INSTALLATION NUMBER

OP | LOCATION | FACILITY | EMISSION POINT | C

A ADD
C CHANGE
D DELETE

READ INSTRUCTIONS CONTAINED IN FORM 76-11-4 BEFORE ANSWERING ANY QUESTION

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

New York City Department of Environmental Protection

DEP

STATIONARY COMBUSTION INSTALLATION

APPLICATION FOR PERMIT TO CONSTRUCT OR CERTIFICATE TO OPERATE

SECTION A

1. NAME OF OWNER/FIRM	Astoria Generating Company , LP
2. NUMBER AND STREET ADDRESS	18-01 20th Avenue
3. CITY - TOWN - VILLAGE	Long Island City
4. STATE	NY
5. ZIP	11105-4271
6. OWNER CLASSIFICATION	A ☐ COMMERCIAL; B ☐ INDUSTRIAL; C ☒ UTILITY; D ☐ FEDERAL; E ☐ STATE; F ☐ MUNICIPAL; G ☐ EDUC INST.; H ☐ HOSPITAL; I ☐ RESIDENTIAL; J ☐ OTHER
7. NAME & TITLE OF OWNERS REPRESENTATIVE	Baranello, Mark
8. TELEPHONE	(718) 499-6368
9. NAME OF AUTHORIZED AGENT	
10. TELEPHONE	
11. NUMBER AND STREET ADDRESS	
12. CITY - TOWN - VILLAGE	
13. STATE	
14. ZIP	
15. NAME OF PE OR ARCHITECT PREPARING PLANS	Janet Bernardo
16. N.Y.S. P.E. OR ARCHITECT LICENSE NO	16 078701
17. TELEPHONE	(781) 431 -1151
18. SIGNATURE OF OWNERS REPRESENTATIVE OR AGENT WHEN APPLYING FOR A PERMIT TO CONSTRUCT	
19. FACILITY NAME (IF DIFFERENT FROM OWNER/FIRM)	Gowanus Generating Station
20. FACILITY LOCATION (NUMBER AND STREET ADDRESS)	29th St & Second Avenue
21. CITY - TOWN - VILLAGE	Brooklyn
22. ZIP	11232
23. BUILDING NAME OR NUMBER	LMS100 Power Block
24. FLOOR NAME OR NUMBER	1
25. START UP DATE MO/YR	06 / 2010
26. DRAWING NUMBER(S) OF PLANS SUBMITTED	Figure 1 Site Locus, Figure 2 Site Plan, Figure 3 LMS100
27. PERMIT TO CONSTRUCT	A ☐ NEW SOURCE; B ☒ MODIFICATION
28. CERTIFICATE TO OPERATE	A ☐ NEW SOURCE; B ☒ MODIFICATION; C ☐ EXISTING

SECTION B

	29. EMISSION POINT ID	30. GROUND ELEVATION (FT)	31. HEIGHT ABOVE STRUCTURES (FT)	32. STACK HEIGHT (FT)	33. INSIDE DIMENSION(S) (IN)	34. EXIT TEMPERATURE (°F)	35. EXIT VELOCITY (FT/SEC)	36. EXIT FLOW (ACFM)	37. HEAT INPUT (MILLION BTU/HR)
Gas	0 0 1 0 0	0	46	100	162	774	105.85	909,052	885.8
Oil	0 0 1 0 0	0	46	100	162	786	103.56	889,453	839.2

38. CONTINUOUS MONITOR(S): A ☐ OPACITY; B ☐ SULFUR DIOXIDE; C ☒ NITROGEN OXIDES; D ☒ OXYGEN; E ☒ CARBON DIOXIDE; F ☐ OTHER

SECTION C

39. UNIT TYPE	03
40. UNIT MANUFACTURER'S NAME AND MODEL NUMBER	General Electric LMS100 Combustion Turbine
41. UNIT HEAT INPUT	885.8 Gas; 839.2 Oil
42. AIR INTAKE	1
43. SOURCE CODE	
44. BURNER TYPE	69
45. NO OF BURNERS	1
46. BURNER MANUFACTURER'S NAME AND MODEL NUMBER	General Electric LMS100
47. FUEL TYPE	52
48. AVG QUANTITY OF FUEL/HR	885
49. MAX QUANTITY OF FUEL/HR	885
50. QUANTITY OF FUEL/YR	
51. HRS./DAY	24
52. DAYS/YEAR	365
53. % OPERATION BY SEASON (Winter, Spring, Summer, Fall)	
54. NAME OF SUPPLIER(S)	
55. BURNER TYPE	51
56. NO OF BURNERS	1
57. BURNER MANUFACTURER'S NAME AND MODEL NUMBER	General Electric LMS100
58. FUEL TYPE	32
59. AVG QUANTITY OF FUEL/HR	839
60. MAX QUANTITY OF FUEL/HR	839
61. QUANTITY OF FUEL/YR	
62. HRS./DAY	24
63. DAYS/YEAR	365
64. % OPERATION BY SEASON (Winter, Spring, Summer, Fall)	
65. NAME OF SUPPLIER(S)	

SECTION D

EMISSION CONTROL EQUIP I.D.	CONTROL TYPE	MANUFACTURER'S NAME AND MODEL NUMBER	DISPOSAL METHOD	DATE INSTALLED MO/YR	USEFUL LIFE
66 LMSOC	67 98	68 Express Integrated Technologies or Equivalent – Oxidation Catalyst	69	70 6-2010	71
72 LMSCR	73 98	74 Express Integrated Technologies or Equivalent – Selective Catalytic Reduction	75	76 6-2010	77

SECTION E

CALCULATIONS

See attached calculation spreadsheet

Natural Gas firing emissions

SECTION F

TO BE COMPLETED FOR ALL SOURCES USING ITEM 27 AND OTHER SOURCES AS DEFINED IN THE INSTRUCTION FORM 76-11-4

CONTAMINANT		EMISSIONS				% CONTROL EFFICIENCY	HOURLY EMISSIONS (LBS/HR)	ANNUAL EMISSIONS (LBS/YR)		
NAME	CAS NUMBER	ACTUAL	UNIT	HOW DET	PERMISS		ACTUAL	ACTUAL	10ˣ	PERMISS.
78 TOTAL PARTICULATES	79 NY075-00-0	80 0.011	81 11	82 4	83	84 0	85 8.50	86 27178	87 0	88
89 SULFUR DIOXIDE	90 7446-09-5	91 0.002	92 11	93 4	94	95 0	96 2.10	97 6715	98 0	99
100 NITROGEN OXIDES	101 NY210-00-0	102 0.009	103 11	104 4	105	106 90.0	107 8.09	108 25867	109 0	110
111 VOC	112 NY998-00-0	113 0.005	114 11	115 4	116	117 20.0	118 3.94	119 12598	120 0	121
122 Carbon Monoxide	123 00630-08-0	124 0.013	125 11	126 4	127	128 95.5	129 11.82	130 37793	131 0	132

Upon completion of construction sign the statement listed below and forward to the appropriate field representative

THE STATIONARY COMBUSTION INSTALLATION HAS BEEN CONSTRUCTED AND WILL BE OPERATED IN ACCORDANCE WITH STATED SPECIFICATIONS AND IN CONFORMANCE WITH ALL PROVISIONS OF EXISTING REGULATIONS

133 SIGNATURE OF AUTHORIZED REPRESENTATIVE OR AGENT | DATE

AGENCY USE ONLY

134 LOCATION CODE | 135 FACILITY ID NO. | 136 U.T.M. (E) | 137 U.T.M. (N) | 138 SIC NUMBER | 139 DATE APPL. RECEIVED / / | 140 DATE APPL. REVIEWED / / | 141. REVIEWED BY:

PERMIT TO CONSTRUCT

142. DATE ISSUED / / | 143. EXPIRATION DATE / / | 144. SIGNATURE OF APPROVAL | 145. FEE

146
1. DEVIATION FROM APPROVED APPLICATION SHALL VOID THIS PERMIT
2. THIS IS NOT A CERTIFICATE TO OPERATE
3. TESTS AND/OR ADDITIONAL EMISSION CONTROL EQUIPMENT MAY BE REQUIRED PRIOR TO THE ISSUANCE OF A CERTIFICATE TO OPERATE

RECOMMENDED ACTION RE: C.O.

147. DATE ISSUED / / | 148. EXPIRATION DATE / / | 149. SIGNATURE OF APPROVAL | 150. FEE

151
1. ☐ INSPECTED BY ____________ DATE ____________
2. ☐ INSPECTION DISCLOSED DIFFERENCES AS BUILT VS PERMIT, CHANGES INDICATED ON FORM
3. ☐ ISSUE CERTIFICATE TO OPERATE FOR SOURCE
4. ☐ APPLICATION FOR C.O. DENIED ____________ DATE ____________ INITIALED

152 SPECIAL CONDITIONS:

1. **Installation Number:**	2.
3.	4.
5.	6.
7.	8.

76-19-2 (10/79)

SECTION E

CALCULATIONS

See attached calculation spreadsheet

ULSD firing emissions

SECTION F

TO BE COMPLETED FOR ALL SOURCES USING ITEM 27 AND OTHER SOURCES AS DEFINED IN THE INSTRUCTION FORM 76-11-4

Contaminant Name	CAS Number	Emissions Actual	Unit	How Det	Permiss	% Control Efficiency	Hourly Emissions (LBS/HR) Actual	Annual Emissions (LBS/YR) Actual	10^x	Permiss.
78 TOTAL PARTICULATES	79 NY075-00-0	80 0.0344	81 11	82 4	83	84 0	85 28.83	86 22733	87 0	88
89 SULFUR DIOXIDE	90 7446-09-5	91 0.0015	92 11	93 4	94	95 0	96 1.29	97 1017	98 0	99
100 NITROGEN OXIDES	101 NY210-00-0	102 0.0136	103 11	104 4	105	106 91.7	107 11.42	108 9004	109 0	110
111 VOC	112 NY998-00-0	113 0.0058	114 11	115 4	116	117 37.5	118 4.85	119 3824	120 0	121
122 Carbon Monoxide	123 00630-08-0	124 0.0142	125 11	126 4	127	128 96.0	129 11.92	130 9398	131 0	132
Lead	007439-92-1	0.000014	11	4		0	0.012	9.5	0	

Upon completion of construction sign the statement listed below and forward to the appropriate field representative

THE STATIONARY COMBUSTION INSTALLATION HAS BEEN CONSTRUCTED AND WILL BE OPERATED IN ACCORDANCE WITH STATED SPECIFICATIONS AND IN CONFORMANCE WITH ALL PROVISIONS OF EXISTING REGULATIONS.

133 SIGNATURE OF AUTHORIZED REPRESENTATIVE OR AGENT | DATE

AGENCY USE ONLY

134 LOCATION CODE	135 FACILITY ID NO.	136 U.T.M. (E)	137 U.T.M. (N)	138 SIC NUMBER	139 DATE APPL. RECEIVED	140 DATE APPL. REVIEWED	141. REVIEWED BY:
					/ /	/ /	

PERMIT TO CONSTRUCT

142. DATE ISSUED	143. EXPIRATION DATE	144. SIGNATURE OF APPROVAL	145. FEE
/ /	/ /		

146
1. DEVIATION FROM APPROVED APPLICATION SHALL VOID THIS PERMIT
2. THIS IS NOT A CERTIFICATE TO OPERATE
3. TESTS AND/OR ADDITIONAL EMISSION CONTROL EQUIPMENT MAY BE REQUIRED PRIOR TO THE ISSUANCE OF A CERTIFICATE TO OPERATE

RECOMMENDED ACTION RE: C.O.

147. DATE ISSUED	148. EXPIRATION DATE	149. SIGNATURE OF APPROVAL	150. FEE
/ /	/ /		

151
1. ☐ INSPECTED BY ______________ DATE ______________
2. ☐ INSPECTION DISCLOSED DIFFERENCES AS BUILT VS PERMIT, CHANGES INDICATED ON FORM
3. ☐ ISSUE CERTIFICATE TO OPERATE FOR SOURCE
4. ☐ APPLICATION FOR C.O. DENIED ______ DATE ______ INITIALED

152 SPECIAL CONDITIONS:

1. **Installation Number:**	2.
3.	4.
5.	6.
7.	8.

76-19-2 (10/79)

LMS100 Emission Analysis - Summary Sheets

Pollutant	LMS100 PTE
	Tons Per Year
NOx	13.94
CO	21.23
SO2	3.36
NO2 (as NOx)	13.94
PM	19.26
PM10	19.26
PM2.5	19.26
VOC	6.32
Pb	0.005
NH3	11.03

Potential LMS100 Capacity Factor (CF) and Allowable Emissions

					LMS100 35% Annual CF			LMS100 9% Oil CF			LMS100 36.5% NG CF		
					Hours per Year			Hours per Year			Hours per Year		
					Gas	Oil		Gas	Oil		Gas	Oil	
					2,452.80	613.2		0.00	788.4		3,197.4	0	
	Gas fired (lbs/hr)	Oil fired (lbs/hr)	Start Up PTE/Yr (Tons)	Shut Down PTE/Yr (Tons)	LMS100 Natural Gas Emissions TPY	LMS100 ULSD Emissions TPY	LMS100 Potential To Emit TPY	LMS100 Natural Gas Emissions TPY	LMS100 ULSD Emissions TPY	LMS100 Potential To Emit TPY	LMS100 Natural Gas Emissions TPY	LMS100 ULSD Emissions TPY	LMS100 Potential To Emit TPY
NOx	8.09	11.42	0.20	0.31	10.44	3.50	13.94	0.51	4.50	5.02	13.45	0.00	13.45
CO	11.82	11.92	0.99	1.35	16.83	3.65	20.49	2.34	4.70	7.04	21.23	0.00	21.23
SO2	2.10	1.29			2.58	0.40	2.97	0.00	0.51	0.51	3.36	0.00	3.36
PM10/PM2.5	8.50	28.83			10.42	8.84	19.26	0.00	11.37	11.37	13.59	0.00	13.59
VOC	3.94	4.85			4.83	1.49	6.32	0.00	1.91	1.91	6.30	0.00	6.30
Pb	0.00	0.012			0.00	0.004	0.004	0.00	0.005	0.005	0.00	0.00	0.000
NH3	5.98	12.06			7.33	3.70	11.03	0.00	4.75	4.75	9.56	0.00	9.56

Note: The shaded emissions above represents the potential-to-emit (PTE) in tons per year (TPY) for the LMS100

LMS100 PTE Emission Summary

Pollutant	LMS100 PTE
	Tons per Year
NOx	13.94
CO	21.23
SO2	3.36
PM10/PM2.5	19.26
VOC	6.32
Pb	0.005
NH3	11.03

LMS100 Start-Up Emissions - PTE							
Number of Starts per Year							
240							
Pollutant	**GE Guaranteed Emission Rate for Start Up Initial 10 minutes (Lbs)**	**Maximum LMS100 Emission Rate (Lbs/hr)**	**Start Up Hour = 10 minutes @ Start Up Rate + 50 minutes at Maximum Rate**	**Lbs per Start Up Hour**	**Additional PTE/hr (Lbs)**	**Start Up PTE/Yr (Lbs)**	**Start Up PTE/Yr (Tons)**
NOx	3.01	8.09	0.83	9.75	1.66	398.80	0.20
CO	10.21	11.82	0.83	20.06	8.24	1,977.60	0.99

LMS100 Start Up Emissions per Start Up Event				
Start Up = 30 minutes/event				
Pollutant	**GE Guaranteed Emission Rate for Start Up Initial 10 minutes (Lbs)**	**Maximum LMS100 Emission Rate (Lbs/hr)**	**Start Up Event = 10 minutes @ Start Up Rate + 20 minutes at Maximum Rate**	**Lbs per Start Up Event**
NOx	3.01	8.09	0.33	5.71
CO	10.21	11.82	0.33	14.15

LMS100 Shut-Down Emissions - PTE							
Number of Starts per Year							
240							
Pollutant	**GE Guaranteed Emission Rate for Shut Down Final 10 Minutes (Lbs)**	**Maximum LMS100 Emission Rate (Lbs/hr)**	**Shut Down Hour = 10 minutes @ Shut Down Rate + 50 minutes @ Maximum Rate**	**Lbs per Shut Down Hour**	**Additional PTE/hr (Lbs)**	**Shut Down PTE/Yr (Lbs)**	**Shut Down PTE/Yr (Tons)**
NOx	3.97	8.09	0.83	10.71	2.62	629.20	0.31
CO	13.21	11.82	0.83	23.06	11.24	2,697.60	1.35

LMS100 Shut Down Emissions per Shut Down Event				
Shut Down = 30 minutes/event				
Pollutant	**GE Guaranteed Emission Rate for Shut Down Final 10 minutes (Lbs)**	**Maximum LMS100 Emission Rate (Lbs/hr)**	**Shut Down Event = 10 minutes @ Shut Down Rate + 20 minutes at Maximum Rate**	**Lbs per Shut Down Event**
NOx	3.97	8.09	0.33	6.67
CO	13.21	11.82	0.33	17.15

SPIP - Gowanus Generating Station
Natural Gas Firing
GE LMS100 Emission Inputs & Emission Rates - AQ Permitting
ESS Job № U160-000

Operation	3,197.40	**hrs/yr**
Stack Base Elevation	4.00	**ft msl**
Stack Base Elevation	1.22	**m msl**
Stack Height	100.00	**feet**
Stack Height	30.48	**meters**
Stack Diameter	13.50	**feet**
Stack Diameter	4.11	**meters**
Exhaust Area	143.14	**sq feet**
Reference Temp	68.00	**°F**

Case Number	**300**	**203**	**303**	**301**	**204**	**304**	**302**	**205**	**305**
Load (%)	**100**	**100**	**100**	**75**	**75**	**75**	**50**	**50**	**50**
Ambient Temp (°F)	**-5**	**59**	**105**	**-5**	**59**	**105**	**-5**	**59**	**105**
Air+Gas Flow (lb/hr)	1,732,698	1,699,142	1,465,993	1,463,575	1,456,181	1,253,267	1,162,871	1,155,972	999,715
Air+Gas Flow mol wt	28.12	28.05	27.92	28.23	28.15	28.05	28.35	28.24	28.16
Exhaust Flow (scfm)	395,492	388,830	336,986	332,754	332,008	286,778	263,263	262,765	227,856
Exhaust Flow (acfm)	889,507	909,052	818,089	750,933	763,964	693,096	602,841	613,438	560,757
Exit Velocity (ft/sec)	103.572	105.847	95.256	87.436	88.954	80.702	70.193	71.427	65.293
Exit Velocity (m/sec)	**31.569**	**32.262**	**29.034**	**26.651**	**27.113**	**24.598**	**21.395**	**21.771**	**19.901**
Exhaust Temp (°F)	727.5	774.4	821.8	731.5	755.0	816.1	749.1	772.6	839.4
Exhaust Temp (K)	**659.6**	**685.6**	**711.9**	**661.8**	**674.8**	**708.8**	**671.5**	**684.6**	**721.7**
Emissions (lb/hr)									
NO_x	7.75	8.09	6.88	6.16	6.34	5.49	4.56	4.66	4.11
CO	11.32	11.82	10.05	8.99	9.26	8.01	6.65	6.81	6.00
$PM_{10}/PM_{2.5}$	7.78	8.43	8.46	7.60	7.88	8.04	7.48	7.69	7.81
NH_3	5.73	5.98	5.09	4.55	4.68	4.05	3.37	3.45	3.03
S from Turbine		1.05			0.82			0.61	
SO_2	1.91	2.10	1.70	1.51	1.64	1.35	1.11	1.21	1.01
VOC	3.94	3.59	3.02	3.32	3.06	1.86	2.56	1.90	1.14
Pb									
H_2SO_4	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Fuel Flow									
MMBtu/hr, LHV	787.7	805.3	700.5	623.9	631.3	556.6	453.5	464.8	415.3
MMBtu/hr, HHV	866.5	885.8	770.6	686.3	694.4	612.3	498.9	511.3	456.8
lb/MMBtu, HHV									
NO_x	0.00895	0.00913	0.00893	0.00897	0.00913	0.00896	0.00913	0.00912	0.00899
CO	0.01307	0.01334	0.01305	0.01311	0.01333	0.01309	0.01334	0.01333	0.01313
$PM_{10}/PM_{2.5}$	0.00898	0.00952	0.01098	0.01107	0.01134	0.01313	0.01499	0.01504	0.01710
NH_3	0.00661	0.00675	0.00660	0.00663	0.00675	0.00662	0.00675	0.00674	0.00664
S from Turbine		0.00118			0.00118			0.00118	
SO_2	0.00220	0.00237	0.00220	0.00220	0.00237	0.00220	0.00223	0.00237	0.00220
VOC	0.00455	0.00405	0.00392	0.00483	0.00441	0.00304	0.00513	0.00372	0.00249
Pb									
H_2SO_4	0.00006	0.00006	0.00006	0.00007	0.00007	0.00008	0.00010	0.00010	0.00011

Notes:
1. All emission rates provided by General Electric
2. Natural Gas = (1.1) LHV = HHV
3. Natural Gas Maximum Fuel Sulfur Content = 0.85 grains of Sulfur per 100 SCF

SPIP - Gowanus Generating Station
ULSD Firing
GE LMS100 Emission Inputs & Emission Rates - AQ Permitting
ESS Job № U160-000

Operation	788.40	**hrs/yr**							
Stack Base Elevation	4.00	**ft msl**							
Stack Base Elevation	1.22	**m msl**							
Stack Height	100.00	**feet**							
Stack Height	30.48	**meters**							
Stack Diameter	13.50	**feet**							
Stack Diameter	4.11	**meters**							
Exhaust Area	143.14	**sq feet**							
Reference Temp	68.00	**^{o}F**							
Case Number	**100B**	**103**	**103B**	**101B**	**104**	**104B**	**102B**	**105**	**105B**
Load (%)	**100**	**100**	**100**	**75**	**75**	**75**	**50**	**50**	**50**
Ambient Temp (^{o}F)	**-5**	**59**	**105**	**-5**	**59**	**105**	**-5**	**59**	**105**
Air+Gas Flow (lb/hr)	1,735,367	1,677,347	1,421,523	1,465,832	1,435,489	1,211,705	1,164,578	1,138,054	983,166
Air+Gas Flow mol wt	28.65	28.56	28.52	28.70	28.62	28.56	28.75	28.67	28.61
Exhaust Flow (scfm)	388,733	376,913	319,962	327,828	321,914	272,314	260,005	254,777	220,588
Exhaust Flow (acfm)	888,103	889,453	786,060	750,325	748,120	669,148	603,017	601,053	547,317
Exit Velocity (ft/sec)	103.408	103.565	91.527	87.366	87.109	77.914	70.214	69.985	63.728
Exit Velocity (m/sec)	**31.519**	**31.567**	**27.897**	**26.629**	**26.551**	**23.748**	**21.401**	**21.331**	**19.424**
Exhaust Temp (^{o}F)	746.3	786.0	837.2	748.5	767.1	837.4	764.6	785.6	850.1
Exhaust Temp (K)	**670.0**	**692.0**	**720.5**	**671.2**	**681.5**	**720.6**	**680.1**	**691.8**	**727.6**
Emissions (lb/hr)									
NO_x	11.28	11.42	9.55	8.93	8.95	7.62	6.58	6.60	5.70
CO	11.77	11.92	9.96	9.32	9.34	7.95	6.86	6.89	5.95
$PM_{10}/PM_{2.5}$	28.59	28.83	24.71	22.73	22.62	19.79	16.92	16.85	14.92
NH_3	11.91	12.06	10.08	9.43	9.45	8.05	6.94	6.97	6.02
S from Turbine		0.65			0.51			0.37	
SO_2	1.28	1.29	1.08	1.01	1.01	0.86	0.74	0.75	0.64
VOC	4.85	4.70	3.99	4.09	4.01	3.39	3.24	3.18	2.75
Pb	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
H_2SO_4	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Fuel Flow									
MMBtu/hr, LHV	794.6	791.7	671.6	629.2	621.2	536.3	463.4	457.9	401.3
MMBtu/hr, HHV	842.3	839.2	711.9	667.0	658.5	568.5	491.2	485.4	425.4
lb/MMBtu, HHV									
NO_x	0.01340	0.01361	0.01341	0.01339	0.01360	0.01340	0.01339	0.01360	0.01340
CO	0.01398	0.01420	0.01399	0.01397	0.01419	0.01399	0.01397	0.01419	0.01398
$PM_{10}/PM_{2.5}$	0.03394	0.03436	0.03471	0.03408	0.03436	0.03481	0.03445	0.03472	0.03507
NH_3	0.01414	0.01437	0.01416	0.01414	0.01436	0.01415	0.01414	0.01436	0.01415
S from Turbine		0.00077			0.00077			0.00077	
SO_2	0.00152	0.00154	0.00152	0.00151	0.00154	0.00151	0.00151	0.00154	0.00150
VOC	0.00575	0.00560	0.00560	0.00613	0.00609	0.00597	0.00660	0.00654	0.00646
Pb	0.00001	0.00001	0.00001	0.00001	0.00002	0.00002	0.00002	0.00002	0.00002
H_2SO_4	0.00002	0.00002	0.00003	0.00003	0.00003	0.00004	0.00004	0.00004	0.00005

Notes:
1. All emission rates provided by General Electric
2. Maximum Liquid Fuel Sulfur Content = 0.0015% S by weight
3. Liquid Fuel = (1.06) LHV = HHV

THE CITY OF NEW YORK DEPARTMENT OF ENVIRONMENTAL PROTECTION
59-17 Junction Boulevard, 9th Floor, Corona, New York 11368-5107
JOEL A. MIELE, SR., P.E., Commissioner

ROBERT C. AVALTRONI
Deputy Commissioner

Bureau of Air Noise & Hazardous Materials

RECORDS CONTROL UNIT
(718) 595-3855

DATE:____________________

____
INSTALLATION NUMBER

RE: Gowanus Generating Station, 29th St. & Second Avenue Brooklyn
(PREMISE ADDRESS) (BORO)

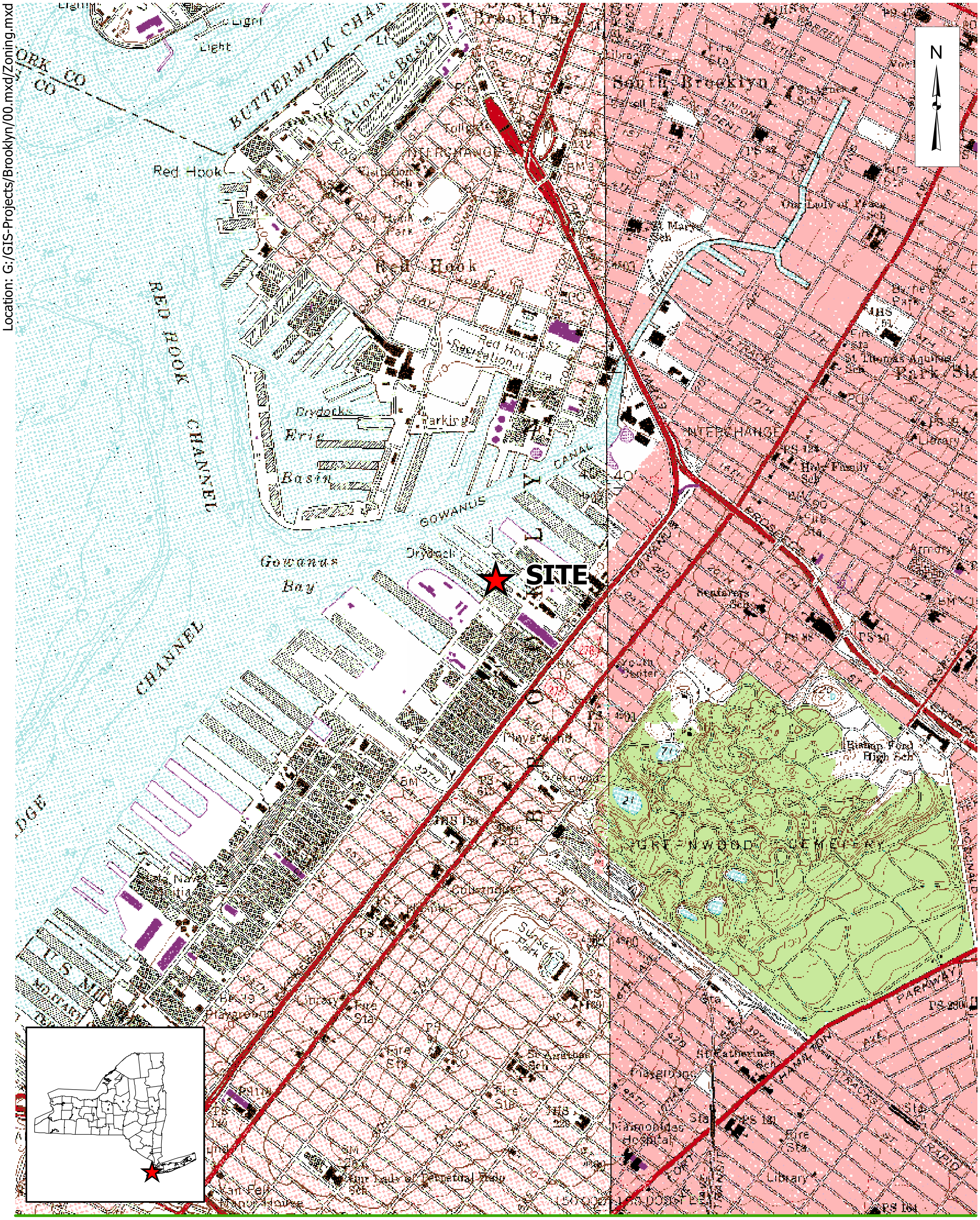
PROFESSIONAL CERTIFICATION

Being duly mindful of my responsibilities as a licenced Professional Engineer in the State of New York and acting as designated agent for the applicant, I hereby certify that the application, plans and all supplementary documents submitted in connection with this filing are complete and fully comply with all applicable laws, codes, rules, regulations and directives of the Department of Environmental Protection, Bureau of Air Noise & Hazardous Materials *(Formerly known as Bureau of Air Resources)* of the City of New York in effect at the time filed.

____
P.E. Seal & Signature

INSTRUCTIONS: Pursuant to Engineering Directive # 1-78, this certification must be submitted in triplicate with all APC 5-0, APC 5-R and APC5-PA applications and does not preclude the necessity to sign and seal the certification now contained on the application forms. This certification shall also be submitted in triplicate with all APC 5-0 applications submitted and certified by a Professional engineer.

Location: G:/GIS-Projects/Brooklyn/00.mxd/Zoning.mxd



ESS Group, Inc.

Engineers
Scientists
Consultants

SOUTH PIER IMPROVEMENT PROJECT
Astoria Generating Company, L.P., a USPowerGen Company
Brooklyn, New York

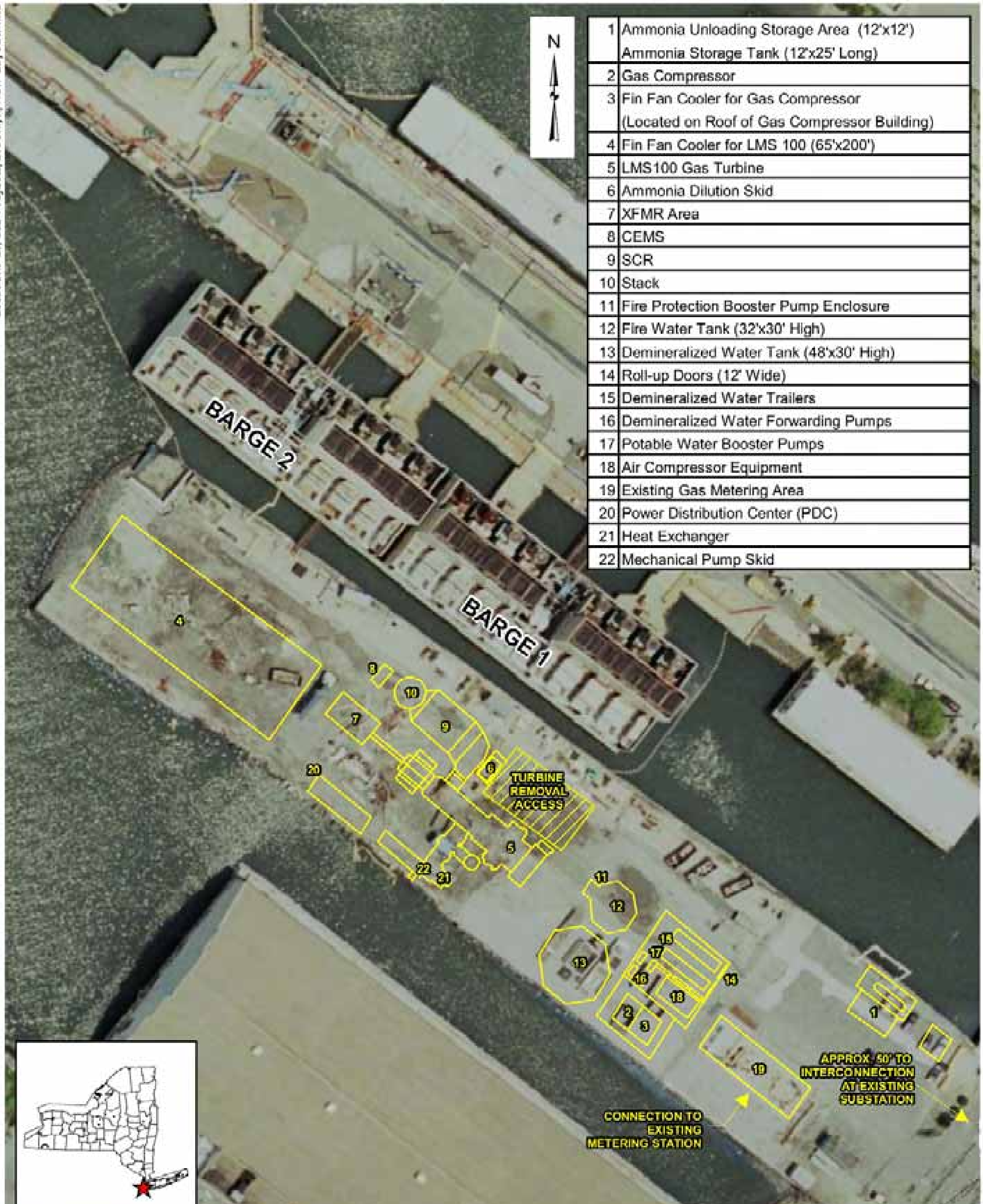
Site Locus

Scale: 1" = 2,000'

Source:
1) NYS GIS Clearinghouse, USGS DRG, 1981

Figure 1

Location: G:/GIS-Projects/Brooklyn/New-Layout.mxd



ESS Group, Inc.

Engineers
Scientists
Consultants

SOUTH PIER IMPROVEMENT PROJECT
Astoria Generating Company, L.P., a USPowerGen Company
Brooklyn, New York

Scale: 1" = 100'

Source: 1) Getmapping USA, Ortho, 2001
2) Astoria, Layout of Facility, 2007

Preliminary Site Plan

Figure 2

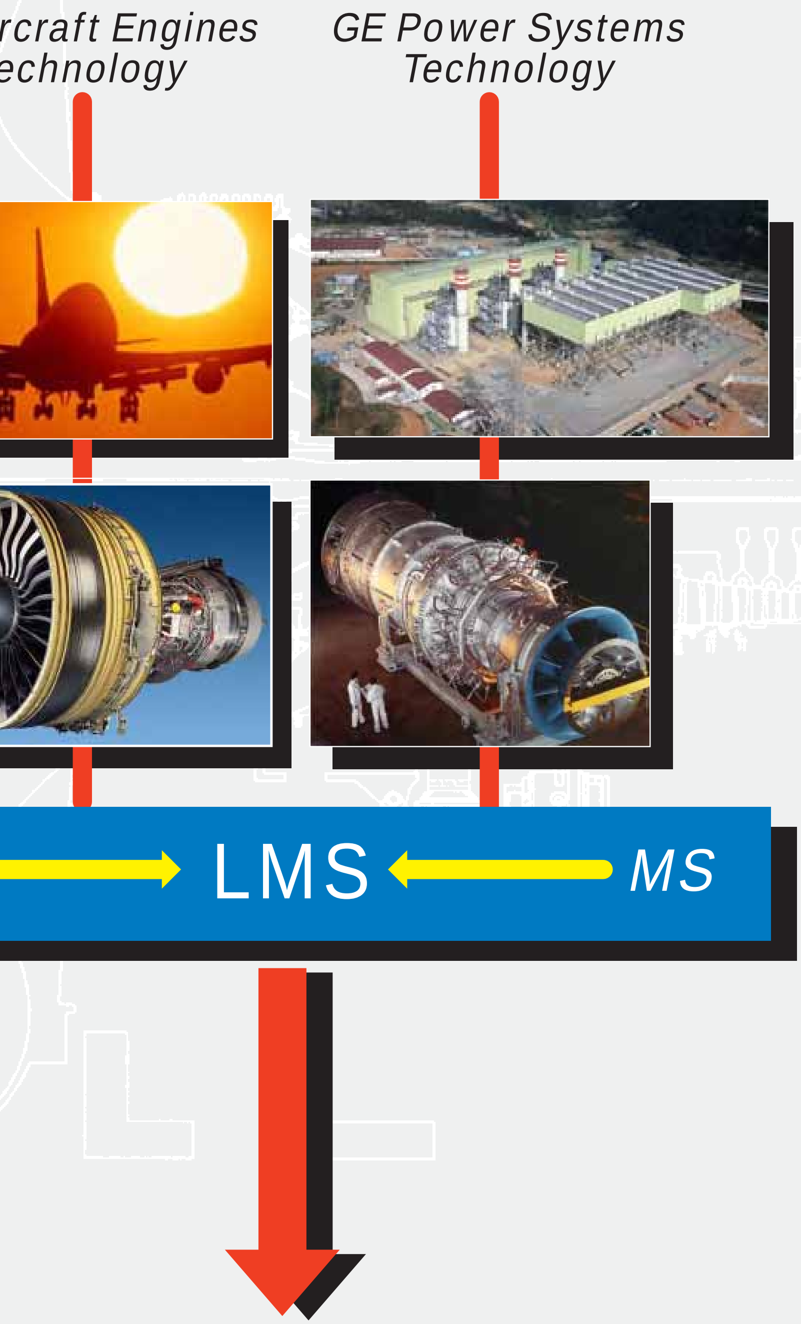
GE's New Gas Turbine System: Designed to Change the Game in Power Generation

LMS100™

ystems

GE Pow

GEA13640 (3M, 11/03)



gh Efficiency Gas Turbine

The **LMS100**™ is the first intercooled gas turbine system developed especially for the power generation industry, utilizing the best of two technologies -- heavy-duty frame gas turbine and aeroderivative gas turbine technology. The LMS100 will deliver 100MW at 46% thermal efficiency. This efficiency is 10 % higher than GE's highest simple cycle efficiency gas turbine available today. It is specifically designed for cyclic applications providing flexible power for peaking, mid-range and baseload.

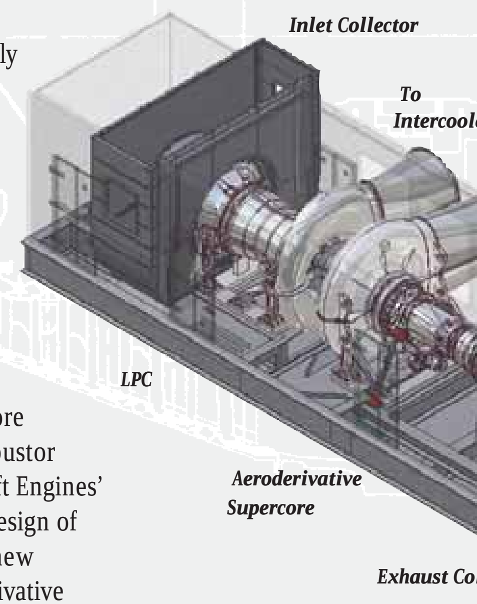
Flexible Power: High Efficiency

High Part-Power Efficiency, 50% Powe

High Simple Cycle Efficiency..........

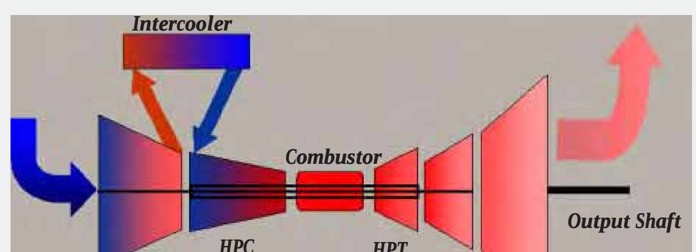
High STIG Efficiency....................

High Combined Cycle Efficiency......



Only GE Can Bring You the Best of Both Worlds

The LMS100 features a heavy-duty low pressure compressor derived from GE Power Systems' MS6001FA heavy-duty gas turbine compressor; its core which includes the high pressure compressor, combustor and high pressure turbine is derived from GE Aircraft Engines' CF6-80C2® and CF6–80E1® aircraft engines. The design of the new 2-stage intermediate pressure turbine and new 5-stage power turbine is based on the latest aeroderivative gas turbine technology. The exhaust and aft shaft for hot-end drive are designed using heavy-duty gas turbine practices.



The compressed air from the
cooled in either an air-to-air o
(intercooler) and ducted to th
The cooled flow means less w
efficiency and power output.
air, used for turbine cooling, a
resulting in increased power

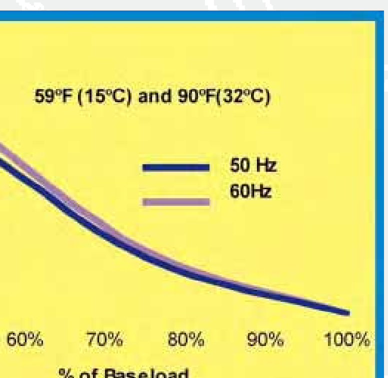
describe their requirements for
eneration facilities, customers
ollowing items as high on their

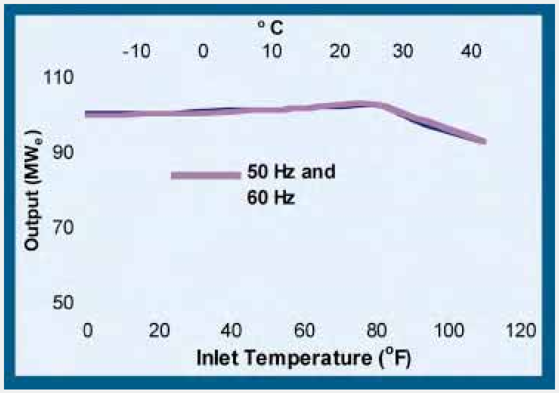
cks of power
cy at full and part-power
bility

bility
t-day power
ty
ns

a new gas turbine which met these
vould be an important addition to
n mix.

) has been designed to specifically
hese needs, changing the game in
erating industry.





The LMS100 is the Right Solution:

- Outstanding full- and part-power efficiency
- Low hot-day lapse rate
- High availability — aero modular maintenance
- Low maintenance cost
- Designed for cycling applications
  - *No cost penalty for starts and stops*
  - *Load-following capability*
- 10 Minutes to full power
  - *Improves average efficiency in cycling*
  - *Potential for spinning reserve credits*
  - *Reduced start-up emissions*
- Synchronous condenser capability

The LMS100 features an inlet and an LPC comprised of the first six stages of the MS6001FA compressor. These stages are followed by an aerodynamically designed volute which ducts the low pressure compressed air into the intercooler. This LPC provides high airflow capacity for the LMS100 Gas Turbine System.

Cooled air from the intercooler is ducted back through another aerodynamically designed volute into the aero supercore. The high efficiency aeroderivative supercore consists of:

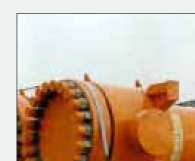
- a high pressure compressor (HPC) based on the CF6-80C2 aircraft engine compressor, strengthened for the high (42:1) pressure ratio of the LMS100;
- a combustor which can be either a standard annular combustor (SAC) or an advanced dry low emissions (DLE2) combustor;
- a high pressure turbine (HPT) derived from the CF6-80E1 aircraft engine;
- a 2-stage intermediate pressure turbine (IPT) designed to drive the LPC through a mid-shaft and flexible coupling.

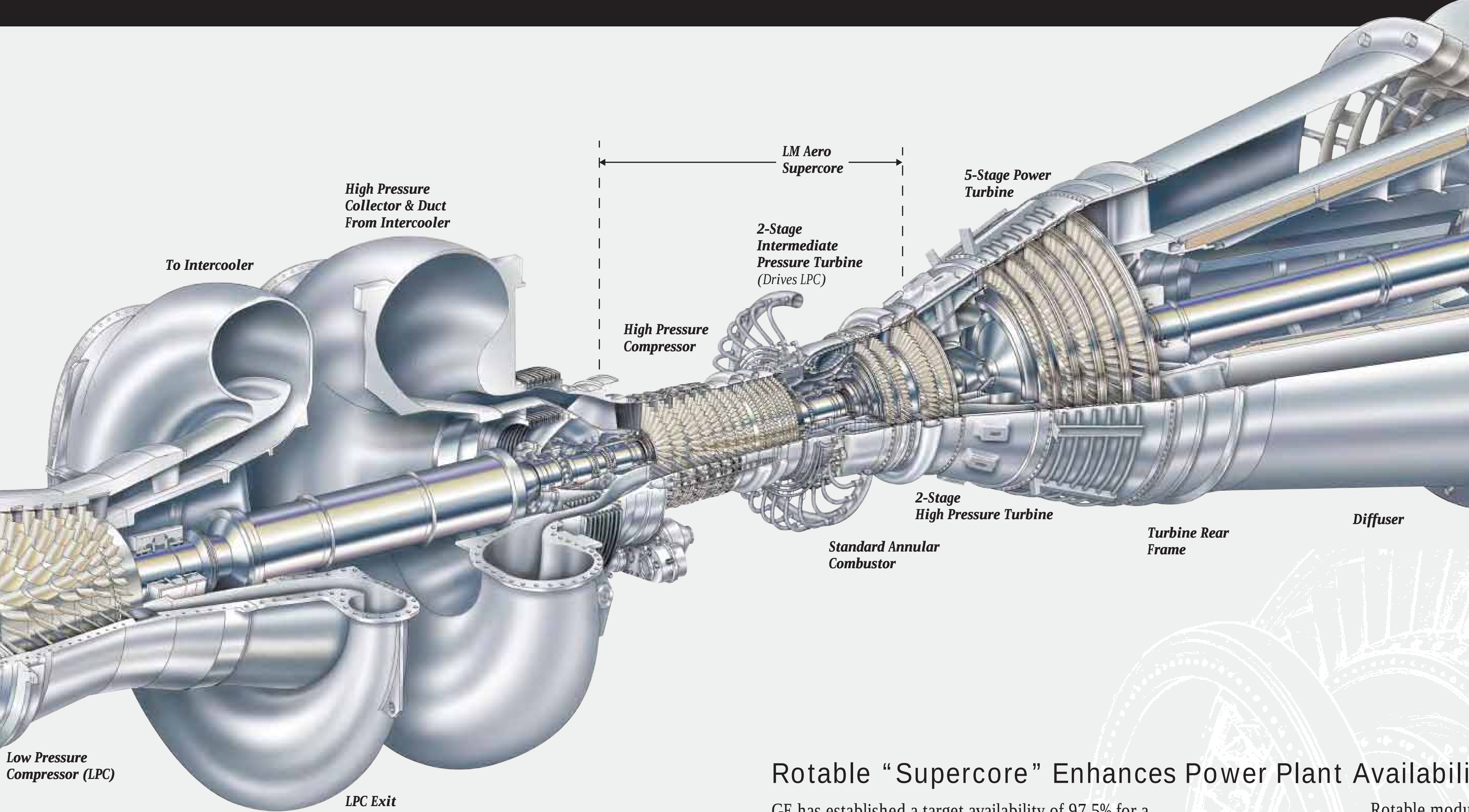
Following the IPT is a 5-stage aerodynamically coupled power turbine (PT) that has been designed specifically for the LMS100. The exhaust frame and aft drive shaft are based on a rugged heavy-duty gas turbine exhaust design.

Over 600 A
Technology
Nearly 8 M

3,786 CF6-80 Engines in Operation
With More Than 103 Million Operating Hours

The LPC air is ducted to an air-to-air or air-to-water heat exchanger where it is cooled before being ducted to the HPC. Both designs are industry standard heat exchangers with significant operating hours in multiple





ability Features

ruction permits replacement of
onents without total disassembly.
cope ports allow on-condition
thout turbine disassembly.
ed maintenance and
stics.

- Split casing construction of the LPC and aeroderivative compressor allows detailed on-site inspection and blade replacement.
- Hot-section field maintenance can be done in several days.
- Accessories are externally mounted for ease of on-site replacement.

Rotable "Supercore" Enhances Power Plant Availabili

GE has established a target availability of 97.5% for a mature GE-built LMS100 power plant. Its power plant target reliability is 98.5%. The rotable "supercore" consists of the HPC, Combustor, HPT and IPT modules.

LMS100 Service Intervals

The expected service intervals for the LMS100 based upon normal operation include:

- On-site hot-section replacement.............................25,000 fired hours*
- Depot maintenance; overhaul of hot section and inspection of all systems, power turbine overhaul ...50,000 fired hours*
- Next on-site hot section replacement ....75,000 fired hours*

Rotable modu
on-site mainte
and a power t
24 hours whe

Maintenan

All warranty a
will be provid
or at its severa
world. These
Service Agree
Rotable Modu

turbine package system was able operation, easy access for d quick installation. The auxiliary assembled on a single skid and ior to shipment. The auxiliary in front of the turbine base plate exible connectors reducing rconnects by 25%. The complete r package can be shipped

nt System Design

plant layout will be t will contain basic elements n inlet, an auxiliaries skid containing stem, lube oil system and starter e skid, an intercooling system, cers, exhaust system and a

em

nasis has been placed on or increased reliability of the nt. The LMS100 control system annel architecture with a ta link providing redundancy which le failures without engine eroptic distributed I/O system he module will be unaffected by or radio frequency interference nate noisy wiring. Site intercon- d by 90% compared to the typical rol system.

C will be equipped with dual fuel

Emissions Control

The LMS100 gas turbine system has all the advantages of an aeroderivative gas turbine in achieving low emissions.The LMS100 gas turbine with the SAC combustor (using water or steam for NOx control) and the advanced DLE combustor (DLE2) are designed to achieve 25 ppm NOx. This represents a 7 to 18% reduction in mass emissions rate (lbs/kwh) vs. the LM6000. In locations where less than 25 ppm NOx is required a low temperature SCR can be used. The high efficiency of the LMS100 results in exhaust temperatures below 800ºF (427ºC) which permits the use of low temperature SCRs without tempering air.

Noise Control

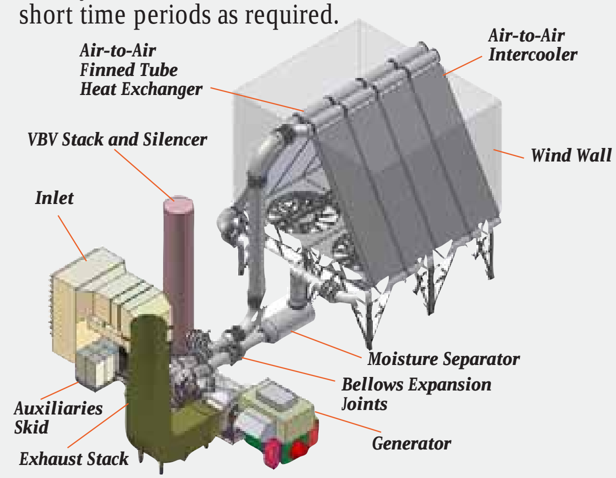
The gas turbine-generator will be rated at 85 dBA average at 3 feet (1 meter). An option for 80 dBA at 3 feet will be available.

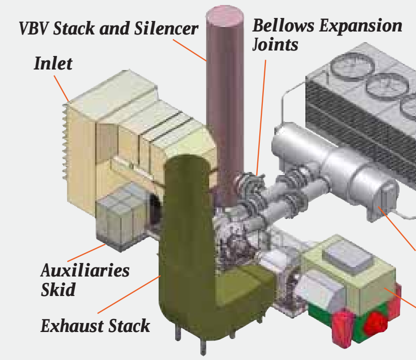
Generator

The generator is dual rated for 50 or 60 Hz applications. Either an air-cooled or TWAC configuration can be provided.

Air-to-Air Intercooler

In locations where water is scarce or very expensive, the basic LMS100 power plant will contain a highly reliable air-to-air intercooler. This unit will be a tube and fin style heat exchanger in an A-frame configuration which is the same as typical steam condensing units in general conformance with API 661 standards. Similar units are in service in the Oil and Gas industry today. In high ambient temperature climates, an evaporative cooling system can be added for power augmentation. This system would use a small amount of water for short time periods as required.





Air-to-Water Intercooler

In locations where water is read abundant or less expensive the intercooler can be of the air-to-w also found in many industrial ap The intercooler would be a tube shell type heat exchanger.

Either type of intercooler will be connected through a system of expansion bellows, from the low compressor volute to the interco upon return to the high pressur compressor inlet volute.

LMS100 is Available in a Variety of Configurations

Four basic LMS100 configurations are available as this product is introduced. When combined with intercooler s and duty applications, the LMS100 will offer the customer 20 different configuration choices.

LMS100 SYSTEM CONFIGURATIONS					
Product Offerings	Fuel	Combustor	Diluent	Power Augmentation	N
LMS100 SAC, 50/60 Hz	Gas, Liquid or Dual Fuel	Single Annular (SAC)	Water	None	
LMS100 SAC Steam, 50/60 Hz	Gas	Single Annular (SAC)	Steam	None	
LMS100 SAC STIG, 50/60 Hz	Gas	Single Annular (SAC)	Steam	Steam Injection	

LMS100 Operational Flexibility Economic Risks Factors / Risks Abatement Characteristics	High Simple Cycle Efficiency	High Part Power Efficiency	Cycling w/o Maintenance Impact	10 Minutes Starts	Load Following Capability	Synchronous Condenser Capability	Off-frequency Support	Dual Fuel (SAC)	Modular Construction
Fuel Price Volitility	•	•						•	
Electricty Price Volitility	•	•	•	•					
Dispatch Rank	•	•	•	•	•				
Grid Stability / Support			•	•	•	•	•		
Load Demand Variations		•	•	•	•				
Plant Outage	•	•	•	•	•		•		•

f the LMS100 make it a versatile
n system offering customers
tional flexibility in a wide variety

/ **Peaking & Mid-Range**…high
rst cost, sustained hot day power,
and no maintenance penalty for
ideal peaking solution. Throw in
efficiency and load following
high dispatch capability for mid-
ns.

n injection for power augmentation
ant efficiency and power
s well as flexibility. With variable
r can inject all of the steam into the
ss the steam to process to take
ctricity prices or process steam

cle …the low exhaust temperature
st exhaust system materials, smaller
ondensers and generators, leading
plant installed cost.

Another benefit from the lower exhaust temperature is more power from duct firing (up to 30MW).

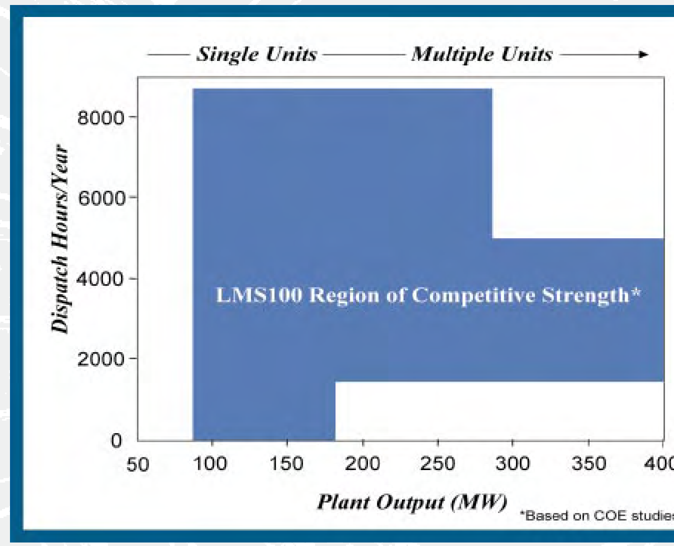
■ **Combined Heat & Power** …the high power-to-steam ratio allows the LMS100 to meet the steam demand served by 40-50MW gas turbines while delivering more than twice the power. Using both exhaust and air-to-water intercooler energy, an LMS100 plant can reach >85% thermal efficiency.

■ **50Hz and 60Hz Applications** …the LMS100 can operate at 50Hz and 60Hz operation without a gearbox, reducing system complexity, plot size and cost, while increasing reliability.

■ **Off-Frequency Operation** …the LMS100 will operate with very little power variation for up to 5% reduction in grid frequency, allowing grid support in times of high demand and load fluctuations.

When your power generation need exceeds 100MW, the LMS100 can provide an economic solution in a multi-unit arrangement by providing high efficiency power with unmatched flexibility.

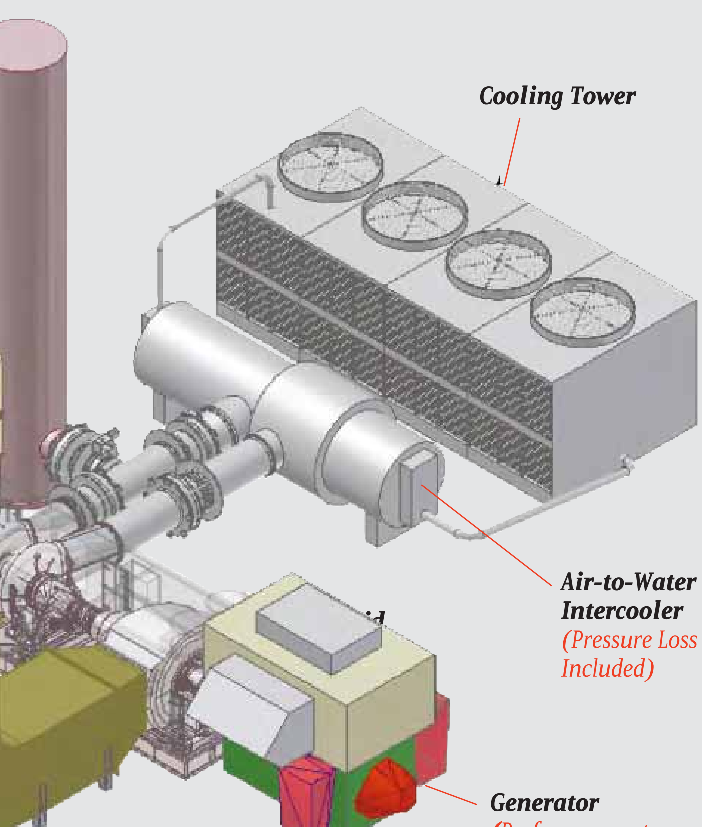
LMS100 Provides Outstanding Customer Value in 80+ MW Applications



ut)	Heat Rate (BTU/KWH)	Efficiency %
	7509	46
	7813	44
	7167	48
	6845	50

terminals

0 BTU/lb)



Model	Output (MWe)	Heat Rat (KJ/KWH)
DLE	99	7921
SAC (w/Water)	102.5	8247
SAC (w/Steam)	102.2	7603
STIG	110.8	7263

Conditions:

Performance at the generator terminals
NOx = 25 ppm
15ºC, 60% Relative Humidity
Losses: 0mm/0mm inlet/exhaust
Fuel: Spec Gas (LHV = 44.2MJ/KG)