



Capacity Performance

Education and Dialogue Session
August 12, 2014

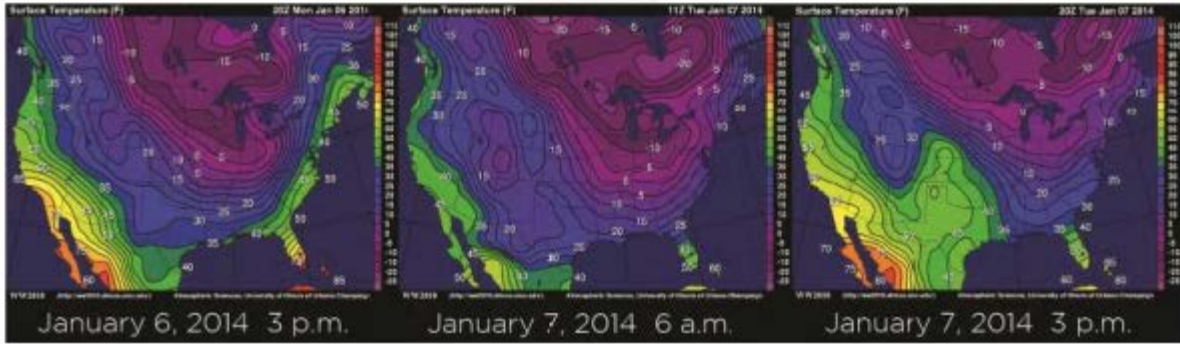
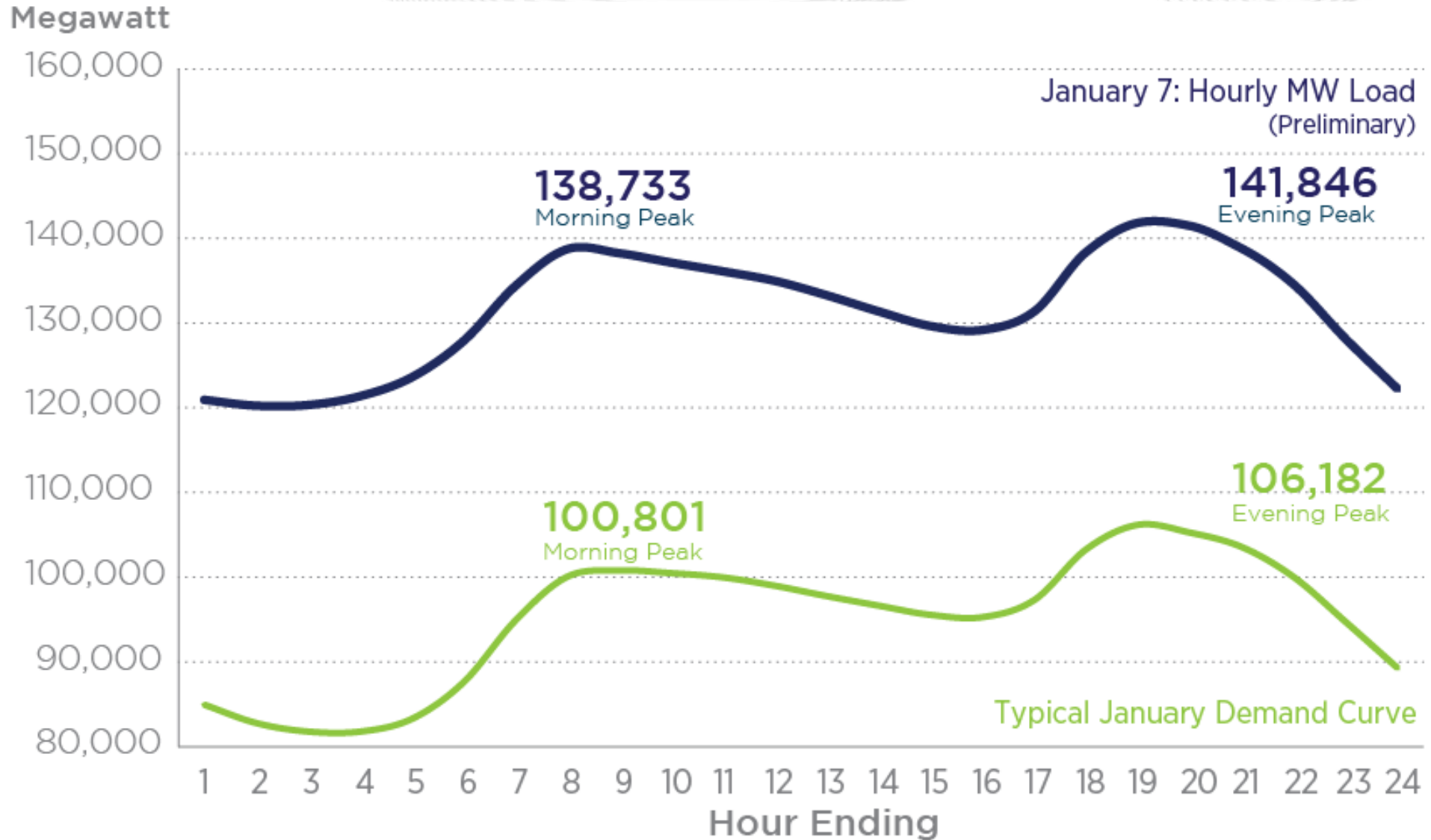


Figure 2: January 2014 Minimum Temperatures: Columbus, Philadelphia, Chicago and Richmond





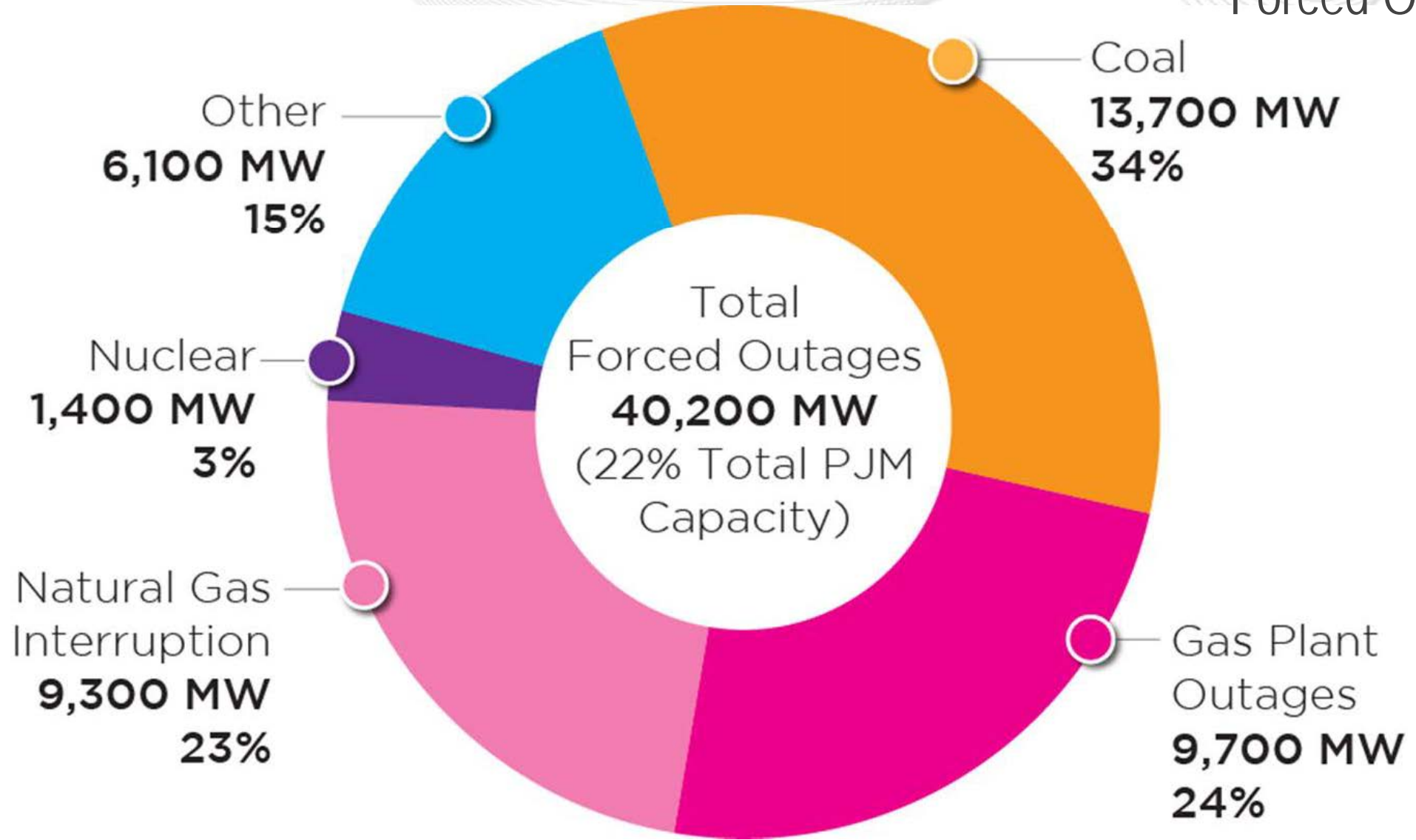
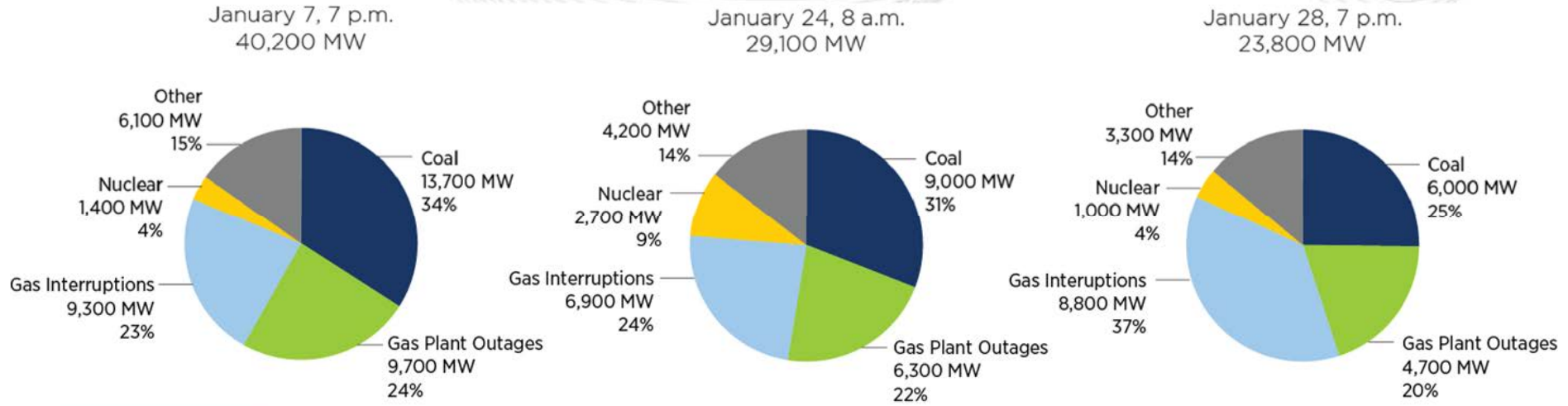


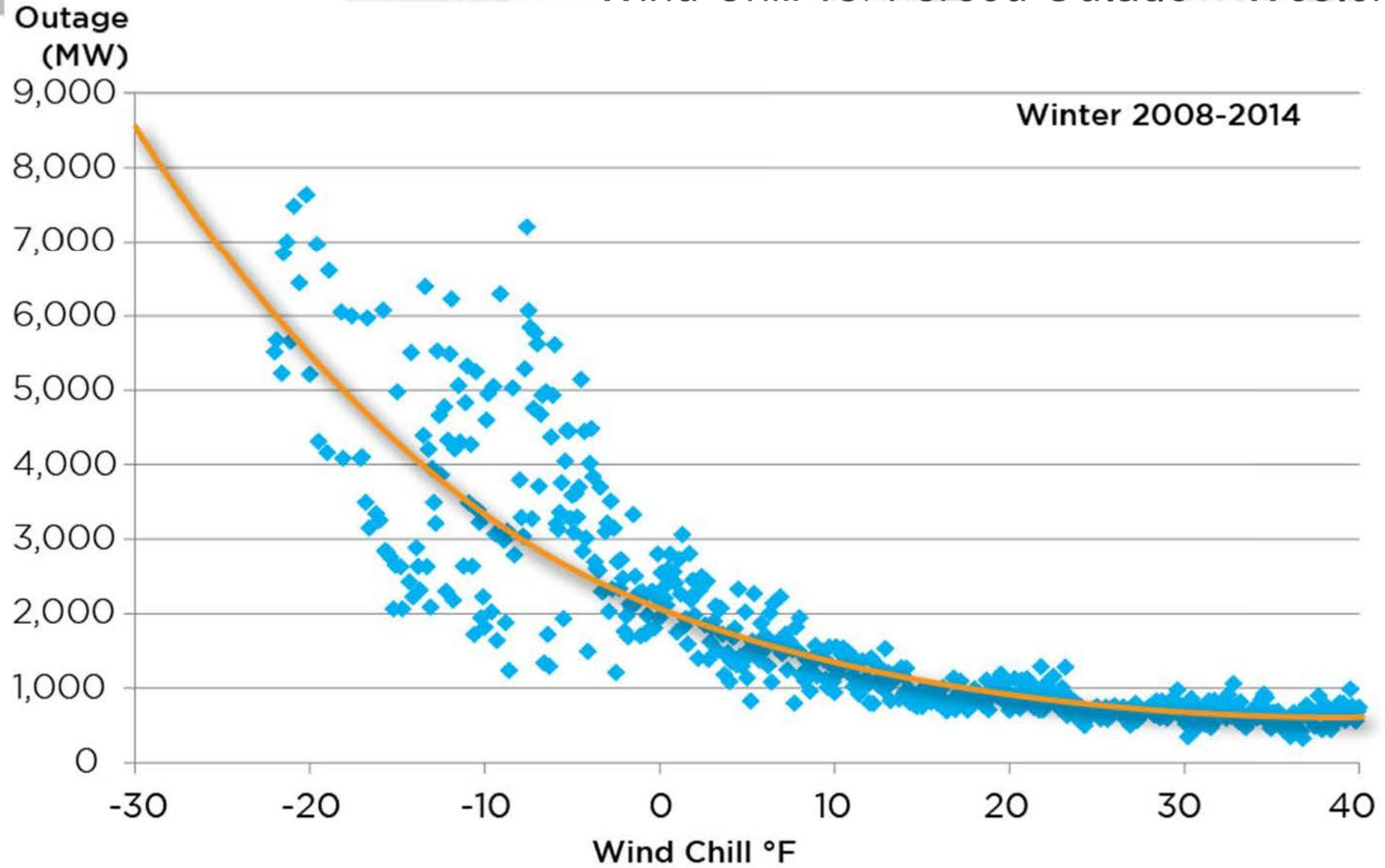
Figure 4: Generator Outages – January 2014



Figure 5: Forced Outages

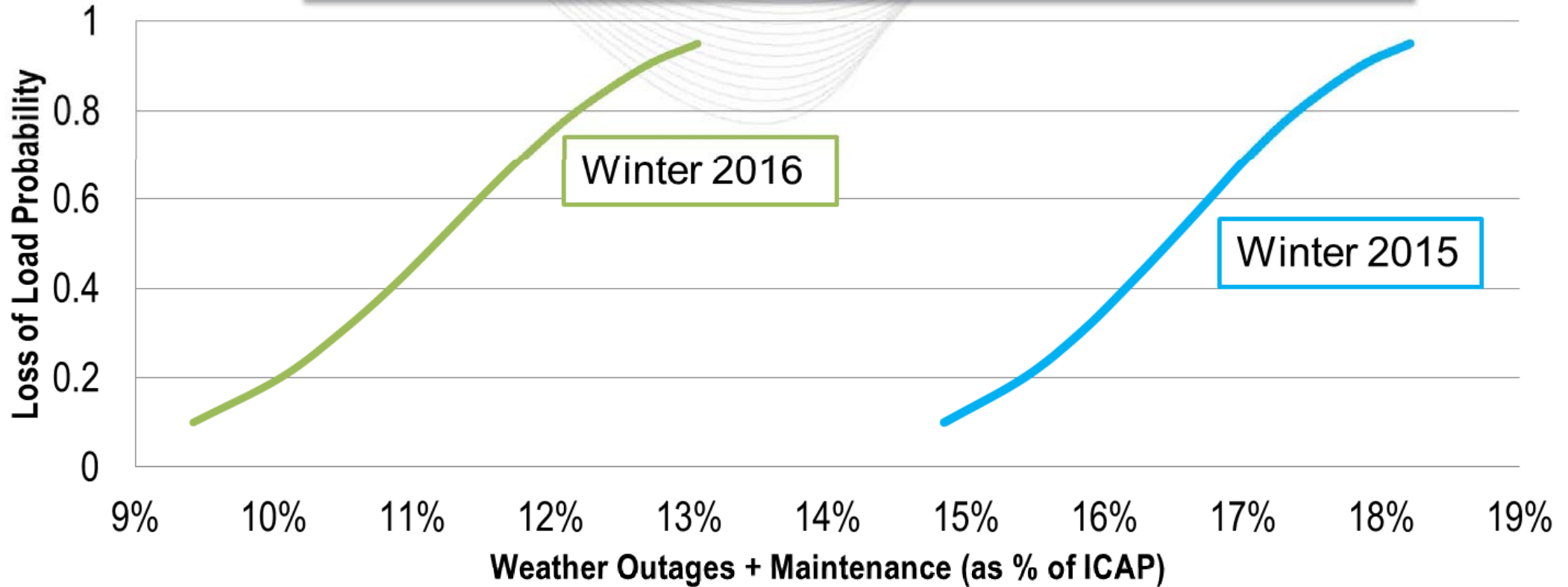


Coldest low/high temp of the three days	January 7		January 24		January 28	
	Low	High	Low	High	Low	High
Philadelphia	4	13	8	19	12	21
Richmond	10	22	11	25	14	27
Pittsburgh	-9	4	0	19	-8	7
Columbus	-7	11	0	22	-11	6
Cleveland	-11	4	-1	21	-9	7
Lexington	-4	11	-5	24	2	12
Chicago	-12	3	-6	28	-11	3



- Frozen equipment
- Fuel Issues
 - Frozen fuel
 - Delivery issues
- Emissions equipment
- Consumables impacts
- Secondary processes
- Units not frequently operated

Loss of Load Probability on Peak Winter Day



Assumptions:

PJM is at a 90/10 winter load level

No DR is implemented

Emergency assistance is only from RPM committed external units

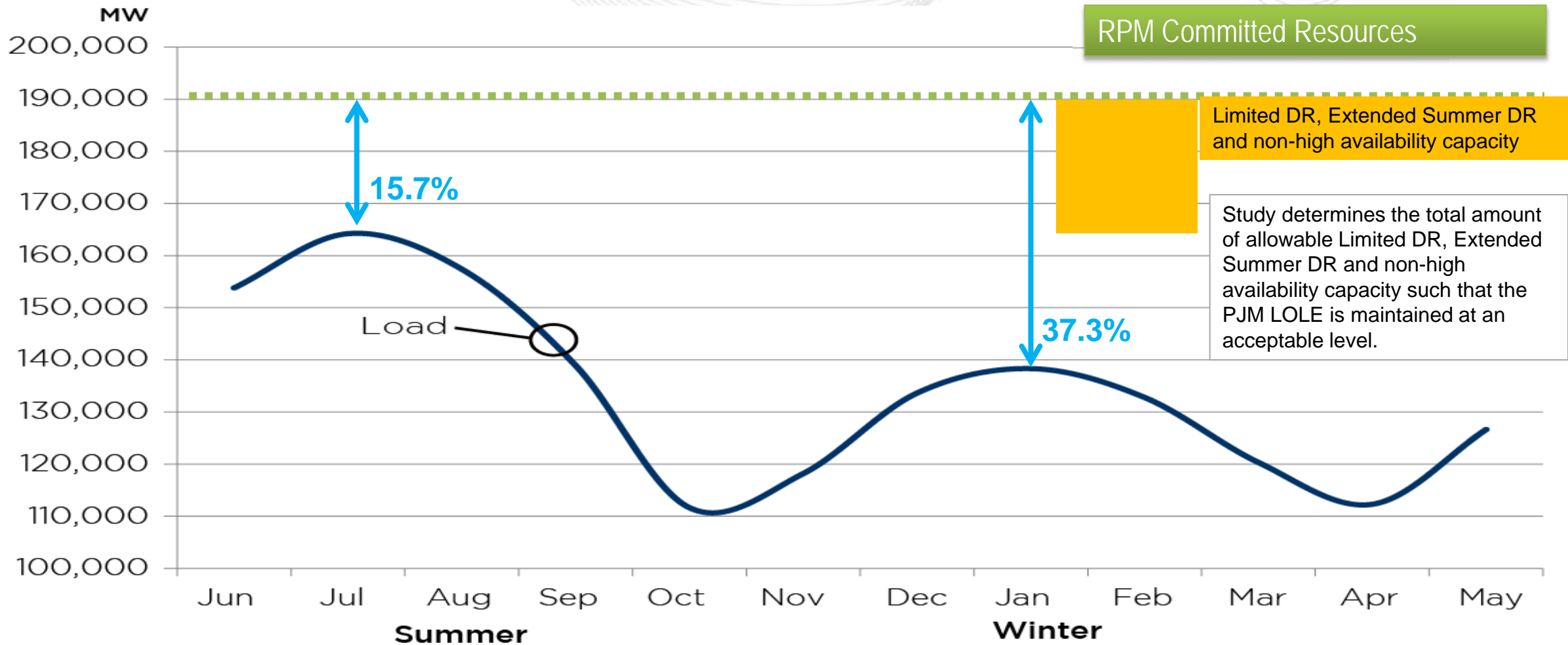
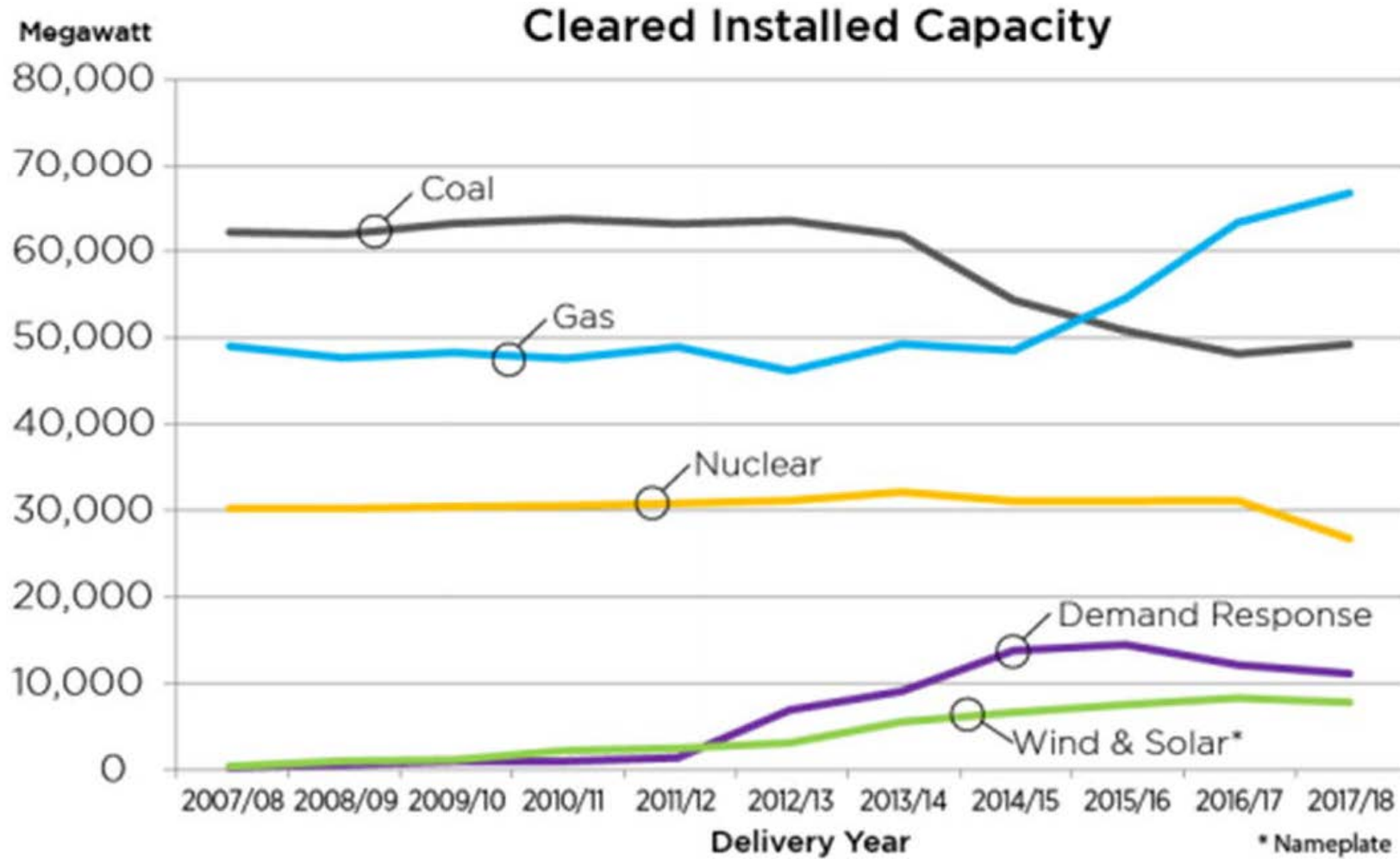
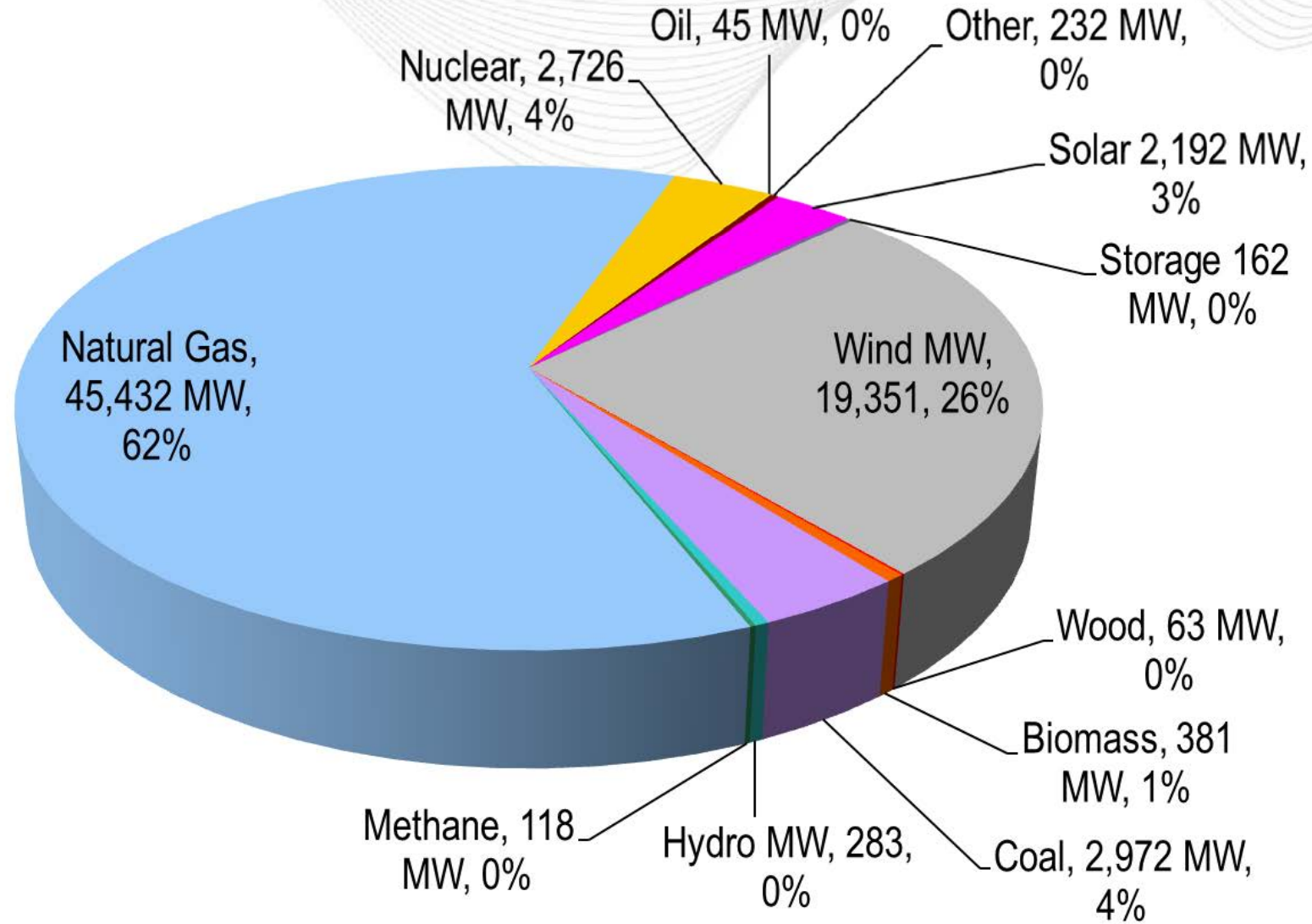


Figure 10: Cleared Installed Capacity



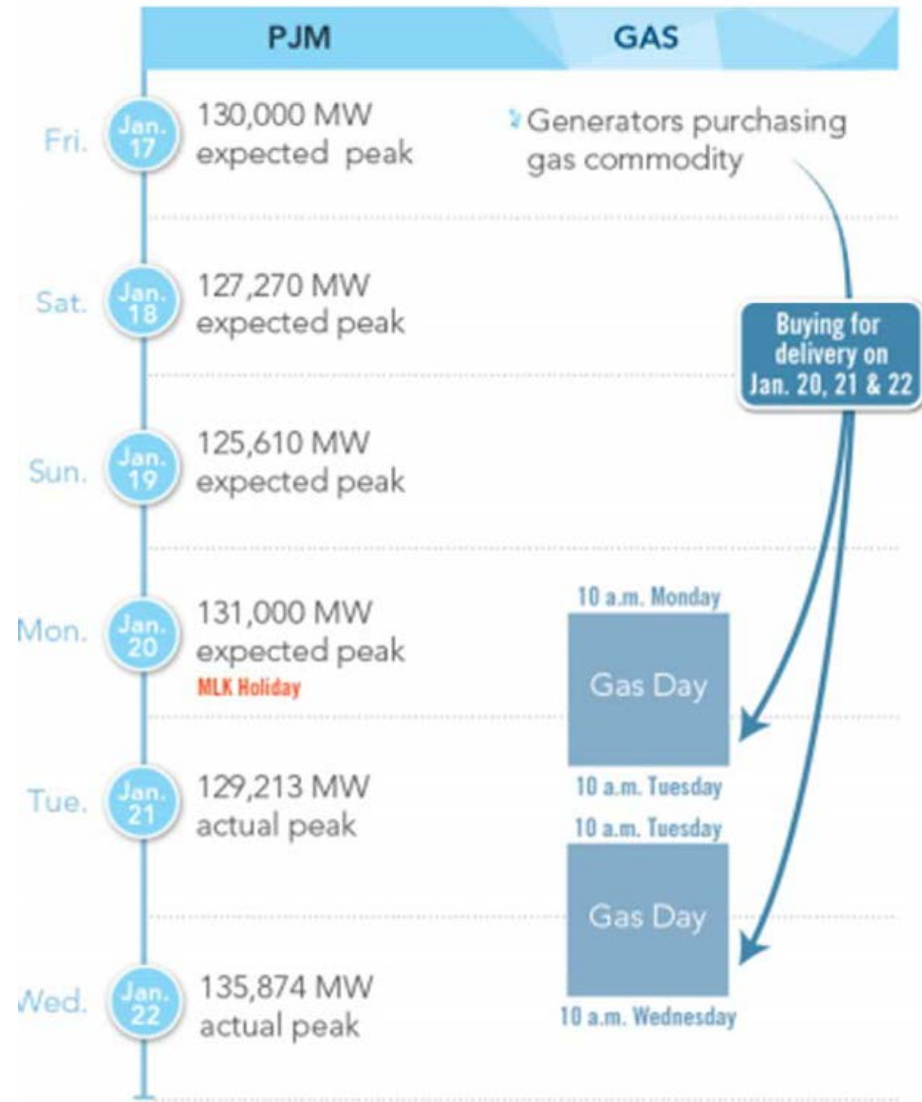
PJM Queued Generation (Nameplate Energy) – Active and Under Construction



As of 03/2013

- Fuel availability is within the generation owner's control
- Penalties for capacity resource unavailability during peaks are insufficient
- Incentives created by insufficient peak period penalties
- Current PJM capacity market rules do not allow full reflection of costs for low probability, high reliability events
- Current PJM energy market rules either do not allow full reflection of costs for low probability, high reliability impact events, or bias decisions away from more reliable solutions
- Overarching direct and indirect incentives for enhancing availability and market implications

- Transportation Issues:
 - Timing of Gas Day and Electricity Day
 - Operational Flow Orders
 - Connections behind LDC city gate
- Commodity Market Issues:
 - Timing of commodity purchases with respect to electricity commitments
 - Weekday vs. weekend



- Fuel procurement restrictions; primarily natural gas.
- Environmental limitations that limit the total run hours for a generation resource.
- A lack of compensation for resource flexibility
- A shift in the supply curve has rendered resources designed to be base load into the role of peaking resources.
- Reductions in staff at some generation sites to minimize costs
- Increase of Demand Response (DR) as a capacity resource

- Some generation resource owners have chosen to decrease staffing at sites
- Business rule changes in 2012 that allowed unit owners to manage startup and notification times in excess of 24 hours
 - **During recent summer days has exceeded 5,000 MW**
- Limited run hours due to environmental restrictions

Performance
Incentives /
Penalties

Operational
Availability
and Flexibility

Fuel Security

- Energy Storage Participation in RPM (PC)
- QTU Credit (MIC)
- Cold Weather Resource Performance Improvement – long term aspects (OC)
- Gas Unit Commitment Coordination – long term aspects (OC)
- Unit Market Offers (MIC)
- Gas / Electric Coordination

- 13,700 MW coal out on January 7 with 13,000 out because they had no natural gas to start. Why weren't these units already on?
- Figure 5 is confusing. Pie charts have different days than table and are not in chronological order, or is the middle chart supposed to be January 24?
- "PJM data show that generator outage rates can be expected to increase during cold weather conditions." Would be good to discuss the basis for this conclusion. More than just three days of data? Need an explanation of Figure 6.
- "The end result is that with a greater shift toward gas-fired resources there is no incentive for generators to sign up for Firm Transportation and expand available pipeline capacity, and then greater uncertainty of which resources will be available based on the ability to secure bundled commodity and transportation on a short-term basis." Is it a good assumption that signing up for firm transport will incent construction of new gas pipeline capability? Thought you needed a longer commitment.

- What is Short-term spot firm transportation?
- LOLP (Should we consider an LSE's peak load obligations as well)
- Need more explanation of unnumbered figure (7?) on page 16 and discussion on how a 15% outage rate in winter translates to a 10% LOLP
- Are figures 7, 8 and 9 all based on the PJM LOLP study? How do these figures tie together?
- "Performance data from January, 2014, clearly indicate that, under extreme winter conditions, the amount of unavailable generation can exceed 20 percent of the total generation fleet." But is it usual to expect that high a level of outages? Thought this was unusual. During "normal" weather, outages much less. So do we plan for LOLP based on extreme or normal?
- Perhaps I read too quickly, but the only thing I saw that made me think about redefining capacity was the "lack of compensation for resource flexibility."