



# *Progress Report* *Study Approach and Assumptions*

Presentation to NYISO Installed Capacity Working Group

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March 1, 2013

# Topics

- Update on technology screening criteria
- Review of environmental aspects of technology screening with NYS DEC
- Approach to interconnection cost estimates
- Responses to other comments from January 22 meeting
  - *Sunset date for NYC tax abatement*
  - *Plant cost data from buyer side mitigation analyses*
  - *Cost components for dual fuel capability*

Note: Abbreviations Summary provided on last slide

# *Technology Screening Criteria Follow-up on Comments*

- Revised the criteria to eliminate the May 2016 COD criterion
  - *Combination of the Article 10 process, environmental permitting process, interconnection study process, etc., precludes any project that hasn't initiated these processes from being operational by May 2016*
  - *Same screening results with or without COD criterion*
- Fast start capabilities:
  - *Wartsila engines, Siemens SGT6-5000F(5) and GE LMS100 CTs have 10-12 minute hot start times*
  - *Hot start time of 45 minutes to CC full load*
- Siemens experience
  - *Well over 150 SGT6-5000F units sold in last 20 years*
- Rationale for the upper limit of the 100-400 MW suggested range
  - *Large enough to have two generators of larger size*
  - *Larger sizes typically require greater utilization (i.e., baseload) for profitability or cost recovery, which reduces dispatchability*

# *Updated Technology Screening Criteria*

- Can meet environmental requirements
- Commercially available
- Plant scale
- Available to most developers
  - *Excludes resources that have limited availability, e.g., hydro, MSW, LFG*
- Dispatchable; has peaking or cycling characteristics
  - *Capable of cycling off during off-peak hours on a daily basis*
    - *In NYC, tax abatement available if unit qualifies as a peaking unit (annual average of less than 18 hours per start)*
  - *Starts and achieves minimum load within an hour*
- Reflecting the above factors, the plant would have 100-400 MW, depending on technology



# *Application of Technology Screening Criteria*

- These technologies will not be reviewed in more detail:
  - *Intermittent power resources (wind, solar) because they are not dispatchable and have low Unforced Capacity in summer (for wind) and winter (for solar).*
  - *Dispatchable renewable technologies (hydropower, biomass, MSW, LFG) because they have limited fuel availability and are not available to most developers*
  - *Fuel cells and storage technologies because they are not economically viable or available to most developers (e.g., CAES)*
  - *Nuclear technologies because of dispatchability*
  - *Coal technologies because of emissions requirements, and commercial status of carbon sequestration and storage technologies*
- Several natural gas technologies have industry proven designs and will be evaluated for reference unit:
  - *Simple cycle combustion turbines*
  - *Combined cycle*
  - *Reciprocating internal combustion engines*

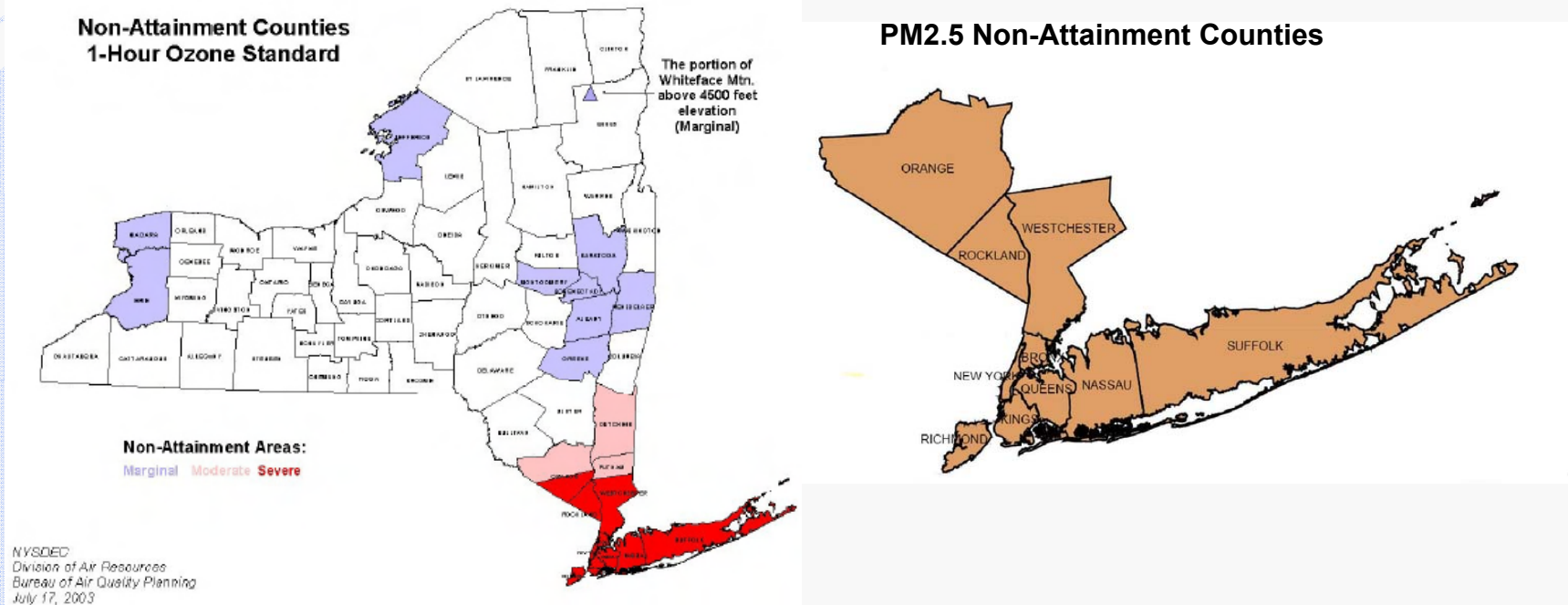
# *Environmental Review Comments*

- Stakeholder comments
  - *Are the emission rates shown in the slides in lb/hr? Ans. Yes*
  - *Provide references on regulations*
  - *Explain why the Siemens Simple Cycle with SCR would not be used in NYC*
  - *Explain why the Siemens Simple Cycle without SCR cannot be used upstate*
  - *Will there be a limit on operating hours? If so, how will this be reflected in the analysis?*
- Met with NYS DEC to review approach and analysis to date
  - *Designation of attainment areas is changing in near term*
  - *Updated the summary presented on January 22 ICAP Working Group meeting in the next several slides to address comments while reflecting DEC feedback and new information*

# *Regulations Reviewed*

- **Federal**
  - *New Source Performance Standards (40 CFR Part 60)*
    - *Subpart KKKK – Stationary Combustion Turbines*
    - *Subpart IIII – Stationary Compression Ignition Internal Combustion Engines*
    - *Subpart JJJJ – Stationary Spark Ignition Internal Combustion Engines*
    - *Subpart TTTT – Greenhouse Gas Emissions for New Stationary Sources (Proposed Rule)*
  - *National Emissions Standards for Hazardous Air Pollutants (40 CFR Part 63)*
    - *Subpart YYYY – Stationary Combustion Turbine*
    - *Subpart ZZZZ – Reciprocating Internal Combustion Engine*
  - *New Source Review*
    - *40 CFR 52.21 – Prevention of Significant Deterioration of Air Quality*
- **State**
  - *6 NYCRR Part 200 – General Provisions*
  - *6 NYCRR Part 201 – Permits and Registrations*
  - *6 NYCRR Part 227 – Stationary Combustion Installations*
  - *6 NYCRR Part 231 – New Source Review for New and Modified Facilities*
  - *NYCRR Part 251 - CO<sub>2</sub> Performance Standards for Major Electric Generating Facilities*
  - *NYCRR Part 487 – Analyzing Environmental Justice Issues in Siting of Major Electric Generating Facilities Pursuant to Public Service Law Article 10*

# Attainment Status of Potential Sites



- Anticipated changes in near term:
  - All counties will be attainment for PM10 and PM2.5
  - All counties in marginal and moderate ozone non-attainment will be in attainment
  - Lower Orange County will be in attainment for ozone
  - Chautauqua County will be in marginal non-attainment for ozone

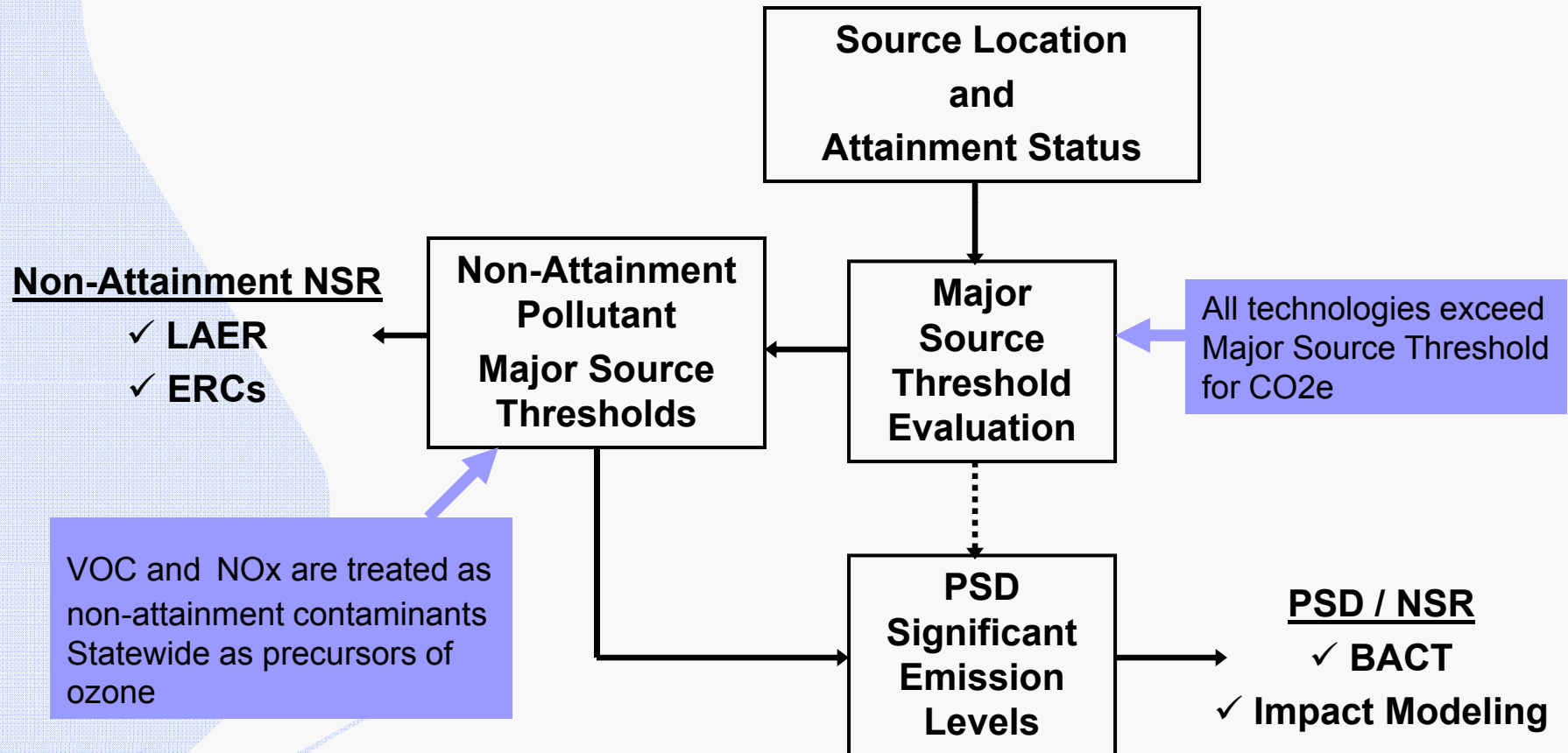


# *Anticipated Attainment Status of Potential Sites*

- Attainment Area in the Ozone Transport Region
  - *Zone C: Onondaga County*
  - *Zone F: Albany and Schenectady Counties*
  - *Zone G: Dutchess, Greene and Orange Counties*
- Severe Ozone Non-attainment
  - *Zone G: Rockland County*
  - *Zones H and I: Westchester County*
  - *Zone J: Kings and Queens Counties*
  - *Zone K: Nassau County*

# *New Source Review*

Process for evaluating NSR requirements varies based on Source Type, Potential Emissions, and Proposed Facility Location:



## *Major Source and PSD Significant Emissions Thresholds*

	Major Source Thresholds (tpy)				PSD Significant Emissions Thresholds for all technologies (tpy)	
	Simple Cycle CTs or RICE		Combined Cycle		Severe Ozone Non-Attainment	Attainment Area in Ozone Transport Region
Regulated Air Pollutant	Severe Ozone Non-Attainment	Attainment Area in Ozone Transport Region	Severe Ozone Non-Attainment	Attainment Area in Ozone Transport Region		
VOC	≥ 25	≥ 50	≥ 25	≥ 50	≥ 2.5	≥ 40
NOx	≥ 25	≥ 100	≥ 25	≥ 100	≥ 2.5	≥ 40
SO <sub>2</sub>	≥ 250	≥ 250	≥ 100	≥ 100	≥ 40	≥ 40
PM <sub>10</sub>	≥ 250	≥ 250	≥ 100	≥ 100	≥ 15	≥ 15
PM <sub>2.5</sub>	≥ 250	≥ 250	≥ 100	≥ 100	≥ 10	≥ 10
CO	≥ 250	≥ 250	≥ 100	≥ 100	≥ 100	≥ 100
CO <sub>2e</sub>	≥ 100,000	≥ 100,000	≥ 100,000	≥ 100,000	≥ 100,000	≥ 100,000

# *New Source Review*

- **Non-Attainment New Source Review (NNSR) Applies to:**
  - ***New Major Stationary Sources*** located in a non-attainment area or an attainment area within the Ozone Transport Region
  - *NNSR regulations apply to each Non-Attainment Contaminant (i.e., VOC and/or NOx) for which the facility exceeds the applicable Major Source Threshold.*
  - ***NNSR Requirements Include:***
    - *Lowest Achievable Emission Rate Controls*
    - *Emission Reduction Credits*
    - *Alternatives Analysis*
  
- **Prevention of Significant Deterioration (PSD) Applies to:**
  - ***New Major Stationary Sources***
  - *PSD regulations apply to each regulated air contaminant (excluding NA contaminants subject to NNSR requirements) for which the facility exceeds the PSD Significant Emissions Threshold (which are lower than Major Source Threshold for NOx, VOC, SO2, PM10 and PM2.5).*
  - ***PSD Requirements include:***
    - *Best Available Control Technology (BACT)*
    - *Air Quality Impact Analysis*
    - *Additional Impacts Analysis*



## *Likely LAER/BACT Requirements*

<b>Pollutant</b>	<b>LAER</b>	<b>BACT</b>
<b>NOx</b>	<b>Selective Catalytic Reduction</b>	<b>Selective Catalytic Reduction</b>
<b>CO / VOC</b>	<b>Oxidation Catalyst</b>	<b>Oxidation Catalyst</b>
<b>PM<sub>10</sub></b>	<b>NA</b>	<b>low ash fuel</b>
<b>GHG</b>	<b>NA</b>	<b>Cycle Efficiency &amp; NYCRR 251</b>

- For Simple and Combined Cycle Combustion Turbines and for RICE
- Short-term modeling of NO<sub>2</sub> impacts for PSD Air Quality Impact Analysis likely to result in operating restrictions for startup
- No annual operating hours limitation is expected
- Emission Reduction Credits required for units that exceed major source threshold for VOC and/or NO<sub>x</sub> (severe ozone 1.3:1, attainment 1.15:1).

# *Approach to Estimating MIS Costs*

- Cost estimates for Minimum Interconnection Standard (MIS) costs will be based on the sum of individual estimates of the following cost categories:
  - *SUFs—including new facilities, Protection SUFs, and other SUFs*
  - *Headroom payments*
  - *Connecting Transmission Owner (CTO) Attachment Facilities (AF)*
- Cost estimates for Protection SUFs, Headroom payments and CTO AFs will be based on an average of these costs taken from representative projects from the last two available class year studies--CY09 and CY10
- Costs for new facilities will be based on a substation that would be expected to be constructed at the point of interconnection (POI)
  - *Cost will be estimated based on a representative conceptual design for the substation regarding*
    - *Type of substation (open air or gas insulated)*
    - *Voltage level (345 kV, 230 kV, 138 kV, or 69 kV)*

# *Approach to Estimating SDU Costs*

- NYISO will conduct deliverability studies at a selected POI in the counties for which reference unit costs are being estimated
  - *Type and Voltage level of substation determined by choice of POI*
- The New Capacity Zone deliverability study case will be the starting case for developing the DCR deliverability study case
  - *The case will be modified to recognize the new G-K Capacity Region and updated to reflect the most recent IRM and LCRs, including the indicative LCR for G-K*
- The studies will be conducted at equilibrium because the demand curves will be developed for the equilibrium conditions
- The deliverability study methodology documented in Section 25.7 of Attachment S of the OATT will be followed
- SDU cost will be estimated based on the upgrade identified for each POI and the number of MWs evaluated
  - *SDU cost will be zero if no deliverability issue is identified*

# *Proposed POIs for Deliverability Studies*

<b>Load Zone</b>	<b>County</b>	<b>POI</b>	<b>Substation Type</b>	<b>CTO</b>
C	No analysis contemplated at this point--assume no SDU costs			
F	Schenectady	Rotterdam 230 kV	Open Air	National Grid
G	Dutchess	East Fishkill 345 kV	Open Air	Central Hudson
G	Orange	Shoemaker 138 kV	Open Air	Orange and Rockland
G	Rockland	Ladentown 345 kV	Open Air	Orange and Rockland
J	Bronx	East 179 <sup>th</sup> St 138 kV	GIS	Consolidated Edison
J	Queens	Rainey 345 kV	Open Air	Consolidated Edison
J	Kings	Hudson Ave 138 kV	Open Air	Consolidated Edison
K	Nassau	Ruland Road 138 kV	Open Air	LIPA



# *Responses to Other Comments*

- No NYC tax abatement by statute:
  - *For construction work performed pursuant to a building permit issued after April 1, 2015; or*
  - *If no building permit is required, for construction work commenced after April 1, 2015*
- Stakeholders can provide project development cost information they want to be considered in the DCR study
- Incremental cost for dual fuel units is accounted for in:
  - *Capital costs of equipment needed for dual fuel capability*
  - *Working capital and inventory line item covering fuel oil inventory*
  - *Carrying charges covering costs of interest and insurance on fuel oil inventory*

# *Abbreviation Summary*

- AF – Attachment Facility
- BACT – Best Available Control Technology
- CAES – Compressed Air Energy Storage
- CC – Combined Cycle
- CFR – Code of Federal Regulations
- CO – Carbon Monoxide
- CO<sub>2</sub> – Carbon Dioxide
- CO<sub>2</sub>e – Carbon Dioxide Equivalent
- COD – Commercial Operation Date
- CT – Combustion Turbine
- CTO – Connecting Transmission Owner
- CY – Class Year
- DCR – Demand Curve Reset
- ERC – Emissions Reduction Credit
- GE – General Electric
- GIS – Gas Insulated Substation
- GHG – Green House Gas
- kV – Kilovolt
- IRM – Installed Reserve Margin
- LAER – Lowest Achievable Emissions Rate
- LCR – Locational Capacity Requirement
- LFG – Landfill Gas
- LIPA – Long Island Power Authority
- Minimum Interconnection Standard
- MSW – Municipal Solid Waste
- MW – Megawatt
- NNSR – Non-attainment New Source Review
- NO<sub>x</sub> – Nitrogen Oxides
- NSR – New Source Review
- NYC – New York City
- NYCRR – New York Codes, Rules, and Regulations
- NYS DEC – New York State Department of Environmental Conservation
- OATT – Open Access Transmission Tariff
- PM – Particulate Matter
- POI – Point of Interconnection
- PSD - Prevention of Significant Deterioration
- RICE- Reciprocating Internal Combustion Engine
- SA – Stand Alone
- SCR – Selective Catalytic Reduction
- SO<sub>2</sub> – Sulfur Dioxide
- SUF – System Upgrade Facilities
- SDU – System Deliverability Upgrades
- tpy – Tons per year
- VOC – Volatile Organic Compounds