cost assessment framework development

REV's Track Two: Ratemaking Reforms and Key Issues

NEW YORK STATE OF OPPORTUNITY. Department of Public Service

Track Two REV Objective

Recognize that the expanding deployment of DER calls for new business and revenue models to provide growth opportunities through enabling and responding to the forces of technology and market innovation

REV Track Two Goals

- Align utility earnings opportunities with customer value
- Evolve the utility business model suited to the modern economy
- Provide customers with accurate and timely value signals
- Achieve public policy objectives:
  - Reliable service
  - Maintain a financially sound utility industry
  - Affordability
  - Environmental goals
  - Gradualism

REV Implementation Schedule (Partial)

Dec. 2015 Questions for organizing the Commission's inquiry into valuing DER

1st qtr 2016: BCA Order

Track Two Order

DSIP Guidance

Community Choice Aggregation

Later in 2016: Each utility files an initial Distributed System Implementation Plan

Reliability Studies

- State Resource Plan Analysis
- NYISO PV Study
- NYISO 2010 Wind Generation Study


THANK YOU

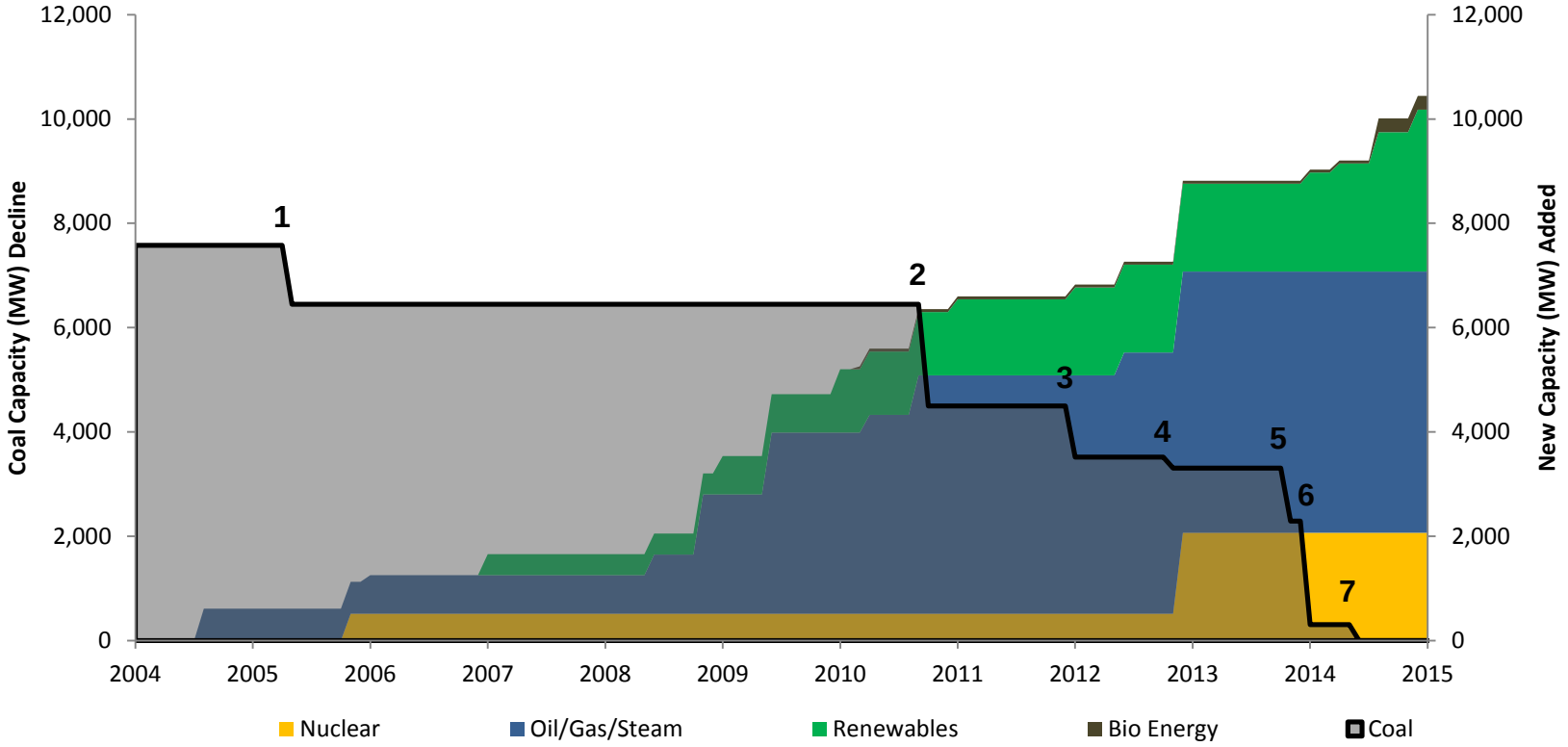
Evolution of the Ontario Supply Mix

Kim Warren
Vice-President, Market & System Operations
& Chief Operating Officer

December 2, 2015

ieso
Independent Electricity System Operator

Transforming Ontario's Power System



1 - **April 30, 2005:** Lakeview Retirement
2 - **October 1, 2010:** Lambton G1, G2 and Nanticoke G3, G4 shutdowns
3 - **December 31, 2013:** Nanticoke G1, G2 shutdown
4 - **September 11, 2012:** Atikokan Shutdown
5 - **September 26, 2013:** Lambton shutdown
6 - **December 31, 2013:** Nanticoke shutdown
7 - **April 1, 2014:** Thunder bay shutdown

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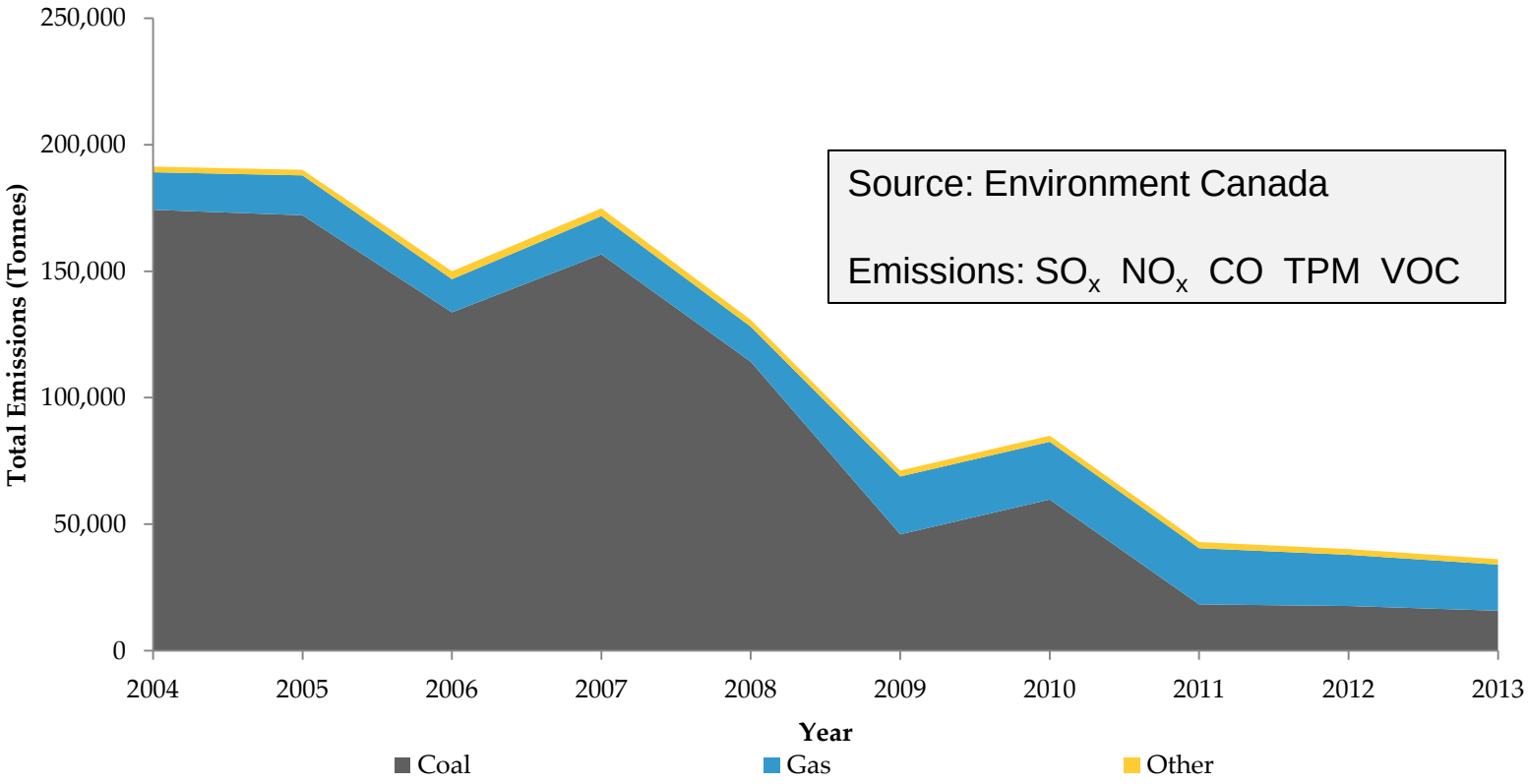
Independent Electricity System Operator

Emissions Management

Ontario Electric Power Utilities Emission Totals (2004 – 2013)



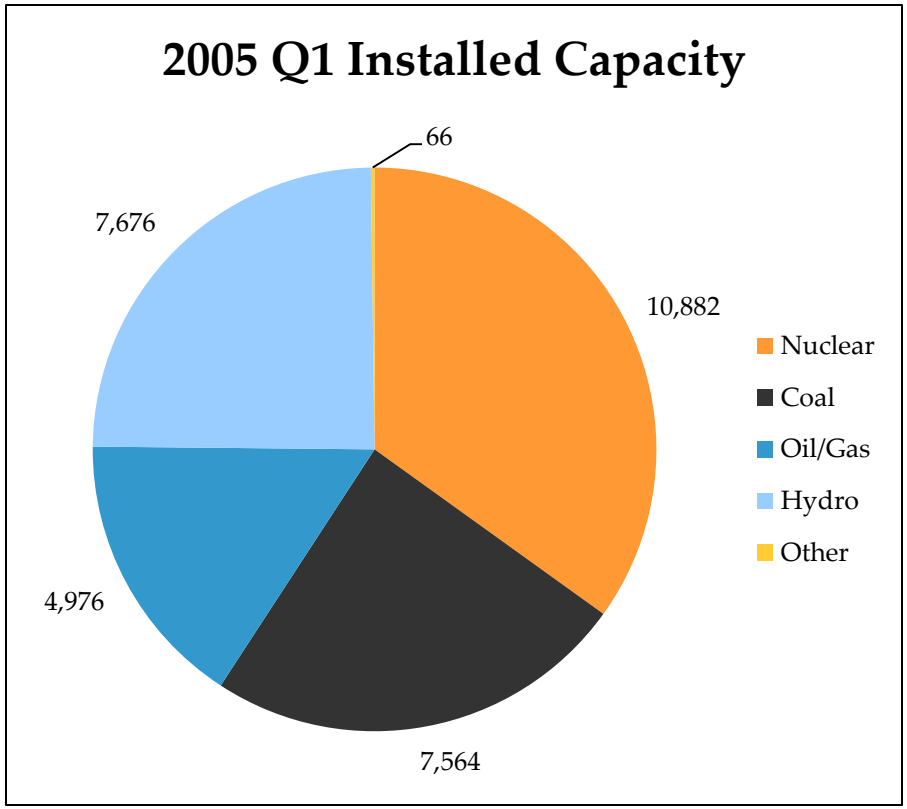
Key Elements of the Coal Replacement Plan

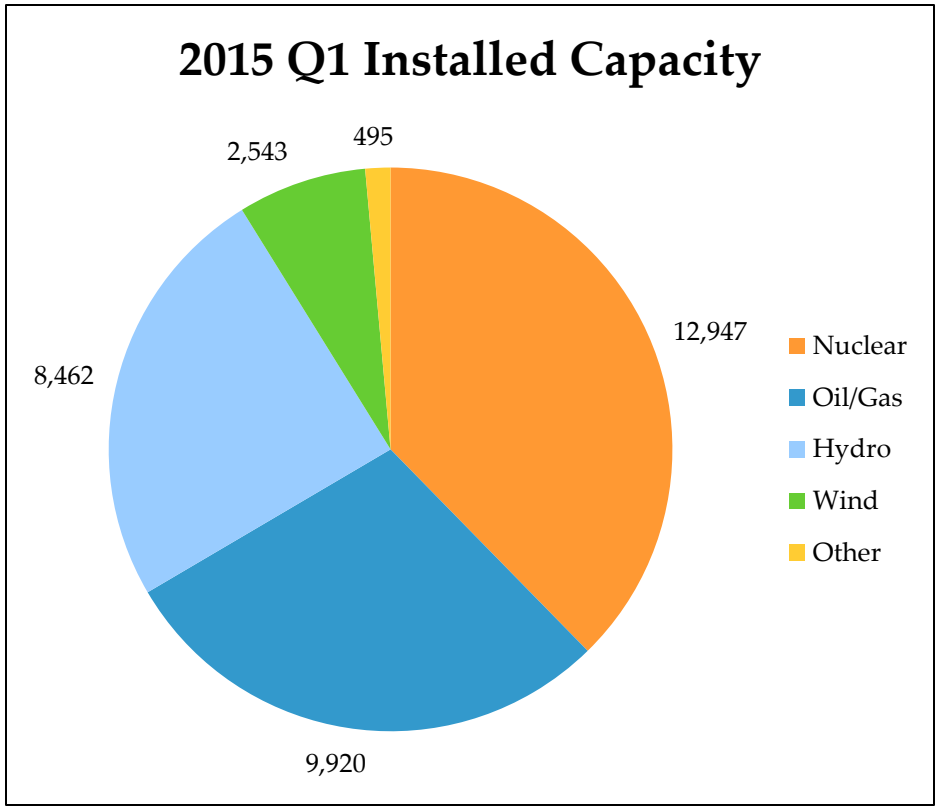
- Maintaining reliability and adequacy
- Preserving operational flexibility
- Emissions control strategy
- Communicating progress and requirements

Maintaining Reliability and Adequacy

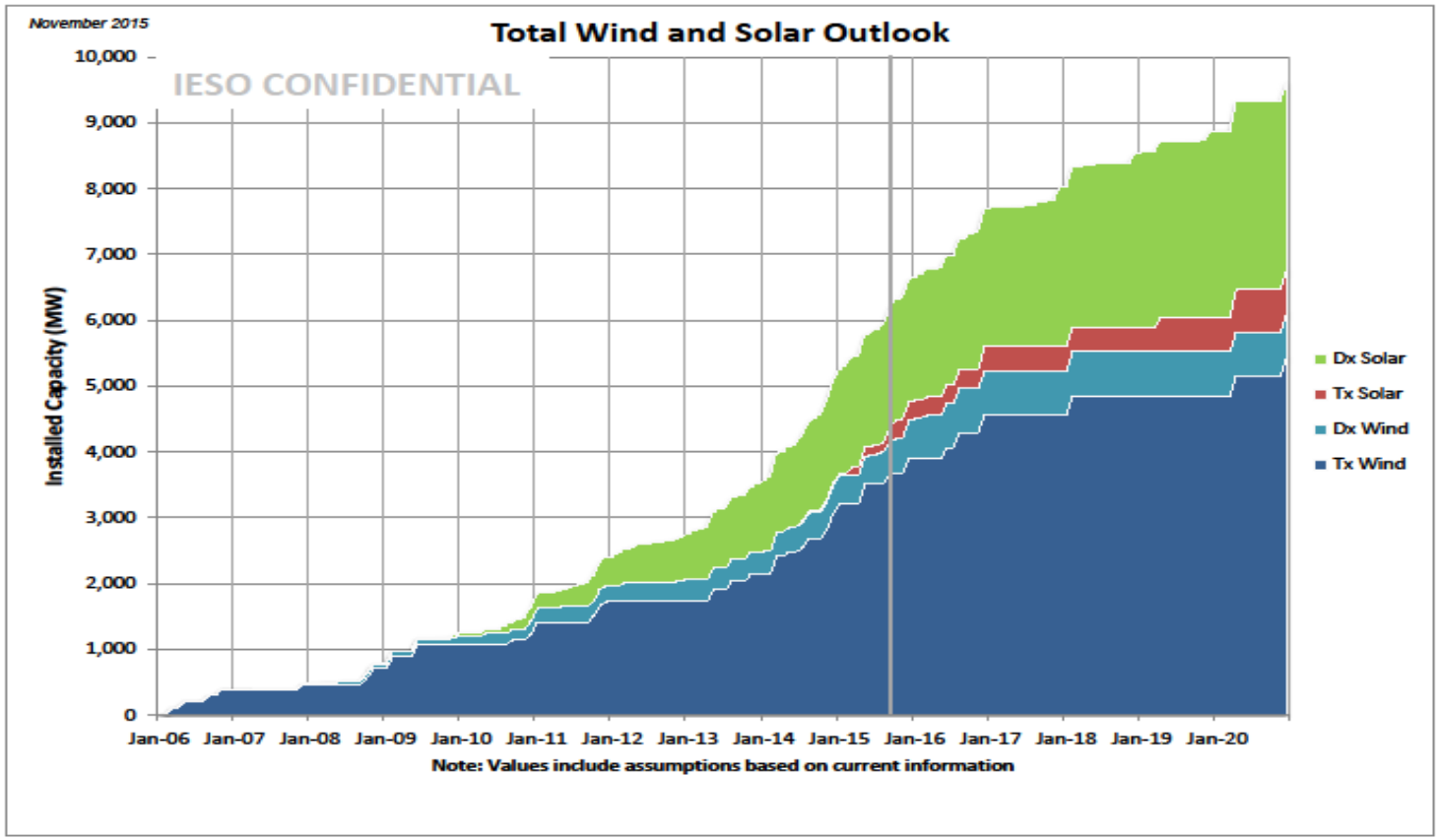
- Supply adequacy
  - Replacement supply required to demonstrate reliable performance before retiring coal units
- Location of replacement supply
  - Need for reactive power support in critical locations to maintain adequate voltages
  - Maintain existing import and export capability
- Transmission enhancements
  - Need for extensive changes and realignment of the transmission infrastructure

Supply Mix – Then and Now





Wind/Solar Outlook

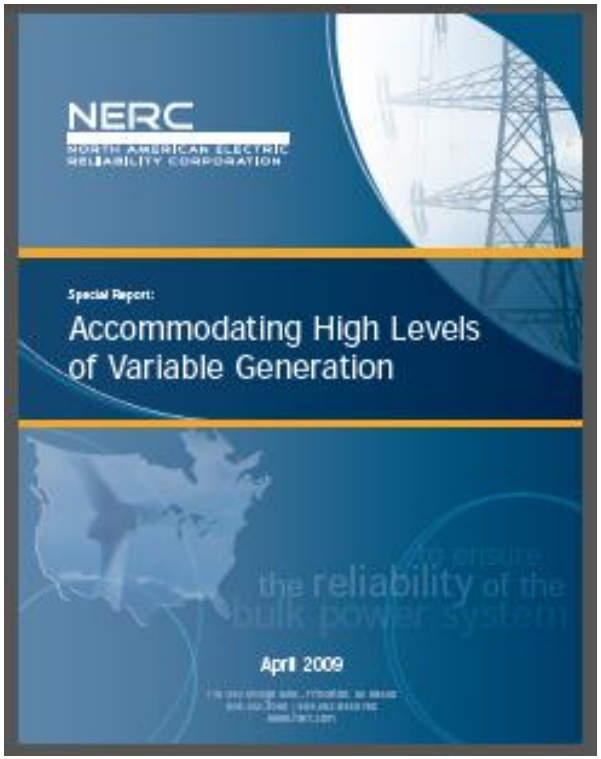


Grid/Transmission Enhancements

- Ensuring replacement supply has appropriate governor response for frequency stabilization
- New system configuration after coal shutdowns and new resources created the need for significant transmission upgrades:
  - Auto-transformers
  - Capacitors
  - Switching stations
  - Static VAR compensators (SVCs)
  - Bruce to Milton 500kV circuits

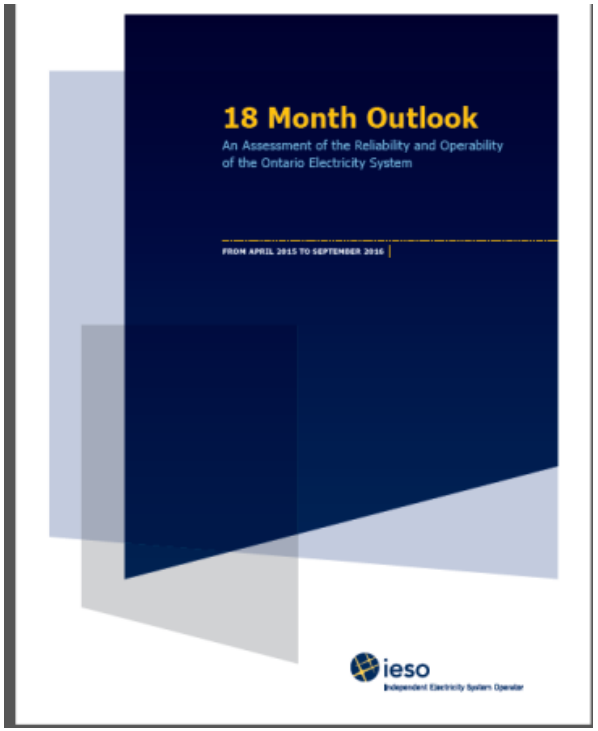
Preserving Operational Flexibility

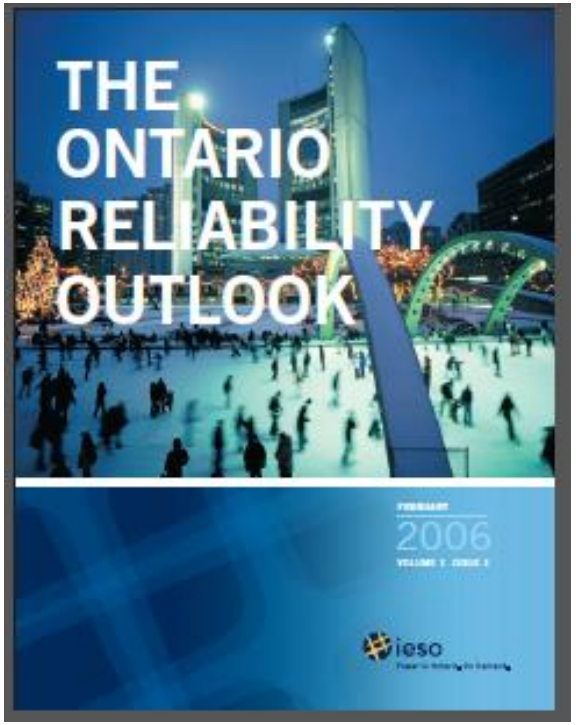
- Ontario Energy Board`s Natural Gas Electricity Interface Review
- Enhanced focus on gas-electric coordination
- Studied operational characteristics and established requirements for replacement supply
  - Connection requirements
  - Performance validation
  - Renewables Integration Initiative (RII)



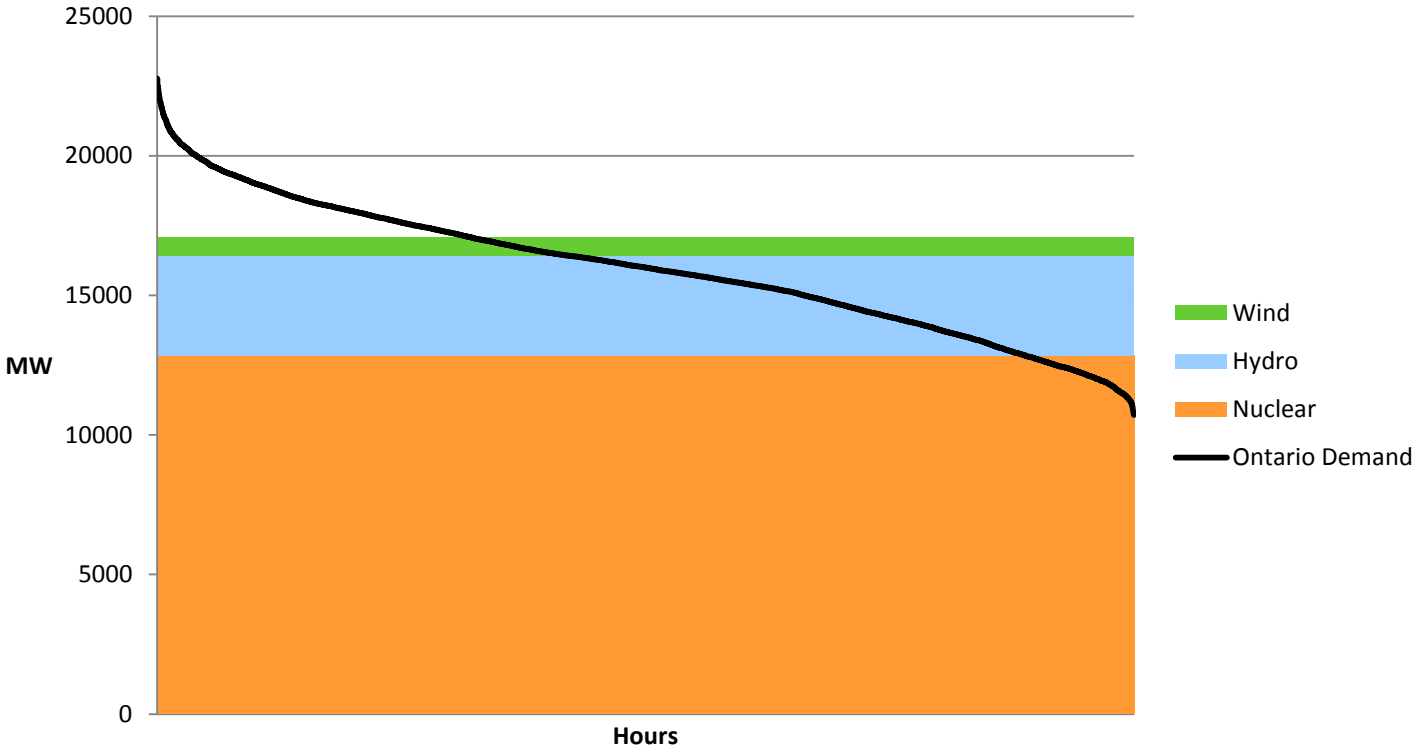
Communicating Progress and Requirements

- Public reporting on important aspects of the off-coal transition





Ontario Demand vs Potential Baseload Supply



Summary

- The coal phase-out program created the need for additional resources, transmission upgrades, new operating methods, and collaboration with stakeholders

- Through planning and operability studies, coal was successfully and reliably replaced by gas, nuclear refurbishments, and renewable resources

- By April 2014, the coal shutdown was complete making Ontario the first jurisdiction in North America with a significant reliance on coal-fired electricity to eliminate coal as a source of electricity production

2015-2016 Winter Capacity Assessment & Winter Preparedness

Wes Yeomans

Vice President - Operations

New York Independent System Operator

Northeast Power Coordinating Council General Meeting

December 2, 2015

Albany, NY

Topics

- **Winter 2015-16 Capacity Assessment**
- **Winter Preparedness**
- **Status of FERC Order 809**
- **Continued Gas-Electric Issues**

Winter Assessment Summary

- **Includes capacity changes since 2015 Gold Book:**
  - ***75 MW of retirements***
  - ***374 MW of increases***
- **Two Weather Scenarios:**
  - ***Normal***
  - ***90/10 Cold Weather***
- **Two Fuel Cases:**
  - ***Base Case***
  - ***Loss of Gas Scenario***
- **Southeastern NY Transmission Security Review**

2015-2016 Capacity Margins (MW)

	Base Case		Loss of Gas Case	
Region	**Normal Weather**	**90/10 Weather**	**Normal Weather**	**90/10 Weather**
NYCA	9,068	7,486	5,417	3,835
SE Region (N-1-1)	9,180	8,576	7,505	6,901

NYCA Winter Installed Capacity Assessment - Base Case

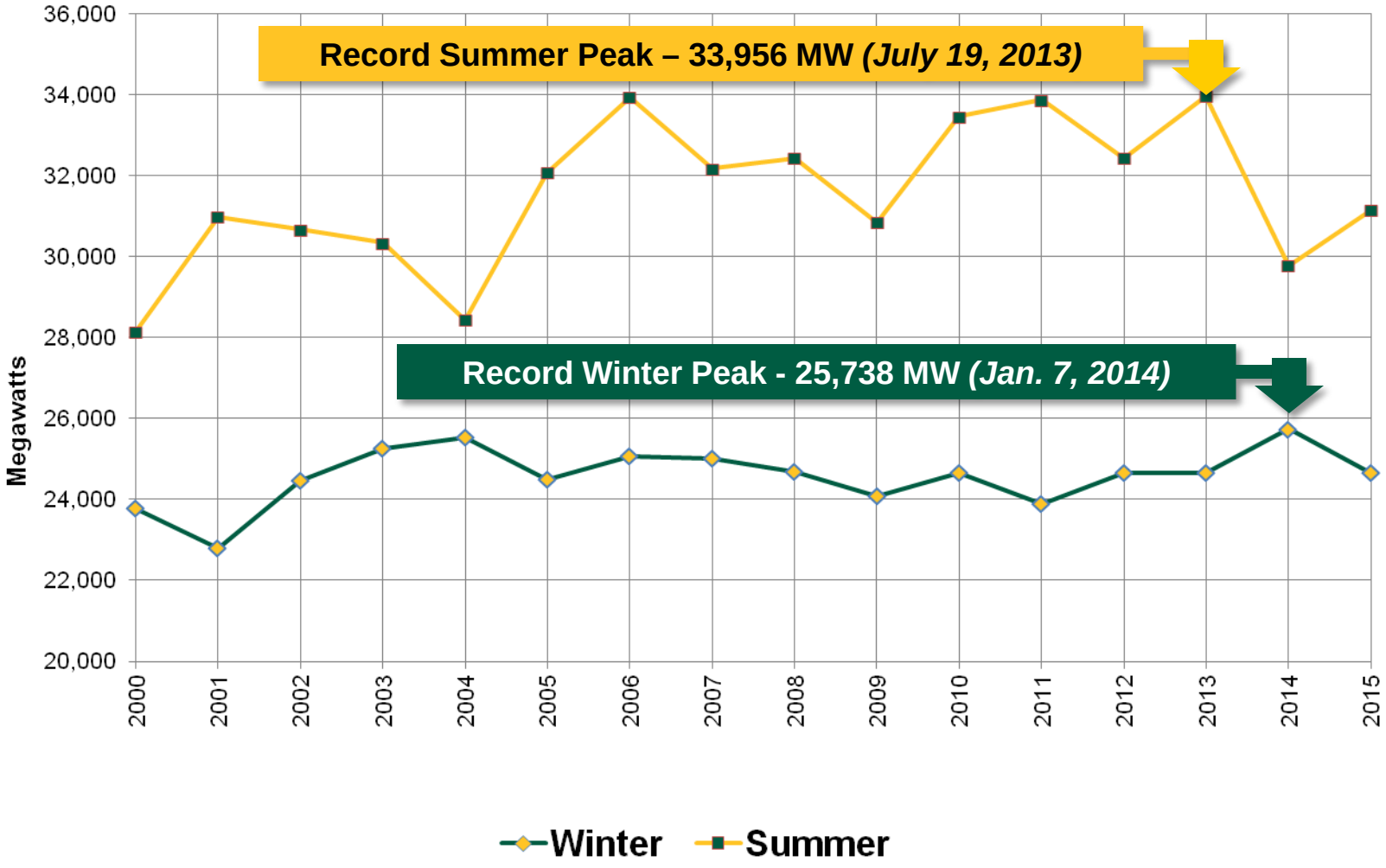
Line	Item	2015-2016 Baseline Forecast	2015-2016 90th Percentile Forecast
1a	Installed Capacity Resources	41,312	41,312
1b	SCR - ICAP Values	885	885
1c	Net ICAP External Imports	338	338
1	**NYCA Resource Capability**	**42,535**	**42,535**
2	Total Projected Capacity Outages	**6,332**	**6,332**
3	**Net Installed Capacity Resources**	**36,203**	**36,203**
4	Load Forecast	24,515	26,097
5	Operating Reserve Requirement	2,620	2,620
6	**Capacity Margin**	**9,068**	**7,486**

- ***2014-2015 winter peak -- 24,638 MW (Jan. 7, 2015)***
- ***All-time record winter peak -- 25,738 MW (Jan. 7, 2014)***

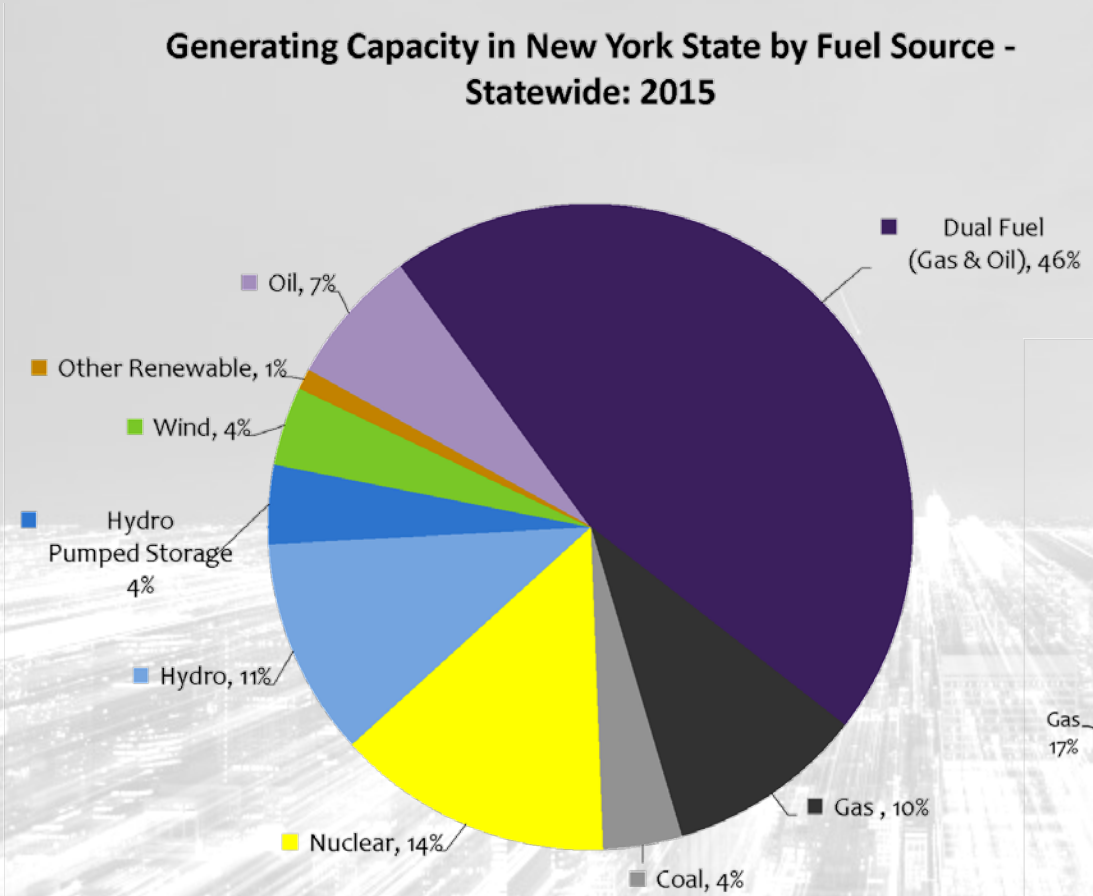
NYCA Winter Installed Capacity Assessment - Loss of Gas

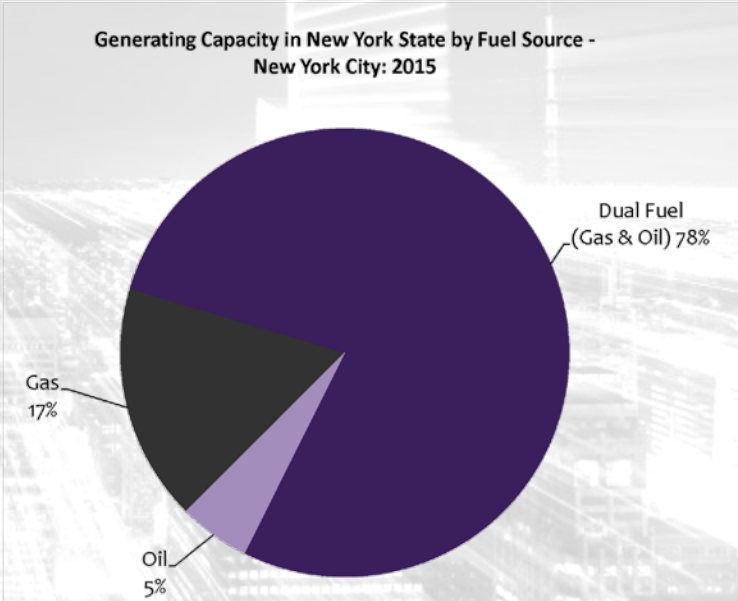
Line	Item	2015-2016 Baseline Forecast	2015-2016 90th Percentile Forecast
1a	Installed Capacity Resources	41,312	41,312
1b	SCR - ICAP Values	885	885
1c	Net ICAP External Imports	338	338
1	NYCA Resource Capability	**42,535**	**42,535**
2	Total Projected Capacity Outages	**6,332**	**6,332**
3 = (1-2)	Net Installed Capacity Resources	**36,203**	**36,203**
4	Load Forecast	24,515	26,097
5	Operating Reserve Requirement	2,620	2,620
6 = (3-4-5)	Capacity Margin	**9,068**	**7,486**
7a	Subtract All Gas Only Units	6,540	6,540
7 = (6-7a)	Capacity Margin, Loss of Gas	2,528	946
8a	Add Back Units with Firm Gas Contracts	2,889	2,889
8 = (7-8a)	Expected Capacity, Loss of Gas Case	5,417	3,835

New York Seasonal Peaks - 2000 to 2015

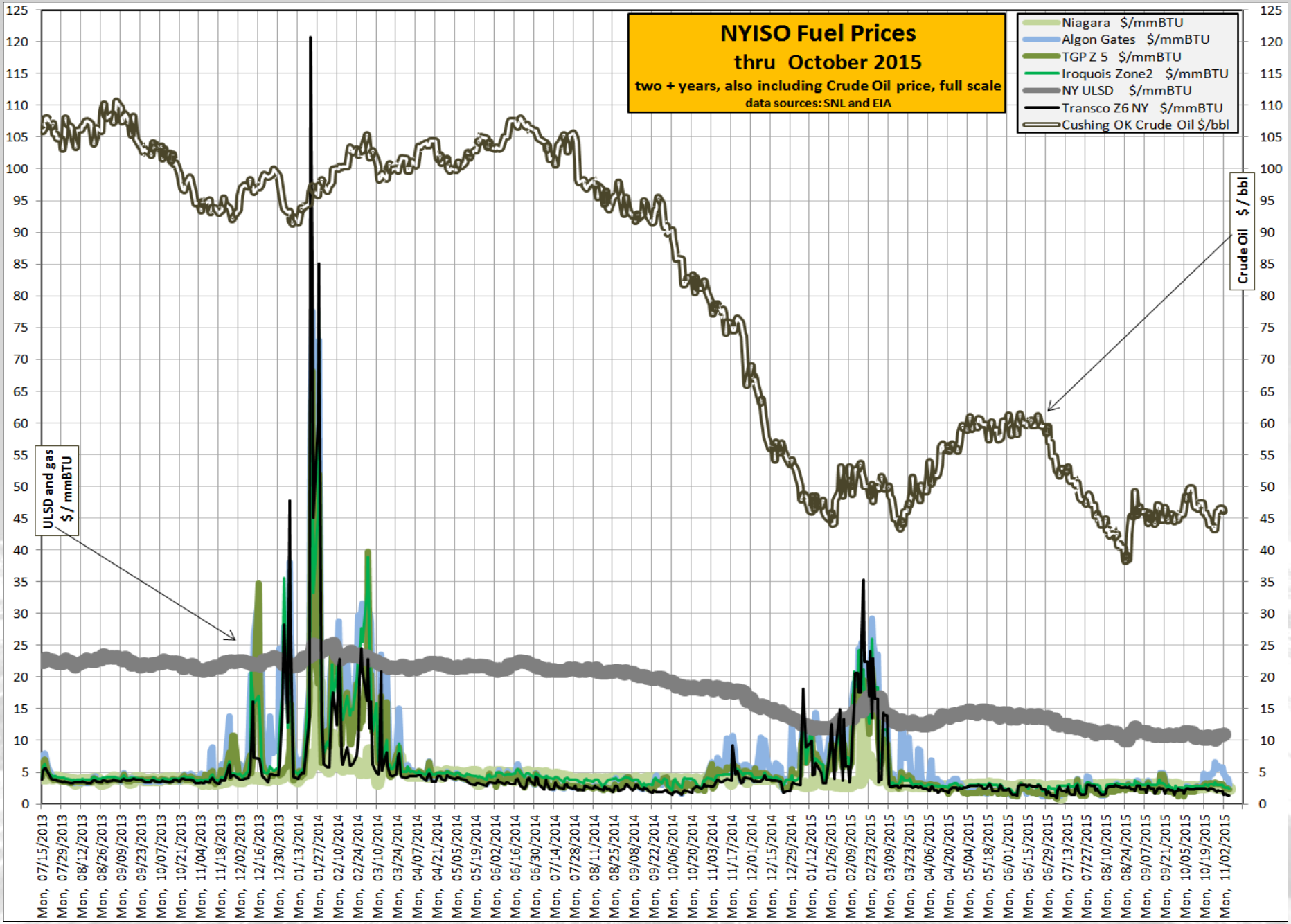


New York Fuel Mix





SOURCE: *Power Trends 2015,* New York Independent System Operator, June 2015



Winter Preparedness

- **Issued the winter preparedness fuel surveys and reviewed the status of starting oil inventories, oil replacement arrangements, and gas transportation arrangements**
- **Continued Control Room gas-electric support position**
  - ***Monitor status of gas pipeline system***
  - ***Monitor alternative fuel inventory***
  - ***Monitor potential emissions limitations***
- **Communications protocol in-place to improve speed and efficiency for state agencies to evaluate potential generator requests for emissions waivers if needed for reliability**

Winter Preparedness

- **Infrastructure maintenance coordination**
  - ***Operations has coordinated gas pipeline, generator, and transmission maintenance schedules***
- **Market Mitigation & Analysis Department visited some generating stations to review maintenance and testing preparations**
- **Expect New York State Reliability Council Minimum Oil Burn rules approved at the November NYISO Operating Committee meeting**

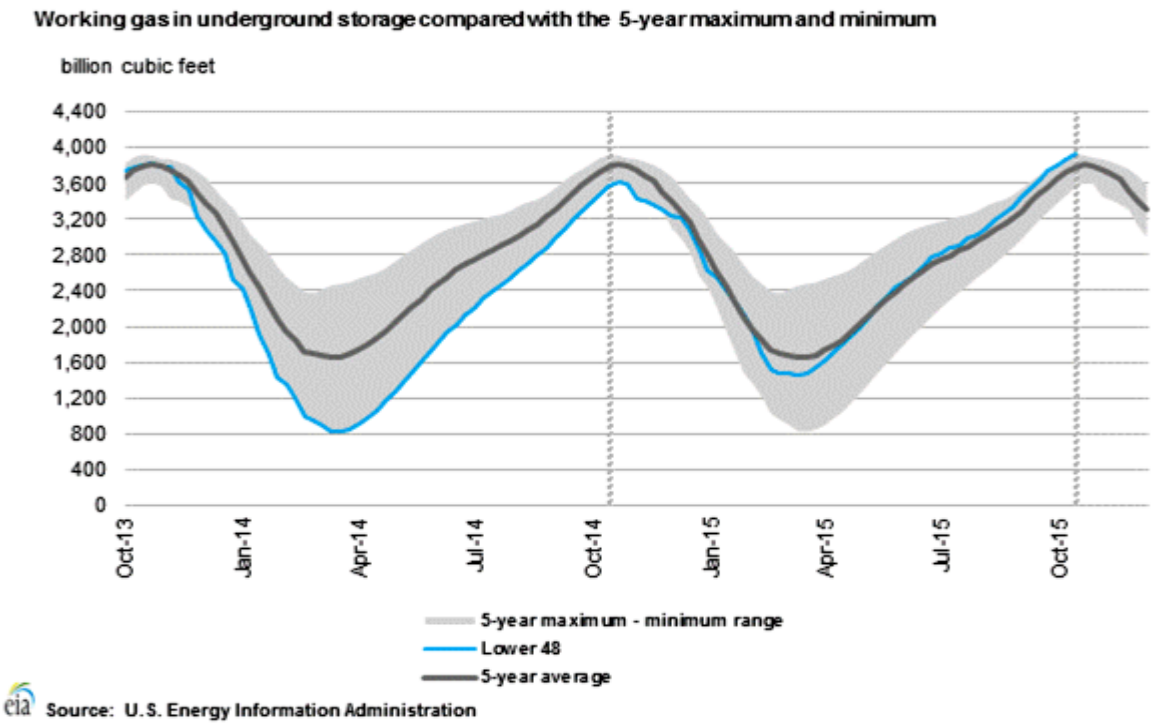
Operator Awareness

- **Northeast interstate pipelines displayed on Control Room Video Board**
  - ***Operational Flow Orders are posted with enhanced brightness on the video board***
- **Will begin to design enhanced operator awareness displays reflective of the Fuel Availability Reporting**

Market Enhancements

- **Enhanced reserve shortage pricing curves *(November 4, 2015)* to better value energy & reserves during tight operating conditions and increase the amount of operating reserves secured in the energy markets**
- **Capability exists for generators to provide expected costs for day-ahead reference level developments**
- **Market design concept for Fuel Constrained Bidding**
- **Continue to work with stakeholders to evaluate capacity market enhancements to encourage fuel assurance investments**

Weekly Natural Gas Storage Report



Note: The shaded area indicates the range between the historical minimum and maximum values for the weekly series from 2010 through 2014.

Source: Form EIA-912, "Weekly Underground Natural Gas Storage Report." The dashed vertical lines indicate current and year-ago weekly periods.

FERC Order 809
(4/16/2015)

- **Adopts two proposals submitted by NAESB**
  - ***Revises Nomination Timeline***
    - **Timely Nomination schedule moved from 12:30 PM to 2:00 PM EST**
  - ***Adds a third intraday nomination cycle***
  - ***Declines to change the gas day to align with the power day***
- **ISOs consider "advancing" the posting of Day Ahead schedules to allow sufficient time for gas purchases prior to the 2:00 PM timely nomination deadline**

Continued Cold Weather Gas-Electric Issues

- **Gas Availability**
  - ***Gas LDC retail load has gas transportation priority across the Gas LDCs and firm transportation service on the interstate pipeline system***
  - ***The interstate gas pipeline system is heavily constrained to Eastern NY, New York City, and Long Island during cold weather conditions***
- **Extended Cold Weather Conditions**
  - ***Burn rates of alternative fuels can exceed replacement rates of alternative fuels during extended cold weather -- resulting in reduced generation***
- **NOx Restrictions**
  - ***Generator switching from gas to oil in some instances result in capacity limitations due to newer, more restrictive NOx emission limitations***
- **Becoming more challenging for generation to burn oil**
  - ***More restrictive NOx emission limitations, less Northeast refinery capability, and upcoming rigorous Clean Power Plan carbon targets***
- **Gas pipeline siting remains challenging**

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.

www.nyiso.com

DECEMBER 2, 2015 | ALBANY, NY

Winter Coordination and Preparations in New England

NPCC General Meeting

John Norden

DIRECTOR, OPERATIONS

Highlights

- Winter Reliability Solution Program is in place for winter 2015/2016
  - Substantial commitment to increased oil inventory, contractual access to Liquefied Natural Gas, and new dual-fuel capability
- Enhancements already implemented
- Capacity Outlook
- ISO has communicated and coordinated winter readiness with Neighboring Control Areas, NPCC, Northeast Gas Association, and New England Generators
- Intelligence Tools
- Load-shedding plans have been updated and include identification of natural gas infrastructure as critical loads

2015/16 Winter Reliability Program

- **Three Components Oil, LNG, DR**
- **Residual Oil Program**
  - By the Oct. 1 deadline, 81 Units submitted intent to provide 4.464 million barrels
  - Based upon assets participating in program total eligible oil is anticipated to be 2.965 million barrels
  - Total oil program cost exposure is anticipated to be $38.25M (@$12.90/barrel)
- **Residual LNG Program**
  - By the Oct. 1 deadline, 8 Units submitted intent to provide at least 1.42 million MMBTU Based upon asset submissions, and capping submissions to permissible asset thresholds total eligible LNG is 1.278 million MMBTU
  - Total LNG program cost exposure is anticipated to be $2.75M (@$2.15/MMBTU)
- **DR Program**
  - By the Oct. 1 deadline, 7 Assets submitted (6 accepted by ISO) an intent to provide at least 26.5 MW of interruption capability
  - Total DR program cost exposure is anticipated to be $132K

Winter Reliability Program Update

- Dual Fuel Commissioning (DFC) Program
  - Participation:
    - 6 Units submitted intent to commission Dual Fuel Capability
      - 4 units for 2014/15 (1,039 MW)
      - 2 units for 2015/16 (735 MW)
    - Total additional winter seasonal claimed capability represented: 1,774 MW
  - Dual Fuel Commissioning Activity:
    - Units commissioned (as of Nov. 30): 5 successful, 1 outstanding
  - Dual Fuel Testing Program also continues as part of normal winter enhancements independent of the winter program

Enhancements in Place

- Prior to the start of the winter of 2014/15:
  - Prior year, still in effect:
    - Advanced the Day Ahead Market Timeline to allow more time to procure gas
    - Replacement Reserve Pricing
    - Tighter criteria for FCM Reserve Shortage Events
  - For Winter 14/15:
    - Energy Market Offer Flexibility Enhancements (December 3, 2014)
    - Expanded the Winter Reliability Program to include LNG and Dual Fuel Conversions

Capacity Outlook

- Forecasted loads for 2015/2016
  - 50/50 Normal Forecast: **21,077 MW**
  - 90/10 Extreme Forecast: **21,737 MW**
  - Last winter peak load was **20,567 MW** on January 8, 2015
  - Last winter peak load forecast was **21,086 MW**
- Forecasted Operable Capacity using Capacity Supply Obligation (CSO)
  - 50/50 Normal Forecast: **979 MW surplus**
  - 90/10 Extreme Forecast: **-387 MW deficient**
  - Eco Max offers are consistently above CSO
    - Can range daily from 1,500 MW to 4,000 MW
    - Approximately 2,900 MW difference between the current Seasonal Claimed Capability (SCC) and CSO values
- Fuel Constraints tend to happen in Real-time

Operable Capacity Analysis 90/10 Forecast

90/10 Load Forecast (Extreme)	January- 2016[2] CSO	January - 2016[2] SCC
Generator Operable Capacity MW [1]	29,897	32,814
OP CAP From OP-4 RTDR (+)	413	413
OP CAP From OP-4 RTEG (+)	174	174
Operable Capacity Generator with OP-4 DR and RTEG	30,484	33,401
External Node Available Net Capacity, CSO imports minus firm capacity exports (+)	1,226	1,226
Non Commercial Capacity (+)	35	35
Non Gas-fired Planned Outage MW (-)	686	729
Gas Generator Outages MW (-)	0	34
Allowance for Unplanned Outages (-) [5]	2,800	2,800
Generation at Risk Due to Gas Supply (-) [4]	4,534	5,004
Net Capacity (NET OPCAP SUPPLY MW) [3]	23,725	26,095
Peak Load Forecast MW(adjusted for Other Demand Resources) [2]	21,737	21,737
Operating Reserve Requirement MW	2,375	2,375
Operable Capacity Required (NET LOAD OBLIGATION MW)	24,112	24,112
Operable Capacity Margin [3]	(387)	1,983

[1] Generator Operable Capacity is based on data as of **November 10, 2015** and does not include Capacity associated with Settlement Only Generators, Passive and Active Demand Response, and external capacity. SCC value is based on data as of **November 10, 2015**

[2] Load based on 2015 CELT report and week with lowest Operable Capacity Margin, week beginning **January 9, 2016**.

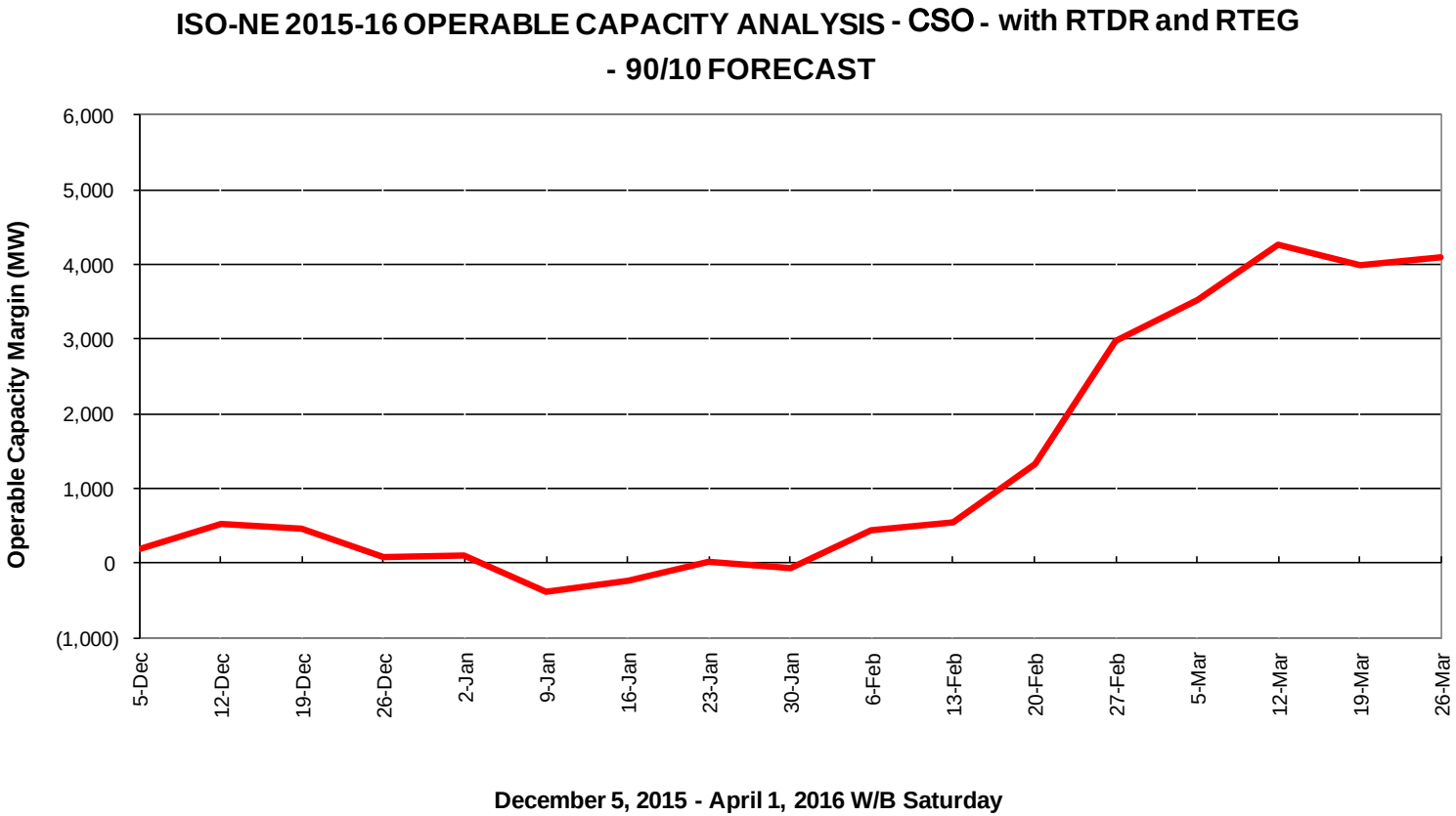
[3] Includes OP4 actions associated with RTEG and RTDR

[4] Total of (Gas at Risk MW) – (Gas Gen Outages MW)

[5] Allowance For Unplanned Outage MW is based on the month corresponding to the day with the lowest Operable Capacity Margin for the week.

Winter 2015-16 Operable Capacity Analysis (MW)

90/10 Forecast (Extreme)



Preparations for Winter – Coordination and Communication

ISO-NE has detailed communications protocols in place

- Regular conference calls with NPCC Reliability Coordinators
  - Per standard operating procedures, ISO-NE confirms expected interchange schedules to ensure enough resources are available to meet the load and reserve requirements in a coordinated fashion
  - However, external contingencies tend to be shifted to New England due to the energy-only nature of the majority of transactions
- Pre-winter conference calls with the Northeast Gas Association
  - Emphasized importance of maintaining close coordination regarding outages
- Regular communications with gas pipelines
  - Information Policy changes were made to improve gas-electric coordination per FERC Order 787
- Winter preparedness seminars
  - ISO-NE provided training for generators and demand resources in October

Generator Planning Reviewed at Winter Readiness Seminar in October

- Plant-specific Winter Readiness Plan
- Ensure adequate winter supplies of fuel
- Freeze protection per guidelines
- Access to secondary fuel
- Verify fuel-switching capability
- Monitor heat tracing
- Consider increased staffing during severe weather
- Develop plant-specific operating plans
- Wind barriers to protect instrument cabinets & sensing lines
- These recommendations are consistent with NERC's Winter Preparedness Guidance and are things all generators can do to get ready for severe weather

Intelligence

- Fuel Surveys
  - Initially monthly; can transition to twice weekly and daily at different points in the winter depending upon system conditions
  - One area of concern that we believe may become a factor is environmental constraints for the resources burning oil. We have asked generators to keep the ISO informed with significant notice times of any environmental constraints they may encounter or for which they believe that they are at risk.

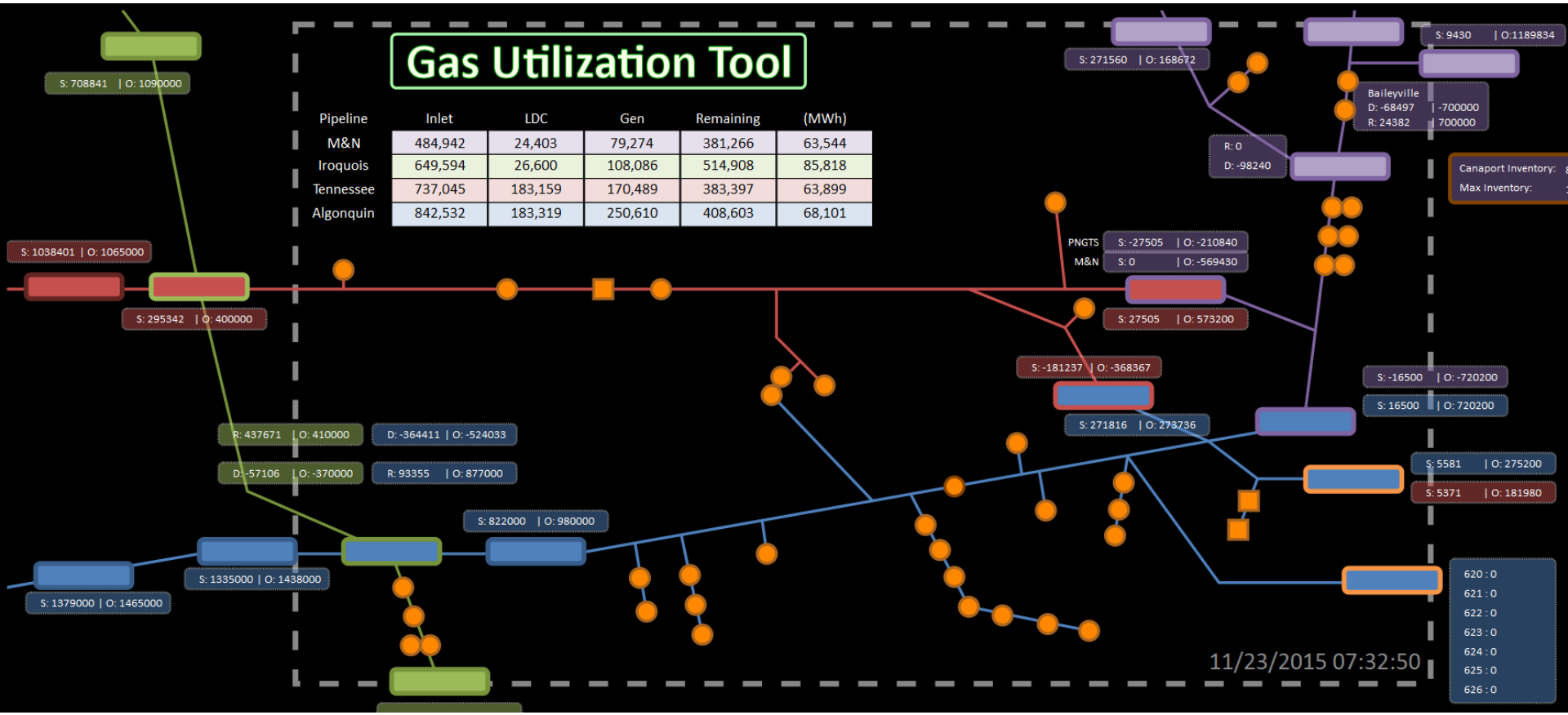
- LNG Inventory Estimation
  - Ships Unloaded – Gas Vaporized = Inventory
  - Ship Tracking

Intelligence

- Gas Pipeline Reporting and Analysis
  - Daily Gas Schedule Reports
    - 0000 – 1000 and 1000 – 2400
    - Also supplied to pipelines for each unit

Plant	MWh Burned So Far	MWh Before Midnight	MWh After Midnight	MWh Scheduled	MWh Surplus	Gas Scheduled
1	2201	169	1932	4493	191	34600
2	777	0	663	0	(1440)	0
3	1910	0	901	2849	38	20700
4	2131	0	0	2736	605	20028
5	5903	403	0	7706	1400	53800
6	2369	0	798	3097	(70)	22500
7	1253	0	350	93	(1510)	1000

Gas Utilization Tool



Operation

- Visualization tools for operators
  - Pipeline indicators for generators
- Understanding Pipeline Limitations
  - Transportation constrained from the west
  - Supply constrained from the northeast
- Anticipated Generator Outages
  - Based on forecasted temperature for situational awareness

ISO-NE Actions & Plans

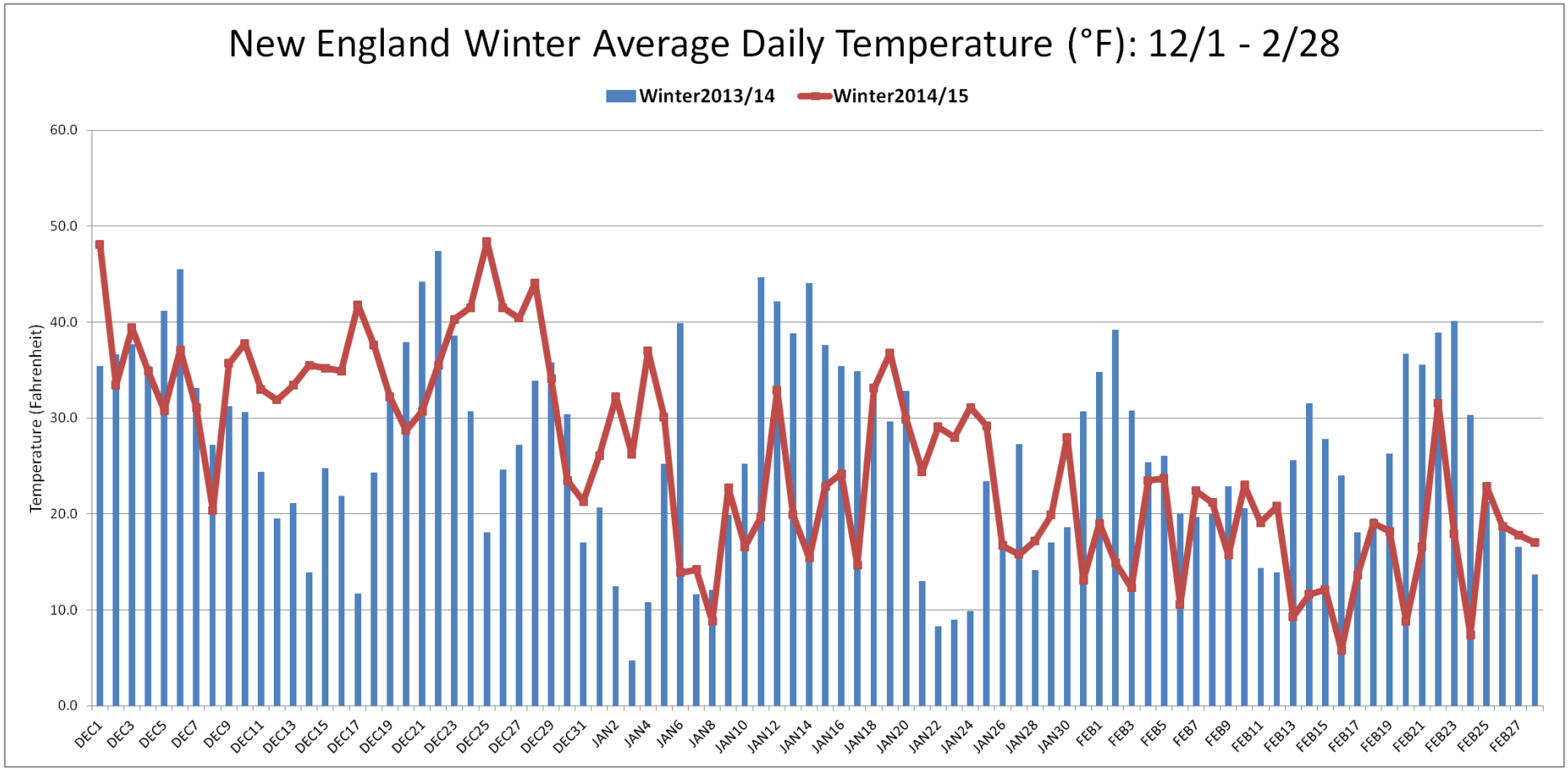
- Identify critical natural gas supply facilities – don't shed loads such as:
  - Compressor stations
  - Gathering facilities
  - Processing plants
- Monthly Load Shed Exercises
- Seasonal Voltage Reduction Tests
- MLCC 16 – Seasonal Preparations
  - Assess generator outages
  - Gas pipeline communications

New England Actions

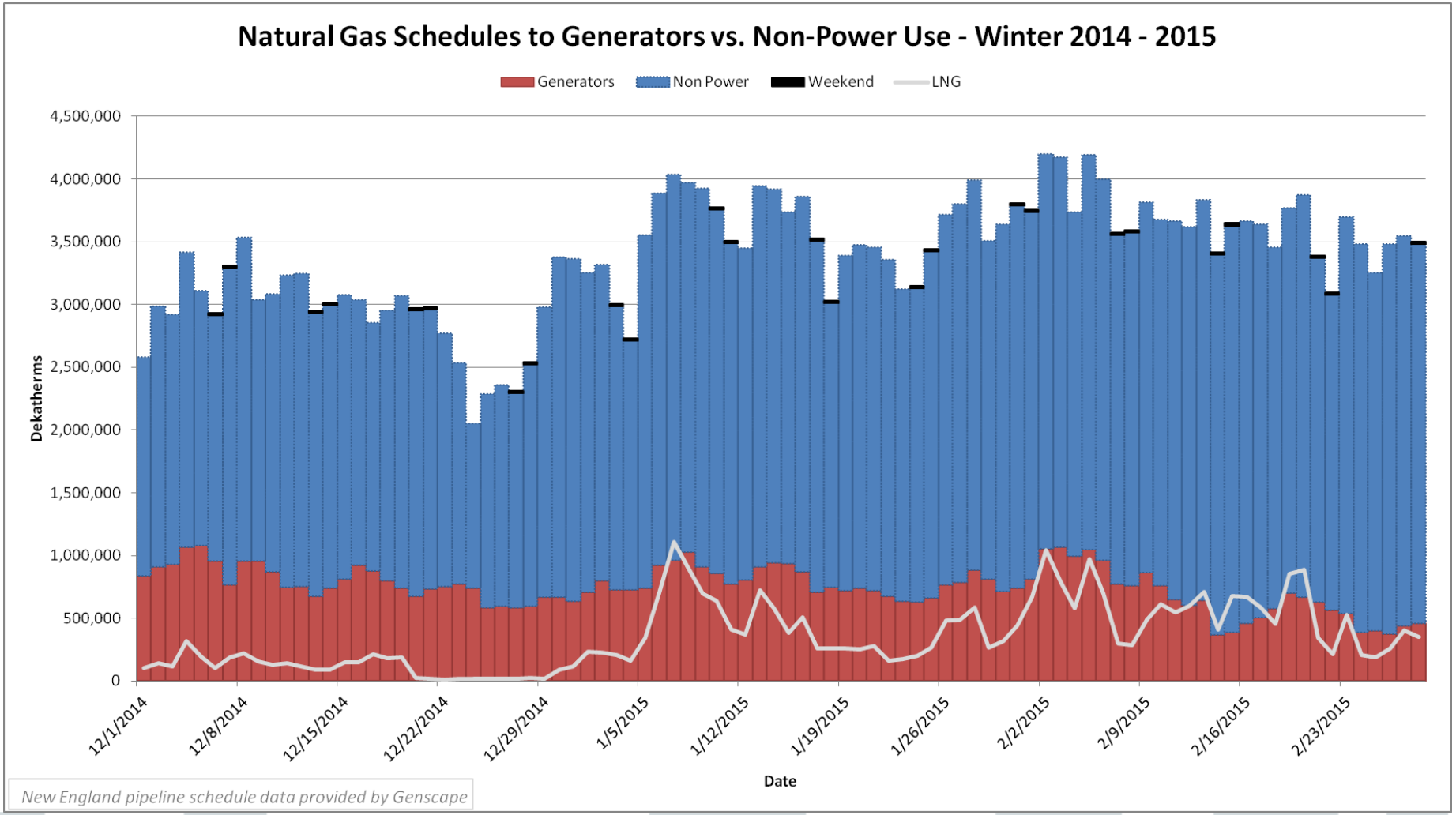
- Generator audits
- Dual-fuel testing
- Black-start resource testing
- Monthly, weekly, daily generator fuel surveys
- Daily calls to dual-fuel generators
- Increased monitoring of gas pipeline maintenance
- Direct communication with pipeline operators

Average Temperature Comparison

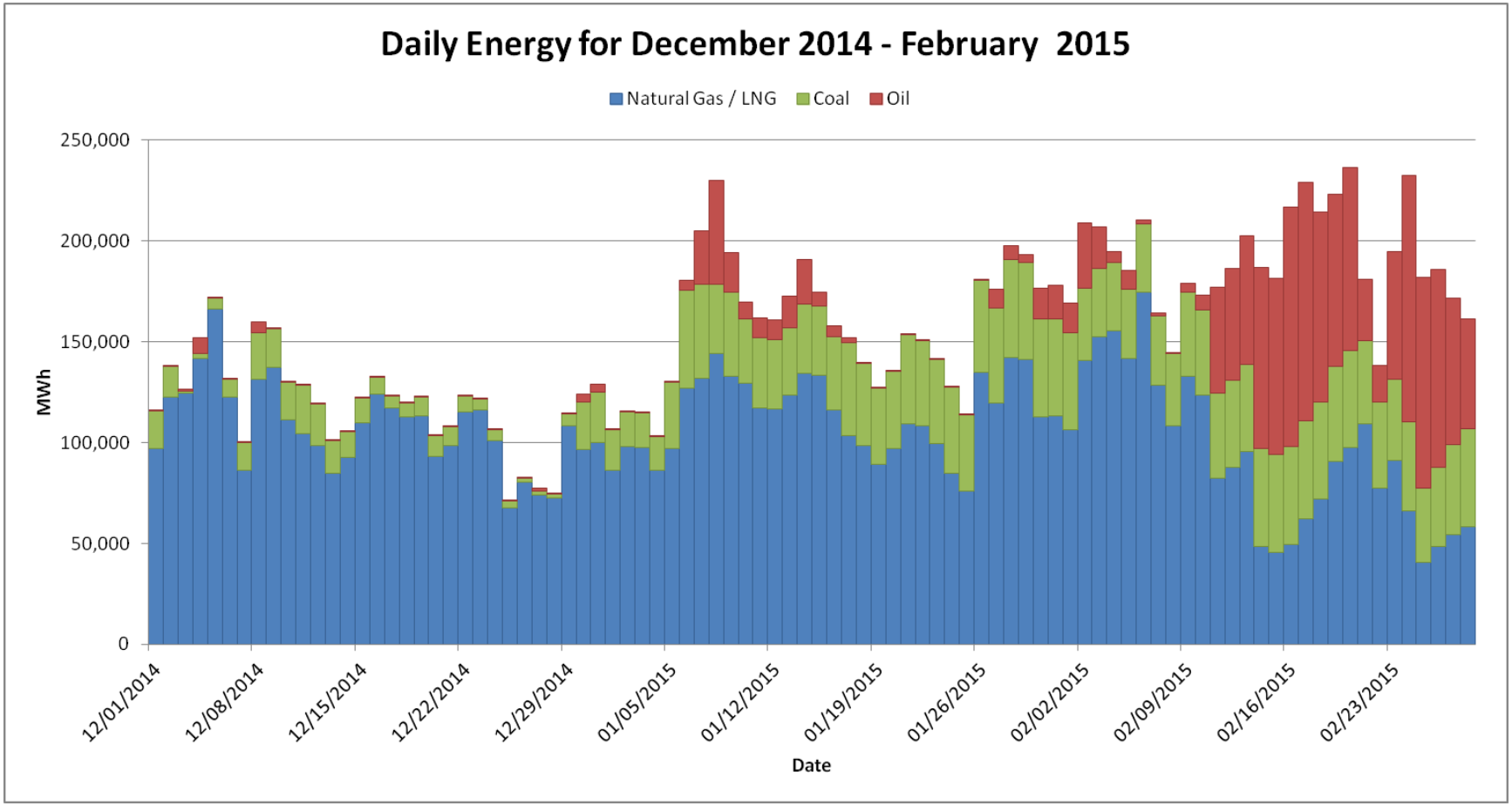
- Daily Average Temperature 2013/14 vs 2014/15



Pipelines Primarily For Non-Power Use; LNG Essential for Power Use



Colder Temps – Oil and Coal In Rate
Energy Contribution from Gas, Oil, and Coal



2016 NPCC General Meeting

Hotel Omni Mont-Royal

Montreal, Quebec

Wednesday, December 7, 2016