NYISO ICAP Demand Curve Reset: Technology Selection and Preliminary Gross CONE Inputs

BURNS McDONNELL

NYISO Installed Capacity Working Group

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Agenda

Introductions

Gross CONE Process and Preliminary Results

Feedback/Discussion

Introductions

Kieran McInerney

Senior Engineer
Energy Storage and Generation Development

Matt Lind

Director
Resource Planning and Market Assessments

Technology Selection Review

Technology Options Considered

- Aeroderivative Turbines
  - GE LM6000 PC Sprint
  - GE LM9000
  - GE LMS100 PA+
  - Siemens SGT-A65 (formerly Trent 60)
  - Siemens SGT-A45
  - P&W (MHPS) FT4000
- Frame Turbines
  - F-class
    - GE 7F.05
    - Siemens SGT6-5000F
  - H/J-class
    - GE 7HA.02
    - Siemens SGT6-8000H
    - MHPS 501JAC
    - MHPS 501GAC
  - Energy Storage
    - Lithium-ion Battery
    - Flow Battery
    - Compressed-air Energy Storage (CAES)
- Combined Cycle Gas Turbine (1x1 configuration for informational purposes only)
  - H/J-class options listed above
  - F-class options listed above

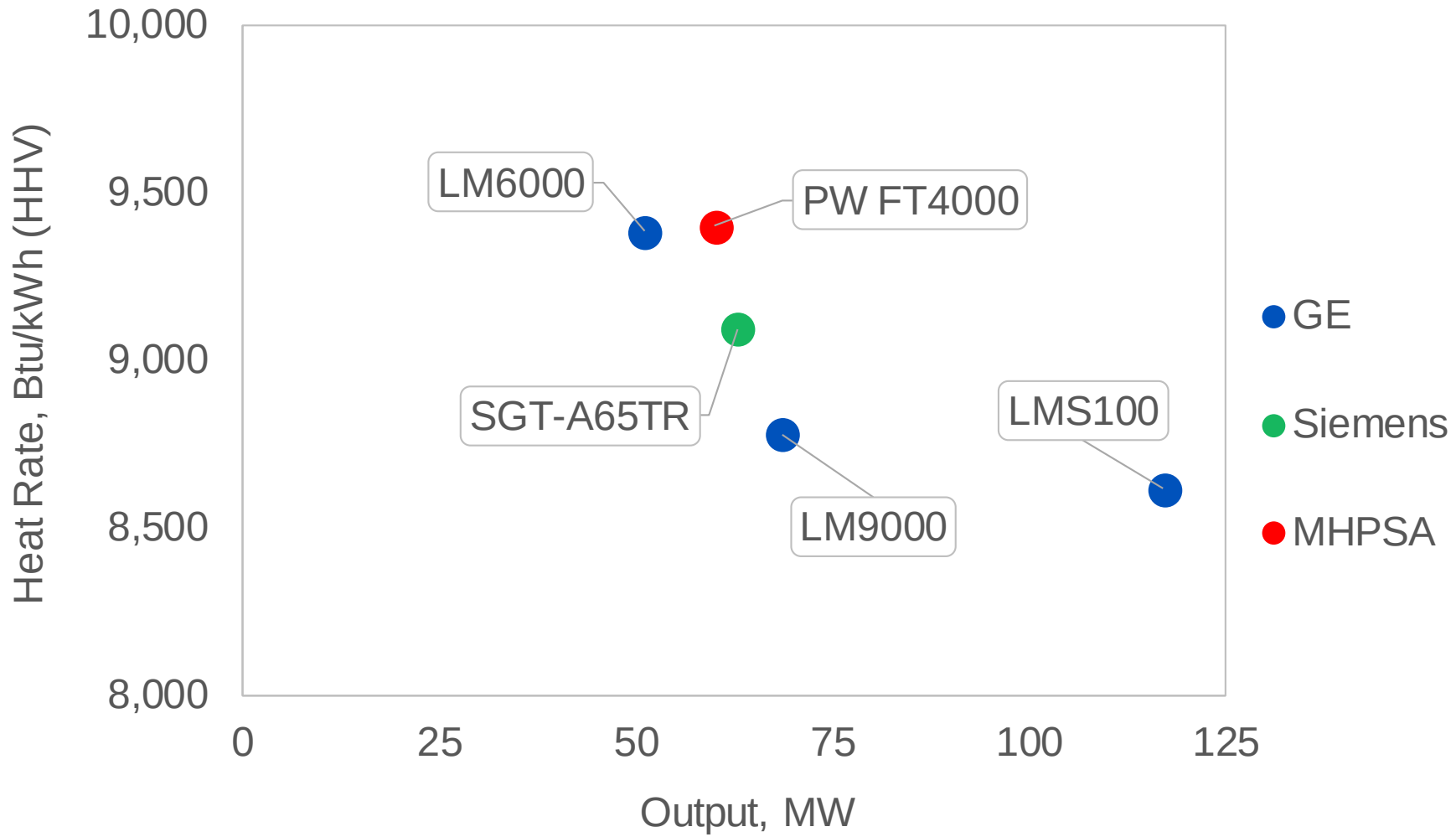
Technology Selection Criteria

- Standard generating facility technology – available to most market participants
  - Technology not limited by geographic region or other aspects
- Mature market technology
  - Commercial operating experience in North America
- Unit characteristics can be economically dispatched
- Ability to cycle and provide energy and/or ancillary services
- Capable of being designed to meet applicable environmental and other operating requirements

Technologies Selected for Evaluation

- Simple Cycle Gas Turbine (SCGT)
  - Aeroderivative: 3x Siemens SGT-A65
  - F-class: GE 7F.05
  - J-class: GE 7HA.02
- Battery Energy Storage Systems (BESS)
  - Lithium-ion technology
  - 200 MW, 4-hour
  - 200 MW, 6-hour
  - 200 MW, 8-hour
- Combined Cycle Gas Turbine (CCGT) [for informational purposes only]
  - 1x1 CCGT
  - H/J-class: GE 7HA.02

Aeroderivative Gas Turbines



Aeroderivative Review

- Last ICAP Demand Curve reset (DCR) evaluated 2x LMS100 as a representative aeroderivative peaking plant option
- Preliminary information suggested LMS100 may continue to be an appropriate aeroderivative option for current DCR
- Further evaluation compared certain multiple unit aeroderivative plant configurations
  - 3x A65
    - ~190 MW at ISO
  - 2x LMS100
    - ~205 MW at ISO
- New Source Performance Standard (NSPS) NOx limit
  - 25 ppm for A65 (heat input <850 MMBtu/hr)
  - 15 ppm LMS100 (heat input > 850 MMBtu/hr)
- Screening level costs with selective catalytic reduction (SCR) emissions controls and recent installation history in NY favor Siemens SGT-A65 as the representative option for this DCR

Environmental Review

Environmental Review

- Greenfield assumed for all locations except zone J (NYC)
  - Locations: zone C, zone F, zone G (Dutchess County), zone G (Rockland County), zone J (NYC), and zone K (LI)
- Reviewed NOx, VOC, CO
- New Source Performance Standard (NSPS)
  - Subpart TTTT
    - CO_2 emissions standard
    - Limit combustion turbines to annual capacity equal to its efficiency
      - Limits capacity factor for SCGT to approximately 35%
    - Does not apply to CCGT
  - Subpart KKKK
    - Applicable to new stationary combustion turbines
    - NOx ppm limit
    - If <850 MMBtu/hr, NOx limit is 25 ppm (i.e. proposed aeroderivative option [A65])
    - If >850MMBtu/hr, NOx limit is 15 ppm (i.e. proposed frame options [7F.05 and 7HA.02])

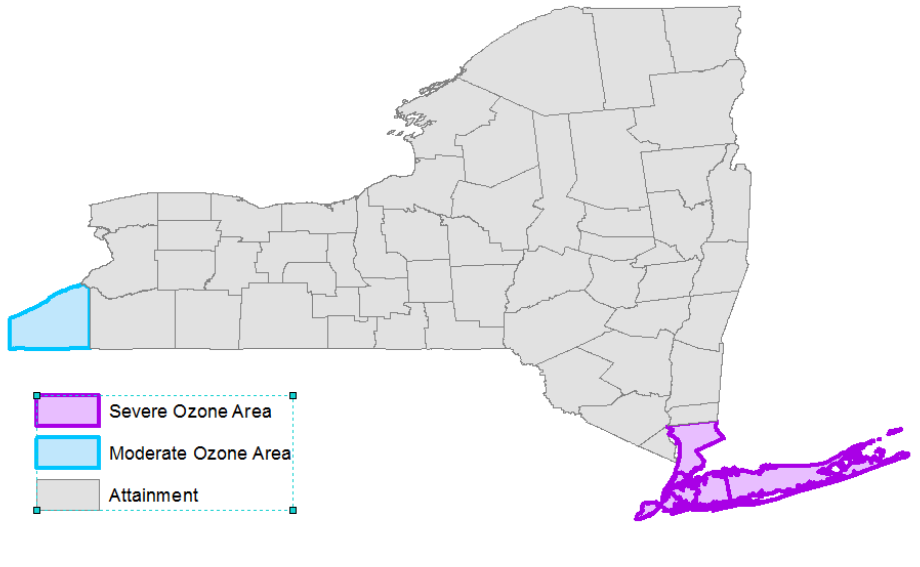
Environmental Review (cont.)

- Attainment Area vs. Non-Attainment Area
  - Typically by metropolitan statistical area or county level
  - Defined per pollutant/averaging period
- Prevention of Significant Deterioration (PSD)
  - Applies in attainment areas
  - Best Available Control Technology (BACT) analysis
    - Evaluation of available control technologies, per PSD pollutant
    - Cost is a factor in evaluation
- Non-Attainment New Source Review (NSR)
  - Applies to non-attainment areas
  - Thresholds and requirements depend on non-attainment classification (marginal to extreme)
  - Lower thresholds for permitting requirements
  - Lowest Achievable Emission Rate (LAER) analysis
    - Does not account for cost of control technology
  - Emission Reduction Credits (ERC) required at a ratio greater than 1:1

Environmental Review (cont.)

- Severe ozone non-attainment – New York City area and Long Island
- Ozone Transport Region (OTR)
  - Thirteen states in northeast US including NY
  - NOx and VOC are precursors to ozone (and regulated to control ozone)
  - Ozone impacts observed downwind from OTR areas
  - OTR areas are treated like nonattainment area – marginal
  - All of New York is in the OTR, thus subject to non-attainment regulations
- Moderate ozone nonattainment – Chautauqua County

Non-attainment Areas in New York



Environmental Review (cont.)

- Assumptions for emissions analysis
  - Steady state emissions only. Does not consider startup or shutdown.
  - Simple cycle limited to 3066 hours per year (per NSPS subpart TTTT)
  - For dual fuel applications, simple cycle evaluated 720 hours on ULSD and 2,346 hours on gas
  - CCGT unlimited in hours (with up to 720 hours on ULSD applicable for dual fuel configuration)
- Control technology evaluation
  1. Needed for NSPS Subpart KKKK compliance?
  2. Subject to LAER for ozone?
     - SCR for NOx
     - Oxidation catalyst for VOC
  3. Subject to BACT for CO?
     - Oxidation catalyst if economically feasible

Greenfield Site Matrix

Greenfield Site Control Requirements in New York ISO

Technology	Load Zone									
	K		G				F		C	
	Severe		Severe		Moderate		Moderate		Moderate	
	SCR Needed?	Oxidation Catalyst Needed?	SCR Needed?	Oxidation Catalyst Needed?	SCR Needed?	Oxidation Catalyst Needed?	SCR Needed?	Oxidation Catalyst Needed?	SCR Needed?	Oxidation Catalyst Needed?
Siemens SGT-A65 (Trent)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GE 7F.05	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
GE 7HA.02 15 ppm NOx	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
GE 7HA.02 25 ppm NOx	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1x1 7HA.02	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Values shown are for maximum annual hours of operation (3,066 hours for SCGT technologies and 8,760 for CCGT technology).
For dual fuel SCGT, the evaluation considers 720 hours operating on ultra-low sulfur fuel oil and the remaining 2,346 hours on gas.
For dual fuel CCGT, evaluation considers 720 hours operating on ultra-low sulfur fuel oil and the remaining 8,040 hours on gas.
For gas only operation, the SCR and oxidation catalyst results above do not change.

Brownfield Site (Zone J Only)

Existing Major Source Site Control Requirements in New York ISO

Technology	Load Zone J Severe	
	SCR Needed?	Oxidation Catalyst Needed?
Siemens SGT-A65 (Trent)	Yes	Yes
GE 7F.05	Yes	No
GE 7HA.02 15 ppm NOx	Yes	No
GE 7HA.02 25 ppm NOx	Yes	No
1x1 7HA.02	Yes	Yes

Values listed here are for maximum annual hours of operation on natural gas (2,346 hours/year for SCGT technologies, 8,040 hours/year for CCGT techology) and ultra low sulfur diesel (720 hrs/year for all technologies)

Possible Operating Limits

Operating Limits Needed to Not Require SCR Using Natural Gas Only at Greenfield Site

Technology	Load Zone					
	K	J	G		F	C
	Severe	Severe	Severe	Moderate	Moderate	Moderate
	Hours Limit to not need SCR					
Siemens SGT-A65 (Trent)	295	295	295	1195	1195	1195
GE 7F.05	620	620	620	2500	2500	2500
GE 7HA.02 15 ppm NOx	260	260	260	1055	1055	1055
GE 7HA.02 25 ppm NOx	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
1x1 7HA.02	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]

(1) These values are for the analyzed project (i.e., the SGT-A65 limit is for all three engines combined, each year)
(2) SCR is required for these units per the NSPS KKKK rule

Operating Limits Needed to Not Require SCR Using ULSD Only at Greenfield Site

Technology	Load Zone					
	K	J	G		F	C
	Severe	Severe	Severe	Moderate	Moderate	Moderate
	Hours Limit to not need SCR					
Siemens SGT-A65 (Trent)	177	177	177	717	717	717
GE 7F.05	115	115	115	465	465	465
GE 7HA.02 15 ppm NOx	135	135	135	545	545	545
GE 7HA.02 25 ppm NOx	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
1x1 7HA.02	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]

(1) These values are for the analyzed project (i.e., the SGT-A65 limit is for all three engines combined, each year)
(2) SCR is required for these units per the NSPS KKKK rule

SCOPE ASSUMPTIONS

Scope Boundaries

- Generic greenfield sites for all locations except zone J
- Generic brownfield for zone J (site leveling only, 5’ fill)
- Engineer, Procure, Construct (EPC) = inside the fence
  - Raw water from wells or surface water available at boundary
  - Wastewater delivered to site boundary. Treatment excluded.
  - Generator step-up transformer (GSU) included
  - Gas compression included
  - Mech/elec equipment, chem storage, fire protection
  - Controls
- Owner’s Costs = Outside the fence
  - Switchyard
  - Transmission/interconnection (and, if applicable, deliverability upgrades)
    - Any applicable System Deliverability Upgrade (SDU) costs will be determined following NYISO’s deliverability analysis for DCR (based on the tariff-prescribed level of excess conditions)
  - Gas pipeline, regulation, meter, conditioning

Thermal Plant Scope Assumptions

- Applicable to both simple cycle and combined cycle options
- Dual fuel and SCR included in base estimates.
  - Applicable cost reductions shown if excluded from plant design
  - 96 hours of fuel oil storage (same inventory as last DCR)
- Fuel gas compression included
- Piling included under GT, SCR, stack, tanks
- Gas turbines outdoors in OEM enclosures
- Administrative / controls building and warehouse
- Raw water, demineralized water, and fire water tanks

Simple Cycle Scope Assumptions

- Evaporative coolers for inlet conditioning
- Fin fan heat rejection
- 3x Aeroderivative Gas Turbine
  - SGT-A65 WLE
  - Water injection for NOx control on gas and fuel oil
  - Includes wet compression
  - Assumes temporary demineralized water trailers
- Frame gas turbines
  - 1x GE 7F.05
  - 1x GE 7HA.02
  - Dry low NOx combustion for gas operation
  - Water injection for NOx control on fuel oil
  - Hot side SCR includes tempering air fans

Combined Cycle Scope Assumptions

- GE 7HA.02 gas turbine
- Fin fan heat rejection for lube oil cooling
- Air cooled condenser for steam cycle
- Evaporative coolers for inlet conditioning
- Air cooled condenser for steam cycle heat rejection
- Onsite, permanent demineralized water system
- Duct firing capability included

BESS Scope Assumptions

- Major equipment:
  - Lithium-ion batteries
  - Racking and battery management system (BMS)
  - Power conditioning system (PCS)
    - Inverter
    - MV transformer
  - GSU
- 15% initial overbuild
  - Minimum state of charge and system losses
  - Auxiliaries and HVAC
  - One year of degradation
- Energy management system
- BOP electrical equipment (DC combiners, switchgear, etc.)
- HVAC (air cooled DX systems)

Notable Exclusions

- System Deliverability Upgrades - TBD
- Demolition or removal of hazardous materials
- Site-specific information (estimates based on generic site conditions)

Preliminary Cost Estimate Overview

ZONE C	3x A65	1x F.05	1x HA.02	1x1 HA.02 (w/ Duct Firing)	4-Hour BESS
ICAP Performance (90 deg / 70% RH)					
Net Plant Output, kW	158,600	207,100	343,700	598,900	200,000
Net Plant Heat Rate, Btu/kWh (HHV)	9,730	10,360	9,460	6,779	N/A
EPC Cost Per kW, 2020 $/kW	$1,340	$830	$690	$860	$1,250
Total Cost Per kW, 2020 $/kW	$1,930	$1,240	$990	$1,130	$1,550

ZONE J	3x A65	1x F.05	1x HA.02	1x1 HA.02 (w/ Duct Firing)	4-Hour BESS
ICAP Performance (90 deg / 70% RH)					
Net Plant Output, kW	158,700	210,200	348,800	605,100	200,000
Net Plant Heat Rate, Btu/kWh (HHV)	9,720	10,360	9,460	6,776	N/A
EPC Cost Per kW, 2020 $/kW	$1,560	$1,030	$830	$1,110	$1,400
Total Cost Per kW, 2020 $/kW	$2,120	$1,420	$1,110	$1,400	$1,700

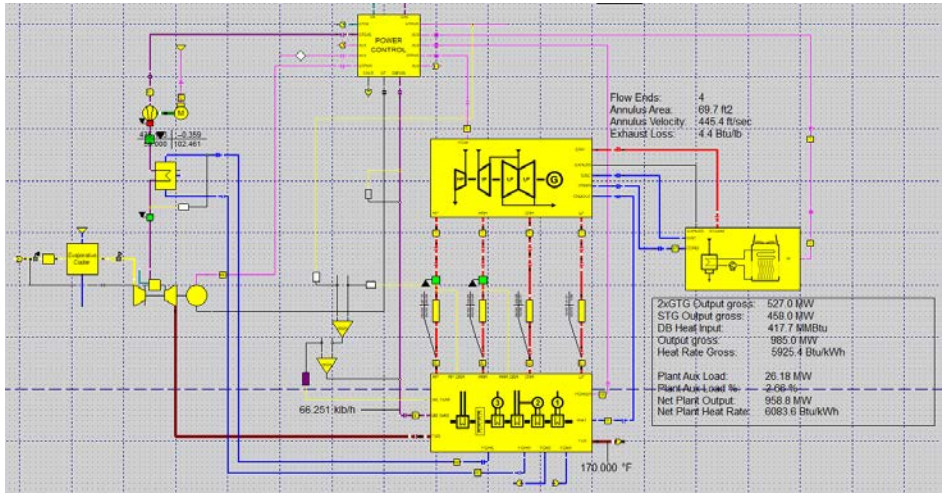
PRELIMINARY PERFORMANCE ESTIMATES

Performance Assumptions

- All information is preliminary
- Degraded performance estimates provided
  - Output values are net kW at generator terminals
  - Heat rates shown in HHV
- All performance based on natural gas operation
- Elevation and ambient conditions are the same assumptions used in the last DCR
- Gas turbine gross performance from OEM proprietary software
- Aux load assumptions for BOP systems
- Emissions based on OEM provided information for both natural gas and fuel oil operation

Combined Cycle Modeling Approach

- Ebsilon Thermal Model Inputs:
- Gas Turbine ratings obtained directly from OEM software
- HRSG Design based on project experience
- Duct fired plant. Incremental performance shown.
- Adjusted for degradation



Performance Comparison (Example Zone C)*

ZONE C PRELIMINARY PERFORMANCE	3x A65	1x F.05	1x HA.02	1x1 HA.02	4-Hour BESS
Spring-Fall Performance (59 deg / 60% RH)					
Net Plant Output, kW	184,700	219,800	359,500	520,400	200,000
Net Plant Heat Rate, Btu/kWh (HHV)	9,430	10,160	9,340	6,300	N/A
Incremental Duct Fired Output, kW	N/A	N/A	N/A	99,900	N/A
Incremental Heat Rate, Btu/kWh (HHV)	N/A	N/A	N/A	8,850	N/A
ICAP Performance (90 deg / 70% RH)					
Net Plant Output, kW	158,600	207,100	343,700	495,100	200,000
Net Plant Heat Rate, Btu/kWh (HHV)	9,730	10,360	9,460	6,410	N/A
Incremental Duct Fired Output, kW	N/A	N/A	N/A	103,800	N/A
Incremental Heat Rate, Btu/kWh (HHV)	N/A	N/A	N/A	8,530	N/A

*Additional preliminary performance results for all technologies and locations are provided in Appendix A

PRELIMINARY CAPITAL COST ESTIMATES

Capital Cost Methodology

- All information is preliminary
- Engineer, Procure, Construct (EPC) methodology
- Owner's Costs shown separately
- Overnight cost in 2020 USD (no escalation)
- Base cost with location-based Modifications
  - Labor rates per RS Means information in representative locations
  - Labor productivity factors per BMcD experience
  - 50 hour work week; No per diem
- Same EPC scope for all locations except NYC (NYC includes additional site prep costs)

Capital Cost Methodology (cont.)

- EPC direct costs
  - Each craft section includes labor, equipment, construction materials, subcontracts
  - Equipment and materials costs same across all locations
  - Manhours factored by labor and productivity adjustments
- EPC indirect costs
  - Construction management
  - General and administrative costs
  - Engineering
  - Startup
  - One year workmanship warranty
- EPC fee: 5%
- EPC contingency: 10%

Owner's Costs Methodology

- Development and management allowance examples:
  - Project development
  - Owner's Engineer
  - Owner's Project Management
  - Permitting and Legal
- Switchyard
  - Ring bus for simple cycle and BESS
  - Breaker and ½ for combined cycle
- Transmission
  - 1 mile in NYC
  - 3 miles for all other locations
  - 345 kV except for zone K
  - Zone K: 345kV for combined cycle; 138kV for BESS and simple cycle
  - Cost per mile for overhead line

Owner's Costs Methodology (cont.)

- System Deliverability Upgrades: TBD
- Gas pipeline and regulation
  - 1 mile for zone J
  - 3 miles for all other locations
  - Cost per mile per inch of pipe diameter
  - No river crossings assumed in cost estimate
- Fuel oil inventory: 96 hours (for dual fuel capacity)
- Operating spare parts
- Builder's risk insurance
- Owner's contingency: 5%
- AFUDC

Preliminary Capital Cost Overview – EPC Cost*

EPC $/kW	Zone C	Zone F	Zone G Dutchess	Zone G Rockland	Zone J	Zone K
3x SGT-A65	$1,340	$1,360	$1,380	$1,430	$1,560	$1,540
1x 7FA.05	$830	$840	$850	$900	$1,030	$1,020
1x 7HA.02	$690	$700	$700	$730	$830	$820
1x1 Combined Cycle	$860	$870	$900	$970	$1,110	$1,090
BESS 4-hour	$1,250	$1,260	$1,280	$1,320	$1,400	$1,390
BESS 6-hour	$1,790	$1,810	$1,820	$1,900	$2,010	$2,000
BESS 8-hour	$2,330	$2,350	$2,370	$2,470	$2,610	$2,600

*Additional preliminary capital cost estimates for all technologies and locations are provided in Appendix B

Preliminary Capital Cost Overview – Total Cost*

Total Capital Cost $/kW	Zone C	Zone F	Zone G Dutchess	Zone G Rockland	Zone J	Zone K
3x SGT-A65	$1,930	$1,950	$1,970	$2,030	$2,120	$2,080
1x 7FA.05	$1,240	$1,250	$1,260	$1,320	$1,420	$1,400
1x 7HA.02	$990	$990	$1,000	$1,040	$1,110	$1,100
1x1 Combined Cycle	$1,130	$1,150	$1,180	$1,260	$1,400	$1,390
BESS 4-hour	$1,550	$1,560	$1,580	$1,630	$1,700	$1,660
BESS 6-hour	$2,160	$2,180	$2,200	$2,280	$2,380	$2,340
BESS 8-hour	$2,770	$2,800	$2,820	$2,930	$3,070	$3,030

*Additional preliminary capital cost estimates for all technologies and locations are provided in Appendix B

PRELIMINARY O&M COST ESTIMATES

O&M Methodology – Thermal Plants

- All information is preliminary
- Based on BMcD experience
- Fixed O&M labor
  - Simple cycle = 7 FTE
  - Combined cycle = 22 FTE
  - BESS is remotely operated with routine maintenance and augmentation through capacity maintenance agreement (CMA) and/or long term service agreement (LTSA)
- Burdened labor rates
  - Escalated from last DCR using RS Means and BLS input
  - Labor range
    - Low: $126K for zone C
    - High: $270K zone J

O&M Methodology – Thermal Plants (cont.)

- Other fixed O&M
  - Office, administrative, and training costs
  - Contract labor for site maintenance and equipment maintenance
  - Testing and lab expenses
  - Safety equipment and small tools
  - Standby energy
- Variable O&M – major gas turbine maintenance
  - Assumes LTSA with OEM or other 3rd party
  - Levelized cost to major overhaul (~50,000 hours)
    - $/hr vs. $/start
    - Simple cycle frames could be hours or starts based program
  - Assumes no penalty for frame fast start (10 mins or less)

O&M Methodology – Thermal Plants (cont.)

- Variable O&M – BOP
  - ACC maintenance
  - Steam turbine maintenance
  - BOP equipment maintenance
  - Makeup water and water treatment
    - Simple cycle demin trailers
    - Combined cycle onsite permanent treatment
  - SCR catalyst replacements – levelized for 5 year life
  - Ammonia and other chemical consumption
  - Based on operation at 59 deg / 60% RH
  - Natural gas and fuel oil operation (applicable for dual fuel capability)
- O&M Exclusions
  - Fuel costs
  - Property Tax
  - Property insurance

O&M Methodology - BESS

- Assumes BESS is remotely operated
- 3rd party contract for all LTSA through performance guarantee
- Fixed O&M
  - Routine maintenance on HVAC, inverters, and other BOP equipment
  - Administrative fees and monitoring
- Variable O&M
  - Models the augmentation for assumed performance guarantee
  - Levelized cost to account for 2% energy degradation per year
  - Assumes 350 cycles per year

O&M Methodology – Leasing Costs

- Cost per acre escalated from last DCR
  - $22K for zones C, F, and G
  - $270K for zone J
  - $26K for zone K
- Plant operating acres (not construction)
  - Simple cycle: 15
  - Combined cycle: 30
  - BESS 4 hour: 9
  - BESS 6 hour: 12
  - BESS 8 hour: 15

Preliminary O&M Estimate Overview*

Fixed O&M, $MM/year	Zone C	Zone F	Zone G Dutchess	Zone G Rockland	Zone J	Zone K
3x SGT-A65	$2.3	$2.4	$2.7	$2.7	$6.9	$3.0
1x 7FA.05	$2.3	$2.4	$2.7	$2.7	$6.9	$3.0
1x 7HA.02	$2.7	$2.8	$3.1	$3.1	$7.3	$3.4
1x1 Combined Cycle	$5.6	$5.9	$6.9	$6.9	$15.6	$7.6
BESS 4-hour	$1.2	$1.2	$1.2	$1.2	$3.4	$1.2
BESS 6-hour	$1.5	$1.5	$1.5	$1.5	$4.5	$1.6
BESS 8-hour	$1.8	$1.8	$1.8	$1.8	$5.5	$1.9

Includes site leasing allowance

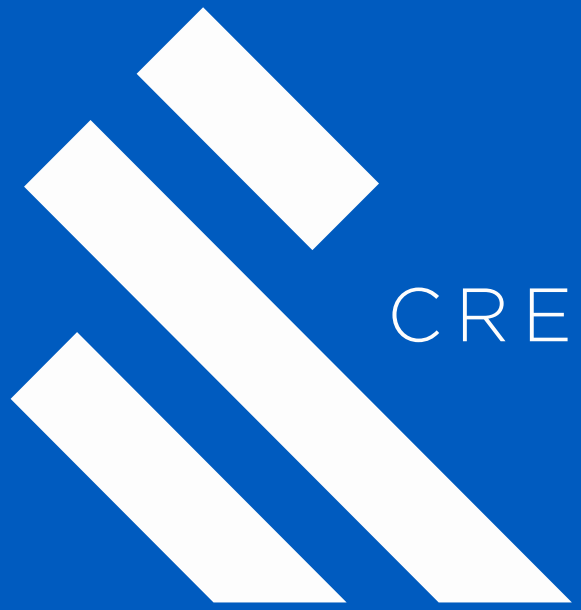
Variable O&M, $MWh	Gas	Fuel Oil	BESS
3x SGT-A65	$13.10	$13.20	N/A
1x 7FA.05	$3.00	$10.30	N/A
1x 7HA.02	$3.00	$12.50	N/A
1x1 Combined Cycle	$2.60	$2.80	N/A
BESS (4, 6, and 8-hour)	N/A	N/A	$14.50

Values shown are zone C

$/MWh for thermal plants shown in table includes gas turbine major maintenance (assumed to be based on $/hour)

$/MWh for thermal plants includes ammonia consumption and SCR catalyst replacement

*Additional preliminary O&M cost estimates for all technologies and locations are provided in Appendix C



CREATE AMAZING.

APPENDIX A: PRELIMINARY PERFORMANCE ESTIMATES

Preliminary Performance Estimates: 3x SGT-A65

3x Siemens SGT-A65	ZONE C	ZONE F	ZONE G - Dutchess	ZONE G - Rockland	ZONE J	ZONE K
Spring-Fall (ISO) Performance						
Ambient Temperature, °F	59.0	59.0	59.0	59.0	59.0	59.0
Relative Humidity, %	60%	60%	60%	60%	60%	60%
Net Plant Output, kW	184,700	184,700	184,800	184,800	184,900	184,900
Net Plant Heat Rate, Btu/kWh (HHV)	9,430	9,430	9,430	9,430	9,420	9,420
Heat Input, MMBtu/h (HHV)	1,740	1,740	1,740	1,740	1,740	1,740
ICAP Performance						
Ambient Temperature, °F	90.0	90.0	90.0	90.0	90.0	90.0
Relative Humidity, %	70%	70%	70%	70%	70%	70%
Net Plant Output, kW	158,600	158,600	158,700	158,700	158,700	158,700
Net Plant Heat Rate, Btu/kWh (HHV)	9,730	9,730	9,730	9,730	9,720	9,720
Heat Input, MMBtu/h (HHV)	1,540	1,540	1,540	1,540	1,540	1,540

Preliminary Performance Estimates: 1x 7F.05

1x GE 7F.05	ZONE C	ZONE F	ZONE G - Dutchess	ZONE G - Rockland	ZONE J	ZONE K
Spring-Fall (ISO) Performance						
Ambient Temperature, °F	59.0	59.0	59.0	59.0	59.0	59.0
Relative Humidity, %	60%	60%	60%	60%	60%	60%
Net Plant Output, kW	219,800	221,000	221,900	221,900	223,000	223,100
Net Plant Heat Rate, Btu/kWh (HHV)	10,160	10,160	10,160	10,160	10,160	10,160
Heat Input, MMBtu/h (HHV)	2,260	2,270	2,280	2,280	2,300	2,300
ICAP Performance						
Ambient Temperature, °F	90.0	90.0	90.0	90.0	90.0	90.0
Relative Humidity, %	70%	70%	70%	70%	70%	70%
Net Plant Output, kW	207,100	208,200	209,100	209,100	210,200	210,200
Net Plant Heat Rate, Btu/kWh (HHV)	10,360	10,360	10,360	10,360	10,360	10,360
Heat Input, MMBtu/h (HHV)	2,170	2,180	2,190	2,190	2,210	2,210

Preliminary Performance Estimates: 1x 7HA.02

1x GE 7HA.02	ZONE C	ZONE F	ZONE G - Dutchess	ZONE G - Rockland	ZONE J	ZONE K
Spring-Fall (ISO) Performance						
Ambient Temperature, °F	59.0	59.0	59.0	59.0	59.0	59.0
Relative Humidity, %	60%	60%	60%	60%	60%	60%
Net Plant Output, kW	359,500	361,400	362,900	362,900	364,800	364,900
Net Plant Heat Rate, Btu/kWh (HHV)	9,340	9,340	9,340	9,340	9,340	9,340
Heat Input, MMBtu/h (HHV)	3,400	3,420	3,430	3,430	3,450	3,450
ICAP Performance						
Ambient Temperature, °F	90.0	90.0	90.0	90.0	90.0	90.0
Relative Humidity, %	70%	70%	70%	70%	70%	70%
Net Plant Output, kW	343,700	345,600	347,000	347,000	348,800	348,800
Net Plant Heat Rate, Btu/kWh (HHV)	9,460	9,460	9,460	9,460	9,460	9,460
Heat Input, MMBtu/h (HHV)	3,290	3,310	3,320	3,320	3,340	3,340

Preliminary Performance Estimates: 1x1 7HA.02

1x1 Combined Cycle GE 7HA.02	ZONE C	ZONE F	ZONE G - Dutchess	ZONE G - Rockland	ZONE J	ZONE K
Spring-Fall (ISO) Performance						
Ambient Temperature, °F	59.0	59.0	59.0	59.0	59.0	59.0
Relative Humidity, %	60%	60%	60%	60%	60%	60%
Net Plant Output, kW	520,400	532,900	535,000	535,000	536,800	537,600
Net Plant Heat Rate, Btu/kWh (HHV)	6,300	6,300	6,300	6,300	6,310	6,300
Heat Input, MMBtu/h (HHV)	3,280	3,360	3,370	3,370	3,390	3,390
Incremental Duct Fired Performance with Evaporative Coolers @ Spring / Fall						
Incremental Duct Fired Output, kW	99,900	100,400	99,400	99,400	99,800	104,400
Incremental Heat Rate, Btu/kWh (HHV)	8,850	8,830	8,830	8,830	8,810	8,860
Incremental Heat Input, MMBtu/h (HHV)	880	890	880	880	880	920
ICAP Performance						
Ambient Temperature, °F	90.0	90.0	90.0	90.0	90.0	90.0
Relative Humidity, %	70%	70%	70%	70%	70%	70%
Net Plant Output, kW	495,100	498,500	500,600	500,600	502,200	502,500
Net Plant Heat Rate, Btu/kWh (HHV)	6,410	6,400	6,400	6,400	6,410	6,410
Heat Input, MMBtu/h (HHV)	3,170	3,190	3,200	3,200	3,220	3,220
Incremental Duct Fired Performance with Evaporative Coolers @ Spring / Fall						
Incremental Duct Fired Output, kW	103,800	104,200	103,200	103,200	102,900	107,700
Incremental Heat Rate, Btu/kWh (HHV)	8,530	8,540	8,550	8,550	8,600	8,530
Incremental Heat Input, MMBtu/h (HHV)	890	890	880	880	880	920

APPENDIX B: PRELIMINARY CAPITAL COST ESTIMATES

Preliminary Capital Cost: 3x SGT-A65

3x Siemens SGT-A65	ZONE C	ZONE F	ZONE G - Dutchess	ZONE G - Rockland	ZONE J	ZONE K
EPC Project Capital Costs, 2020 MM$	**$213**	**$215**	**$219**	**$227**	**$248**	**$245**
Owner's Costs, 2019 MM$	**$74**	**$74**	**$74**	**$75**	**$67**	**$63**
Owner's Project Development	$0.4	$0.4	$0.4	$0.4	$0.5	$0.4
Owner's Operational Personnel Prior to COD	$0.4	$0.4	$0.4	$0.4	$0.6	$0.5
Owner's Engineer	$1.0	$1.0	$1.0	$1.0	$1.3	$1.1
Owner's Project Management	$1.1	$1.1	$1.1	$1.1	$1.5	$1.2
Owner's Legal Costs	$1.0	$1.0	$1.0	$1.0	$1.3	$1.1
Owner's Start-up Engineering and Commissioning	$0.3	$0.3	$0.3	$0.3	$0.4	$0.3
Construction Power and Water	$0.5	$0.5	$0.5	$0.5	$0.7	$0.6
Permitting and Licensing Fees	$1.0	$1.0	$1.0	$1.0	$1.3	$1.1
Switchyard	$17.1	$17.1	$17.1	$17.1	$17.9	$9.3
Electrical Interconnection and Deliverability	$11.0	$11.0	$11.0	$11.0	$5.2	$6.5
Gas Interconnection and Reinforcement	$14.3	$14.3	$14.3	$14.3	$9.3	$14.3
System Deliverability Upgrade Costs	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Emission Reduction Credits	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Political Concessions & Area Development Fees	$0.5	$0.5	$0.5	$0.5	$0.7	$0.6
Startup/Testing (Fuel & Consumables)	$2.6	$2.6	$2.6	$2.6	$2.6	$2.6
Initial Fuel Inventory	$4.2	$4.2	$4.2	$4.2	$4.2	$4.2
Site Security	$0.6	$0.6	$0.6	$0.6	$0.8	$0.6
Operating Spare Parts	$3.1	$3.1	$3.1	$3.1	$3.1	$3.1
Builders Risk Insurance (0.45% of EPC Costs)	$1.0	$1.0	$1.0	$1.0	$1.1	$1.1
Owner's Contingency (5% for Screening)	$13.7	$13.8	$14.0	$14.5	$15.1	$14.8
AFUDC, 2019 MM$	**$20**	**$20**	**$21**	**$21**	**$22**	**$22**
EPC Portion	$14.9	$15.0	$15.3	$15.9	$17.3	$17.1
Non-EPC Portion	$5.2	$5.2	$5.2	$5.2	$4.7	$4.4
Total Project Costs, 2020 MM$	**$306**	**$309**	**$313**	**$323**	**$337**	**$330**

CAPITAL COST DEDUCT FOR GAS ONLY						
Capital Costs, 2020 MM$	($11.3)	($11.3)	($11.3)	($11.3)	($12.3)	($12.3)
Owner's Costs, 2020 MM$	($4.8)	($4.8)	($4.8)	($4.8)	($4.9)	($4.9)
CAPITAL COST DEDUCT TO REMOVE SCR/CO						
Capital Costs, 2020 MM$	($17.1)	($17.1)	($17.1)	($17.1)	($20.4)	($20.4)
Owner's Costs, 2020 MM$	($0.9)	($0.9)	($0.9)	($0.9)	($1.1)	($1.1)

Preliminary Capital Cost: 1x 7F.05

1x GE 7F.05	ZONE C	ZONE F	ZONE G - Dutchess	ZONE G - Rockland	ZONE J	ZONE K
EPC Project Capital Costs, 2020 MM$	**$171**	**$174**	**$178**	**$189**	**$217**	**$214**
Owner's Costs, 2019 MM$	**$68**	**$68**	**$68**	**$69**	**$62**	**$62**
Owner's Project Development	$0.4	$0.4	$0.4	$0.4	$0.5	$0.4
Owner's Operational Personnel Prior to COD	$0.4	$0.4	$0.4	$0.4	$0.6	$0.5
Owner's Engineer	$1.0	$1.0	$1.0	$1.0	$1.3	$1.1
Owner's Project Management	$1.1	$1.1	$1.1	$1.1	$1.5	$1.2
Owner's Legal Costs	$1.0	$1.0	$1.0	$1.0	$1.3	$1.1
Owner's Start-up Engineering and Commissioning	$0.3	$0.3	$0.3	$0.3	$0.4	$0.3
Construction Power and Water	$0.5	$0.5	$0.5	$0.5	$0.7	$0.6
Permitting and Licensing Fees	$1.0	$1.0	$1.0	$1.0	$1.3	$1.1
Switchyard	$10.3	$10.3	$10.3	$10.3	$10.8	$5.6
Electrical Interconnection and Deliverability	$11.0	$11.0	$11.0	$11.0	$5.2	$6.5
Gas Interconnection and Reinforcement	$14.3	$14.3	$14.3	$14.3	$9.3	$14.3
System Deliverability Upgrade Costs	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Emission Reduction Credits	$0.1	$0.1	$0.1	$0.3	$0.3	$0.3
Political Concessions & Area Development Fees	$0.5	$0.5	$0.5	$0.5	$0.7	$0.6
Startup/Testing (Fuel & Consumables)	$3.1	$3.1	$3.1	$3.1	$3.1	$3.1
Initial Fuel Inventory	$4.9	$4.9	$4.9	$4.9	$4.9	$4.9
Site Security	$0.6	$0.6	$0.6	$0.6	$0.8	$0.6
Operating Spare Parts	$5.5	$5.5	$5.5	$5.5	$5.5	$5.5
Builders Risk Insurance (0.45% of EPC Costs)	$0.8	$0.8	$0.8	$0.9	$1.0	$1.0
Owner's Contingency (5% for Screening)	$11.4	$11.6	$11.7	$12.3	$13.3	$13.1
AFUDC, 2019 MM$	**$17**	**$17**	**$17**	**$18**	**$20**	**$19**
EPC Portion	$12.0	$12.2	$12.5	$13.2	$15.2	$15.0
Non-EPC Portion	$4.8	$4.8	$4.8	$4.9	$4.4	$4.3
Total Project Costs, 2020 MM$	**$256**	**$259**	**$264**	**$277**	**$298**	**$295**

CAPITAL COST DEDUCT FOR GAS ONLY						
Capital Costs, 2020 MM$	($16.9)	($16.9)	($16.9)	($16.9)	($20.1)	($20.1)
Owner's Costs, 2020 MM$	($5.8)	($5.8)	($5.8)	($5.8)	($6.0)	($6.0)
CAPITAL COST DEDUCT TO REMOVE SCR/CO						
Capital Costs, 2020 MM$	($20.6)	($20.6)	($20.6)	($20.6)	($24.0)	($24.0)
Owner's Costs, 2020 MM$	($1.1)	($1.1)	($1.1)	($1.1)	($1.3)	($1.3)

Preliminary Capital Cost: 1x 7HA.02

1x GE 7HA.02	ZONE C	ZONE F	ZONE G - Dutchess	ZONE G - Rockland	ZONE J	ZONE K
EPC Project Capital Costs, 2020 MM$	**$238**	**$241**	**$244**	**$255**	**$289**	**$286**
Owner's Costs, 2019 MM$	**$81**	**$81**	**$81**	**$82**	**$73**	**$75**
Owner's Project Development	$0.4	$0.4	$0.4	$0.4	$0.5	$0.4
Owner's Operational Personnel Prior to COD	$0.4	$0.4	$0.4	$0.4	$0.6	$0.5
Owner's Engineer	$1.0	$1.0	$1.0	$1.0	$1.3	$1.1
Owner's Project Management	$1.1	$1.1	$1.1	$1.1	$1.5	$1.2
Owner's Legal Costs	$1.0	$1.0	$1.0	$1.0	$1.3	$1.1
Owner's Start-up Engineering and Commissioning	$0.3	$0.3	$0.3	$0.3	$0.4	$0.3
Construction Power and Water	$0.6	$0.6	$0.6	$0.6	$0.7	$0.6
Permitting and Licensing Fees	$1.0	$1.0	$1.0	$1.0	$1.3	$1.1
Switchyard	$10.3	$10.3	$10.3	$10.3	$10.8	$5.6
Electrical Interconnection and Deliverability	$11.0	$11.0	$11.0	$11.0	$5.2	$6.5
Gas Interconnection and Reinforcement	$17.9	$17.9	$17.9	$17.9	$10.8	$17.9
System Deliverability Upgrade Costs	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Emission Reduction Credits	$0.1	$0.1	$0.1	$0.4	$0.4	$0.4
Political Concessions & Area Development Fees	$0.5	$0.5	$0.5	$0.5	$0.7	$0.6
Startup/Testing (Fuel & Consumables)	$4.5	$4.5	$4.5	$4.5	$4.5	$4.5
Initial Fuel Inventory	$7.2	$7.2	$7.2	$7.2	$7.2	$7.2
Site Security	$0.6	$0.6	$0.6	$0.6	$0.8	$0.6
Operating Spare Parts	$6.5	$6.5	$6.5	$6.5	$6.5	$6.5
Builders Risk Insurance (0.45% of EPC Costs)	$1.1	$1.1	$1.1	$1.2	$1.3	$1.3
Owner's Contingency (5% for Screening)	$15.2	$15.3	$15.5	$16.0	$17.2	$17.2
AFUDC, 2019 MM$	**$22**	**$22**	**$23**	**$24**	**$25**	**$25**
EPC Portion	$16.6	$16.8	$17.1	$17.8	$20.2	$20.0
Non-EPC Portion	$5.6	$5.7	$5.7	$5.7	$5.1	$5.2
Total Project Costs, 2020 MM$	**$340**	**$344**	**$348**	**$360**	**$387**	**$385**

CAPITAL COST DEDUCT FOR GAS ONLY						
Capital Costs, 2020 MM$	($25.4)	($25.4)	($25.4)	($25.4)	($30.2)	($30.2)
Owner's Costs, 2020 MM$	($8.6)	($8.6)	($8.6)	($8.6)	($8.9)	($8.9)
CAPITAL COST DEDUCT TO REMOVE SCR/CO						
Capital Costs, 2020 MM$	($43.4)	($43.4)	($43.4)	($43.4)	($52.3)	($52.3)
Owner's Costs, 2020 MM$	($2.4)	($2.4)	($2.4)	($2.4)	($2.9)	($2.9)

Preliminary Capital Cost: 1x1 7HA.02 CC

1x1 Combined Cycle GE 7HA.02	ZONE C	ZONE F	ZONE G - Dutchess	ZONE G - Rockland	ZONE J	ZONE K
EPC Project Capital Costs, 2020 MM$	**$513**	**$526**	**$544**	**$586**	**$669**	**$663**
Owner's Costs, 2019 MM$	**$119**	**$119**	**$120**	**$124**	**$121**	**$130**
Owner's Project Development	$3.5	$3.5	$3.5	$3.5	$4.6	$3.9
Owner's Operational Personnel Prior to COD	$2.4	$2.4	$2.4	$2.4	$3.1	$2.6
Owner's Engineer	$2.6	$2.6	$2.6	$2.6	$3.4	$2.9
Owner's Project Management	$4.8	$4.8	$4.8	$4.8	$6.2	$5.3
Owner's Legal Costs	$1.0	$1.0	$1.0	$1.0	$1.3	$1.1
Owner's Start-up Engineering and Commissioning	$0.5	$0.5	$0.5	$0.5	$0.7	$0.6
Land	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Construction Power and Water	$1.5	$1.5	$1.5	$1.5	$2.0	$1.7
Permitting and Licensing Fees	$1.0	$1.0	$1.0	$1.0	$1.3	$1.1
Switchyard	$18.9	$18.9	$18.9	$18.9	$19.9	$18.9
Electrical Interconnection and Deliverability	$11.0	$11.0	$11.0	$11.0	$5.2	$11.0
Gas Interconnection and Reinforcement	$17.9	$17.9	$17.9	$17.9	$10.8	$17.9
System Deliverability Upgrade Costs	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Emission Reduction Credits	$0.2	$0.2	$0.2	$1.1	$1.1	$1.1
Political Concessions & Area Development Fees	$0.5	$0.5	$0.5	$0.5	$0.7	$0.6
Startup/Testing (Fuel & Consumables)	$5.5	$5.5	$5.5	$5.5	$5.5	$5.5
Initial Fuel Inventory	$7.2	$7.2	$7.2	$7.2	$7.2	$7.2
Site Security	$1.1	$1.1	$1.1	$1.1	$1.4	$1.2
Operating Spare Parts	$6.5	$6.5	$6.5	$6.5	$6.5	$6.5
Builders Risk Insurance (0.45% of EPC Costs)	$2.3	$2.4	$2.5	$2.6	$3.0	$3.0
Owner's Contingency (5% for Screening)	$30.1	$30.7	$31.6	$33.8	$37.6	$37.8
AFUDC, 2019 MM$	**$44**	**$45**	**$46**	**$50**	**$55**	**$55**
EPC Portion	$35.9	$36.8	$38.1	$41.0	$46.8	$46.4
Non-EPC Portion	$8.3	$8.4	$8.4	$8.6	$8.5	$9.1
Total Project Costs, 2020 MM$	**$676**	**$690**	**$710**	**$759**	**$846**	**$848**

CAPITAL COST DEDUCT FOR GAS ONLY						
Capital Costs, 2020 MM$	($25.4)	($25.4)	($25.4)	($25.4)	($30.2)	($30.2)
Owner's Costs, 2020 MM$	($3.7)	($3.8)	($3.8)	($4.0)	($4.7)	($4.6)

Preliminary Capital Cost: BESS 4-Hour

200 MW BESS (4-Hour)	ZONE C	ZONE F	ZONE G - Dutchess	ZONE G - Rockland	ZONE J	ZONE K
EPC Project Capital Costs, 2020 MM$	**$250**	**$253**	**$255**	**$265**	**$281**	**$279**
Owner's Costs, 2019 MM$	**$40**	**$40**	**$40**	**$40**	**$36**	**$32**
Owner's Project Development	$0.2	$0.2	$0.2	$0.2	$0.2	$0.2
Owner's Operational Personnel Prior to COD	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1
Owner's Engineer	$0.2	$0.2	$0.2	$0.2	$0.3	$0.2
Owner's Project Management	$0.4	$0.4	$0.4	$0.4	$0.5	$0.4
Owner's Legal Costs	$0.5	$0.5	$0.5	$0.5	$0.7	$0.6
Owner's Start-up Engineering and Commissioning	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1
Land	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Construction Power and Water	$0.5	$0.5	$0.5	$0.5	$0.6	$0.5
Permitting and Licensing Fees	$0.3	$0.3	$0.3	$0.3	$0.3	$0.3
Switchyard	$10.3	$10.3	$10.3	$10.3	$10.8	$5.6
Electrical Interconnection and Deliverability	$11.0	$11.0	$11.0	$11.0	$5.2	$6.5
Gas Interconnection and Reinforcement	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
System Deliverability Upgrade Costs	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Emission Reduction Credits	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Political Concessions & Area Development Fees	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1
Startup/Testing (Fuel & Consumables)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Initial Fuel Inventory	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Site Security	$0.4	$0.4	$0.4	$0.4	$0.5	$0.4
Operating Spare Parts	$0.8	$0.8	$0.8	$0.8	$0.8	$0.8
Builders Risk Insurance (0.45% of Construction Costs)	$1.1	$1.1	$1.2	$1.2	$1.3	$1.3
Owner's Contingency (5% for Screening Purposes)	$13.8	$13.9	$14.0	$14.5	$15.1	$14.8
AFUDC, 2019 MM$	**$20**	**$20**	**$21**	**$21**	**$22**	**$22**
EPC Portion	$17.5	$17.7	$17.9	$18.5	$19.7	$19.5
Non-EPC Portion	$2.8	$2.8	$2.8	$2.8	$2.6	$2.2
Total Project Costs, 2020 MM$	**$310**	**$313**	**$316**	**$327**	**$339**	**$332**

Preliminary Capital Cost: BESS 6-Hour

200 MW BESS (6-Hour)	ZONE C	ZONE F	ZONE G - Dutchess	ZONE G - Rockland	ZONE J	ZONE K
EPC Project Capital Costs, 2020 MM$	**$358**	**$362**	**$365**	**$379**	**$402**	**$399**
Owner's Costs, 2019 MM$	**$46**	**$46**	**$46**	**$47**	**$44**	**$39**
Owner's Project Development	$0.2	$0.2	$0.2	$0.2	$0.2	$0.2
Owner's Operational Personnel Prior to COD	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1
Owner's Engineer	$0.2	$0.2	$0.2	$0.2	$0.3	$0.3
Owner's Project Management	$0.4	$0.4	$0.4	$0.4	$0.5	$0.5
Owner's Legal Costs	$0.5	$0.5	$0.5	$0.5	$0.7	$0.6
Owner's Start-up Engineering and Commissioning	$0.1	$0.1	$0.1	$0.1	$0.2	$0.2
Land	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Construction Power and Water	$0.5	$0.5	$0.5	$0.5	$0.7	$0.6
Permitting and Licensing Fees	$0.3	$0.3	$0.3	$0.3	$0.3	$0.3
Switchyard	$10.3	$10.3	$10.3	$10.3	$10.8	$5.6
Electrical Interconnection and Deliverability	$11.0	$11.0	$11.0	$11.0	$5.2	$6.5
Gas Interconnection and Reinforcement	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
System Deliverability Upgrade Costs	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Emission Reduction Credits	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Political Concessions & Area Development Fees	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1
Startup/Testing (Fuel & Consumables)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Initial Fuel Inventory	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Site Security	$0.4	$0.4	$0.4	$0.4	$0.6	$0.5
Operating Spare Parts	$1.1	$1.1	$1.1	$1.1	$1.1	$1.1
Builders Risk Insurance (0.45% of Construction Costs)	$1.6	$1.6	$1.6	$1.7	$1.8	$1.8
Owner's Contingency (5% for Screening Purposes)	$19.3	$19.4	$19.6	$20.3	$21.2	$20.9
AFUDC, 2019 MM$	**$28**	**$29**	**$29**	**$30**	**$31**	**$31**
EPC Portion	$25.1	$25.3	$25.5	$26.5	$28.1	$27.9
Non-EPC Portion	$3.2	$3.2	$3.3	$3.3	$3.1	$2.7
Total Project Costs, 2020 MM$	**$433**	**$437**	**$440**	**$456**	**$477**	**$469**

Preliminary Capital Cost: BESS 8-Hour

200 MW BESS (8-Hour)	ZONE C	ZONE F	ZONE G - Dutchess	ZONE G - Rockland	ZONE J	ZONE K
EPC Project Capital Costs, 2020 MM$	**$466**	**$471**	**$475**	**$493**	**$523**	**$520**
Owner's Costs, 2019 MM$	**$53**	**$53**	**$53**	**$54**	**$51**	**$46**
Owner's Project Development	$0.2	$0.2	$0.2	$0.2	$0.2	$0.2
Owner's Operational Personnel Prior to COD	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1
Owner's Engineer	$0.3	$0.3	$0.3	$0.3	$0.3	$0.3
Owner's Project Management	$0.5	$0.5	$0.5	$0.5	$0.6	$0.5
Owner's Legal Costs	$0.5	$0.5	$0.5	$0.5	$0.7	$0.6
Owner's Start-up Engineering and Commissioning	$0.2	$0.2	$0.2	$0.2	$0.2	$0.2
Land	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Construction Power and Water	$0.6	$0.6	$0.6	$0.6	$0.7	$0.6
Permitting and Licensing Fees	$0.3	$0.3	$0.3	$0.3	$0.3	$0.3
Switchyard	$10.3	$10.3	$10.3	$10.3	$10.8	$5.6
Electrical Interconnection and Deliverability	$11.0	$11.0	$11.0	$11.0	$5.2	$6.5
Gas Interconnection and Reinforcement	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
System Deliverability Upgrade Costs	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Emission Reduction Credits	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Political Concessions & Area Development Fees	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1
Startup/Testing (Fuel & Consumables)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Initial Fuel Inventory	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Site Security	$0.5	$0.5	$0.5	$0.5	$0.7	$0.6
Operating Spare Parts	$1.5	$1.5	$1.5	$1.5	$1.5	$1.5
Builders Risk Insurance (0.45% of Construction Costs)	$2.1	$2.1	$2.1	$2.2	$2.4	$2.3
Owner's Contingency (5% for Screening Purposes)	$24.7	$24.9	$25.1	$26.1	$27.3	$27.0
AFUDC, 2019 MM$	**$36**	**$37**	**$37**	**$38**	**$40**	**$40**
EPC Portion	$32.6	$32.9	$33.2	$34.5	$36.6	$36.4
Non-EPC Portion	$3.7	$3.7	$3.7	$3.8	$3.6	$3.2
Total Project Costs, 2020 MM$	**$555**	**$560**	**$565**	**$586**	**$614**	**$606**

APPENDIX C: PRELIMINARY O&M ESTIMATES

Preliminary O&M Estimate: 3x SGT-A65

3x Siemens SGT-A65	ZONE C	ZONE F	ZONE G - Dutchess	ZONE G - Rockland	ZONE J	ZONE K
FIXED O&M COSTS						
Fixed O&M Cost - LABOR, 2020$MM/Yr	$0.90	$1.00	$1.30	$1.30	$1.70	$1.50
Fixed O&M Cost - OTHER, 2020$MM/Yr	$1.10	$1.10	$1.10	$1.10	$1.10	$1.10
Site Leasing Allowance, 2020$/MM/Yr	$0.3	$0.3	$0.3	$0.3	$4.1	$0.4
LEVELIZED MAJOR MAINTENANCE COSTS						
Major Maintenance Cost, 2020$/GT-hr or $/engine-hr	$190	$190	$190	$190	$190	$190
Major Maintenance Cost, 2020$/GT-start	N/A	N/A	N/A	N/A	N/A	N/A
Major Maintenance Cost, 2020$/MWh	$3.00	$3.00	$3.00	$3.00	$3.00	$3.00
NON-FUEL VARIABLE O&M COSTS (EXCLUDES MAJOR MAINTENANCE) - GAS OPERATION						
Total Variable O&M Cost, 2020$/MWh	$10.10	$9.90	$9.80	$9.80	$9.70	$9.70
Water Related O&M, $/MWh	$8.30	$8.20	$8.10	$8.10	$8.00	$8.00
SCR Related Costs, $/MWh	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80
Other Consumables and Variable O&M, $/MWh	$0.90	$0.90	$0.90	$0.90	$0.90	$0.90
NON-FUEL VARIABLE O&M COSTS (EXCLUDES MAJOR MAINTENANCE) - FUEL OIL OPERATION						
Total Variable O&M Cost, 2020$/MWh	$10.20	$10.00	$9.90	$9.90	$9.80	$9.80
Water Related O&M, $/MWh	$8.20	$8.10	$8.00	$8.00	$7.90	$7.90
SCR Related Costs, $/MWh	$1.00	$1.00	$1.00	$1.00	$1.00	$1.00
Other Consumables and Variable O&M, $/MWh	$0.90	$0.90	$0.90	$0.90	$0.90	$0.90

Preliminary O&M Estimate: 1x 7F.05

1x GE 7F.05	ZONE C	ZONE F	ZONE G - Dutchess	ZONE G - Rockland	ZONE J	ZONE K
FIXED O&M COSTS						
Fixed O&M Cost - LABOR, 2020$MM/Yr	$0.90	$1.00	$1.30	$1.30	$1.70	$1.50
Fixed O&M Cost - OTHER, 2020$MM/Yr	$1.10	$1.10	$1.10	$1.10	$1.10	$1.10
Site Leasing Allowance, 2020$/MM/Yr	$0.3	$0.3	$0.3	$0.3	$4.1	$0.4
LEVELIZED MAJOR MAINTENANCE COSTS						
Major Maintenance Cost, 2020$/GT-hr or $/engine-hr	$350	$190	$190	$190	$190	$190
Major Maintenance Cost, 2020$/GT-start	N/A	N/A	N/A	N/A	N/A	N/A
Major Maintenance Cost, 2020$/MWh	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
NON-FUEL VARIABLE O&M COSTS (EXCLUDES MAJOR MAINTENANCE) - GAS OPERATION						
Total Variable O&M Cost, 2020$/MWh	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
Water Related O&M, $/MWh	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
SCR Related Costs, $/MWh	$0.60	$0.60	$0.60	$0.60	$0.60	$0.60
Other Consumables and Variable O&M, $/MWh	$0.90	$0.90	$0.90	$0.90	$0.90	$0.90
NON-FUEL VARIABLE O&M COSTS (EXCLUDES MAJOR MAINTENANCE) - FUEL OIL OPERATION						
Total Variable O&M Cost, 2020$/MWh	$8.80	$8.80	$8.80	$8.80	$8.80	$8.80
Water Related O&M, $/MWh	$7.10	$7.10	$7.10	$7.10	$7.10	$7.10
SCR Related Costs, $/MWh	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80
Other Consumables and Variable O&M, $/MWh	$0.90	$0.90	$0.90	$0.90	$0.90	$0.90

Preliminary O&M Estimate: 1x 7HA.02

1x GE 7HA.02	ZONE C	ZONE F	ZONE G - Dutchess	ZONE G - Rockland	ZONE J	ZONE K
FIXED O&M COSTS						
Fixed O&M Cost - LABOR, 2020$MM/Yr	$0.90	$1.00	$1.30	$1.30	$1.70	$1.50
Fixed O&M Cost - OTHER, 2020$MM/Yr	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
Site Leasing Allowance, 2020$/MM/Yr	$0.3	$0.3	$0.3	$0.3	$4.1	$0.4
LEVELIZED MAJOR MAINTENANCE COSTS						
Major Maintenance Cost, 2020$/GT-hr or $/engine-hr	$600	$190	$190	$190	$190	$190
Major Maintenance Cost, 2020$/GT-start	N/A	N/A	N/A	N/A	N/A	N/A
Major Maintenance Cost, 2020$/MWh	$1.60	$1.60	$1.60	$1.60	$1.60	$1.60
NON-FUEL VARIABLE O&M COSTS (EXCLUDES MAJOR MAINTENANCE) - GAS OPERATION						
Total Variable O&M Cost, 2020$/MWh	$1.40	$1.30	$1.30	$1.30	$1.30	$1.30
Water Related O&M, $/MWh	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
SCR Related Costs, $/MWh	$0.50	$0.40	$0.40	$0.40	$0.40	$0.40
Other Consumables and Variable O&M, $/MWh	$0.90	$0.90	$0.90	$0.90	$0.90	$0.90
NON-FUEL VARIABLE O&M COSTS (EXCLUDES MAJOR MAINTENANCE) - FUEL OIL OPERATION						
Total Variable O&M Cost, 2020$/MWh	$10.90	$10.90	$10.90	$10.90	$10.90	$10.90
Water Related O&M, $/MWh	$9.30	$9.30	$9.30	$9.30	$9.30	$9.30
SCR Related Costs, $/MWh	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70
Other Consumables and Variable O&M, $/MWh	$0.90	$0.90	$0.90	$0.90	$0.90	$0.90

Preliminary O&M Estimate: 1x1 7HA.02 CC

1x1 Combined Cycle GE 7HA.02	ZONE C	ZONE F	ZONE G - Dutchess	ZONE G - Rockland	ZONE J	ZONE K
FIXED O&M COSTS						
Fixed O&M Cost - LABOR, 2020$MM/Yr	$2.8	$3.1	$4.1	$4.1	$5.3	$4.7
Fixed O&M Cost - OTHER, 2020$MM/Yr	$2.1	$2.1	$2.1	$2.1	$2.1	$2.1
Site Leasing Allowance, 2020$/MM/Yr	$0.7	$0.7	$0.7	$0.7	$8.1	$0.8
LEVELIZED CAPITAL MAINTENANCE COSTS						
Major Maintenance Cost, 2019 $/GT-hr	$600	$600	$600	$600	$600	$600
Major Maintenance Cost, 2019 $/MWh	$1.10	$1.10	$1.10	$1.10	$1.10	$1.10
NON-FUEL VARIABLE O&M COSTS (EXCLUDES MAJOR MAINTENANCE) - GAS OPERATION						
Total Variable O&M Cost, 2019 $/MWh	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
Water Related O&M ($/MWh)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
SCR Related Costs, $/MWh	$0.30	$0.30	$0.30	$0.30	$0.30	$0.30
Other Consumables and Variable O&M ($/MWh)	$1.20	$1.20	$1.20	$1.20	$1.20	$1.20
Incremental Duct Fired Variable O&M, 2019 $/MWh (exc	$0.60	$0.60	$0.60	$0.60	$0.60	$0.60
Water Related O&M ($/MWh)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
SCR Reagent, $/MWh	$0.10	$0.10	$0.10	$0.10	$0.10	$0.10
Other Consumables and Variable O&M ($/MWh)	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50
NON-FUEL VARIABLE O&M COSTS (EXCLUDES MAJOR MAINTENANCE) - FUEL OIL OPERATION						
Total Variable O&M Cost, 2019 $/MWh	$1.70	$1.70	$1.70	$1.70	$1.70	$1.70
Water Related O&M ($/MWh)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
SCR Related Costs, $/MWh	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50
Other Consumables and Variable O&M ($/MWh)	$1.20	$1.20	$1.20	$1.20	$1.20	$1.20

Preliminary O&M Estimates: BESS (4, 6, and 8 Hour)

200 MW BESS (4-Hour)	ZONE C	ZONE F	ZONE G - Dutchess	ZONE G - Rockland	ZONE J	ZONE K
FIXED O&M COSTS						
Fixed O&M Cost - Assumes LTSA with Integrator/OEM, 2020$MM/Yr	$1.0	$1.0	$1.0	$1.0	$1.0	$1.0
Site Leasing Allowance, 2020$/MM/Yr	$0.2	$0.2	$0.2	$0.2	$2.4	$0.2
CAPACITY AUGMENTATION (Modeled as VARIABLE O&M COSTS)						
Capacity Augmentation (via LTSA) for 20 Years Levelized, 2020 $/MWh	$14.50	$14.50	$14.50	$14.50	$14.50	$14.50

200 MW BESS (6-Hour)	ZONE C	ZONE F	ZONE G - Dutchess	ZONE G - Rockland	ZONE J	ZONE K
FIXED O&M COSTS						
Fixed O&M Cost - Assumes LTSA with Integrator/OEM, 2020$MM/Yr	$1.2	$1.2	$1.2	$1.2	$1.2	$1.2
Site Leasing Allowance, 2020$/MM/Yr	$0.3	$0.3	$0.3	$0.3	$3.2	$0.3
CAPACITY AUGMENTATION (Modeled as VARIABLE O&M COSTS)						
Capacity Augmentation (via LTSA) for 20 Years Levelized, 2020 $/MWh	$14.50	$14.50	$14.50	$14.50	$14.50	$14.50

200 MW BESS (8-Hour)	ZONE C	ZONE F	ZONE G - Dutchess	ZONE G - Rockland	ZONE J	ZONE K
FIXED O&M COSTS						
Fixed O&M Cost - Assumes LTSA with Integrator/OEM, 2020$MM/Yr	$1.5	$1.5	$1.5	$1.5	$1.5	$1.5
Site Leasing Allowance, 2020$/MM/Yr	$0.3	$0.3	$0.3	$0.3	$4.1	$0.3
CAPACITY AUGMENTATION (Modeled as VARIABLE O&M COSTS)						
Capacity Augmentation (via LTSA) for 20 Years Levelized, 2020 $/MWh	$14.50	$14.50	$14.50	$14.50	$14.50	$14.50