Information Request CLF-1-1

Request:

For the analysis reported in Exhibit NG-JNC-3, please provide the following data:

a. In machine-readable, spreadsheet form, present the annual generation in MWh for each state, region, resource type, fuel type, power plant, or unit where available, for each year covered by each scenario in this analysis.

b. In machine-readable, spreadsheet form, present the annual generating capacity in MW for each state, region, resource type, fuel type, power plant, or unit where available, for each year covered by each scenario in this analysis.

c. In machine-readable, spreadsheet form, present the annual carbon dioxide (CO2) emissions in short tons for each state, region, resource type, fuel type, power plant, or where if available, for each year covered by each scenario in this analysis. Please include data for the six New England states, and for all other modeled states (including New York, Maryland, and Delaware) where this data are available.

d. In machine-readable, spreadsheet form, present the annual demand for electricity in MWh for each state, region, zone, or node where available, for each year covered by each scenario in this analysis.

e. In machine-readable, spreadsheet form, present the annual energy efficiency savings in MWh or annual savings as a percent of sales before energy efficiency for each state, region, zone, or node where available, for each year covered by each scenario in this analysis.

f. In machine-readable, spreadsheet form, present the annual imports in MWh to New England from New York and Canada, or more finely defined regions, if available, for each year covered by each scenario in this analysis.

g. In machine-readable, spreadsheet form, present the annual exports in MWh from New England to New York and Canada, or more finely defined regions, if available, for each year covered by each scenario in this analysis.

h. In machine-readable, spreadsheet form, present the annual non-electric demand for natural gas in million cubic feet for each state, region, zone, node, or sector where available, for each year covered by each scenario in this analysis.

i. In machine-readable, spreadsheet form, present the annual non-electric energy efficiency for natural gas in avoided million cubic feet or annual savings as a percent of non-electric natural gas demand before energy efficiency for each state, region, zone, node, or sector where available, for each year covered by each scenario in this analysis.

j. In machine-readable, spreadsheet form, present the assumptions for renewable portfolio standards (RPS) in MWh or percent of affected demand for electricity (i.e., sales) for each state for each year covered by each scenario in this analysis.

Response:

a. This information was previously provided in Exhibit NEER-1-1 and Attachments NEER-1-1(b)(HIGHLY SENSITIVE CONFIDENTIAL INFORMATION) and NEER-1-1(c)(HIGHLY SENSITIVE CONFIDENTIAL INFORMATION).

b. This information was previously provided in Exhibit NEER-1-1 and Attachment NEER-1-1(d)(HIGHLY SENSITIVE CONFIDENTIAL INFORMATION).

c. This information was previously provided in Exhibit NEER-1-1 and Attachments NEER-1-1(b)(HIGHLY SENSITIVE CONFIDENTIAL INFORMATION) and NEER-1-1(c)(HIGHLY SENSITIVE CONFIDENTIAL INFORMATION).

d. This information was previously provided in Exhibit NEER-1-1 and Attachment NEER-1-1(f).

e. Energy efficiency savings are not available from this analysis. Black & Veatch uses the energy and demand forecasts from the ISO-NE 2015 CELT report, and any assumed energy efficiency savings would be embedded in these forecasts.

f. This information was previously provided in Exhibit NEER-1-1 and Attachment NEER-1-1(e) (HIGHLY SENSITIVE CONFIDENTIAL INFORMATION).

g. This information was previously provided in Exhibit NEER-1-1 and Attachment NEER-1-1(e) (HIGHLY SENSITIVE CONFIDENTIAL INFORMATION).

h. This information was provided previously in Attachment NEER-1-1(j)(HIGHLY SENSITIVE CONFIDENTIAL INFORMATION). The annual non-electric demand for natural gas remained unchanged in each scenario.

i. Non-electric energy efficiency savings are not available for this analysis. Black & Veatch's projection of non-electric demand was informed by a compilation of natural gas local distribution companies' long-term supply and demand resource plans and any assumed energy efficiency savings would be embedded in these forecasts.

j. This information was previously provided in Exhibit NEER-1-1 and Attachments NEER-1-1(b)(HIGHLY SENSITIVE CONFIDENTIAL INFORMATION).

Information Request CLF-1-2

Request:

For the analysis reported in Exhibit NG-JNC-3, please provide a detailed annual accounting of how CO2 emissions compare to annual emission targets under the Massachusetts Global Warming Solutions Act (GWSA) as follows:

a. Present the Massachusetts electric sector and non-electric heating and other buildings emissions relevant to the Massachusetts Greenhouse Gas Inventory for each scenario by year throughout the modeled period.

b. Which scenarios do not achieve GWSA compliance in 2020 given expected emissions from other sources documented in the Massachusetts Clean Energy and Climate Plan for 2020, 2015 Update (Dec. 31, 2015)?[1]

[1] http://www.mass.gov/eea/docs/eea/energy/cecp-for-2020.pdf

Response:

a-b. Specific analysis of the GWSA was not performed as part of this analysis. Given the uncertainty regarding CO2 policy in the United States, Black & Veatch chose a regional approach for the RGGI states using a carbon price projection to reflect CO2 control alternatives.

Information Request CLF-1-3

Request:

For the analysis reported in Exhibit NG-JNC-3, please provide a detailed annual accounting of how expected CO2 emissions compare to annual emission targets under other modeled states' specific climate regulations as follows:

a. Present each modeled state's electric sector and non-electric heating and other buildings emissions relevant to state inventory systems used to evaluate emissions for compliance with state emission regulations for each scenario by year throughout the modeled period.

b. Which scenarios do not achieve compliance with state climate regulations given expected emissions from other sources?

Response:

a-b. Specific analysis of each state's specific climate regulations was not performed as part of this analysis. As stated in response to Information Request CLF 1-2, given the uncertainty regarding CO2 policy in the United States, Black & Veatch chose a regional approach for the RGGI states using a carbon price projection to reflect CO2 control alternatives.

Prepared by or under the supervision of: Joseph Neil Copeland

Information Request CLF-1-4

Request:

For each scenario modeled in the analysis reported in Exhibit NG-JNC-3, please provide a detailed accounting of how expected CO_2 emissions compare to emission targets under U.S. EPA's Clean Power Plan as follows:

a. Present the assumptions used for the Clean Power Plan approach modeled in each scenario including a discussion of the particular compliance path modeled (rate-based vs. mass-based, etc.). Please provide detailed assumptions used to model regional trading under the Clean Power Plan.

b. Present the forecast of Massachusetts electric sector emissions from sources required to comply with the Clean Power Plan for each scenario by year throughout the modeled period.

c. Which scenarios do not achieve Massachusetts compliance with the Clean Power Plan in each compliance period?

d. Present the forecast of other modeled states' electric sector emissions from sources required to comply with the Clean Power Plan for each scenario by year throughout the modeled period.

e. Which scenarios do not achieve each modeled states' compliance with the Clean Power Plan in each compliance period?

Response:

a-e. Specific, detailed analysis of the EPA's Clean Power Plan was not performed as part of this analysis. As stated in response to Information Request, CLF 1-2, given the uncertainty regarding CO2 policy in the United States, Black & Veatch chose a regional approach for the RGGI states, as well as other states, using a carbon price projection to reflect CO2 control alternatives.

Information Request CLF-1-5

Request:

For each scenario modeled in the analysis reported in Exhibit NG-JNC-3, please provide a detailed accounting of how expected CO2 emissions compare to emission targets under the Regional Greenhouse Gas Initiative (RGGI) as follows:

a. For each of the nine RGGI states and for the RGGI region as a whole present the forecast the RGGI regions' electric sector emissions from sources required to comply with RGGI for each scenario by year throughout the modeled period.

b. Which scenarios do not achieve RGGI caps in each modeled year?

c. Provide the RGGI electric-sector CO2 emissions caps assumed in years after 2020.

Response:

a. For the RGGI region, Black & Veatch assumed a price projection for CO2 that would attempt to meet the caps prescribed by the RGGI program through 2020. Black & Veatch assumed that the RGGI program would be subsumed by a national program in the future. Emissions for the six state area of New England are provided as part of Exhibit NEER-1-1 and Attachment NEER-1-1(g).

b. All cases considered for this analysis remain below the published caps from the RGGI program through 2020.

c. Post 2020 no specific caps were assumed. Black & Veatch prescribed a price projection for CO2 to capture the uncertainty of CO2 policies beyond 2020.

Information Request CLF-1-6

Request:

For the analysis reported in Exhibit NG-JNC-3, please provide a more detailed accounting of compliance with state Renewable Portfolio Standards (RPS) in all modeled scenarios and years as follows:

a. For each New England state, for what share of total state electric demand are REC purchases required in each year in each scenario and year modeled?

b. For Massachusetts, by how much is the share of total state electric demand for which REC purchases required grow in ever year after 2020?

c. For New York, are the NY-SUN and Large Scale Renewables programs modeled in addition to the state's existing RPS? If so, please describe how they are modeled in detail.

Response:

a. Black & Veatch models Renewable Portfolio Standards for New England at a regional versus a state level. Please see response to Information Request NEER 1-12 for a description of the modeling approach used by Black & Veatch.

b. Beyond 2020, the share of total MA electric demand to be served by REC purchases grows by 1% each year.

c. Black & Veatch's responses are limited to the New England area given the limited relevance of information regarding power markets outside of New England.

Prepared by or under the supervision of: Joseph Neil Copeland

Information Request CLF-1-7

Request:

For the analysis reported in Exhibit NG-JNC-3, please provide a detailed accounting of compliance with state electric energy efficiency regulations and plans including Energy Efficiency Resources Standards, utility IRPs, state energy efficiency plans, and third-party provider plans in all modeled scenarios and years as follows:

a. Provide a description with how each New England states' and New York's electric energy efficiency regulations and plans are accounted for in modeling.

b. For each New England state and New York, for which scenarios is compliance with the state electric energy efficiency regulations and plans not achieved in each year? Please provide a specific detailed response by year, state, and scenario to supplement the information provided in Exhibit NGJNC-3.

c. Please provide a detailed accounting of assumptions on costs, cost levelization, and cost allocation for electric-sector energy efficiency measures for each state, year, and sector (i.e., residential, commercial, and industrial).

Response:

a-c. Black & Veatch used the ISO-NE 2015 CELT assumptions for energy efficiency. Further discussion of the forecast used can be found in the response to Information Request NEER-1-5.

Prepared by or under the supervision of: Joseph Neil Copeland

Information Request CLF-1-8

Request:

For the analysis reported in Exhibit NG-JNC-3 please provide a detailed accounting of compliance with gas electric energy efficiency regulations and plans including Energy Efficiency Resources Standards, utility IRPs, state energy efficiency plans, and third-party provider plans in all modeled scenarios and years as follows:

a. Provide a description with how each New England states' and New York's gas energy efficiency regulations and plans are accounted for in modeling.

b. For each New England state and New York, for which scenarios is compliance with the state gas energy efficiency regulations and plans not achieved in each year, if any?

c. Please provide a detailed accounting of assumptions on costs, cost levelization, and cost allocation for electric-sector energy efficiency measures for each state, year, and sector (including residential, commercial, and industrial).

Response:

a-b. As discussed in CLF-1-18, Black & Veatch did not make any assumptions regarding long-term gas energy efficiency beyond what has been stated in the long-term supply demand resource reports from the New England LDCs. The focus of Black & Veatch's analysis in Exhibit NG-JNC-3 was the New England market, and no explicit assumptions were made in regard to New York's gas energy efficiency regulations.

c. In the analysis reported in Exhibit NG-JNC-3, Black & Veatch did not make any assumptions on costs, cost levelization, or cost allocation for gas-sector energy efficiency measures. Black & Veatch assumed that pipeline capacity would be incrementally added over time to satisfy LDC gas load growth. Therefore the assumed efficiency and corresponding load growth for LDCs in Exhibit NG-JNC-3 is not a relevant factor for the electric consumer benefits calculated in Exhibit NG-JNC-3. Please see CLF-1-7 (c) for the electric-sector energy efficiency discussion.

Prepared by or under the supervision of: Joseph Neil Copeland

Information Request CLF-1-9

Request:

For the analysis reported in Exhibit NG-JNC-3, please provide:

a. In machine-readable, spreadsheet form provide the specific CO_2 allowance prices that are used in modeling for each scenario and modeled year.

b. In machine-readable, spreadsheet form provide any annual probabilities used to weight these CO_2 allowance prices.

c. Provide a detailed explanation of the rationale for and source of the probabilities used to weight these CO_2 allowance prices.

d. Provide a detailed explanation of the rationale for and source of any CO_2 allowance prices used in this analysis.

Response:

a. RGGI CO2 prices used in this analysis are provided in Attachment NEER-1-1(g).

b. No probabilities were used for weighting the CO2 prices.

c. No probabilities were used for weighting the CO2 prices.

d. The analysis reported in Exhibit NG-JNC-3 used regional carbon prices, including RGGI CO2 prices, throughout the country to achieve the CO2 emission reduction targets for each region under EPA's Clean Power Plan by 2030.

Prepared by or under the supervision of: Joseph Neil Copeland

Information Request CLF-1-10

Request:

For the analysis reported in Exhibit NG-JNC-3, please provide a detailed description of the assumptions regarding existing and soon-to-be constructed pipeline capacity as follows:

a. For each existing pipeline, provide a detailed explanation of the rationale for and source of assumptions regarding pipeline capacity in each scenario and year.

b. For each soon-to-be constructed pipeline, provide a detailed explanation of the rationale for and source of assumptions regarding pipeline capacity in each scenario and year.

Response:

a. For existing natural gas pipelines to the New England market, Black & Veatch considered both the estimates of operational capacity reported by PointLogic's Pipeline database into the region and the FERC index of customer data to define the capacities utilized in the GPCM model. For Iroquois Gas Transmission ("IGT"), Black & Veatch included only firm contracted capacity in the FERC index of customer data having receipt points outside of New England and delivery points within New England.

Pipeline System	Capacity (Bcf/d)
Algonquin Gas Transmission	1.36
Iroquois Gas Transmission	0.26
Maritimes and Northeast Pipeline	0.85
Portland Natural Gas Transmission System	0.17
Tennessee Gas Pipeline	1.41

The existing capacity to the New England market remains unchanged for each scenario in Exhibit-NG-JNC-3.

b. For soon-to-be constructed pipelines, Black & Veatch used capacities based on each pipeline expansion project's website.

Pipeline Expansion Project	Capacity (Bcf/d)
Algonquin Incremental Market Project (AIM)[1]	0.34

[1] http://www.spectraenergy.com/Operations/US-Natural-Gas-Operations/New-Projects-US/Algonquin-Incremental-Market-AIM-Project/

Tennessee Connecticut Expansion[2]	0.07
Spectra Atlantic Bridge[3]	0.13

The soon-to-be constructed capacity to the New England market remains unchanged for each scenario in Exhibit-NG-JNC-3.

[2] http://www.kindermorgan.com/business/gas_pipelines/east/connecticut/
[3] http://www.spectraenergy.com/Operations/US-Natural-Gas-Operations/New-Projects-US/Atlantic-Bridge/

Information Request CLF-1-11

Request:

For the analysis reported in Exhibit NG-JNC-3, please provide a detailed description of assumed LNG shipments to Everett as follows:

a. In machine-readable, spreadsheet form provide LNG shipments to Everett assumed by month, year and scenario in billion cubic feet.

b. Provide a detailed explanation of the rationale for and source for the assumptions regarding LNG shipments modeled in each scenario and year.

c. Do the LNG shipments modeled include consideration of 2015/2016 historical LNG shipments? If so, in what way are 2015/2016 historical LNG shipments considered and included in the assumptions modeled?

Response:

(a) Black & Veatch has provided in Attachment NEER-1-11(a), the Everett terminal sendout in MMcf/d for a given month. These volumes only include deliveries to Algonquin Gas Transmission, Tennessee Gas Pipeline, Boston Gas d/b/a National Grid and the Constellation Mystic Power generation facility.

(b) Black & Veatch assumed that projected Everett LNG terminal sendout would be similar to recent historical observed send-out volumes. While the Everett terminal has a maximum daily vaporization quantity well above the assumed sendout volumes, the historical observed volumes are more reflective of the current attractiveness of the New England market as an LNG import destination market. The Everett LNG terminal sendout volumes are the same across the scenarios.

(c) The analysis reported in Exhibit NG-JNC-3 was performed in November and December of 2015. It considers historical LNG shipments only through October 2015.

Prepared by or under the supervision of: Joseph Neil Copeland

Information Request CLF-1-12

Request:

For the analysis reported in Exhibit NG-JNC-3, please provide a detailed description of assumed LNG storage and vaporization as follows:

a. In machine-readable, spreadsheet form provide LNG storage and vaporization by facility, month, year and scenario. Please address storage owned and/or operated by the following types of entities: local distribution companies (LDCs); pipeline owners/developers; electric generators; gas and electric utilities; state agencies; any other potential owners or operators of storage and vaporization.

b. Provide a detailed explanation of the rationale for and source for the assumptions regarding the LNG storage, liquefaction, and vaporization modeled in each scenario and year.

Response:

a. For the analysis reported in Exhibit NG-JNC-3, Black & Veatch has provided the LNG peak shaving storage activity related to the ANE project in Attachment CLF-1-12(a) (HIGHLY SENSITIVE CONFIDENTIAL INFORMATION). Black & Veatch modeled the ANE related LNG project at Acushnet as it provides a winter peaking supply to the ANE pipeline solution to serve power generation. Black & Veatch did not model individual LNG storage facilities within New England, as these facilities are typically and primarily utilized to serve local distribution customers. Black & Veatch did assume that additional pipeline capacity would be built to serve LDC load growth, which would serve a similar role to LNG storage during the peak winter months.

b. For the proposed LNG storage and vaporization facility for ANE at Acushnet, Black & Veatch utilized the information provided in ANE RFP response for modeling purposes.

REDACTED

Column	A	B
Line #	Month-Year	Net Injection (+)/New Withdrawal (-) (MMcf/d)
1	May-2021	[redacted]
2	Jun-2021	
3	Jul-2021	
4	Aug-2021	
5	Sep-2021	
6	Oct-2021	
7	Nov-2021	
8	Dec-2021	
9	Jan-2022	
10	Feb-2022	
11	Mar-2022	
12	Apr-2022	
13	May-2022	
14	Jun-2022	
15	Jul-2022	
16	Aug-2022	
17	Sep-2022	
18	Oct-2022	
19	Nov-2022	
20	Dec-2022	
21	Jan-2023	
22	Feb-2023	
23	Mar-2023	
24	Apr-2023	
25	May-2023	
26	Jun-2023	
27	Jul-2023	
28	Aug-2023	
29	Sep-2023	
30	Oct-2023	
31	Nov-2023	
32	Dec-2023	
33	Jan-2024	
34	Feb-2024	
35	Mar-2024	
36	Apr-2024	
37	May-2024	

Column	A	B
Line #	Month-Year	Net Injection (+)/New Withdrawal (-) (MMcf/d)
38	Jun-2024	[redacted]
39	Jul-2024	
40	Aug-2024	
41	Sep-2024	
42	Oct-2024	
43	Nov-2024	
44	Dec-2024	
45	Jan-2025	
46	Feb-2025	
47	Mar-2025	
48	Apr-2025	
49	May-2025	
50	Jun-2025	
51	Jul-2025	
52	Aug-2025	
53	Sep-2025	
54	Oct-2025	
55	Nov-2025	
56	Dec-2025	
57	Jan-2026	
58	Feb-2026	
59	Mar-2026	
60	Apr-2026	
61	May-2026	
62	Jun-2026	
63	Jul-2026	
64	Aug-2026	
65	Sep-2026	
66	Oct-2026	
67	Nov-2026	
68	Dec-2026	
69	Jan-2027	
70	Feb-2027	
71	Mar-2027	
72	Apr-2027	
73	May-2027	
74	Jun-2027	
75	Jul-2027	
76	Aug-2027	

Column	A	B
Line #	Month-Year	Net Injection (+)/New Withdrawal (-) (MMcf/d)
77	Sep-2027	[redacted]
78	Oct-2027	
79	Nov-2027	
80	Dec-2027	
81	Jan-2028	
82	Feb-2028	
83	Mar-2028	
84	Apr-2028	
85	May-2028	
86	Jun-2028	
87	Jul-2028	
88	Aug-2028	
89	Sep-2028	
90	Oct-2028	
91	Nov-2028	
92	Dec-2028	
93	Jan-2029	
94	Feb-2029	
95	Mar-2029	
96	Apr-2029	
97	May-2029	
98	Jun-2029	
99	Jul-2029	
100	Aug-2029	
101	Sep-2029	
102	Oct-2029	
103	Nov-2029	
104	Dec-2029	
105	Jan-2030	
106	Feb-2030	
107	Mar-2030	
108	Apr-2030	
109	May-2030	
110	Jun-2030	
111	Jul-2030	
112	Aug-2030	
113	Sep-2030	
114	Oct-2030	
115	Nov-2030	

Column	A	B
Line #	Month-Year	Net Injection (+)/New Withdrawal (-) (MMcf/d)
116	Dec-2030	[redacted]
117	Jan-2031	
118	Feb-2031	
119	Mar-2031	
120	Apr-2031	
121	May-2031	
122	Jun-2031	
123	Jul-2031	
124	Aug-2031	
125	Sep-2031	
126	Oct-2031	
127	Nov-2031	
128	Dec-2031	
129	Jan-2032	
130	Feb-2032	
131	Mar-2032	
132	Apr-2032	
133	May-2032	
134	Jun-2032	
135	Jul-2032	
136	Aug-2032	
137	Sep-2032	
138	Oct-2032	
139	Nov-2032	
140	Dec-2032	
141	Jan-2033	
142	Feb-2033	
143	Mar-2033	
144	Apr-2033	
145	May-2033	
146	Jun-2033	
147	Jul-2033	
148	Aug-2033	
149	Sep-2033	
150	Oct-2033	
151	Nov-2033	
152	Dec-2033	
153	Jan-2034	
154	Feb-2034	

Column	A	B
Line #	Month-Year	Net Injection (+)/New Withdrawal (-) (MMcf/d)
155	Mar-2034	[redacted]
156	Apr-2034	
157	May-2034	
158	Jun-2034	
159	Jul-2034	
160	Aug-2034	
161	Sep-2034	
162	Oct-2034	
163	Nov-2034	
164	Dec-2034	
165	Jan-2035	
166	Feb-2035	
167	Mar-2035	
168	Apr-2035	
169	May-2035	
170	Jun-2035	
171	Jul-2035	
172	Aug-2035	
173	Sep-2035	
174	Oct-2035	
175	Nov-2035	
176	Dec-2035	
177	Jan-2036	
178	Feb-2036	
179	Mar-2036	
180	Apr-2036	
181	May-2036	
182	Jun-2036	
183	Jul-2036	
184	Aug-2036	
185	Sep-2036	
186	Oct-2036	
187	Nov-2036	
188	Dec-2036	
189	Jan-2037	
190	Feb-2037	
191	Mar-2037	
192	Apr-2037	
193	May-2037	

Column	A	B
Line #	Month-Year	Net Injection (+)/New Withdrawal (-) (MMcf/d)
194	Jun-2037	[redacted]
195	Jul-2037	
196	Aug-2037	
197	Sep-2037	
198	Oct-2037	
199	Nov-2037	
200	Dec-2037	
201	Jan-2038	
202	Feb-2038	
203	Mar-2038	
204	Apr-2038	
205	May-2038	
206	Jun-2038	
207	Jul-2038	
208	Aug-2038	
209	Sep-2038	
210	Oct-2038	
211	Nov-2038	
212	Dec-2038	

Information Request CLF-1-13

Request:

For the analysis reported in Exhibit NG-JNC-3, please present the natural gas prices created as outputs and/or used as inputs for each of the models used (including ProMOD and GPCM) as follows:

a. In machine-readable, spreadsheet form provide these natural gas prices at the finest level of geographical and temporal resolution available for each region or delivery site for which natural gas prices were differentiated in this analysis.

b. Were daily natural gas prices modeled by or used in the Black and Veatch models used in this analysis? If so, provide these daily natural gas prices as daily values for each region or delivery site for which natural gas prices were differentiated in this analysis.

c. Do the daily, monthly, or annual natural gas prices modeled include consideration of 2015/2016 natural gas prices? If so, in what way are 2015/2016 natural gas prices considered and included in the assumptions modeled? Please include a specific discussing of temporal resolution.

Response:

a-b. The relevant regional monthly average gas prices utilized to the analysis have been previously provided and are a part of Exhibit NEER-1-3 and Attachment NEER-1-3(a).

c. The analysis reported in Exhibit NG-JNC-3 was performed in November and December of 2015. It considers historical gas prices through October 2015.

Prepared by or under the supervision of: Joseph Neil Copeland

Information Request CLF-1-14

Request:

For the analysis reported in Exhibit NG-JNC-3, please present the wholesale electricity prices created as outputs and/or used as inputs for each of the models used (including ProMOD and GPCM) as follows:

a. In machine-readable, spreadsheet form provide these wholesale electricity prices at the finest level of geographical and temporal resolution available for each region or delivery site for which wholesale electricity prices were differentiated in this analysis.

b. Were daily wholesale electricity prices modeled by or used in the Black and Veatch models used in this analysis? If so, provide these daily wholesale electricity prices as daily values for each region or delivery site for which wholesale electricity prices were differentiated in this analysis.

c. Do the daily, monthly, or annual wholesale electricity prices modeled include consideration of 2015/2016 natural gas prices? If so, in what way are 2015/2016 natural gas prices considered and included in the assumptions modeled? Please include a specific discussing of temporal resolution.

Response:

a-b. Monthly electric prices have been previously provided and are a part of Exhibit NEER-1-1 and Attachment NEER-1-1(a).

c. The analysis reported in Exhibit NG-JNC-3 was performed in November and December of 2015. It considers historical gas prices through October 2015.

Prepared by or under the supervision of: Joseph Neil Copeland

Information Request CLF-1-15

Request:

For the analysis reported in Exhibit NG-JNC-3 please provide a detailed description of the assumptions used to model ISO-NE's Winter Reliability program as follows:

a. What specific assumptions and methodology are used to represent the Winter Reliability program in ProMOD? In this description please address whether and in what way dual-fuel units are assumed to be subject to air quality constraints, and how and in what way the model selects the fuel used in a given dual fuel unit in a particular scenario and year?

b. What specific assumptions and methodology are used to represent the Winter Reliability program in GPCM? In this description please address whether and in what way dual-fuel units are assumed to be subject to air quality constraints, and how and in what way the model selects the fuel used in a given dual fuel unit in a particular scenario and year?

Response:

a-b. Due to the upcoming phase out of ISO-NE's Winter Reliability program, Black & Veatch did not use any assumptions from ISO-NE's Winter Reliability program.

Information Request CLF-1-16

Request:

For the analysis reported in Exhibit NG-JNC-3, please provide a detailed description of the assumptions used to model ISO-NE's Pay for Performance program as follows:

a. What specific assumptions and methodology are used to represent the Pay for Performance program in ProMOD? In this description please address how fines are modeled by scenario and year.

b. What specific assumptions and methodology are used to represent the Pay for Performance program in GPCM? In this description please address how fines are modeled by scenario and year.

Response:

a. The Pay for Performance program is not explicitly modeled within the production cost model ProMod, which focuses on energy and operating reserve markets. The Pay for Performance model is a capacity payment based performance model where generators receive payments, or pay penalties, for assumed performance under scarcity conditions in the energy market. Without having the benefit of how the Pay for Performance program is performing with respect to generator availability improvement, Black & Veatch used industry average forced outage rates. From a modeling perspective Black & Veatch has assumed that these generators will perform as expected under scarcity conditions.

b. The Pay for Performance program was not explicitly modeled in GPCM.

Prepared by or under the supervision of: Joseph Neil Copeland

Information Request CLF-1-17

Request:

For the analysis reported in Exhibit NG-JNC-3, please provide a detailed description of the specific methodology used to forecast electric load growth as follows:

a. In machine-readable, spreadsheet form provide hourly, monthly, and annual electric demand by sector (including electricity demand from residential, commercial, industrial, and transportation) for each year analyzed for each state in New England and New York, both inclusive and exclusive of electric-sector energy efficiency in MWh.

b. In machine-readable, spreadsheet form provide the specific assumptions made regarding future electric peak load and annual electric demand as a result of changes in vehicle electrification for each year analyzed.

c. In machine-readable, spreadsheet form provide the specific assumptions made regarding future electric peak load and annual electric demand as a result of increased electrification of heating (i.e., from new incremental heat pump units) and water heating (i.e., from new incremental electric water heating units) for each year analyzed.

d. In machine-readable, spreadsheet form provide the specific assumptions made regarding in future winter peak demand for electricity by each sector for each state for each year analyzed.

Response:

a-d. Black & Veatch used the ISO-NE 2015 CELT forecast for electric load growth. More information regarding the electric load forecast has been previously provided in Exhibits NEER-1-1 and NEER-1-5, with monthly and annual demand by zone provided in Attachment NEER-1-1(f).

Prepared by or under the supervision of: Joseph Neil Copeland

Information Request CLF-1-18

Request:

For the analysis reported in Exhibit NG-JNC-3, please provide a detailed description of the specific methodology used to forecast end-use natural gas demand in the residential, commercial, industrial, and transportation sectors as follows:

a. In machine-readable, spreadsheet form provide hourly, monthly, and annual end-use natural gas demand by sector (including demand from residential, commercial, industrial, and transportation) for each year analyzed for each state in New England, both inclusive and exclusive of end-use energy efficiency in billion cubic feet.

b. In machine-readable, spreadsheet form provide the specific assumptions made regarding in future winter peak demand for end-use natural gas by each sector for each state for each year analyzed.

Response:

a. For the analysis reported in Exhibit NG-JNC-3, Black & Veatch's forecast of end use natural gas demand is based in part on the latest long-term supply and demand resource plans developed by the New England LDCs and Energy Information Administration ("EIA") consumption and Form 176 data, which provides annual customer counts, gas sales and transported quantities. For residential and commercial demand beyond the LDC forecasts, Black & Veatch projected customer counts based on population growth expectations, observed historical customer growth and potential oil to gas conversions. Customer counts and gas use per customer were then applied to project gas consumption. For industrial demand, Black & Veatch assumed that it would remain relatively flat over the analysis period.

   Black & Veatch did not make any assumptions regarding end-use energy efficiency beyond what is stated in the long-term supply and demand resource plans developed by the New England LDCs.

b. Black & Veatch has provided in Attachment CLF 1-18(a) (HIGHLY SENSITIVE CONFIDENTIAL INFORMATION), the projected monthly gas demand by sector used in the analysis. The monthly profile was developed using EIA historical consumption data.

Prepared by or under the supervision of: Joseph Neil Copeland

REDACTED

Units: MMcf/d

Column	A	B	C	D
Line #	Year-Month	Residential	Commercial	Industrial
1	Jan-16	[redacted]	[redacted]	[redacted]
2	Feb-16	[redacted]	[redacted]	[redacted]
3	Mar-16	[redacted]	[redacted]	[redacted]
4	Apr-16	[redacted]	[redacted]	[redacted]
5	May-16	[redacted]	[redacted]	[redacted]
6	Jun-16	[redacted]	[redacted]	[redacted]
7	Jul-16	[redacted]	[redacted]	[redacted]
8	Aug-16	[redacted]	[redacted]	[redacted]
9	Sep-16	[redacted]	[redacted]	[redacted]
10	Oct-16	[redacted]	[redacted]	[redacted]
11	Nov-16	[redacted]	[redacted]	[redacted]
12	Dec-16	[redacted]	[redacted]	[redacted]
13	Jan-17	[redacted]	[redacted]	[redacted]
14	Feb-17	[redacted]	[redacted]	[redacted]
15	Mar-17	[redacted]	[redacted]	[redacted]
16	Apr-17	[redacted]	[redacted]	[redacted]
17	May-17	[redacted]	[redacted]	[redacted]
18	Jun-17	[redacted]	[redacted]	[redacted]
19	Jul-17	[redacted]	[redacted]	[redacted]
20	Aug-17	[redacted]	[redacted]	[redacted]
21	Sep-17	[redacted]	[redacted]	[redacted]
22	Oct-17	[redacted]	[redacted]	[redacted]
23	Nov-17	[redacted]	[redacted]	[redacted]
24	Dec-17	[redacted]	[redacted]	[redacted]
25	Jan-18	[redacted]	[redacted]	[redacted]
26	Feb-18	[redacted]	[redacted]	[redacted]
27	Mar-18	[redacted]	[redacted]	[redacted]
28	Apr-18	[redacted]	[redacted]	[redacted]
29	May-18	[redacted]	[redacted]	[redacted]
30	Jun-18	[redacted]	[redacted]	[redacted]
31	Jul-18	[redacted]	[redacted]	[redacted]
32	Aug-18	[redacted]	[redacted]	[redacted]
33	Sep-18	[redacted]	[redacted]	[redacted]
34	Oct-18	[redacted]	[redacted]	[redacted]
35	Nov-18	[redacted]	[redacted]	[redacted]
36	Dec-18	[redacted]	[redacted]	[redacted]

Column	A	B	C	D
Line #	**Year-Month**	**Residential**	**Commercial**	**Industrial**
37	Jan-19	[redacted]		
38	Feb-19			
39	Mar-19			
40	Apr-19			
41	May-19			
42	Jun-19			
43	Jul-19			
44	Aug-19			
45	Sep-19			
46	Oct-19			
47	Nov-19			
48	Dec-19			
49	Jan-20			
50	Feb-20			
51	Mar-20			
52	Apr-20			
53	May-20			
54	Jun-20			
55	Jul-20			
56	Aug-20			
57	Sep-20			
58	Oct-20			
59	Nov-20			
60	Dec-20			
61	Jan-21			
62	Feb-21			
63	Mar-21			
64	Apr-21			
65	May-21			
66	Jun-21			
67	Jul-21			
68	Aug-21			
69	Sep-21			
70	Oct-21			
71	Nov-21			
72	Dec-21			
73	Jan-22			
74	Feb-22			
75	Mar-22			

Column	A	B	C	D
Line #	**Year-Month**	**Residential**	**Commercial**	**Industrial**
76	Apr-22			
77	May-22			
78	Jun-22			
79	Jul-22			
80	Aug-22			
81	Sep-22			
82	Oct-22			
83	Nov-22			
84	Dec-22			
85	Jan-23			
86	Feb-23			
87	Mar-23			
88	Apr-23			
89	May-23			
90	Jun-23			
91	Jul-23			
92	Aug-23			
93	Sep-23			
94	Oct-23			
95	Nov-23			
96	Dec-23			
97	Jan-24			
98	Feb-24			
99	Mar-24			
100	Apr-24			
101	May-24			
102	Jun-24			
103	Jul-24			
104	Aug-24			
105	Sep-24			
106	Oct-24			
107	Nov-24			
108	Dec-24			
109	Jan-25			
110	Feb-25			
111	Mar-25			
112	Apr-25			
113	May-25			
114	Jun-25			

Column	A	B	C	D
Line #	**Year-Month**	**Residential**	**Commercial**	**Industrial**
115	Jul-25	[redacted]		
116	Aug-25			
117	Sep-25			
118	Oct-25			
119	Nov-25			
120	Dec-25			
121	Jan-26			
122	Feb-26			
123	Mar-26			
124	Apr-26			
125	May-26			
126	Jun-26			
127	Jul-26			
128	Aug-26			
129	Sep-26			
130	Oct-26			
131	Nov-26			
132	Dec-26			
133	Jan-27			
134	Feb-27			
135	Mar-27			
136	Apr-27			
137	May-27			
138	Jun-27			
139	Jul-27			
140	Aug-27			
141	Sep-27			
142	Oct-27			
143	Nov-27			
144	Dec-27			
145	Jan-28			
146	Feb-28			
147	Mar-28			
148	Apr-28			
149	May-28			
150	Jun-28			
151	Jul-28			
152	Aug-28			
153	Sep-28			

Column	A	B	C	D
Line #	**Year-Month**	**Residential**	**Commercial**	**Industrial**
154	Oct-28	[redacted]		
155	Nov-28			
156	Dec-28			
157	Jan-29			
158	Feb-29			
159	Mar-29			
160	Apr-29			
161	May-29			
162	Jun-29			
163	Jul-29			
164	Aug-29			
165	Sep-29			
166	Oct-29			
167	Nov-29			
168	Dec-29			
169	Jan-30			
170	Feb-30			
171	Mar-30			
172	Apr-30			
173	May-30			
174	Jun-30			
175	Jul-30			
176	Aug-30			
177	Sep-30			
178	Oct-30			
179	Nov-30			
180	Dec-30			
181	Jan-31			
182	Feb-31			
183	Mar-31			
184	Apr-31			
185	May-31			
186	Jun-31			
187	Jul-31			
188	Aug-31			
189	Sep-31			
190	Oct-31			
191	Nov-31			
192	Dec-31			

REDACTED

Column	A	B	C	D
Line #	Year-Month	Residential	Commercial	Industrial
193	Jan-32	[redacted]		
194	Feb-32			
195	Mar-32			
196	Apr-32			
197	May-32			
198	Jun-32			
199	Jul-32			
200	Aug-32			
201	Sep-32			
202	Oct-32			
203	Nov-32			
204	Dec-32			
205	Jan-33			
206	Feb-33			
207	Mar-33			
208	Apr-33			
209	May-33			
210	Jun-33			
211	Jul-33			
212	Aug-33			
213	Sep-33			
214	Oct-33			
215	Nov-33			
216	Dec-33			
217	Jan-34			
218	Feb-34			
219	Mar-34			
220	Apr-34			
221	May-34			
222	Jun-34			
223	Jul-34			
224	Aug-34			
225	Sep-34			
226	Oct-34			
227	Nov-34			
228	Dec-34			
229	Jan-35			
230	Feb-35			
231	Mar-35			

Column	A	B	C	D
Line #	**Year-Month**	**Residential**	**Commercial**	**Industrial**
232	Apr-35			
233	May-35			
234	Jun-35			
235	Jul-35			
236	Aug-35			
237	Sep-35			
238	Oct-35			
239	Nov-35			
240	Dec-35			
241	Jan-36			
242	Feb-36			
243	Mar-36			
244	Apr-36			
245	May-36			
246	Jun-36			
247	Jul-36			
248	Aug-36			
249	Sep-36			
250	Oct-36			
251	Nov-36			
252	Dec-36			
253	Jan-37			
254	Feb-37			
255	Mar-37			
256	Apr-37			
257	May-37			
258	Jun-37			
259	Jul-37			
260	Aug-37			
261	Sep-37			
262	Oct-37			
263	Nov-37			
264	Dec-37			
265	Jan-38			
266	Feb-38			
267	Mar-38			
268	Apr-38			
269	May-38			
270	Jun-38			

REDACTED

Column	A	B	C	D
Line #	Year-Month	Residential	Commercial	Industrial
271	Jul-38	[redacted]		
272	Aug-38			
273	Sep-38			
274	Oct-38			
275	Nov-38			
276	Dec-38			
277	Jan-39			
278	Feb-39			
279	Mar-39			
280	Apr-39			
281	May-39			
282	Jun-39			
283	Jul-39			
284	Aug-39			
285	Sep-39			
286	Oct-39			
287	Nov-39			
288	Dec-39			
289	Jan-40			
290	Feb-40			
291	Mar-40			
292	Apr-40			
293	May-40			
294	Jun-40			
295	Jul-40			
296	Aug-40			
297	Sep-40			
298	Oct-40			
299	Nov-40			
300	Dec-40			