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August 24, 2023

Timothy J. Skone, P.E.; Senior Environmental Engineer
timothy.skone@hq.doe.gov
Office of Fossil Energy and Carbon Management
U.S. Department of Energy
sent via email

Re: NFE Altamira FLNG, S. de R.L. de C.V.
Docket No. 22-110-LNG
Response to Request for Clarifications for Environmental Assessment

Dear Mr. Skone:

On August 23, 2023, NFE Altamira FLNG, S. de R.L. de C.V. ("NFE Altamira") received correspondence requesting responses ("August 23rd Request") to additional questions related to the Environmental Assessment[1] the United States Department of Energy's Office of Fossil Energy and Carbon Management is preparing with respect to NFE Altamira's pending request for authorization to re-export U.S.-sourced natural gas in the form of liquefied natural gas from the proposed NFE Altamira Project in Mexico to Non-Free Trade Agreement nations.[2]

NFE Altamira is providing answers to the August 23rd Request in the attached Annex A. If you have any questions regarding this filing, please contact the undersigned at (212) 506-3710.

Respectfully submitted,

/s/ Lisa M. Tonery
Lisa M. Tonery
Mariah T. Johnston
Jacob I. Cunningham
Attorneys for
NFE Altamira FLNG, S. de R.L. de C.V.

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1 *NFE Altamira FLNG, S. de R.L. de C.V.*, Notice of Environmental Assessment, Docket No. 22-110-LNG (Jun. 27, 2023).

2 *NFE Altamira FLNG, S. de R.L. de C.V.*, Request for Clarifications for Environmental Assessment, Docket No. 22-110-LNG (Aug. 23, 2023).

ANNEX A

DOE Information Request # 2
August 23, 2023

Question #1: Please explain the carbon dioxide emissions calculation resulting from combustion for power production on-site?

NFE ALTAMIRA FLNG RESPONSE:

CO_2 emissions are based upon the emission factor in 40 CFR Part 98, Appendix C, the rated fuel throughput for each unit, and 8,760 hours per year of operation. There was a minor discrepancy in the CO_2 emission factor applied for natural gas, a factor of 53.02 kg/MMBtu (116.89 lb/MMBtu) was applied based upon 40 CFR Part 98, Appendix C prior to the update to 53.06 kg/MMBtu (116.98 lb/MMBtu) in April 2013. Updated emissions information is included in Appendix F Rev. 3 (attached).

Question #2: How were the 5 tonnes of methane emissions determined as reported in Appendix F for each of the first four entries?

a. Note: Based on 13 BCF/year of fuel consumption and NETL's methane slip rate of 0.06 g CH4/MJ Natural Gas Combusted, a cumulative value of 517 tonnes CH4, or 129 tonnes CH4 for each entry in the first four rows of Appendix F.

NFE ALTAMIRA FLNG RESPONSE:

CH4 emissions were calculated in the same manner as CO2, using the emission factor in 40 CFR Part 98, Appendix C, the rated fuel throughput for each unit, and 8,760 hours per year of operation. The CH4 emission factor is 0.001 kg/MMBtu (0.002205 lb/MMBtu) which results in emissions of 4.7 tons/yr at 4,222,434 MMBtu/yr for the compressor turbines. NETL's methane slip rate of 0.06 g CH4/MJ Natural Gas Combusted reflects unburned methane passing through the combustion turbine. NFE believes that the Part 98 factor more accurately reflects the actual methane slip for the proposed state of the art combustion turbines and has been used extensively to calculate CH4 emissions for combustion turbines used in natural gas production and power generation. Potential fugitive CH4 emissions are also included in Appendix F Rev. 3. The mixed refrigerant compressors utilize dry gas seals to minimize methane leaks.

Question #3: Could you please confirm the ratio of natural gas fuel consumption per unit of LNG produced for export?

a. Note, the ratio is used to estimate the carbon dioxide and methane emissions from combustion of natural gas for power production when scaled to 2.8 MTPA.

NFE ALTAMIRA FLNG RESPONSE:

The ratio of natural gas fuel consumption per unit of LNG produced for export is 4.37 MJ of natural gas combusted per kilogram of LNG produced for export. The gas turbines used in the Project are smaller than the referenced combustion turbines used for onshore facilities and will operate in simple cycle mode and therefore will have a lower efficiency than the referenced industry average values which reflect onshore projects utilizing larger combustion turbines in combined cycle mode. The Siemens SGT-400 power generating turbines will each have an operating output of approximately 11 MW, an order of magnitude less than the referenced F-class turbines, and an efficiency of 27.1% operating in simple cycle mode, which is below the 50% efficiency of the referenced combined cycle turbines.

FLNG1 and FLNG 2 Wet Flare (acid gas treatment) is reported in Appendix F (Rev. 2) at 94,518 tonnes per year for each unit.

Question #4: What is the source and volume of these CO2 emissions (CO2 removed from pipeline gas and/or natural gas liquids separated from pipeline gas, other)?

NFE ALTAMIRA FLNG RESPONSE:

The feed gas pre-treatment system uses an amine solution to remove CO2 from the incoming pipeline gas. Steam is used to remove CO2 from the amine solution and the waste gas is sent to the flare. The waste gas also contains other hydrocarbons that produce CO2 when combusted. To maintain minimum operating temperature, supplemental firing of natural gas is required, also contributing to CO2 emissions. Attached are the calculations documenting the CO2 emissions from the acid gas flare (FLNG Acid Gas Flare (Design Case Operation)).

Question #5: In the Application, on page 5, the "total productive capacity" of the proposed facility is cited as "approximately 2.1 MTPA of LNG per FLNG." During the discussion on August 21, it was established that this figure was a typo, with the correct figure being the one stated elsewhere in the Application, 1.4 MTPA per FLNG, for a total of 2.8 MTPA. Can you please confirm this?

NFE ALTAMIRA FLNG RESPONSE:

Yes, the correct figure for the total productive capacity of the proposed facility is 1.4 MTPA per FLNG, for a total of 2.8 MTPA.

Appendix F Rev. 3

Appendix F (Rev. 3) Facility-Wide Operational Potential Air Emissions

	Annual Emissions, tpy													
	NO_x	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2	HAP	Pb	H_2SO_4	H_2S	CO_2	CH_4	N_2O	CO_2e
PSD Stationary Sources														
FLNG1 Compressor Turbine	193.8	118.0	8.10	20.0	20.0	6.31	2.2	0	0.1	0	245,922	4.6	0.5	246,176
FLNG2 Compressor Turbine	116.7	118.0	8.10	20.0	20.0	6.31	2.16	0	0.14	0	245,922	4.6	0.46	246,176
FLNG1 Power Generating Turbines (2 operating units)	41.6	25.3	1.48	5.2	5.2	3.56	1.2	0	0.3	0	138,675	2.6	0.3	138,818
FLNG2 Power Generating Turbines (2 operating units)	41.6	25.3	1.48	5.2	5.2	3.56	1.2	0	0.3	0	138,675	2.6	0.3	138,818
FLNG1 Dry Flare (normal operation)	0.6	2.3	0.27	0.06	0.06	0.02	0.02	4.0E-06	0.002	0	959	3.1	0.002	1,038
FLNG1 Dry Flare (emergency operation)	0.2	0.7	2.53	0.02	0.02	0.01	0.00	1.3E-06	0.001	0	310	0.8	0.001	329
FLNG1 Dry Flare (startup)	15.7	63.8	1.24	1.72	1.72	0.69	0.43	1.1E-04	0.053	0	27,058	95.7	0.051	29,466
FLNG1 Dry Flare (shutdown)	0.3	1.1	0.02	0.03	0.03	0.01	0.01	1.9E-06	0.001	0	454	1.6	0.001	494
FLNG2 Dry Flare (normal operation)	0.6	2.3	0.27	0.06	0.06	0.02	0.02	4.0E-06	0.002	0	959	3.1	0.002	1,038
FLNG2 Dry Flare (emergency operation)	0.2	0.7	2.53	0.02	0.02	0.01	0.005	1.3E-06	0.001	0	310	0.8	0.001	329
FLNG2 Dry Flare (startup)	15.7	63.8	1.24	1.72	1.72	0.69	0.43	1.1E-04	0.053	0	27,058	95.7	0.051	29,466
FLNG2 Dry Flare (shutdown)	0.3	1.1	0.02	0.03	0.03	0.01	0.01	1.9E-06	0.001	0	454	1.6	0.001	494
FLNG1 Wet Flare (acid gas treatment)	4.5	18.3	2.78	0.49	0.49	36.12	0.14	3.6E-05	2.766	0	92,222	27.7	0.015	92,918
FLNG1 Wet Flare (normal operation)	1.2	4.8	0.60	0.13	0.13	0.05	0.03	8.5E-06	0.004	0	2,020	6.6	0.004	2,186
FLNG1 Wet Flare (emergency operation)	0.1	0.5	0.20	0.01	0.01	0.01	0.00	9.1E-07	0.000	0	216	0.8	0.000	237
FLNG1 Wet Flare (startup)	10.4	42.1	0.82	1.14	1.14	0.46	0.28	7.5E-05	0.035	0	17,871	63.2	0.034	19,461
FLNG1 Wet Flare (shutdown)	0.0	0.2	0.00	0.00	0.00	0.002	0.001	3.0E-07	0.0001	0	73	0.26	0.0001	79
FLNG2 Wet Flare (acid gas treatment)	4.5	18.3	2.78	0.49	0.49	36.12	0.14	3.6E-05	2.766	0	92,222	27.7	0.015	92,918
FLNG2 Wet Flare (normal operation)	1.2	4.8	0.60	0.13	0.13	0.05	0.03	8.5E-06	0.004	0	2,020	6.6	0.004	2,186
FLNG2 Wet Flare (emergency operation)	0.1	0.5	0.20	0.01	0.01	0.01	0.00	9.1E-07	0.000	0	216	0.8	0.000	237
FLNG2 Wet Flare (startup)	10.4	42.1	0.82	1.14	1.14	0.46	0.28	7.5E-05	0.035	0	17,871	63.2	0.034	19,461
FLNG2 Wet Flare (shutdown)	0.0	0.2	0.00	0.00	0.00	0.00	0.00	3.0E-07	0.000	0	73	0.3	0.000	79
FLNG1 Emergency Diesel Generator Engines (7 units)	21.33	4.48	0.13	0.285	0.285	8.5E-03	9.0E-03	0.0E+00	6.5E-04	0	929	3.8E-02	7.5E-03	932
FLNG2 Emergency Diesel Generator Engines (7 units)	9.68	3.97	0.19	0.227	0.227	6.9E-03	7.2E-03	0.0E+00	5.3E-04	0	748	3.0E-02	6.1E-03	750
FLNG2 Emergency Fire Pump Engines (8 units)	3.6	2.07	0.71	0.118	0.118	3.7E-03	3.9E-03	0.0E+00	2.8E-04	0	400	1.6E-02	3.2E-03	401
FSU Emergency Generator Engine	0.6	0.3	0.11	0.019	0.019	5.8E-04	6.1E-04	0.0E+00	4.5E-05	0	63	0.003	5.1E-04	64
FSU Boilers (2 boilers)	6.8	1.7	0.12	1.12	1.12	4.82	0.02	4.2E-04	0.369	0	7,641	0.3	0.062	7,667
FSU GCU	1.4	1.2	0.08	0.11	0.11	0.04	0.03	7.0E-06	0.003	0	1,661	5.4	0.003	1,797
FLNG1 & 2 Fuel Tanks (all tanks)	0	0	0.44	0	0	0	0	0	0	0	0	0	0	0
FLNG1 Fugitive Emissions	0	0	0.89	0	0	0	0	0	0	0	0	11.9	0	298
FLNG2 Fugitive Emissions	0	0	0.89	0	0	0	0	0	0	0	0	11.9	0	298
Project-Wide Annual Stationary Source Totals	**503.1**	**567.7**	**39.7**	**59.5**	**59.5**	**99.4**	**8.6**	**9.1E-04**	**6.9**	**0.00**	**1,063,000**	**443.7**	**1.7**	**1,074,614**

FLNG Acid Gas Flare
(Design Case Operation)

FLNG Acid Gas Flare (Design Case Operation)

Component	MW kg/kmol	Units	Normal Flash Acid Gas	Max Flash Acid Gas	Supplemental Natural Gas (Normal Flash)	Supplemental Natural Gas (Max Flash)
Nitrogen	28	mol %	0.0100%	0.0187%	3.1924%	3.1924%
Carbon Dioxide	44	mol %	94.8569%	88.1533%	0.0010%	0.0010%
Methane	16	mol %	1.6139%	8.4255%	94.5373%	94.5373%
Ethane	30	mol %	0.0375%	0.0497%	0.7484%	0.7484%
Propane	44.1	mol %	0.0057%	0.0062%	0.1429%	0.1429%
i-Butane/n-Butane	58.1	mol %	0.0021%	0.0023%	0.5712%	0.5712%
i-Pentane/n-Pentane	72.2	mol %	0.0005%	0.0022%	0.2651%	0.2651%
C6+	142.3	mol %	0.0013%	0.0031%	0.4417%	0.4417%
H2O	18	mol %	3.4248%	3.2707%	0.0000%	0.0000%
H2S	34	mol %	0.0282%	0.0373%	0.0000%	0.0000%
M-Mercaptan	48.1	mol %	0.0000%	0.0000%	0.0004%	0.0004%
Aromatics	106.2	mol %	0.0192%	0.0311%	0.0996%	0.0996%
VOC		mol %	0.0663%	0.6996%		
Molecular Weight		g/mol	42.67	40.80	17.40	17.40
Molar Flow Rate		kmole/hr	213.1	161.0	15.6	3.9
Mass Flow Rate (calc'd))		kg/hr	9,095	6,569	272.0	68.6
Standard Volume Flow		Sm3/hr	5,040	3,802	370	93
		MMSCFD	4.27	3.22	0.31	0.08
Heat Content (LHV)		Btu/lb	149.2	737.8	20,267	20,267
Heat Input (LHV)		MMBtu/hr	2.99	10.65	12.16	3.07
Operating Temperature		°C	871	871	871	871
Control Efficiency		%	99.0%	99.0%	99.0%	99.0%
Operating Hours		hr/yr	8,760	8,760	8,760	8,760

Normal Flash				Max Flash			
Inlet Flow (lb/hr)	Outlet Flow (lb/hr)	Outlet CO2 (lb/hr)	Outlet VOC (lb/hr)	Inlet Flow (lb/hr)	Outlet Flow (lb/hr)	Outlet CO2 (lb/hr)	Outlet VOC (lb/hr)
31.6	31.6	0.0	0	9.5	9.5	0.0	0
19,287.8	19,287.8	19,287.8	0	13,521.6	13,521.6	13,521.6	0
632.0	6.3	1,720.6	0	599.2	6.0	1,631.4	0
12.8	0.128	18.6	0	7.1	0.071	10.3	0
3.3	0.033	3.3	0.033	1.5	0.015	1.5	0.015
11.8	0.118	8.8	0.118	3.3	0.033	2.5	0.033
6.7	0.067	4.0	0.067	2.2	0.022	1.3	0.022
22.2	0.222	6.8	0.222	6.9	0.069	2.1	0.069
284.9	1,837.2	0.0	0.000	205.2	1,612.1	0.0	0.000
4.4	0.044	0.0	0.000	4.4	0.044	0.0	0.000
6.5E-03	0.000	0.0	0.000	0.0	0.000	0.0	0.000
13.0	0.130	5.3	0.130	12.4	0.124	5.1	0.124

	Potential Emissions			
Pollutant	lb/MMBtu	lb/hr (Normal Flash)	lb/hr (Max Flash)	tpy
NOx	0.068	1.03	0.93	4.51
CO	0.2755	4.17	3.78	18.28
VOC (acid gas)	N/A	0.569	0.263	2.493
VOC (gas comb)	0.0054	0.066	0.017	0.288
PM10/PM2.5	0.0075	0.11	0.10	0.49
SO2	N/A	8.25	8.24	36.12
HAP	1.9E-03	0.028	0.025	0.12
Pb	4.9E-07	7.4E-06	6.7E-06	3.3E-05
H2SO4	N/A	0.63	0.63	2.77
CO2	N/A	21,055	15,176	92,222
CH4	N/A	6.32	5.99	27.68
N2O	0.00022	0.003	0.001	0.01
CO2e	N/A	21,214	15,326	92,918
H2S	N/A	0.044	0.044	0.194

Notes:

1) Heat input rate is based on Fluor design waste gas rate, fuel gas rate, and gas composition to the thermal oxidizer.
2) Annual emissions are based on operation for 8,760 hours per year at full load.
3) NOx, CO, and PM10/PM2.5 based upon vendor performance data.
4) VOC emissions based upon VOC content of gas streams, design control efficiency, and VOC from fuel gas combustion using emission factor in AP-42 Table 1.4-2.
5) SO2 emissions were estimated using mass balance based upon the design H2S concentration in the waste gas and 99.9 percent conversion to SO2.
6) HAP emission factor compiled from AP-42 Table 1.4-3.
7) Pb emission factor is from AP-42 Table 1.4-2.
8) H2SO4 emissions assume that 5% of SO2 is converted to SO3.
9) Carbon mass balance used to calculate CO2 emission rates assuming design control efficiency for carbon containing combustibles.
10) CO2e emission rates use the following global warming potentials from 40 CFR 98, Table A-1: 25 for CH4, and 298 for N2O.

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list in this proceeding.

Dated at New York, N.Y., this 24th day of August, 2023.

/s/ *Dionne McCallum-George*
Dionne McCallum-George
Executive Assistant on behalf of
NFE Altamira FLNG, S. de R.L. de C.V.

VERIFICATION

I, Komi Hassan, declare that I serve as Managing Director, Permitting for New Fortress Energy Inc. and I am duly authorized to make this Verification on behalf of NFE Altamira FLNG, S. de R.L. de C.V.; that I have read the foregoing instrument and the facts therein stated are true and correct to the best of my knowledge, information, and belief.

Signed on this 24th day of August, 2023, at Houston, TX.

/s/ Komi Hassan
Komi Hassan
Managing Director, Permitting on behalf of
NFE Altamira FLNG, S. de R.L. de C.V.