Public

Integrated Resource Plan

4 CSR 240-22.060

Integrated Resource Analysis

February 2008

4 CSR 240-22.060 (1)

The utility shall design alternative resource plans to satisfy at least the objectives and priorities identified in 4 CSR 240-22.010(2). The utility may identify additional planning objectives that alternative resource plans will be designed to serve.

AmerenUE developed a set of resource plans from the breadth of generating technology, demand-side management (DSM), and renewable portfolio options**.** The primary objective is provide the public with energy services that are safe, reliable and efficient, at just and reasonable rates, in a manner that serves the public interest.

Some other objectives given consideration were the following:

- Minimizing risks associated with critical uncertain factors that will affect the actual costs associated with alternative resource plans.
- Minimizing risks associated with new or more stringent environmental laws or regulations that may be imposed at some point within the planning horizon; and
- Minimizing Rate increases associated with alternative resource plans.

Some Supplemental, but not independent, Objectives

- Provide customer program choices
    - Provide all customer classes with an array of options to assist them in using electricity more efficiently
    - Promote emerging technologies
- Seek energy efficiency and renewable resources **first**
    - Exhaust cost effective demand-side and renewable resource options prior to constructing new baseload capacity
    - Lead by example by pursuing efficiency improvements in the generation and ED business lines
- Strengthen customer service
    - Actively engage hard-to-reach customer groups
    - Act as a partner with customers rather than simply a provider of a commodity

  - An educated consumer is our best customer
- Minimize environmental impact (stewardship)
  - Increasing the efficiency of our system and reducing customer demand lessens the need for new capacity
  - Reduce/recycle combustion by-products
- Balance risk among stakeholders
  - Pursue demand-side options as a way to mitigate long-term risk exposure
  - Demand-side options place some ownership on stakeholders and help send proper price signals to customers

4 CSR 240-22.060 (2)

The utility shall specify a set of quantitative measures for assessing the performance of alternative resource plans with respect to identified planning objectives. These measures shall include at least the following: present worth of utility revenue requirements, present worth of probable environmental costs, present worth of out-of-pocket costs to participants in demand-side programs, levelized annual average rates and maximum single-year increase in annual average rates. All present worth and levelization calculations shall use the utility discount rate and all costs and benefits shall be expressed in nominal dollars. Utility decision-makers may also specify other measures that they believe are appropriate for assessing the performance of resource plans relative to the planning objectives identified in 4 CSR 240-22.010 (2).

The performance assessment consisted of five quantitative measures: present worth of utility revenue requirements, present worth of probable environmental costs, present worth of out-of-pocket costs to participants in demand-side programs, levelized annual average rates and maximum single-year increase in annual average rates. All present worth and levelization calculations used the AmerenUE discount rate and all costs and benefits are expressed in nominal dollars. Tables showing these quantitative measures can be found in 4 CSR 240-22.060) (6) (B).

4 CSR 240-22.060 (3)

The utility shall use appropriate combinations of candidate demand-side and supply-side resources to develop a set of alternative resource plans, each of which is designed to achieve one (1) or more of the planning objectives identified in 4 CSR 240-22.010 (2). The alternative resource plans developed at this stage of the analysis shall not include load-building programs, which shall be analyzed as required by section (5) of this rule.

Using one or more of the planning objectives identified in 4 CSR 240-22-010 (2), AmerenUE created a total of 110 alternative resource plans which were appropriate combinations of candidate demand-side and supply-side resources. Each of these plans is contained in several Microsoft Excel spreadsheets, and these spreadsheets are available in electronic form in 4 CSR 240-22.060 Appendix Capacity_A2 through 4 CSR 240-22.060 Appendix Capacity_Q2.

4 CSR 240-22.060 (4)

AmerenUE will assess the relative performance of the alternative resource plans by calculating for each plan the value of each performance measure specified pursuant to section (2). This calculation shall be performed for each scenario in the probability tree. The analysis shall cover a planning horizon of at least twenty (20) years and shall be carried out with computer models that are capable of simulating the total operation of the system on a year-by-year basis in order to assess the cumulative impacts of alternative resource plans. These models shall be sufficiently detailed to accomplish the following tasks and objectives:

AmerenUE created 110 alternative resource plans, and calculated the value of the performance measures specified in section (2) for each scenario in the probability tree. This was done for a planning horizon of twenty (20) years by using the "Midas" computer model, which is more fully described in 4 CSR 240-22.060(6)(E) below. The Midas model simulated the total operation of the system on a year-by-year basis so that AmerenUE could assess the cumulative impacts of alternative resource plans.

4 CSR 240-22.060 (4) (A)

The financial impact of alternative resource plans shall be modeled in sufficient detail to provide comparative estimates of at least the following measures of the utility's financial condition for each year of the planning horizon: pretax interest coverage, ratio of total debt to total capital and ratio of net cash flow to capital expenditures;

The Midas computer model provides detailed estimates of AmerenUE's financial condition for each plan that is submitted to it, for each year of the planning horizon, including pretax interest coverage, ratio of total debt to total capital and ratio of net cash flow to capital expenditures.

Tables of the values for pretax interest coverage, ratio of total debt to total capital and ratio of net cash flow to capital expenditures are shown below for the top 18 plans of the total

110 plans. *(A description of the process to select these top 18 plans from the total 110 plans is in the response to 4 CSR 240-22.060 (6)(A) which appears later in this document):*

Table of pre-tax interest coverage by plan by year, plan name consisting of supply-side type, then DSM type, then renewables portfolio type:

	Plan Name	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
a	NUC1600-Agg-Moderate	3.68	3.55	3.49	3.08	2.89	2.70	2.49	2.42	2.22	2.04	1.92	1.79	2.44	1.98	1.88	1.85	1.83	1.80	1.77	1.74	1.72	1.69	1.67	1.64	1.62	1.61	1.60	1.59	1.57
b	NUC1200-Agg-Moderate	3.69	3.56	3.51	3.12	2.98	2.82	2.61	2.55	2.39	2.19	2.07	1.92	2.51	2.08	1.96	1.93	1.92	1.92	1.89	1.86	1.83	1.81	1.78	1.76	1.74	1.72	1.72	1.71	1.69
c	NUC1600-Agg-High	3.68	3.55	3.49	3.08	2.87	2.68	2.43	2.36	2.15	2.10	1.89	1.78	2.30	1.90	1.85	1.81	1.77	1.74	1.71	1.67	1.64	1.61	1.58	1.55	1.52	1.50	1.49	1.47	1.44
d	NUC1200-Agg-High	3.69	3.56	3.51	3.12	2.95	2.78	2.55	2.48	2.29	2.24	2.00	1.88	2.32	1.98	1.94	1.91	1.87	1.84	1.80	1.77	1.73	1.70	1.67	1.64	1.61	1.59	1.58	1.57	1.54
e	NUC1600-Agg-Wind	3.69	3.58	3.55	3.14	2.94	2.75	2.54	2.45	2.24	2.17	1.94	1.82	2.33	1.92	1.85	1.83	1.80	1.77	1.74	1.71	1.67	1.65	1.62	1.58	1.56	1.54	1.53	1.51	1.48
f	NUC1600-Agg-no	3.69	3.62	3.69	3.36	3.10	2.89	2.90	2.72	2.41	2.17	2.00	1.86	2.58	2.04	1.93	1.91	1.90	1.90	1.87	1.85	1.82	1.80	1.78	1.75	1.73	1.72	1.72	1.71	1.69
g	NUC1600-Agg-LowW/Wind	3.69	3.62	3.69	3.36	3.10	2.88	2.86	2.59	2.32	2.11	1.96	1.87	2.48	1.99	1.89	1.87	1.86	1.85	1.82	1.80	1.77	1.75	1.72	1.69	1.67	1.65	1.65	1.64	1.62
h	NUC1200-Agg-Wind	3.69	3.59	3.57	3.18	3.05	2.90	2.69	2.62	2.44	2.34	2.08	1.94	2.36	2.00	1.89	1.86	1.85	1.84	1.80	1.77	1.73	1.71	1.68	1.65	1.62	1.60	1.59	1.57	1.55
i	NUC1200-Agg-no	3.70	3.63	3.74	3.45	3.25	3.06	3.10	2.91	2.61	2.34	2.17	1.99	2.64	2.15	2.05	2.03	2.02	2.03	2.00	1.98	1.96	1.94	1.92	1.89	1.87	1.86	1.87	1.86	1.84
j	NUC1200-Agg-LowW/Wind	3.70	3.63	3.74	3.45	3.25	3.06	3.07	2.77	2.52	2.28	2.13	2.01	2.52	2.08	1.98	1.95	1.95	1.95	1.92	1.90	1.87	1.85	1.83	1.80	1.78	1.76	1.76	1.75	1.73
k	Pumped Storage-Agg-Moderate	3.70	3.61	3.65	3.30	3.37	3.36	3.09	3.20	3.29	3.29	3.33	3.23	3.10	2.92	2.72	2.73	2.71	2.67	2.63	2.59	2.56	2.54	2.52	2.49	2.48	2.49	2.56	2.60	2.61
l	Combine Cycle-Agg-Moderate	3.70	3.61	3.65	3.30	3.37	3.36	3.09	3.19	3.28	3.29	3.35	3.41	3.46	3.15	2.83	2.80	2.80	2.75	2.71	2.67	2.63	2.61	2.59	2.56	2.54	2.55	2.63	2.68	2.70
m	Coal850W/OCCS-Agg-Moderate	3.70	3.61	3.65	3.30	3.37	3.36	3.09	3.14	3.26	3.27	3.34	3.03	2.74	2.53	2.46	2.39	2.39	2.40	2.36	2.33	2.31	2.28	2.25	2.22	2.20	2.19	2.22	2.24	2.23
n	Simple Cycle-Agg-High	3.70	3.61	3.65	3.30	3.36	3.32	3.03	3.19	3.24	3.25	2.79	2.74	2.74	2.78	2.70	2.64	2.66	2.58	2.53	2.48	2.44	2.40	2.36	2.31	2.27	2.26	2.29	2.31	2.29
o	Coal425W/OCCS-Agg-Moderate	3.70	3.61	3.65	3.30	3.37	3.36	3.09	3.14	3.26	3.27	3.35	3.15	2.96	2.77	2.63	2.54	2.56	2.62	2.56	2.52	2.48	2.46	2.43	2.40	2.38	2.38	2.43	2.46	2.45
p	NUC1600-Agg-LowNoWind	3.69	3.60	3.63	3.28	3.04	2.79	2.76	2.61	2.33	2.12	1.97	1.83	2.51	2.01	1.90	1.88	1.85	1.83	1.80	1.78	1.75	1.73	1.71	1.68	1.66	1.65	1.65	1.63	1.61
q	Combine Cycle-Agg-LowNoWind	3.70	3.65	3.82	3.55	3.53	3.49	3.54	3.60	3.62	3.49	3.49	3.29	3.27	2.77	2.52	2.47	2.45	2.47	2.52	2.48	2.45	2.43	2.40	2.38	2.36	2.35	2.41	2.44	2.44
r	Coal425W/OCCS-Agg-no	3.71	3.67	3.87	3.66	3.60	3.51	3.59	3.66	3.63	3.33	3.24	3.05	3.16	2.91	2.66	2.62	2.61	2.58	2.55	2.52	2.50	2.49	2.46	2.44	2.43	2.43	2.49	2.53	2.53

Table of ratio of total debt to total capital by plan by year plan name consisting of supply-side type, then DSM type, then renewables portfolio type:

	Plan Name	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
a	NUC1600-Agg-Moderate	40.64	45.82	48.41	46.59	51.57	55.84	55.50	57.27	56.71	58.73	59.79	59.65	63.50	67.96	67.73	67.31	66.90	66.49	66.08	65.68	65.19	64.80	64.42	64.03	63.66	62.93	62.40	61.97	61.58
b	NUC1200-Agg-Moderate	40.73	45.97	48.91	47.59	51.50	54.07	53.60	55.54	57.12	60.83	62.80	63.93	64.60	64.44	63.87	63.42	62.99	62.56	62.13	61.71	61.18	60.77	60.37	59.97	59.97	59.54	59.03	58.50	58.02
c	NUC1600-Agg-High	40.64	45.82	48.41	46.54	50.54	54.25	57.24	58.30	56.95	52.90	53.50	53.28	58.13	66.47	70.32	69.95	69.55	69.16	68.77	68.39	67.93	67.55	67.18	66.81	66.45	65.79	65.08	64.72	64.39
d	NUC1200-Agg-High	40.73	45.97	48.91	47.54	51.57	54.57	53.96	57.68	58.21	54.70	55.92	56.63	62.63	65.59	66.47	66.04	65.62	65.20	64.79	64.38	63.88	63.48	63.09	62.70	62.50	62.12	61.68	61.22	60.81
e	NUC1600-Agg-Wind	40.69	44.75	47.75	46.21	51.38	55.05	54.57	57.04	55.40	51.42	51.18	50.29	55.20	63.68	69.38	69.06	68.66	68.26	67.86	67.47	67.01	66.62	66.25	65.87	65.51	64.83	64.09	63.71	63.36
f	NUC1600-Agg-no	40.84	40.36	45.97	43.91	49.77	46.69	45.99	48.60	48.61	51.59	53.58	53.87	58.16	66.67	66.27	65.83	65.40	64.97	64.55	64.13	63.62	63.21	62.81	62.41	62.02	61.25	60.40	59.93	59.49
g	NUC1600-Agg-LowW/Wind	40.84	40.36	45.97	43.91	49.77	46.46	51.07	53.15	52.73	55.40	56.81	54.39	58.87	67.37	67.58	67.15	66.73	66.31	65.89	65.48	64.98	64.58	64.19	63.80	63.41	62.67	61.87	61.33	60.93
h	NUC1200-Agg-Wind	40.78	44.90	48.25	47.22	50.10	52.08	52.06	54.20	54.74	51.67	52.05	52.04	58.07	66.95	66.69	66.27	65.84	65.43	65.02	64.61	64.11	63.71	63.32	62.93	62.55	62.18	61.74	61.29	60.88
i	NUC1200-Agg-no	40.93	40.50	45.08	43.56	48.34	45.40	45.09	50.23	51.96	56.46	59.27	60.63	63.07	62.81	62.21	61.75	61.29	60.84	60.40	59.97	59.41	58.99	58.57	58.16	57.75	57.27	56.70	56.11	55.57
j	NUC1200-Agg-LowW/Wind	40.93	40.50	45.08	43.56	48.34	45.16	48.09	53.00	54.58	58.93	61.20	59.30	64.31	64.68	64.10	63.65	63.20	62.77	62.33	61.90	61.37	60.95	60.54	60.13	59.73	59.26	58.75	58.21	57.72
k	Pumped Storage-Agg-Moderate	41.00	44.98	46.47	46.40	44.45	47.55	47.23	46.47	44.66	44.66	42.45	44.35	46.62	48.05	46.80	47.31	47.31	47.31	47.31	47.32	47.05	47.05	47.05	47.05	47.05	46.06	44.87	43.62	42.45
l	Combine Cycle-Agg-Moderate	41.00	44.98	46.47	46.40	44.46	47.58	47.24	46.48	44.67	44.67	43.18	40.31	37.33	45.09	44.70	45.95	45.95	45.95	45.95	45.95	45.66	45.66	45.66	45.66	45.66	44.56	43.25	41.85	40.55
m	Coal850W/OCCS-Agg-Moderate	41.00	44.98	46.47	46.40	44.46	47.58	47.31	46.55	44.73	44.73	40.58	44.07	49.80	54.15	53.59	53.07	52.56	52.06	51.58	51.10	50.89	50.89	50.89	50.89	50.89	50.14	49.25	48.31	47.45
n	Simple Cycle-Agg-High	41.00	44.98	46.47	46.37	43.39	48.38	48.12	46.84	44.17	47.56	51.87	48.72	49.15	48.65	47.90	47.57	47.57	47.57	47.57	47.57	47.33	47.33	47.33	47.33	47.33	46.45	45.40	44.29	43.27
o	Coal425W/OCCS-Agg-Moderate	41.00	44.98	46.47	46.40	44.46	47.58	47.31	46.55	44.73	44.73	41.96	46.03	48.43	50.89	50.13	49.60	49.08	48.65	48.65	48.66	48.42	48.42	48.42	48.42	48.42	47.53	46.48	45.37	44.34
p	NUC1600-Agg-LowNoWind	40.80	40.01	46.71	44.36	50.01	51.32	50.18	52.08	51.68	53.91	55.11	55.17	59.09	67.23	67.37	66.94	66.51	66.09	65.67	65.26	64.76	64.36	63.96	63.57	63.19	62.44	61.63	61.18	60.77
q	Combine Cycle-Agg-LowNoWind	41.16	40.58	38.72	44.38	42.02	39.17	39.26	37.92	43.49	43.44	40.36	44.94	48.73	52.44	52.08	51.49	50.90	50.33	49.80	49.80	49.55	49.55	49.55	49.55	49.55	48.63	47.52	46.35	45.26
r	Coal425W/OCCS-Agg-no	41.21	40.94	39.30	39.44	44.51	41.99	42.52	41.09	43.78	46.49	42.00	45.50	42.57	49.67	48.97	49.04	48.52	48.52	48.52	48.52	48.26	48.26	48.26	48.26	48.26	47.29	46.13	44.90	43.76

Table of ratio of net cash flow to capital expenditures by plan by year, plan name consisting of supply-side type, then DSM type, then renewables portfolio type:

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
a	NUC1600 - AggressiveDSM - ModerateRenewables	1.09	0.84	0.53	0.46	0.66	0.41	0.46	1.03	0.32	0.25	0.23	0.22	0.17	0.68	1.94	2.18	2.14	2.02	2.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b	NUC1200 - AggressiveDSM - ModerateRenewables	472.08	528.59	605.89	551.00	591.31	624.77	655.35	616.03	522.63	452.46	408.88	376.85	721.50	1106.19	1080.84	1076.31	1050.19	1073.23	1074.89	1077.77	1079.24	1089.94	1096.21	1100.24	1083.09	1038.40	1050.34	1072.40	1103.93
c	NUC1600 - AggressiveDSM - HighRenewables	471.24	527.10	601.68	539.66	518.92	618.44	648.52	619.97	508.12	609.67	668.36	612.35	1053.94	1506.93	1443.88	1376.73	1315.91	1282.55	1281.03	1276.15	1266.12	1277.31	1286.43	1289.05	1272.46	1215.54	1230.27	1236.53	1274.12
d	NUC1200 - AggressiveDSM - HighRenewables	472.08	528.59	605.89	550.59	542.49	691.50	664.04	673.99	581.72	709.31	783.80	756.30	1080.68	1413.61	1355.97	1289.87	1231.84	1201.06	1202.03	1199.52	1189.87	1201.26	1210.18	1212.80	1196.21	1139.29	1154.02	1163.14	1199.60
e	NUC1600 - AggressiveDSM - WindRenewables	471.52	530.02	599.70	542.13	519.93	586.12	620.08	547.37	423.05	537.68	621.19	614.18	1069.61	1523.72	1421.32	1335.36	1269.26	1229.05	1226.76	1234.19	1236.00	1247.81	1257.17	1260.69	1244.90	1201.59	1213.91	1236.82	1270.78
f	NUC1600 - AggressiveDSM - noRenewables	472.39	507.31	520.95	463.92	439.08	443.54	462.18	433.40	335.53	245.21	195.79	133.38	598.36	1087.50	1052.67	1054.69	1037.58	1065.91	1069.95	1076.56	1077.62	1097.64	1122.54	1121.19	1104.84	1094.37	1098.98	1121.89	1155.85
g	NUC1600 - AggressiveDSM - LowW/WindRenewables	472.39	507.31	520.95	463.92	439.08	441.91	499.02	480.40	371.91	279.94	226.61	244.69	722.46	1186.16	1147.37	1149.39	1104.59	1105.23	1109.27	1115.88	1116.94	1136.96	1161.86	1160.31	1144.16	1133.68	1123.17	1149.62	1183.58
h	NUC1200 - AggressiveDSM - WindRenewables	472.35	531.31	603.92	553.06	543.50	619.17	655.61	601.40	496.65	637.31	736.41	758.12	1096.35	1430.40	1331.23	1240.98	1161.25	1159.07	1165.62	1174.56	1176.01	1187.32	1195.83	1198.76	1182.41	1139.00	1151.33	1173.11	1209.93
i	NUC1200 - AggressiveDSM - noRenewables	473.23	509.00	525.34	474.84	482.64	476.60	497.71	487.42	409.14	344.85	311.01	277.15	618.12	973.95	973.37	961.71	960.81	1003.61	1011.75	1019.81	1020.43	1039.69	1064.28	1062.72	1046.17	1035.66	1040.28	1064.05	1098.87
j	NUC1200 - AggressiveDSM - LowW/WindRenewables	473.23	509.00	525.34	474.84	482.64	474.96	534.54	534.43	445.52	379.57	341.83	388.47	742.21	1070.61	1068.08	1076.42	1027.82	1042.92	1051.07	1059.13	1059.75	1079.01	1103.60	1102.03	1085.49	1074.98	1064.47	1091.78	1126.60
k	Pumped Storage - AggressiveDSM - ModerateRenewables	474.59	533.24	619.24	583.74	621.85	723.55	756.32	756.96	762.54	773.98	785.92	776.84	735.51	707.38	803.96	882.83	887.31	879.81	879.36	886.94	887.42	896.13	904.02	906.52	889.93	845.33	857.27	878.47	911.14
l	Combine Cycle - AggressiveDSM - ModerateRenewables	474.59	533.24	619.24	583.77	622.00	723.87	756.80	757.78	764.01	776.55	795.29	804.36	781.29	742.56	851.68	888.58	884.77	877.84	878.10	886.34	887.43	896.70	905.27	907.89	891.29	846.69	858.63	879.83	912.50
m	Coal850W/OCCS - AggressiveDSM - ModerateRenewables	474.59	533.24	619.24	583.77	622.00	723.88	758.08	762.86	768.87	778.12	788.96	798.21	620.02	592.39	893.97	940.61	911.98	950.67	957.40	962.61	960.90	967.58	975.00	976.81	959.47	914.75	926.69	948.75	982.28
n	Simple Cycle - AggressiveDSM - HighRenewables	474.59	533.24	619.24	583.36	613.16	750.60	785.50	815.74	823.11	1033.40	1170.21	1184.21	1156.92	1102.33	1101.40	1033.48	1020.05	1004.79	1011.15	1013.57	1003.16	1012.78	1020.75	1022.64	1005.92	949.01	963.74	971.99	1007.59
o	Coal425W/OCCS - AggressiveDSM - ModerateRenewables	474.59	533.24	619.24	583.77	622.00	723.88	758.08	762.86	768.87	769.19	772.03	756.66	696.54	666.79	871.35	916.42	881.70	923.57	934.21	940.16	939.13	946.44	953.74	955.29	937.71	892.95	904.89	926.95	960.48
p	NUC1600 - AggressiveDSM - LowNoWindRenewables	472.11	504.77	523.11	461.85	466.89	449.14	461.92	448.03	352.62	256.42	222.44	186.87	648.72	1153.46	1124.90	1124.66	1112.16	1097.18	1090.00	1091.35	1093.20	1113.51	1138.62	1136.96	1120.36	1108.69	1112.92	1134.12	1166.78
q	Combine Cycle - AggressiveDSM - LowNoWindRenewables	473.46	510.74	540.65	505.55	561.14	581.28	600.15	648.82	662.45	673.22	719.18	739.65	685.08	756.64	837.43	866.54	861.62	830.55	868.69	884.94	884.80	902.36	926.22	923.66	906.23	893.79	897.90	919.95	953.49

4 CSR 240-22.060 (4) (B)

The modeling procedure shall be based on the assumption that rates will be adjusted annually, in a manner that is consistent with Missouri law. This provision does not imply any requirement for the utility to file actual rate cases or for the commission to accord any particular ratemaking treatment to actual costs incurred by the utility;

The Midas model adjusts rates annually, so that whenever new assets are acquired, rates are adjusted by rolling those new assets into the rate base. A more complete description of the Midas model is in section (6) (E) below.

4 CSR 240-22.060 (4) (C)

The modeling procedure shall include a method to ensure that the impacts of changes in electric rates on future levels of demand for electric service is accounted for in the analysis.

See documentation for 4 CSR 240-22.060 (6) (D).

4 CSR 240-22.060 (5)

If the utility intends to continue existing load-building programs or implement new ones, it shall analyze these programs in the context of one (1) or more of the alternative plans developed pursuant to section (3) of this rule, including the preferred resource plan selected pursuant to 4 CSR 240-22.070 (6). This analysis shall use the same modeling procedure and assumptions described in section (4) and shall include the following elements:

(A) Estimation of the impact of load-building programs on the electric utility's summer and winter peak demands and energy usage;

(B) A comparison of annual average rates in each year of the planning horizon for the resource plan with and without the load-building program;

(C) A comparison of the probable environmental costs of the resource plan in each year of the planning horizon with and without the proposed load-building program; and

(D) An assessment of any other aspects of the proposed load-building programs that affect the public interest.

4 CSR 240-22.060 (5) (D) is not applicable because AmerenUE has no load-building programs.

4 CSR 240-22.060 (6)

Reporting Requirements. To demonstrate compliance with the provisions of this rule, and pursuant to the requirements of 4 CSR 240-22.080, the utility shall prepare a report that contains at least the following information:

(A) A description of each alternative resource plan including the type and size of each resource addition and a listing of the sequence and schedule for retiring existing resources and acquiring each new resource addition;

The 110 alternative resource plans are grouped into 17 spreadsheets provided in "4 CSR 240-22.060 Appendix Capacity_A2" through "4 CSR 240-22.060 Appendix Capacity_Q2" in Adobe software called "PDF" files. These 17 spreadsheets or PDF files generally group together several of the 110 total resource plans that have a similar combination of demand-side management (DSM) type and renewable portfolio standard (RPS) resource type.

Within each spreadsheet are details on the type, size, and timing of the retirement of existing resources and the acquisition of each new resource, in "tabs" whose names generally indicate the supply-side type, the DSM type, and the renewable portfolio type for the plan contained in any particular tab in one of the 17 spreadsheets. In the "PDF" version of these spreadsheets, the names of the plans are shown in the "footer" at the bottom of each page, with the "footer" indicating the supply-side type, the DSM type, and the renewable portfolio standard (RPS) type, while in the Microsoft Excel version of the spreadsheets the name of the tab is visibly displayed to enable selection of any particular tab.

A complete listing of the 110 total plans is in the next 4 tables, which show the supply-side type, DSM type, renewables type, and whether or not the plan includes existing plant upgrades. Additionally show is the name of the "tab" (within a Microsoft Excel spreadsheet) that has the specific details on each individual plan, and the name of the spreadsheet that contains one or more tabs. Any one Excel or Adobe "PDF" spreadsheet generally groups together some plans sharing some common characteristics. In the Adobe "PDF" version of the spreadsheets, the tab name will be visible in the "footer" at the bottom of each page.

The first table has the 42 plans of the 110 total plans that have "Aggressive DSM" and existing plant upgrades, with a variety of supply side resources and a variety of renewable types:

	Supply-side Type	DSM Type	Renewables Type	Existing Plant Upgrade	Sheet or Tab Name	Spreadsheet Name
1	Coal425W/CCS	Aggressive	High	Yes	Coal425 AggDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_A2.xls
2	Coal425W/OCCS	Aggressive	High	Yes	Coal425 AggDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_A2.xls
3	Coal850W/OCCS	Aggressive	High	Yes	Coal850 AggDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_A2.xls
4	Combine Cycle	Aggressive	High	Yes	Combine Cycle AggDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_A2.xls
5	NUC1200	Aggressive	High	Yes	Nuc75% AggDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_A2.xls
6	NUC1600	Aggressive	High	Yes	Nuc100% AggDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_A2.xls
7	Pumped Storage	Aggressive	High	Yes	Pumped AggDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_A2.xls
8	Simple Cycle	Aggressive	High	Yes	Simple Cycle AggDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_A2.xls
9	Coal425W/CCS	Aggressive	LowW/Wind	Yes	Coal425 AggDSM LowWWindRPS	4 CSR 240-22.060 Appendix Capacity_C2.xls
10	Coal425W/OCCS	Aggressive	LowW/Wind	Yes	Coal425 AggDSM LowWWindRPS	4 CSR 240-22.060 Appendix Capacity_C2.xls
11	Coal850W/OCCS	Aggressive	LowW/Wind	Yes	Coal850 AggDSM LowWWindRPS	4 CSR 240-22.060 Appendix Capacity_C2.xls
12	Combine Cycle	Aggressive	LowW/Wind	Yes	Combine CycleAggDSM LowWWindRPS	4 CSR 240-22.060 Appendix Capacity_C2.xls
13	NUC1200	Aggressive	LowW/Wind	Yes	Nuc75% AggDSM LowWWindRPS	4 CSR 240-22.060 Appendix Capacity_C2.xls
14	NUC1600	Aggressive	LowW/Wind	Yes	Nuc100% AggDSM LowWWindRPS	4 CSR 240-22.060 Appendix Capacity_C2.xls
15	Pumped Storage	Aggressive	LowW/Wind	Yes	Pumped AggDSM LowWWindRPS	4 CSR 240-22.060 Appendix Capacity_C2.xls
16	Simple Cycle	Aggressive	LowW/Wind	Yes	Simple AggDSM LowWWindRPS	4 CSR 240-22.060 Appendix Capacity_C2.xls
17	Coal425W/CCS	Aggressive	Moderate	Yes	Coal425 AggDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_E2.xls
18	Coal425W/OCCS	Aggressive	Moderate	Yes	Coal425 AggDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_E2.xls
19	Coal850W/OCCS	Aggressive	Moderate	Yes	Coal850 AggDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_E2.xls
20	Combine Cycle	Aggressive	Moderate	Yes	Combine Cycle AggDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_F2.xls
21	NUC1200	Aggressive	Moderate	Yes	Nuke75% AggDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_E2.xls
22	NUC1600	Aggressive	Moderate	Yes	Nuke100% AggDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_E2.xls
23	Pumped Storage	Aggressive	Moderate	Yes	Pumped AggDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_F2.xls
24	Simple Cycle	Aggressive	Moderate	Yes	Simple Cycle AggDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_F2.xls
25	Coal425W/CCS	Aggressive	no	Yes	Coal425 AggDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_B2.xls
26	Coal425W/OCCS	Aggressive	no	Yes	Coal425 AggDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_B2.xls
27	Coal850W/OCCS	Aggressive	no	Yes	Coal850 AggDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_B2.xls
28	Combine Cycle	Aggressive	no	Yes	Combine Cycle AggDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_B2.xls
29	NUC1200	Aggressive	no	Yes	Nuke75% AggDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_B2.xls
30	NUC1600	Aggressive	no	Yes	Nuke100% AggDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_B2.xls
31	Pumped Storage	Aggressive	no	Yes	Pumped AggDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_B2.xls
32	Simple Cycle	Aggressive	no	Yes	Simple Cycle AggDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_B2.xls
33	Combine Cycle	Aggressive	LowNoWind	Yes	CombCyc AggDSM LoNoWdRPS YesEPU	4 CSR 240-22.060 Appendix Capacity_Q2.xls
34	NUC1600	Aggressive	LowNoWind	Yes	Nuk100% AggDSM LoNoWdRPS YesEPU	4 CSR 240-22.060 Appendix Capacity_Q2.xls
35	Coal425W/CCS	Aggressive	Wind	Yes	Coal425 AggDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_D2.xls
36	Coal425W/OCCS	Aggressive	Wind	Yes	Coal425 AggDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_D2.xls
37	Coal850W/OCCS	Aggressive	Wind	Yes	Coal850 AggDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_D2.xls
38	Combine Cycle	Aggressive	Wind	Yes	Combine Cycle AggDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_D2.xls
39	NUC1200	Aggressive	Wind	Yes	Nuc75% AggDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_D2.xls
40	NUC1600	Aggressive	Wind	Yes	Nuc100% AggDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_D2.xls
41	Pumped Storage	Aggressive	Wind	Yes	Pumped AggDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_D2.xls
42	Simple Cycle	Aggressive	Wind	Yes	Simple Cycle AggDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_D2.xls

The second table has the 32 plans of the 110 total plans that have "Moderate DSM" and existing plant upgrades, with a variety of supply side resources and a variety of renewable types:

	Supply-side Type	DSM Type	Renewables Type	Existing Plant Upgrade	Sheet or Tab Name	Spreadsheet Name
43	Coal425W/CCS	Moderate	High	Yes	Coal425 ModDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_G2.xls
44	Coal425W/OCCS	Moderate	High	Yes	Coal425 ModDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_G2.xls
45	Coal850W/OCCS	Moderate	High	Yes	Coal850 ModDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_G2.xls
46	Combine Cycle	Moderate	High	Yes	Combine Cycle ModDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_G2.xls
47	NUC1200	Moderate	High	Yes	Nuc75% ModDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_G2.xls
48	NUC1600	Moderate	High	Yes	Nuc100% ModDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_G2.xls
49	Pumped Storage	Moderate	High	Yes	Pumped ModDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_G2.xls
50	Simple Cycle	Moderate	High	Yes	Simple Cycle ModDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_G2.xls
51	Coal425W/CCS	Moderate	Moderate	Yes	Coal425 ModDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_J2.xls
52	Coal425W/OCCS	Moderate	Moderate	Yes	Coal425 ModDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_J2.xls
53	Coal850W/OCCS	Moderate	Moderate	Yes	Coal850 ModDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_J2.xls
54	Combine Cycle	Moderate	Moderate	Yes	Combine Cycle ModDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_J2.xls
55	NUC1200	Moderate	Moderate	Yes	Nuc75% ModDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_J2.xls
56	NUC1600	Moderate	Moderate	Yes	Nuc100% ModDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_J2.xls
57	Pumped Storage	Moderate	Moderate	Yes	Pumped ModDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_J2.xls
58	Simple Cycle	Moderate	Moderate	Yes	Simple Cycle ModDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_J2.xls
59	Coal425W/CCS	Moderate	no	Yes	Coal425 ModDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_I2.xls
60	Coal425W/OCCS	Moderate	no	Yes	Coal425 ModDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_I2.xls
61	Coal850W/OCCS	Moderate	no	Yes	Coal850 ModDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_I2.xls
62	Combine Cycle	Moderate	no	Yes	Combine Cycle ModDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_I2.xls
63	NUC1200	Moderate	no	Yes	Nuc75% ModDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_I2.xls
64	NUC1600	Moderate	no	Yes	Nuc100% ModDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_I2.xls
65	Pumped Storage	Moderate	no	Yes	Pumped ModDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_I2.xls
66	Simple Cycle	Moderate	no	Yes	Simple Cycle ModDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_I2.xls
67	Coal425W/CCS	Moderate	Wind	Yes	Coal425 ModDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_H2.xls
68	Coal425W/OCCS	Moderate	Wind	Yes	Coal425 ModDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_H2.xls
69	Coal850W/OCCS	Moderate	Wind	Yes	Coal850 ModDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_H2.xls
70	Combine Cycle	Moderate	Wind	Yes	Combine Cycle ModDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_H2.xls
71	NUC1200	Moderate	Wind	Yes	Nuc75% ModDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_H2.xls
72	NUC1600	Moderate	Wind	Yes	Nuc100% ModDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_H2.xls
73	Pumped Storage	Moderate	Wind	Yes	Pumped ModDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_H2.xls
74	Simple Cycle	Moderate	Wind	Yes	Simple Cycle ModDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_H2.xls

The third table has the 32 plans of the 110 total plans that have "No DSM" and existing plant upgrades, with a variety of supply side resources and a variety of renewable types:

	Supply-side Type	DSM Type	Renewables Type	Plant Upgrade	Sheet or Tab Name	Spreadsheet Name
75	Coal425W/CCS	No	High	Yes	Coal425 NoDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_K2.xls
76	Coal425W/OCCS	No	High	Yes	Coal425 NoDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_K2.xls
77	Coal850W/OCCS	No	High	Yes	Coal850 NoDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_K2.xls
78	Combine Cycle	No	High	Yes	Combine Cycle NoDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_K2.xls
79	NUC1200	No	High	Yes	Nuc75% NoDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_K2.xls
80	NUC1600	No	High	Yes	Nuc100% NoDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_K2.xls
81	Pumped Storage	No	High	Yes	Pumped NoDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_K2.xls
82	Simple Cycle	No	High	Yes	Simple Cycle NoDSM HighRPS	4 CSR 240-22.060 Appendix Capacity_K2.xls
83	Coal425W/CCS	No	Moderate	Yes	Coal425 NoDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_L2.xls
84	Coal425W/OCCS	No	Moderate	Yes	Coal425 NoDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_L2.xls
85	Coal850W/OCCS	No	Moderate	Yes	Coal850 NoDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_L2.xls
86	Combine Cycle	No	Moderate	Yes	Combine Cycle NoDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_L2.xls
87	NUC1200	No	Moderate	Yes	Nuc75% NoDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_L2.xls
88	NUC1600	No	Moderate	Yes	Nuc100% NoDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_L2.xls
89	Pumped Storage	No	Moderate	Yes	Pumped NoDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_L2.xls
90	Simple Cycle	No	Moderate	Yes	Simple Cycle NoDSM ModRPS	4 CSR 240-22.060 Appendix Capacity_L2.xls
91	Coal425W/CCS	No	no	Yes	Coal425 NoDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_N2.xls
92	Coal425W/OCCS	No	no	Yes	Coal425 NoDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_N2.xls
93	Coal850W/OCCS	No	no	Yes	Coal850 NoDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_N2.xls
94	Combine Cycle	No	no	Yes	Combine Cycle NoDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_N2.xls
95	NUC1200	No	no	Yes	Nuc75% NoDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_N2.xls
96	NUC1600	No	no	Yes	Nuc100% NoDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_N2.xls
97	Pumped Storage	No	no	Yes	Pumped NoDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_N2.xls
98	Simple Cycle	No	no	Yes	Simple Cycle NoDSM NoRPS	4 CSR 240-22.060 Appendix Capacity_N2.xls
99	Coal425W/CCS	No	Wind	Yes	Coal425 NoDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_M2.xls
100	Coal425W/OCCS	No	Wind	Yes	Coal425 NoDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_M2.xls
101	Coal850W/OCCS	No	Wind	Yes	Coal850 NoDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_M2.xls
102	Combine Cycle	No	Wind	Yes	Combine Cycle NoDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_M2.xls
103	NUC1200	No	Wind	Yes	Nuc75% NoDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_M2.xls
104	NUC1600	No	Wind	Yes	Nuc100% NoDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_M2.xls
105	Pumped Storage	No	Wind	Yes	Pumped NoDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_M2.xls
106	Simple Cycle	No	Wind	Yes	Simple Cycle NoDSM WindRPS	4 CSR 240-22.060 Appendix Capacity_M2.xls

The fourth table has the 4 plans of the 110 total plans that have "No existing plant upgrades" with Aggressive DSM, various supply side resources and various renewable types:

	Supply-side Type	DSM Type	Renewables Type	Existing Plant Upgrade	Sheet or Tab Name	Spreadsheet Name
107	Combine Cycle	Aggressive	Moderate	No	Comb Cycle AggDSM ModRP NoEPU	4 CSR 240-22.060 Appendix Capacity_O2.xls
108	NUC1600	Aggressive	Moderate	No	Nuke100% AggDSM ModRPS NoEPU	4 CSR 240-22.060 Appendix Capacity_O2.xls
109	Combine Cycle	Aggressive	LowNoWind	No	CombCyc AggDSM LoNoWdRPS NoEPU	4 CSR 240-22.060 Appendix Capacity_P2.xls
110	NUC1600	Aggressive	LowNoWind	No	Nuke100% AggDSM LoNoWdRPS NoEPU	4 CSR 240-22.060 Appendix Capacity_P2.xls

In what has been defined as "Step 2A," the 110 total resource plans within each of the 9 scenarios or "worlds" were analyzed to determine which top-ranking plans should be selected among them for more detailed analysis in later steps. A scenario is defined by 3 characteristics, CO_2 prices from CO_2 policy, natural gas prices, and energy efficiency levels. A description of the 9 scenarios is shown in the nearby table.

Scenario Number	CO2 Policy	Gas Prices	Energy Efficiency
0	*Base Price*	*Base Price*	*Base Energy Efficiency*
1	High Price	High Price	Transformed Demand
2	High Price	High Price	Base Energy Efficiency
3	High Price	Base Price	Transformed Demand
4	High Price	Base Price	Base Energy Efficiency
5	Moderate Price	High Price	Base Energy Efficiency
6	Moderate Price	Base Price	Base Energy Efficiency
7	Mandates	High Price	Base Energy Efficiency
8	Mandates	Base Price	Base Energy Efficiency

An analysis found the best (lowest) present value of revenue requirements (PVRR) for each of the 9 scenarios by comparing the PVRRs of each of the 110 plans within each scenario. Then the best PVRR for each scenario was subtracted from each plan's PVRR within the respective scenario. This created a difference versus the "best" PVRR within each scenario for each plan. These differences vs. the best PVRR across the 9 scenarios were summed for each of the 110 plans for an overall total difference.

These differences versus the best PVRR within scenario by plan are shown for the top 29 plans in a table several paragraphs below this paragraph. The difference versus the best in each scenario are shown in columns titled "Scen_0," Scen_1," etc, and the total of the differences summed across the 9 scenarios is shown in a column titled "Total Diff." It is on the value of "Total Diff" that the ranking from best (lowest Total Diff) to worst (highest Total Diff) occurs.

When ranked solely by overall total difference, it takes the top 29 plans to include the winner in each of the 9 scenarios (indicated by a zero difference in one or more columns; these situations are highlighted with a yellow background in the table below).

In this table the plan name consists of the combination of the supply-side type, the DSM type, the renewable type, and the EPU type (existing plant upgrade). The DSM type abbreviations are "Agg" for "aggressive" or "Mod" for "Moderate," while the EPU type is shown as either "YesEPU" or "NoEPU." So for example "NUC1600-Agg-Moderate-YesEPU" means Nuclear 1600 MW, Aggressive DSM, Moderate renewables, with existing plant upgrade.

Any top-29 plan that is a "NoEPU" was found to rank far below its comparable "YesEPU" counterpart. For example, "NUC1600-Agg-Moderate-YesEPU" in first place with a 2,407 difference was far better than its "NoEPU counterpart in the 12th place with a 6,223 difference.

	NameWithEPUKey	Difference between Plan PVRR and "best" PVRR within own scenario										1=in	Rank in
	(EPU=Existing plant upgrade)	Scen_0	Scen_1	Scen_2	Scen_3	Scen_4	Scen_5	Scen_6	Scen_7	Scen_8	Total Diff	top 18	top 18
1	NUC1600-Agg-Moderate-YesEPU	735	16	0	0	0	88	260	502	806	2,407	1	1
2	NUC1200-Agg-Moderate-YesEPU	592	353	244	235	229	138	195	463	613	3,062	1	2
3	NUC1600-Agg-LowNoWind-YesEPU	489	149	70	21	16	0	91	1,077	1,234	3,148	1	3
4	NUC1200-Agg-High-YesEPU	1,229	260	284	336	338	476	698	0	421	4,041	1	4
5	NUC1600-Agg-High-YesEPU	1,418	0	109	241	248	484	816	165	763	4,244	1	5
6	NUC1600-Agg-Wind-YesEPU	1,226	237	276	343	343	466	713	655	1,069	5,329	1	6
7	NUC1200-Agg-Wind-YesEPU	1,059	553	497	546	540	492	624	639	888	5,838	1	7
8	NUC1600-Agg-no-YesEPU	524	582	432	379	367	195	204	1,604	1,608	5,895	1	8
9	NUC1600-Agg-LowW/Wind-YesEPU	615	466	354	335	323	202	259	1,651	1,733	5,938	1	9
10	Coal850W/OCCS-Agg-Moderate-YesEPU	265	1,414	1,156	1,016	1,015	350	223	471	93	6,004	1	10
11	Pumped Storage-Agg-Moderate-YesEPU	334	1,563	1,124	952	971	416	178	455	126	6,118	1	11
12	*NUC1600-Agg-Moderate-NoEPU*	1,092	531	476	454	453	515	644	928	1,130	6,223	0	
13	Combine Cycle-Agg-Moderate-YesEPU	340	1,578	1,102	1,104	1,003	416	170	471	93	6,277	1	12
14	NUC1200-Agg-no-YesEPU	375	957	678	590	589	242	145	1,526	1,365	6,467	1	13
15	NUC1200-Agg-LowW/Wind-YesEPU	459	835	593	542	541	241	193	1,604	1,487	6,495	1	14
16	Coal425W/OCCS-Agg-Moderate-YesEPU	395	1,601	1,225	1,181	1,113	471	281	471	93	6,830	1	15
17	Combine Cycle-Agg-LowNoWind-YesEPU	109	1,739	1,175	1,154	1,062	301	0	1,012	467	7,020	1	16
18	Coal850W/OCCS-Agg-High-YesEPU	882	1,270	1,175	1,119	1,102	669	697	76	62	7,053	0	
19	Coal425W/OCCS-Agg-High-YesEPU	891	1,365	1,151	1,083	1,090	699	662	76	62	7,079	0	
20	Simple Cycle-Agg-High-YesEPU	1,052	1,479	1,178	1,243	1,121	767	711	15	0	7,565	1	17
21	Simple Cycle-Agg-Moderate-YesEPU	550	1,701	1,234	1,344	1,142	527	321	612	235	7,665	0	
22	NUC1600-Mod-Moderate-YesEPU	1,200	821	735	709	706	679	786	994	1,188	7,819	0	
23	*NUC1600-Agg-LowNoWind-NoEPU*	932	781	655	612	604	523	568	1,587	1,640	7,902	0	
24	Pumped Storage-Agg-High-YesEPU	1,034	1,548	1,253	1,178	1,192	830	749	94	52	7,930	0	
25	Coal850W/OCCS-Agg-Wind-YesEPU	629	1,520	1,310	1,236	1,226	601	550	629	338	8,037	0	
26	Combine Cycle-Agg-High-YesEPU	1,054	1,576	1,251	1,287	1,225	851	751	76	62	8,135	0	
27	NUC1600-Mod-High-YesEPU	1,772	652	707	783	787	951	1,223	537	1,026	8,437	0	
28	NUC1200-Mod-Moderate-YesEPU	1,036	1,166	961	976	980	708	707	967	995	8,496	0	
29	Coal425W/OCCS-Agg-no-YesEPU	0	1,965	1,445	1,389	1,277	368	39	1,439	763	8,686	1	18

Since "Aggressive" DSM took 26 of the top 29 spots compared to only 3 appearances of "Moderate" DSM appearances in the top 29 plans (with the best "Moderate" DSM type being in the relatively low 22nd position), only "Aggressive" DSM types were considered for the top 18 plans.

Additionally, among the top 29 plans there are numerous duplications of various supply-side types and renewables types. So further paring was done among the top 29 plans, while keeping representatives of the key supply-side and renewables types, and while keeping the plans that were winners in each of the 9 scenarios. That culling is indicated in the table above, highlighted in green in the far right column, where the numbers 1 through 18 appear for those selected in the top 18, while blanks appear for those dropped in this final selection step. A summary table showing just the top 18 plans resulting from this final selection process is shown on the right, highlighted in blue. Since these 18 all include existing plant upgrades, the "YesEPU" component of their name has been omitted in this table.

NUC1600-Agg-Moderate
NUC1200-Agg-Moderate
NUC1600-Agg-LowNoWind
NUC1200-Agg-High
NUC1600-Agg-High
NUC1600-Agg-Wind
NUC1200-Agg-Wind
NUC1600-Agg-no
NUC1600-Agg-LowW/Wind
Coal850W/OCCS-Agg-Moderate
Pumped Storage-Agg-Moderate
Combine Cycle-Agg-Moderate
NUC1200-Agg-no
NUC1200-Agg-LowW/Wind
Coal425W/OCCS-Agg-Moderate
Combine Cycle-Agg-LowNoWind
Simple Cycle-Agg-High
Coal425W/OCCS-Agg-no

Two tables below demonstrate that significant representation of supply-side types and of renewables types were retained by this selection process.

	InTop18		
SupplySide	No	Yes	Grand Total
Coal425W/OCCS	1	2	3
Coal850W/OCCS	2	1	3
Combine Cycle	1	2	3
NUC1200	1	5	6
NUC1600	4	6	10
Pumped Storage	1	1	2
Simple Cycle	1	1	2
Grand Total	11	18	29

	InTop18		
Renewables	No	Yes	Grand Total
High	5	3	8
LowNoWind	1	2	3
LowW/Wind		2	2
Moderate	4	6	10
no		3	3
Wind	1	2	3
Grand Total	11	18	29

(B) A summary tabulation that shows the performance of each alternative resource plan as measured by each of the measures specified in section (2) of this rule;

Present worth of utility revenue requirements

Present Value of Revenue Requirement ($ MM)									
Plan name	Scenario_0	Scenario_1	Scenario_2	Scenario_3	Scenario_4	Scenario_5	Scenario_6	Scenario_7	Scenario_8
NUC1600 - AggressiveDSM - ModerateRenewables	$ 35,229	$ 37,424	$ 39,025	$ 38,164	$ 39,508	$ 36,813	$ 36,716	$ 35,370	$ 36,400
NUC1200 - AggressiveDSM - ModerateRenewables	$ 35,111	$ 37,786	$ 39,295	$ 38,424	$ 39,762	$ 36,888	$ 36,676	$ 35,355	$ 36,232
NUC1600 - AggressiveDSM - HighRenewables	$ 35,911	$ 37,408	$ 39,135	$ 38,406	$ 39,756	$ 37,209	$ 37,272	$ 35,033	$ 36,357
NUC1200 - AggressiveDSM - HighRenewables	$ 35,747	$ 37,692	$ 39,334	$ 38,525	$ 39,871	$ 37,226	$ 37,179	$ 34,892	$ 36,040
NUC1600 - AggressiveDSM - WindRenewables	$ 35,720	$ 37,645	$ 39,301	$ 38,508	$ 39,852	$ 37,191	$ 37,169	$ 35,522	$ 36,663
NUC1600 - AggressiveDSM - noRenewables	$ 35,018	$ 37,989	$ 39,458	$ 38,544	$ 39,875	$ 36,920	$ 36,660	$ 36,472	$ 37,202
NUC1600 - AggressiveDSM - LowW/WindRenewables	$ 35,109	$ 37,873	$ 39,379	$ 38,499	$ 39,832	$ 36,927	$ 36,715	$ 36,518	$ 37,327
NUC1200 - AggressiveDSM - WindRenewables	$ 35,577	$ 37,986	$ 39,548	$ 38,735	$ 40,073	$ 37,242	$ 37,105	$ 35,532	$ 36,506
NUC1200 - AggressiveDSM - noRenewables	$ 34,894	$ 38,390	$ 39,728	$ 38,779	$ 40,122	$ 36,992	$ 36,626	$ 36,419	$ 36,984
NUC1200 - AggressiveDSM - LowW/WindRenewables	$ 34,978	$ 38,267	$ 39,643	$ 38,731	$ 40,074	$ 36,991	$ 36,674	$ 36,497	$ 37,106
Pumped Storage - AggressiveDSM - ModerateRenewables	$ 34,928	$ 39,072	$ 40,250	$ 39,217	$ 40,581	$ 37,242	$ 36,735	$ 35,423	$ 35,821
Combine Cycle - AggressiveDSM - ModerateRenewables	$ 34,935	$ 39,086	$ 40,229	$ 39,370	$ 40,612	$ 37,242	$ 36,727	$ 35,439	$ 35,788
Coal850W/OCCS - AggressiveDSM - ModerateRenewables	$ 34,860	$ 38,923	$ 40,282	$ 39,282	$ 40,624	$ 37,176	$ 36,780		
Simple Cycle - AggressiveDSM - HighRenewables	$ 35,647	$ 38,988	$ 40,305	$ 39,508	$ 40,730	$ 37,593	$ 37,268	$ 34,983	$ 35,695
Coal425W/OCCS - AggressiveDSM - ModerateRenewables	$ 34,990	$ 39,110	$ 40,351	$ 39,446	$ 40,722	$ 37,297	$ 36,838		
NUC1600 - AggressiveDSM - LowNoWindRenewables	$ 34,983	$ 37,557	$ 39,096	$ 38,186	$ 39,524	$ 36,725	$ 36,547	$ 35,945	$ 36,828
Combine Cycle - AggressiveDSM - LowNoWindRenewables	$ 34,704	$ 39,248	$ 40,301	$ 39,419	$ 40,672	$ 37,127	$ 36,557	$ 35,980	$ 36,162
Coal425W/OCCS - AggressiveDSM - noRenewables	$ 34,595	$ 39,473	$ 40,572	$ 39,654	$ 40,886	$ 37,194	$ 36,596		

Present worth of probable environmental costs

Levelized Emission Expenditure ($ MM - after 2020)										
Plan name	Scenario_0	Scenario_1	Scenario_2	Scenario_3	Scenario_4	Scenario_5	Scenario_6	Scenario_7	Scenario_8	Average
NUC1600 - AggressiveDSM - ModerateRenewables	$ 294	$ 5,111	$ 4,909	$ 5,012	$ 5,045	$ 1,888	$ 1,883	$ 177	$ 183	$ 2,722
NUC1200 - AggressiveDSM - ModerateRenewables	$ 294	$ 5,157	$ 4,937	$ 5,139	$ 5,163	$ 1,895	$ 1,893	$ 177	$ 182	$ 2,760
NUC1600 - AggressiveDSM - HighRenewables	$ 302	$ 5,119	$ 4,915	$ 5,014	$ 5,048	$ 1,897	$ 1,890	$ 185	$ 189	$ 2,729
NUC1200 - AggressiveDSM - HighRenewables	$ 302	$ 5,119	$ 4,915	$ 5,014	$ 5,048	$ 1,897	$ 1,890	$ 185	$ 189	$ 2,729
NUC1600 - AggressiveDSM - WindRenewables	$ 276	$ 5,096	$ 4,891	$ 5,009	$ 5,040	$ 1,866	$ 1,868	$ 159	$ 167	$ 2,708
NUC1600 - AggressiveDSM - noRenewables	$ 276	$ 5,141	$ 4,922	$ 5,136	$ 5,157	$ 1,875	$ 1,878	$ 159	$ 167	$ 2,746
NUC1600 - AggressiveDSM - LowW/WindRenewables	$ 276	$ 5,141	$ 4,921	$ 5,136	$ 5,157	$ 1,874	$ 1,878	$ 159	$ 167	$ 2,746
NUC1200 - AggressiveDSM - WindRenewables	$ 276	$ 5,141	$ 4,918	$ 5,136	$ 5,157	$ 1,874	$ 1,878	$ 159	$ 167	$ 2,745
NUC1200 - AggressiveDSM - noRenewables	$ 276	$ 5,247	$ 4,966	$ 5,310	$ 5,323	$ 1,888	$ 1,898	$ 160	$ 168	$ 2,804
NUC1200 - AggressiveDSM - LowW/WindRenewables	$ 276	$ 5,247	$ 4,964	$ 5,310	$ 5,323	$ 1,887	$ 1,897	$ 159	$ 168	$ 2,803
Pumped Storage - AggressiveDSM - ModerateRenewables	$ 295	$ 5,289	$ 5,025	$ 5,352	$ 5,363	$ 1,909	$ 1,915	$ 178	$ 183	$ 2,834
Combine Cycle - AggressiveDSM - ModerateRenewables	$ 303	$ 5,384	$ 5,077	$ 5,571	$ 5,506	$ 1,934	$ 1,953	$ 181	$ 188	$ 2,900
Coal850W/OCCS - AggressiveDSM - ModerateRenewables	$ 488	$ 6,170	5,884	$ 6,184	$ 6,196	$ 2,354	$ 2,328			$ 4,229
Simple Cycle - AggressiveDSM - HighRenewables	$ 312	$ 5,248	$ 5,013	$ 5,284	$ 5,240	$ 1,928	$ 1,939	$ 189	$ 195	$ 2,816
Coal425W/OCCS - AggressiveDSM - ModerateRenewables	$ 397	$ 5,811	$ 5,497	$ 5,941	$ 5,904	$ 2,151	$ 2,149			$ 3,979
NUC1600 - AggressiveDSM - LowNoWindRenewables	$ 294	$ 5,111	4,910	$ 5,013	$ 5,046	$ 1,888	$ 1,883	$ 177	$ 183	$ 2,723
Combine Cycle - AggressiveDSM - LowNoWindRenewables	$ 304	$ 5,423	$ 5,114	$ 5,633	$ 5,568	$ 1,941	$ 1,967	$ 182	$ 189	$ 2,924
Coal425W/OCCS - AggressiveDSM - noRenewables	$ 399	$ 5,899	$ 5,592	$ 6,077	$ 6,006	$ 2,176	$ 2,185			$ 4,048

Present worth of out-of-pocket costs to participants in demand-side programs

	DSM Expenditure ($ MM - Levelized Value)		
Plan	Plan name	DSM	Expenditure (Levelized Average)
NUC1600-Aggressive-M	NUC1600 - AggressiveDSM - ModerateRenewables	Aggressive	23.18
NUC1200-Aggressive-M	NUC1200 - AggressiveDSM - ModerateRenewables	Aggressive	23.18
NUC1600-Aggressive-H	NUC1600 - AggressiveDSM - HighRenewables	Aggressive	23.18
NUC1200-Aggressive-H	NUC1200 - AggressiveDSM - HighRenewables	Aggressive	23.18
NUC1600-Aggressive-W	NUC1600 - AggressiveDSM - WindRenewables	Aggressive	23.18
NUC1600-Aggressive-no	NUC1600 - AggressiveDSM - noRenewables	Aggressive	23.18
NUC1600-Aggressive-LWW	NUC1600 - AggressiveDSM - LowW/WindRenewables	Aggressive	23.18
NUC1200-Aggressive-W	NUC1200 - AggressiveDSM - WindRenewables	Aggressive	23.18
NUC1200-Aggressive-no	NUC1200 - AggressiveDSM - noRenewables	Aggressive	23.18
NUC1200-Aggressive-LWW	NUC1200 - AggressiveDSM - LowW/WindRenewables	Aggressive	23.18
Pumped Storage-Aggressive-M	Pumped Storage - AggressiveDSM - ModerateRenewables	Aggressive	23.18
Combine Cycle-Aggressive-M	Combine Cycle - AggressiveDSM - ModerateRenewables	Aggressive	23.18
Coal850W/OCCS-Aggressive-M	Coal850W/OCCS - AggressiveDSM - ModerateRenewables	Aggressive	23.18
Simple Cycle-Aggressive-H	Simple Cycle - AggressiveDSM - HighRenewables	Aggressive	23.18
Coal425W/OCCS-Aggressive-M	Coal425W/OCCS - AggressiveDSM - ModerateRenewables	Aggressive	23.18
NUC1600-Aggressive-LNW	NUC1600 - AggressiveDSM - LowNoWindRenewables	Aggressive	23.18
Combine Cycle-Aggressive-LNW	Combine Cycle - AggressiveDSM - LowNoWindRenewables	Aggressive	23.18
Coal425W/OCCS-Aggressive-No	Coal425W/OCCS - AggressiveDSM - noRenewables	Aggressive	23.18

Levelized annual average rates

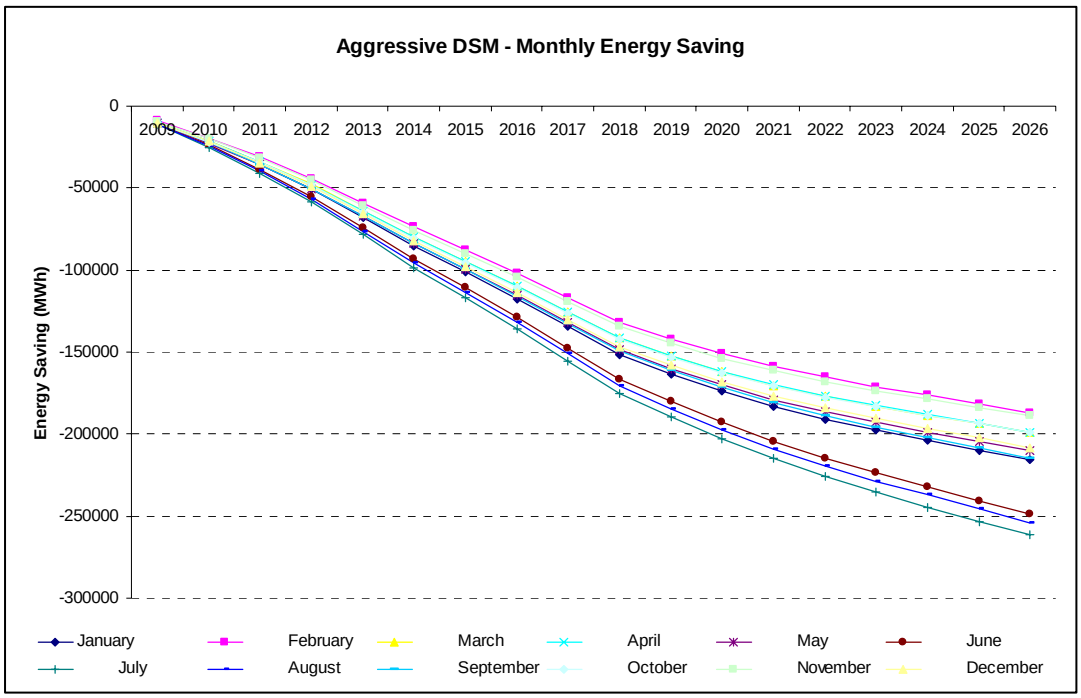
Levelized annual average rate									
Plan name	Scenario_0	Scenario_1	Scenario_2	Scenario_3	Scenario_4	Scenario_5	Scenario_6	Scenario_7	Scenario_8
NUC1600 - AggressiveDSM - ModerateRenewables	72	81	83	83	83	76	76	73	74
NUC1200 - AggressiveDSM - ModerateRenewables	72	82	83	83	84	76	76	73	74
NUC1600 - AggressiveDSM - HighRenewables	73	81	83	83	84	77	77	72	74
NUC1200 - AggressiveDSM - HighRenewables	73	82	83	83	84	77	77	72	74
NUC1600 - AggressiveDSM - WindRenewables	73	82	83	83	84	76	77	73	75
NUC1600 - AggressiveDSM - noRenewables	71	82	84	84	84	76	76	75	76
NUC1600 - AggressiveDSM - LowW/WindRenewables	72	82	84	83	84	76	76	75	76
NUC1200 - AggressiveDSM - WindRenewables	73	82	84	84	84	77	77	73	75
NUC1200 - AggressiveDSM - noRenewables	71	83	84	84	84	76	76	75	76
NUC1200 - AggressiveDSM - LowW/WindRenewables	71	83	84	84	84	76	76	75	75
Pumped Storage - AggressiveDSM - ModerateRenewables	71	84	85	85	85	76	76	73	73
Combine Cycle - AggressiveDSM - ModerateRenewables	71	85	85	85	85	76	76	73	73
Coal850W/OCCS - AggressiveDSM - ModerateRenewables	71	84	85	85	85	76	76	73	73
Simple Cycle - AggressiveDSM - HighRenewables	72	84	85	85	85	77	77	72	73
Coal425W/OCCS - AggressiveDSM - ModerateRenewables	71	85	85	85	85	76	76	73	73
NUC1600 - AggressiveDSM - LowNoWindRenewables	71	81	83	83	83	76	75	74	75
Combine Cycle - AggressiveDSM - LowNoWindRenewables	71	85	85	85	85	76	75	74	74
Coal425W/OCCS - AggressiveDSM - noRenewables	70	85	86	86	86	76	75	75	74

Maximum single-year increase in annual average rates

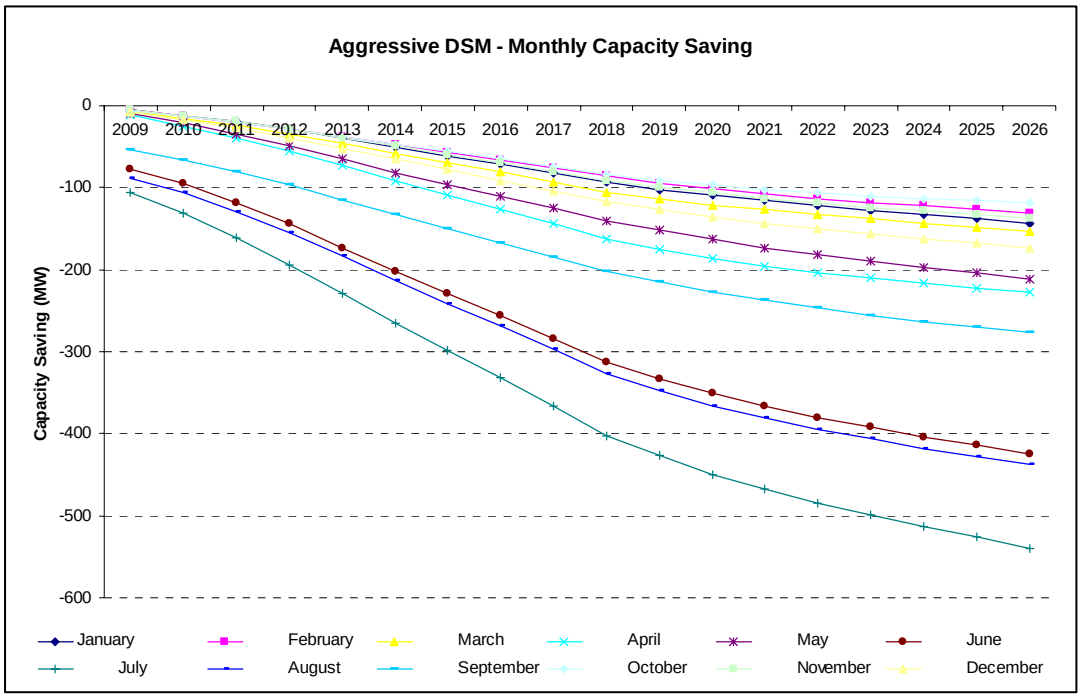
Maximum single-year increase in annual average rates (%)									
Plan name	Scenario_0	Scenario_1	Scenario_2	Scenario_3	Scenario_4	Scenario_5	Scenario_6	Scenario_7	Scenario_8
NUC1600 - AggressiveDSM - ModerateRenewables	35%	27%	28%	27%	28%	29%	31%	37%	43%
NUC1200 - AggressiveDSM - ModerateRenewables	26%	27%	28%	28%	28%	22%	24%	29%	34%
NUC1600 - AggressiveDSM - HighRenewables	28%	27%	27%	27%	28%	23%	26%	31%	37%
NUC1200 - AggressiveDSM - HighRenewables	20%	27%	28%	27%	28%	17%	19%	24%	29%
NUC1600 - AggressiveDSM - WindRenewables	27%	27%	28%	27%	28%	22%	24%	28%	34%
NUC1600 - AggressiveDSM - noRenewables	36%	28%	28%	28%	28%	30%	32%	37%	43%
NUC1600 - AggressiveDSM - LowW/WindRenewables	31%	28%	29%	28%	29%	25%	27%	31%	37%
NUC1200 - AggressiveDSM - WindRenewables	19%	27%	28%	28%	28%	15%	17%	21%	26%
NUC1200 - AggressiveDSM - noRenewables	27%	28%	29%	28%	29%	23%	25%	29%	34%
NUC1200 - AggressiveDSM - LowW/WindRenewables	22%	28%	29%	29%	29%	19%	20%	23%	29%
Pumped Storage - AggressiveDSM - ModerateRenewables	9%	27%	28%	28%	28%	11%	11%	9%	9%
Combine Cycle - AggressiveDSM - ModerateRenewables	9%	27%	28%	28%	28%	11%	11%	7%	7%
Coal850W/OCCS - AggressiveDSM - ModerateRenewables	12%	27%	28%	28%	28%	12%	12%	12%	9%
Simple Cycle - AggressiveDSM - HighRenewables	16%	27%	28%	28%	28%	16%	16%	16%	15%
Coal425W/OCCS - AggressiveDSM - ModerateRenewables	10%	27%	28%	28%	28%	11%	11%	10%	9%
NUC1600 - AggressiveDSM - LowNoWindRenewables	35%	28%	28%	28%	28%	29%	31%	36%	42%
Combine Cycle - AggressiveDSM - LowNoWindRenewables	8%	28%	29%	28%	29%	11%	11%	8%	9%
Coal425W/OCCS - AggressiveDSM - noRenewables	10%	28%	29%	29%	29%	11%	11%	10%	14%

(C) For each alternative resource plan, a plot of each of the following over the planning horizon:

(1) The combined impact of all demand-side resources on the base-case forecast of summer and winter peak demands;



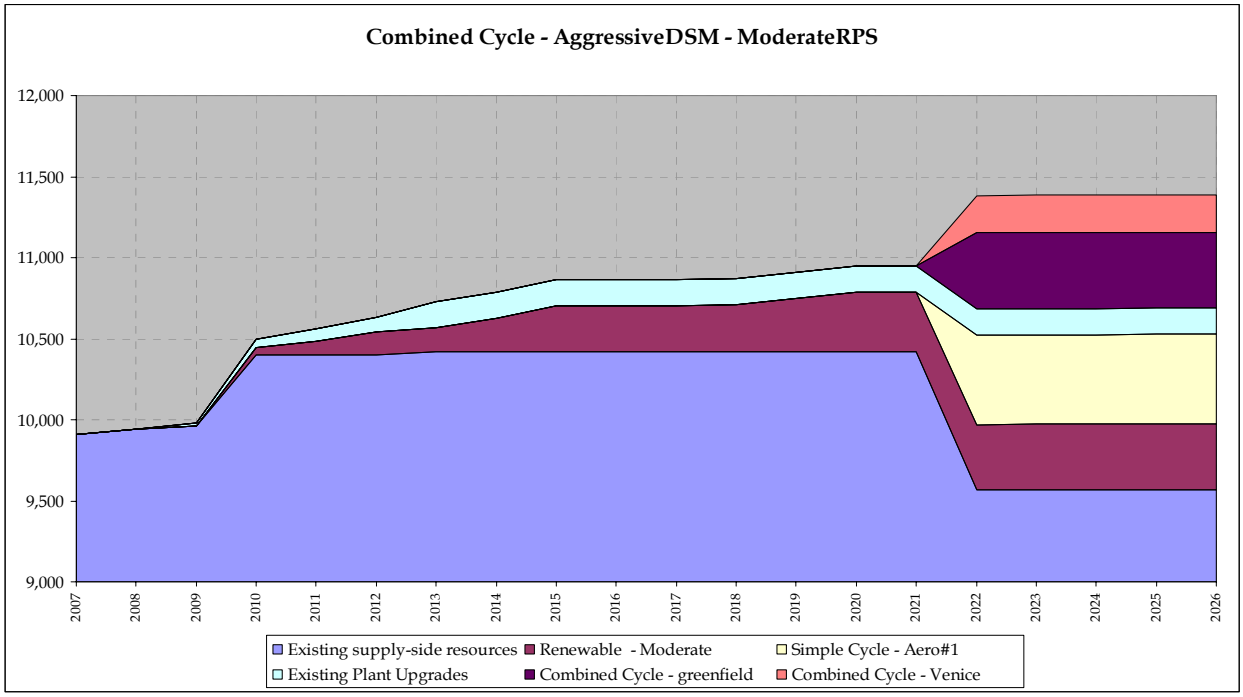
(2) The composition, by program, of the capacity provided by demand-side resources;



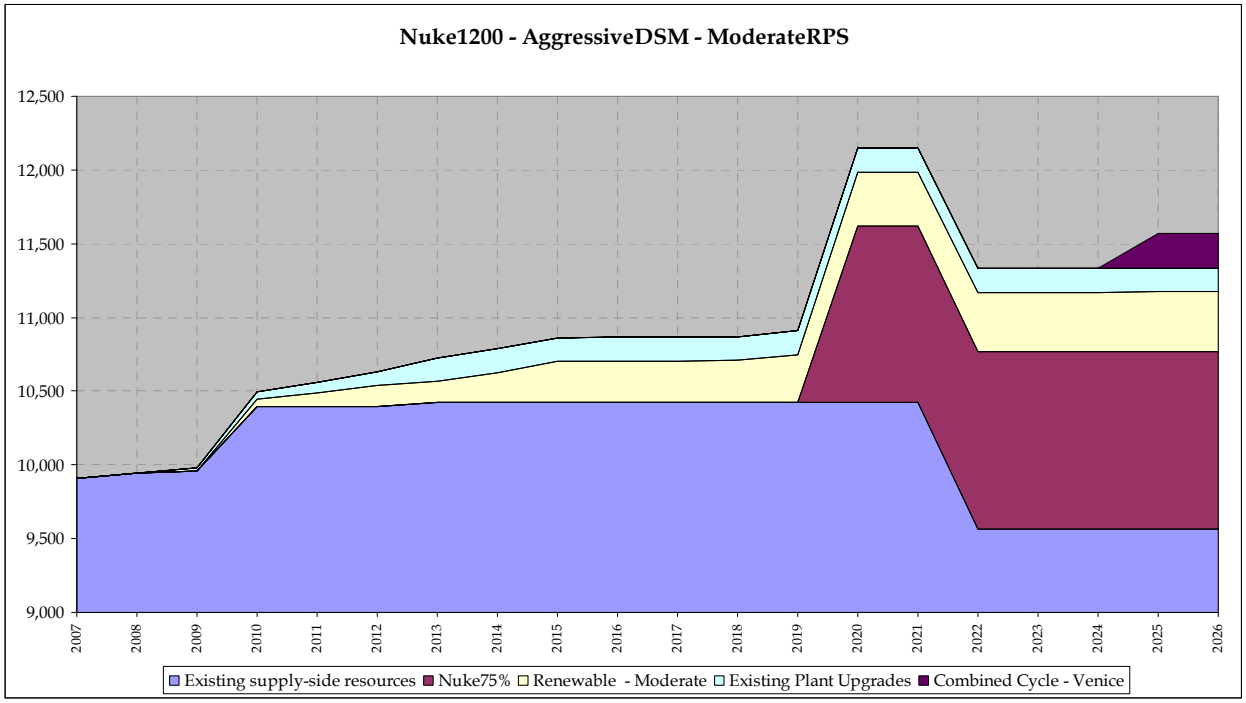
(3) The composition, by supply resource, of the capacity (including reserve margin) provided by supply resources. Existing supply-side resources may be shown as a single resource;

Plots of the composition by supply resource, for each of the 18 top alternative resource plans are shown below, with the x-axis showing year and the y-axis showing MWs:

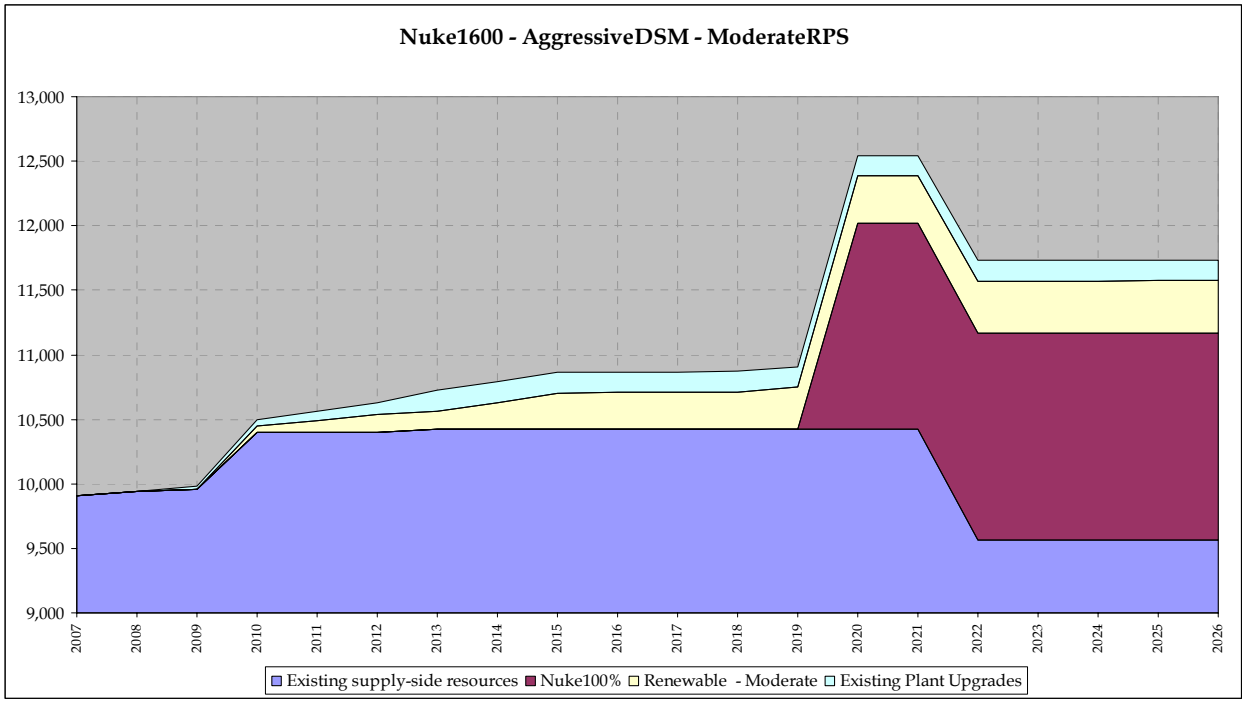
a. Combined Cycle, Aggressive DSM, Moderate RPS



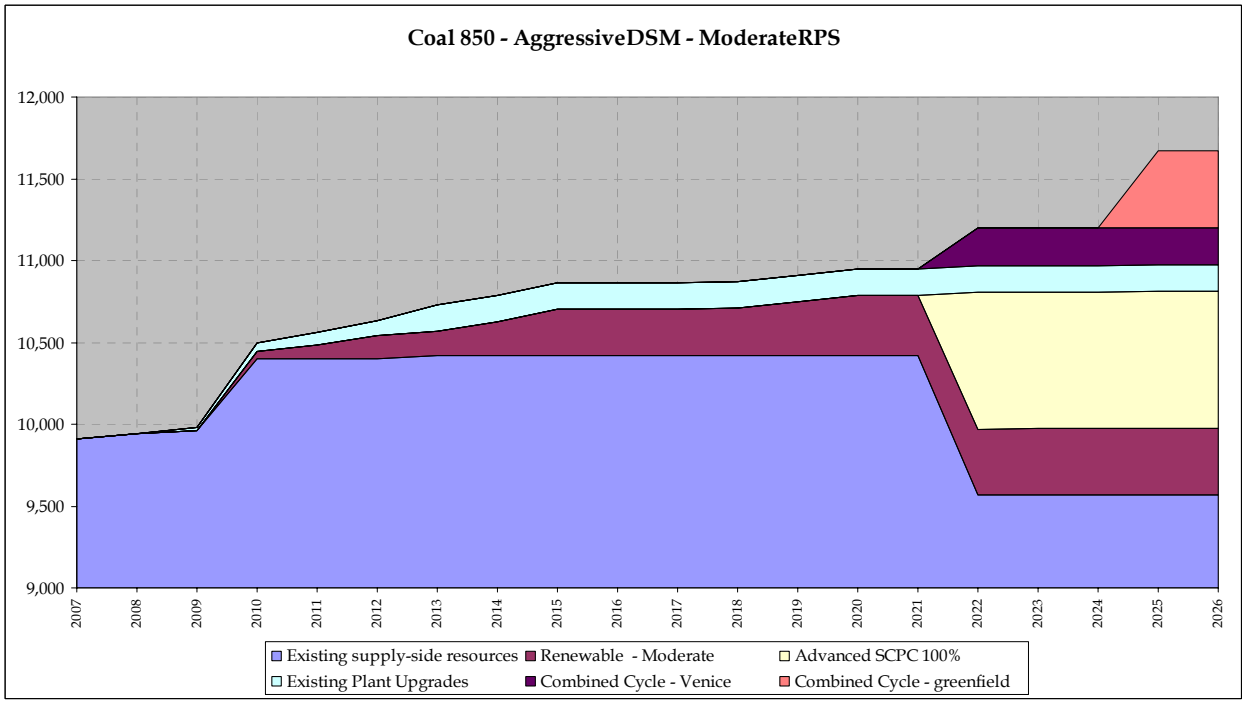
b. Nuke1200, Aggressive DSM, Moderate RPS



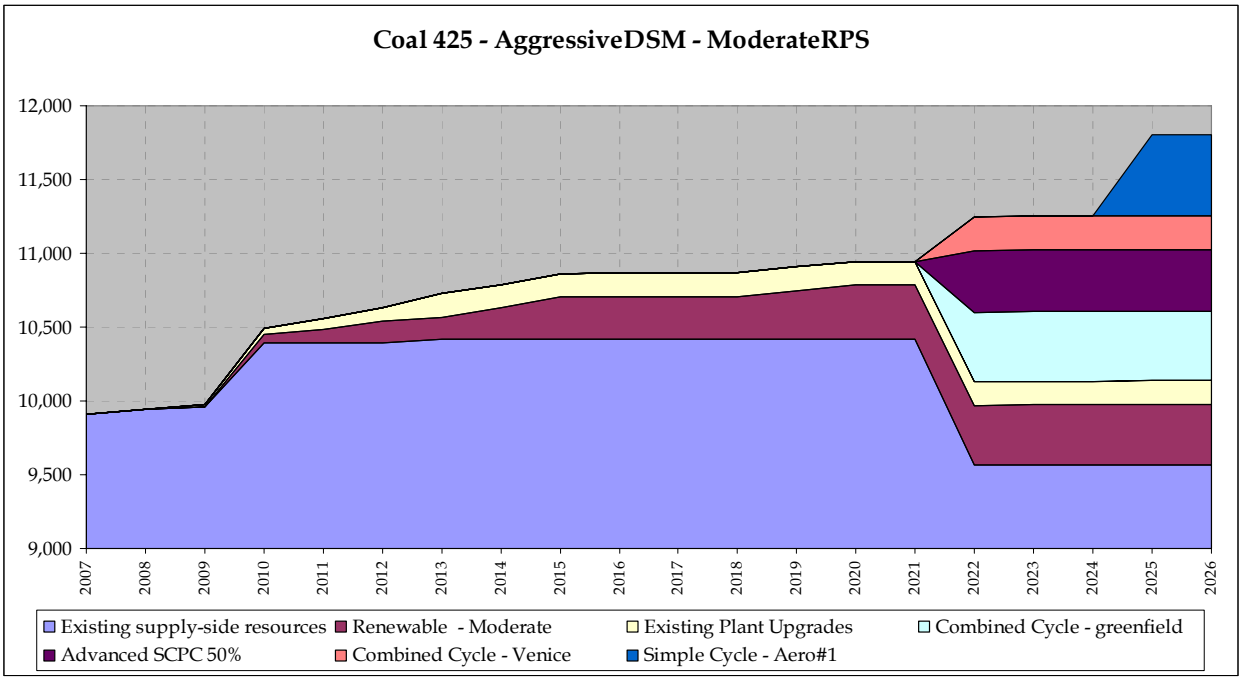
c. Nuke 1600, Aggressive DSM, Moderate RPS



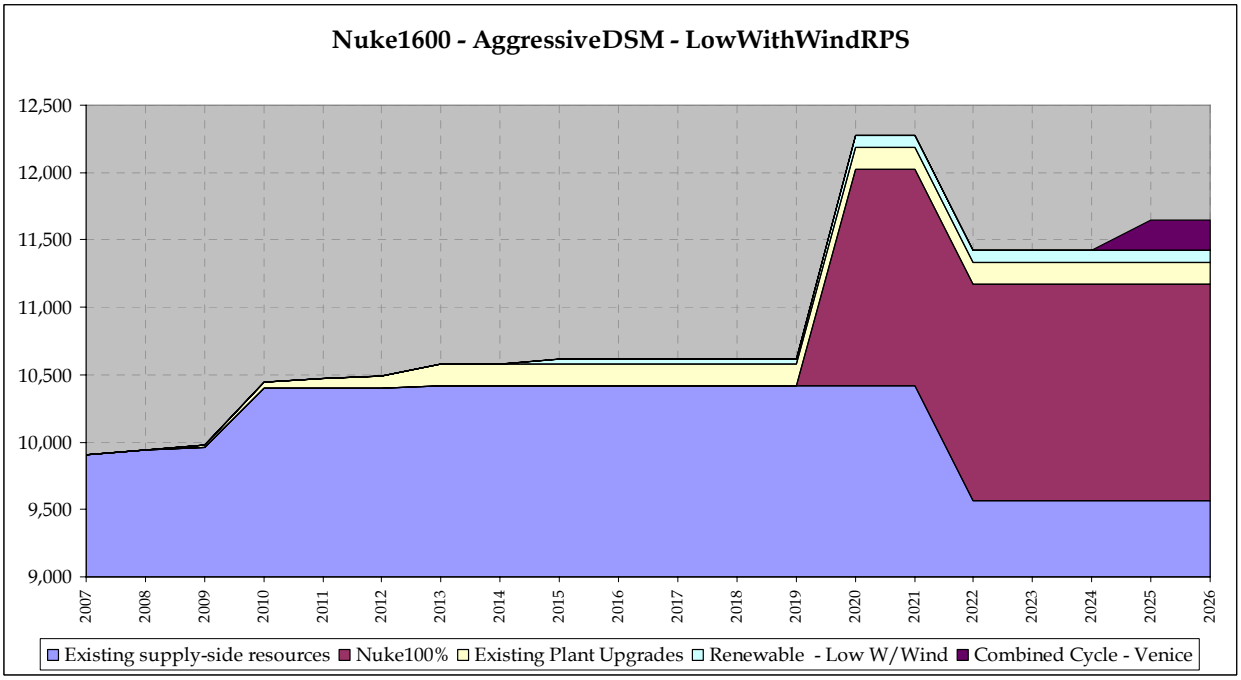
d. Coal 850, Aggressive DSM, Moderate RPS



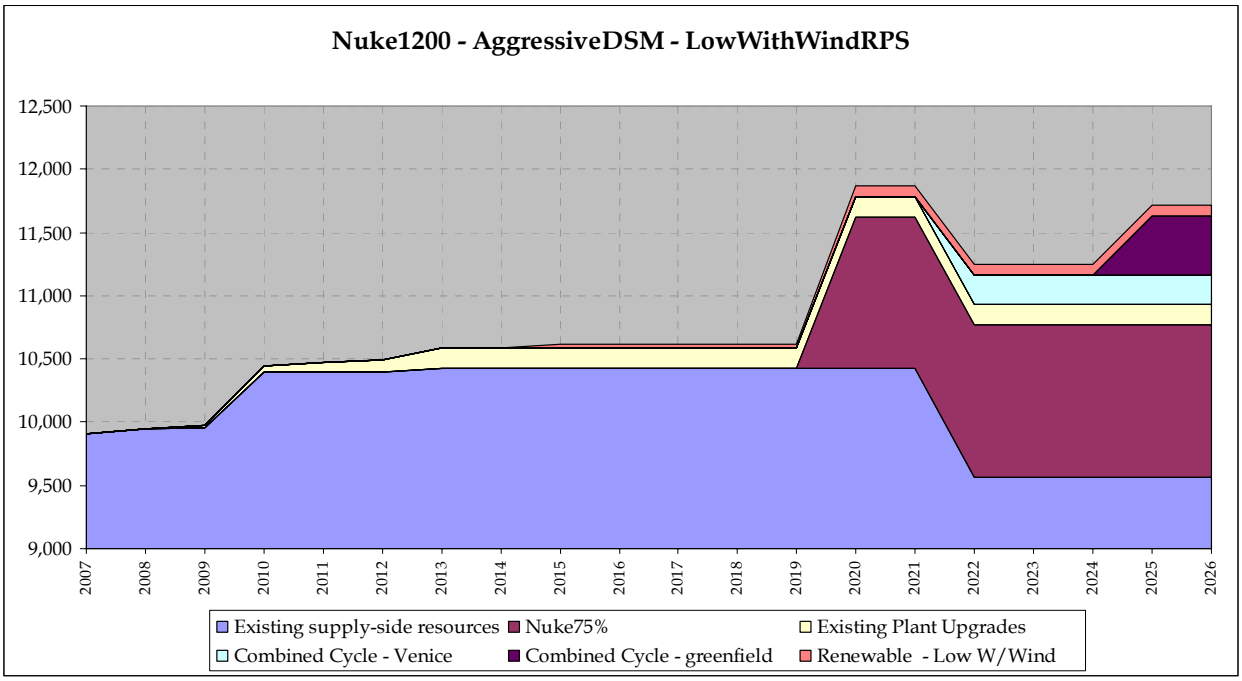
e. Coal 425, Aggressive DSM, Moderate RPS



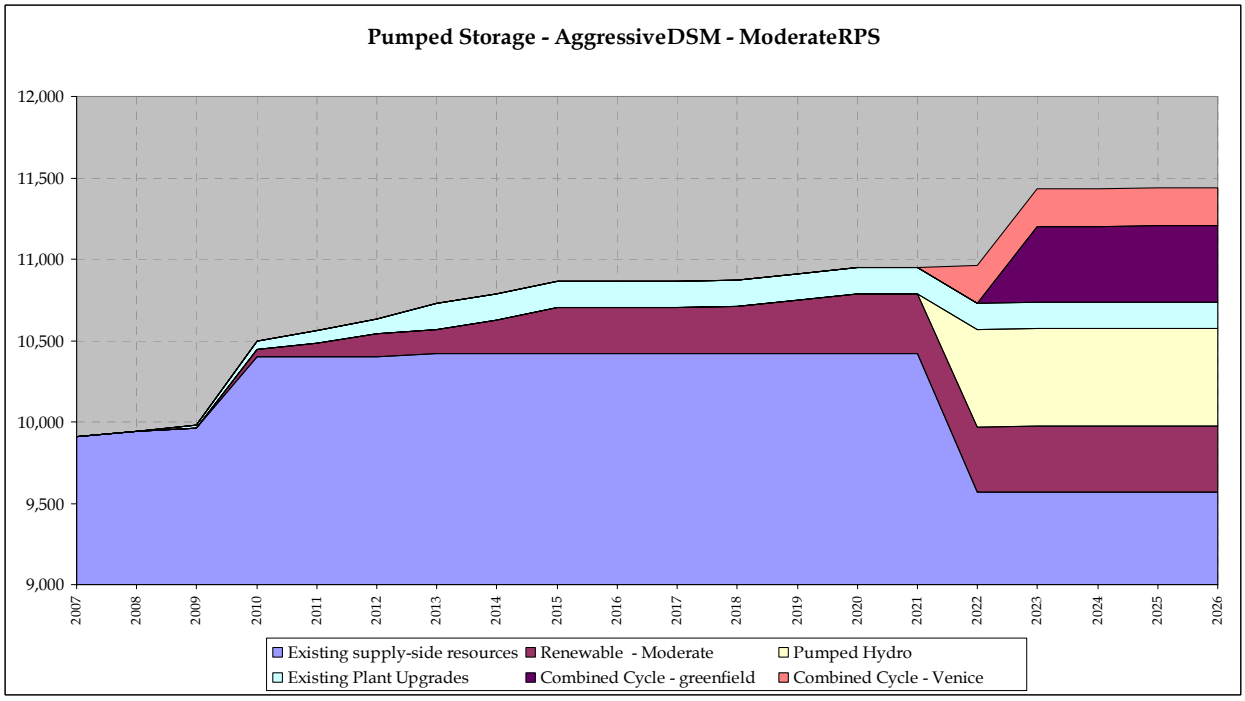
f. Nuke 1600, Aggressive DSM, LowWithWind RPS



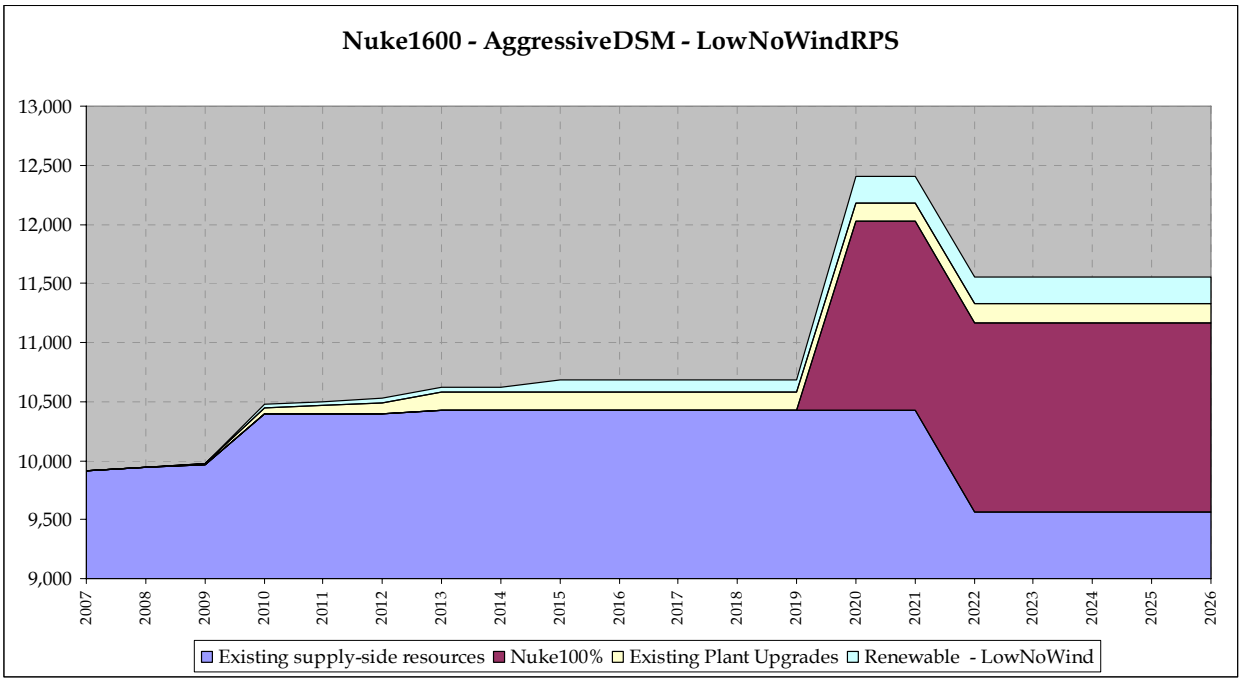
g. Nuke 1200, Aggressive DSM, LowWithWind RPS



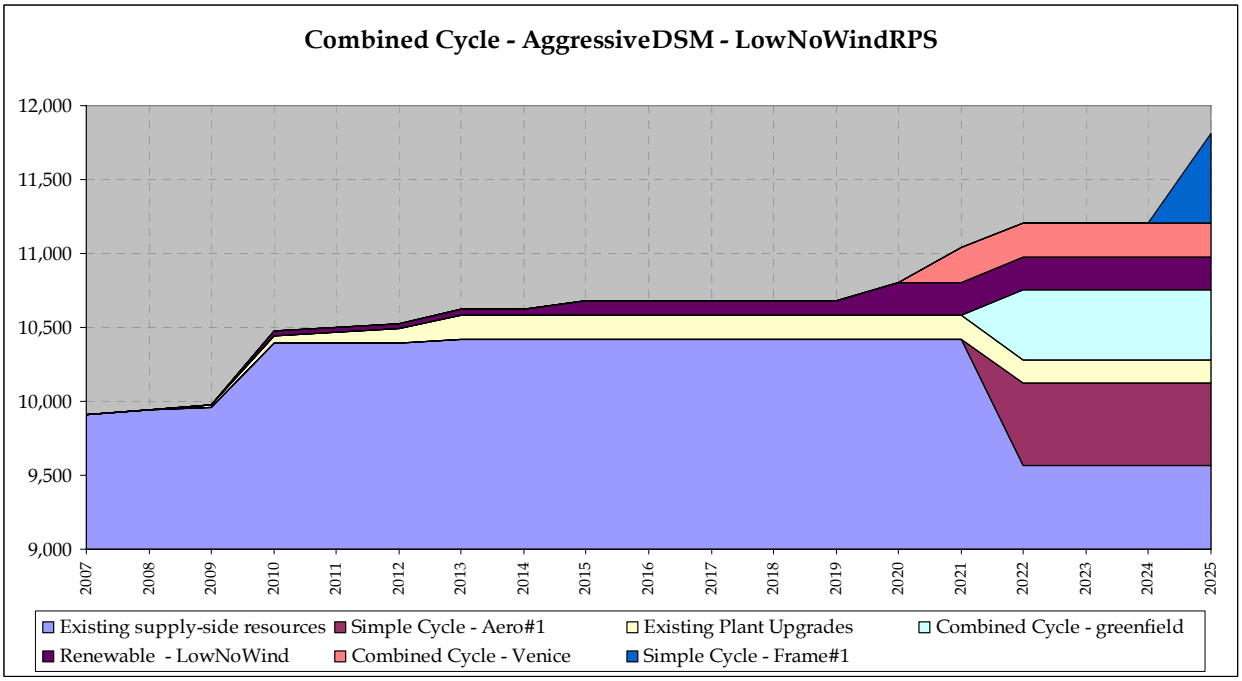
h. Pumped Storage, Aggressive DSM, Moderate RPS



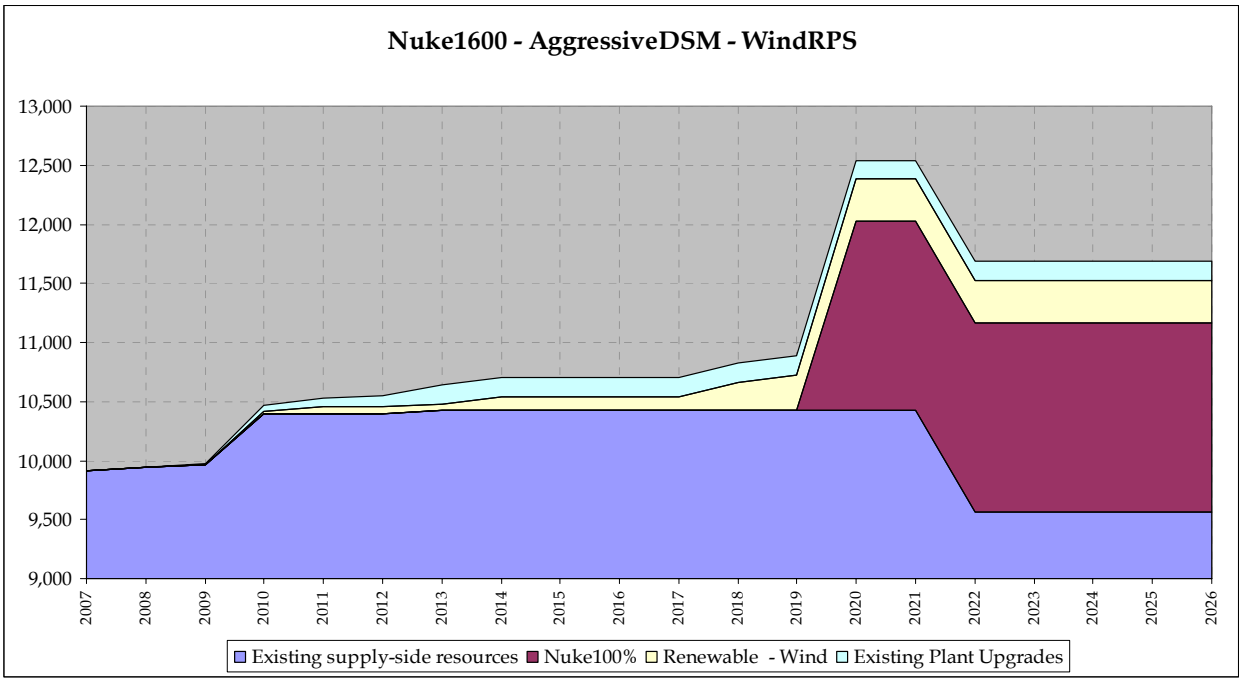
i. Nuke 1600, Aggressive DSM, LowNoWind RPS



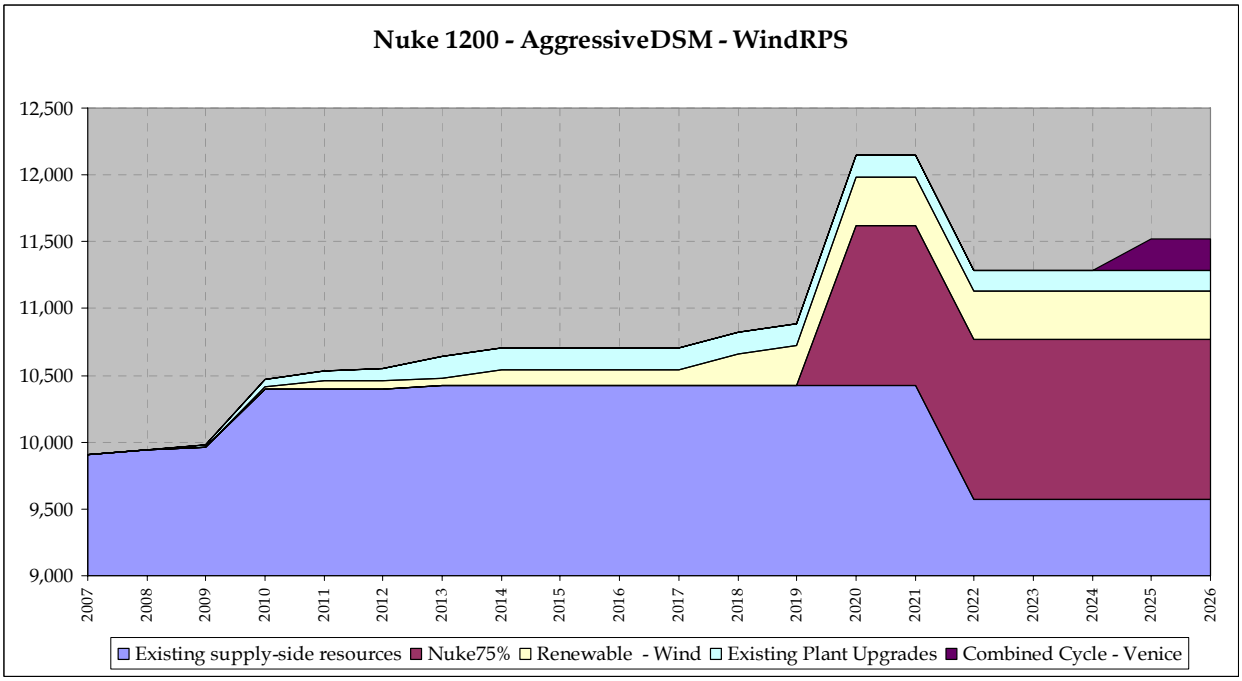
j. Combined Cycle, Aggressive DSM, LowNoWind RPS



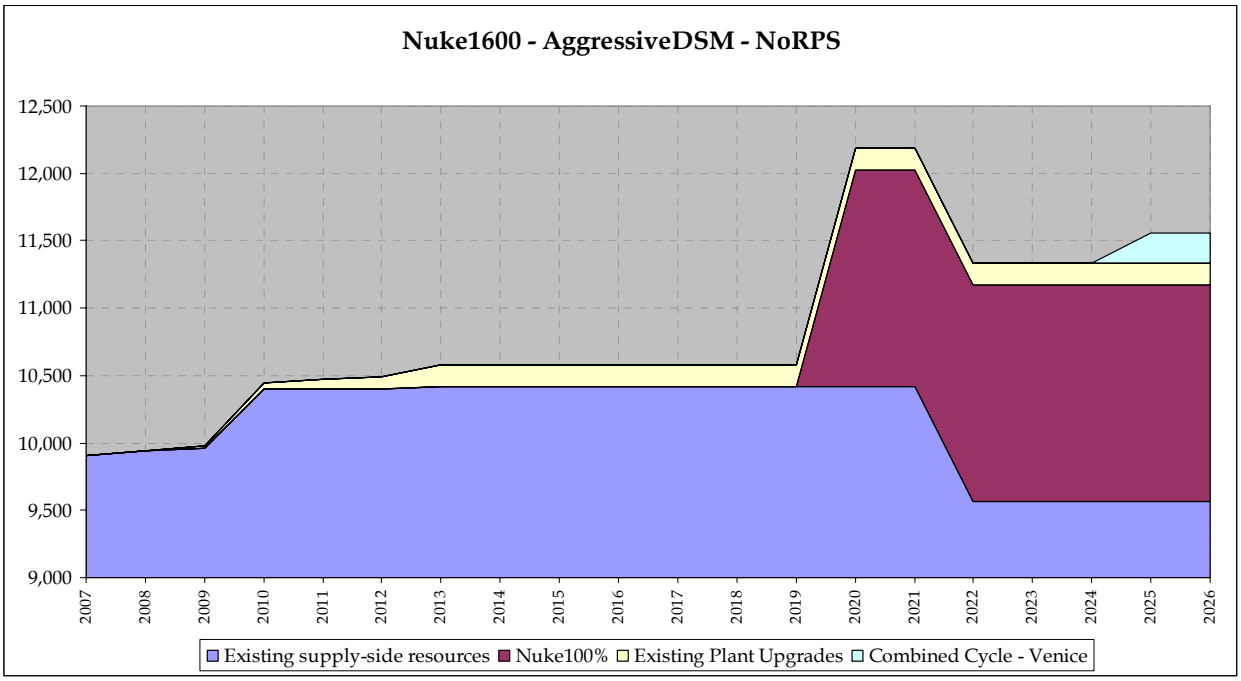
k. Nuke 1600, Aggressive DSM, Wind RPS



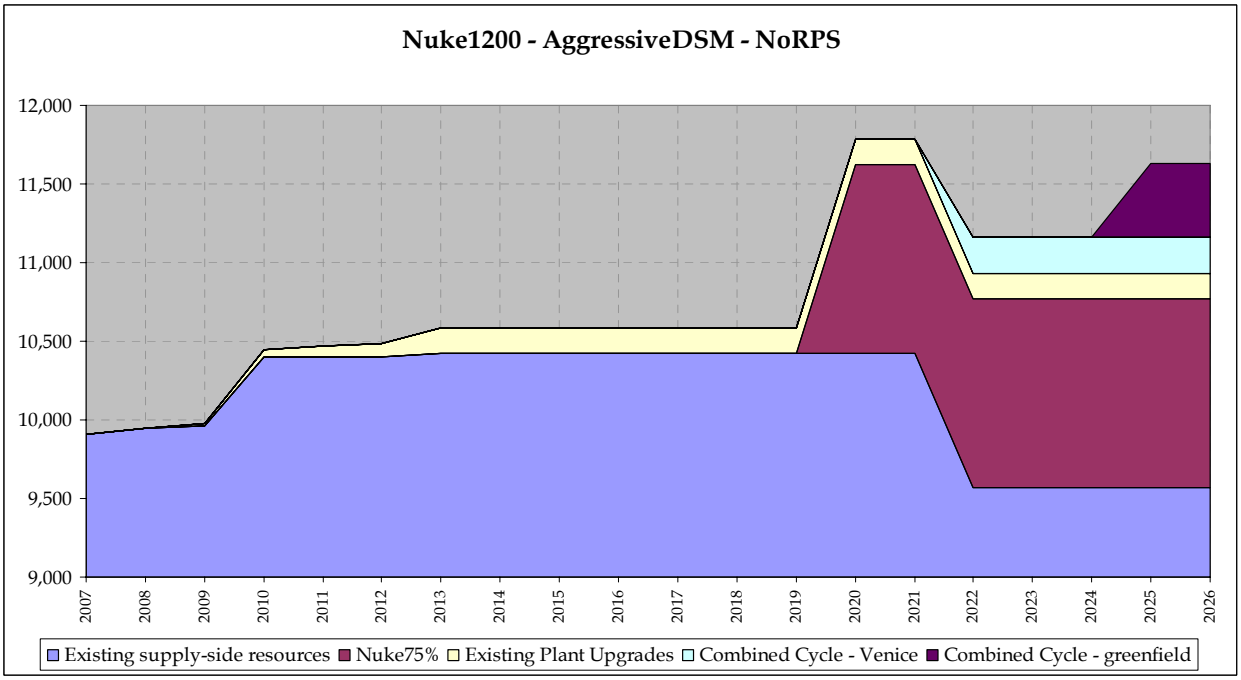
l. Nuke 1200, Aggressive DSM, Wind RPS



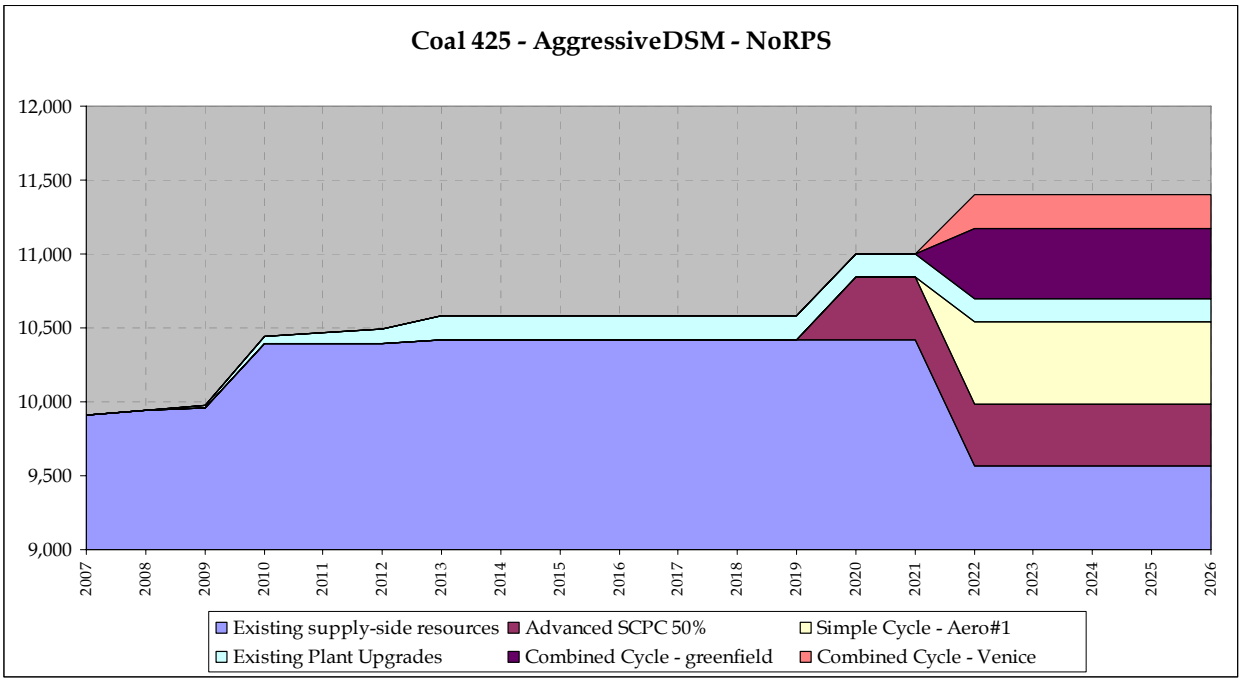
m. Nuke 1600, Aggressive DSM, No RPS



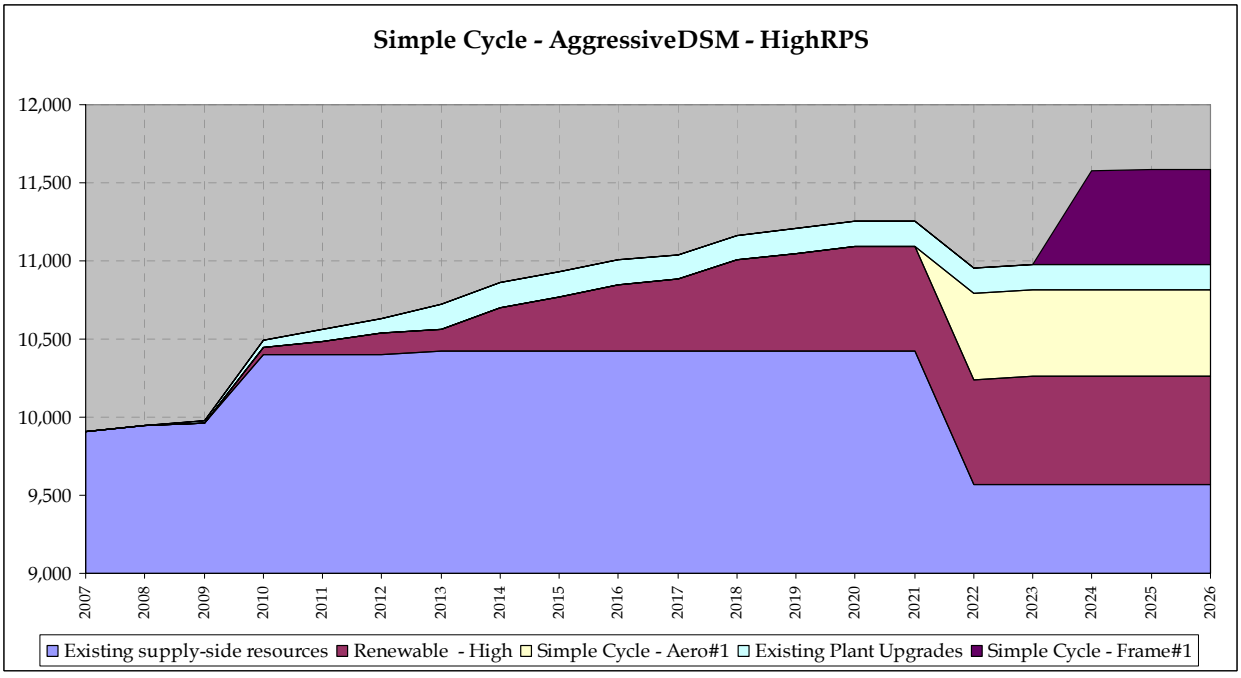
n. Nuke 1200, Aggressive DSM, No RPS



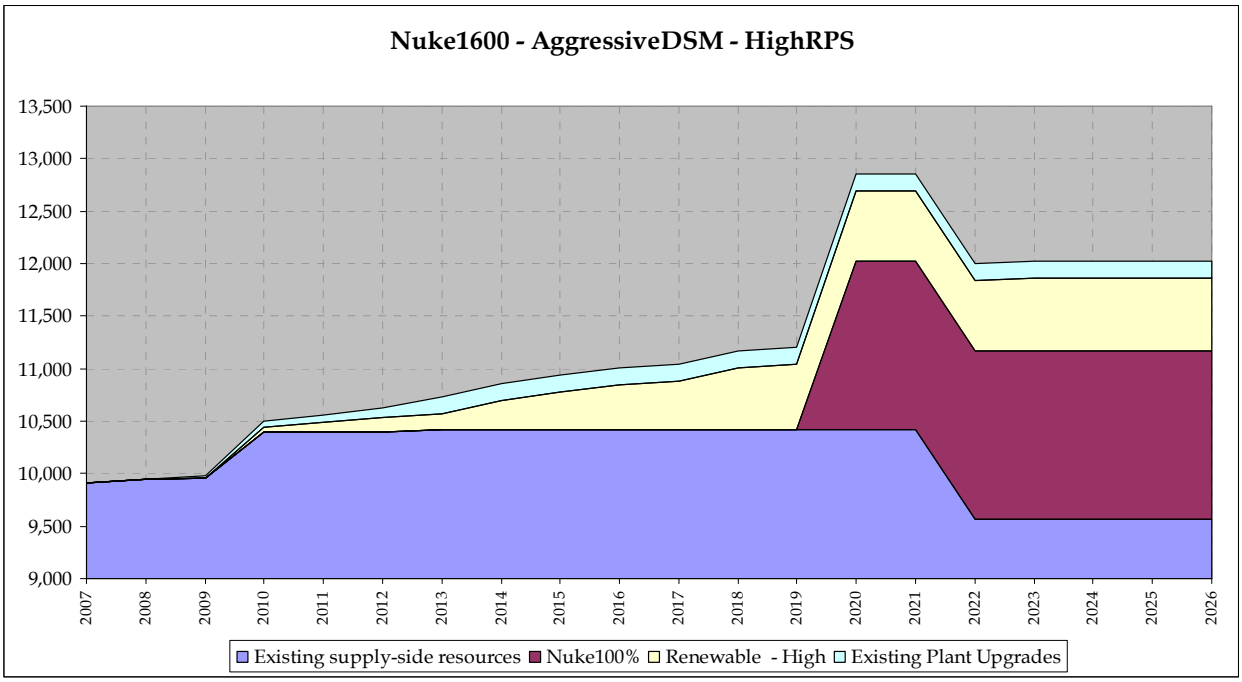
o. Coal 425, Aggressive DSM, No RPS



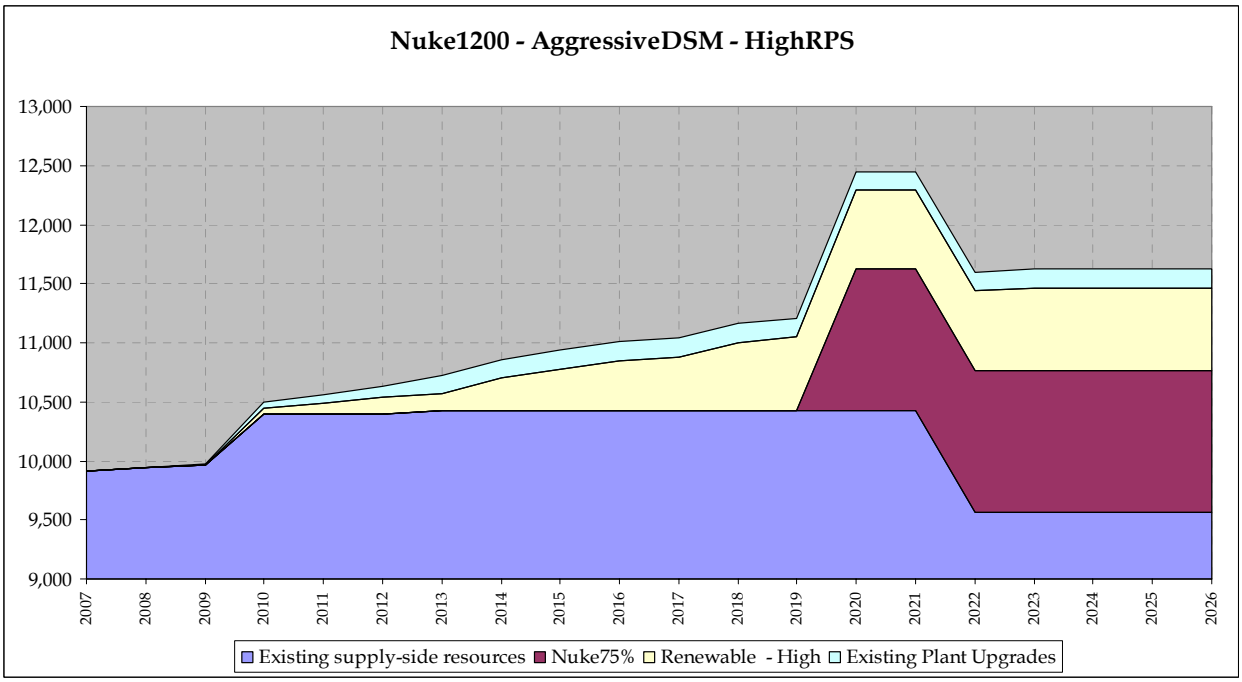
p. Simple Cycle, Aggressive DSM, High RPS



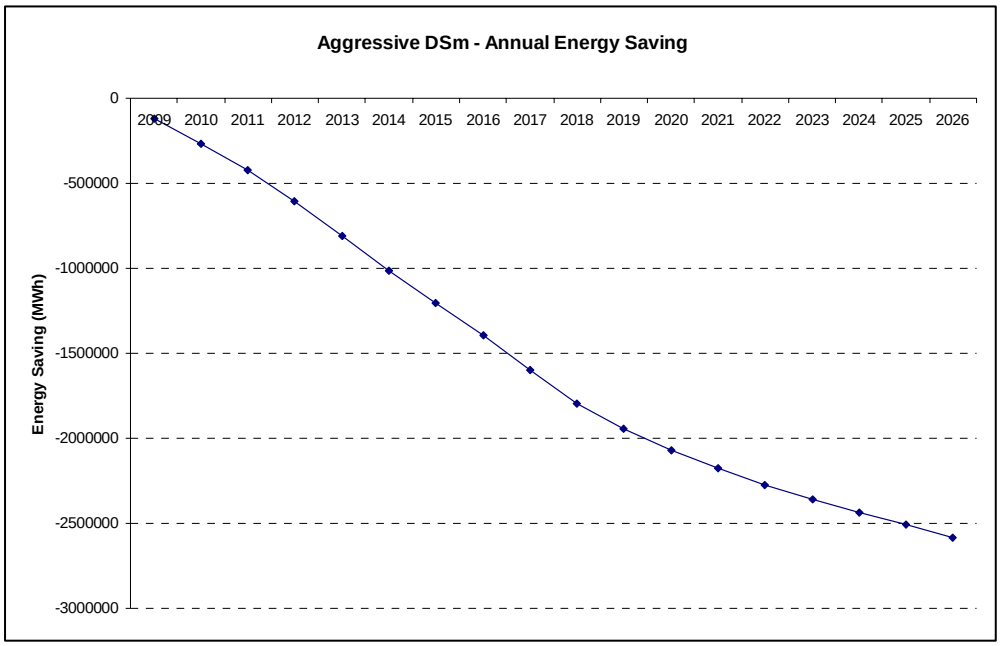
q. Nuke 1600, Aggressive DSM, High RPS



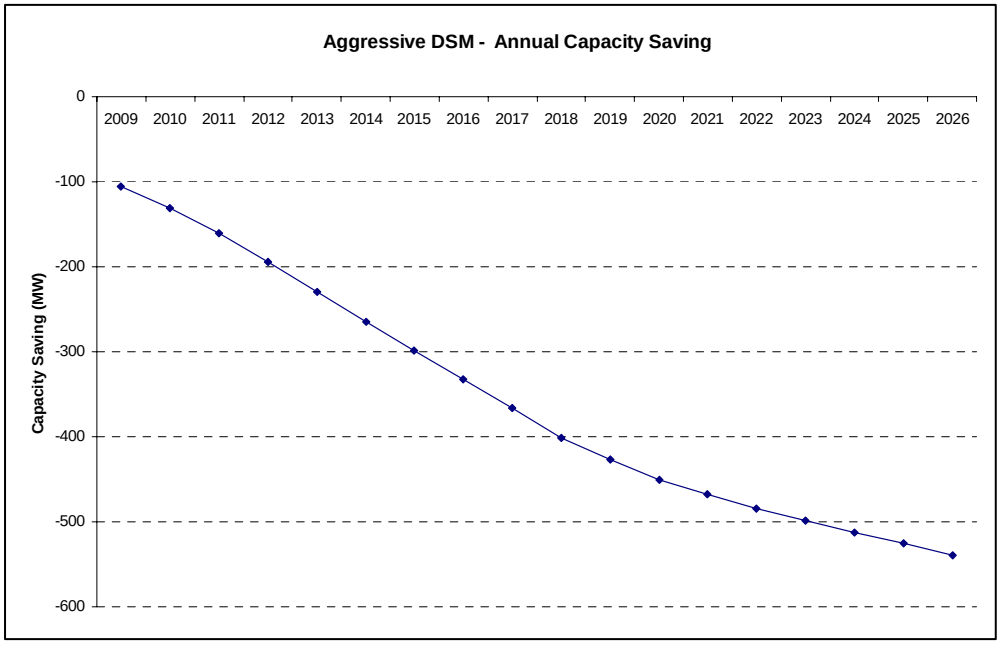
r. Nuke 1200, Aggressive DSM, High RPS



(4) The combined impact of all demand-side resources on the base-case forecast of annual energy requirements;

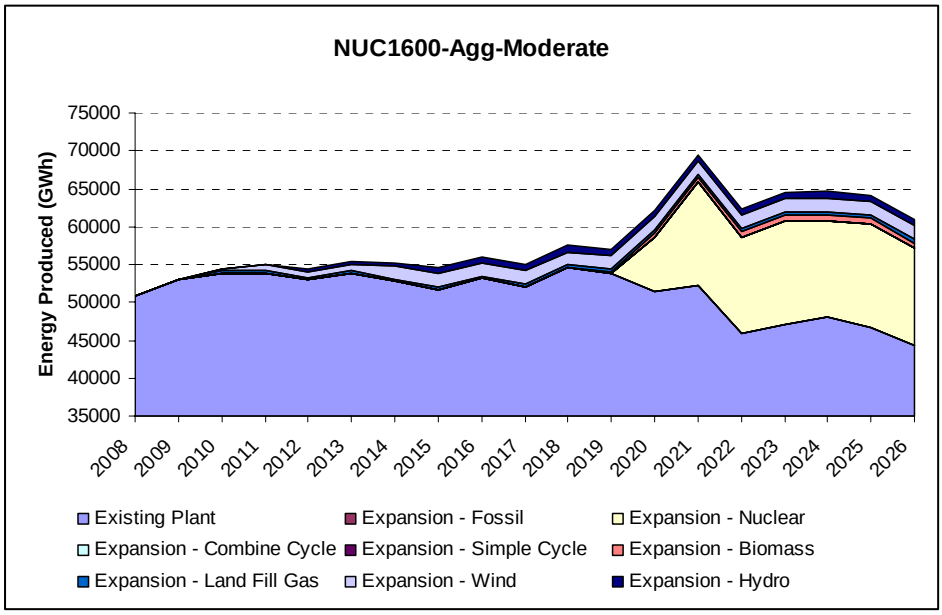


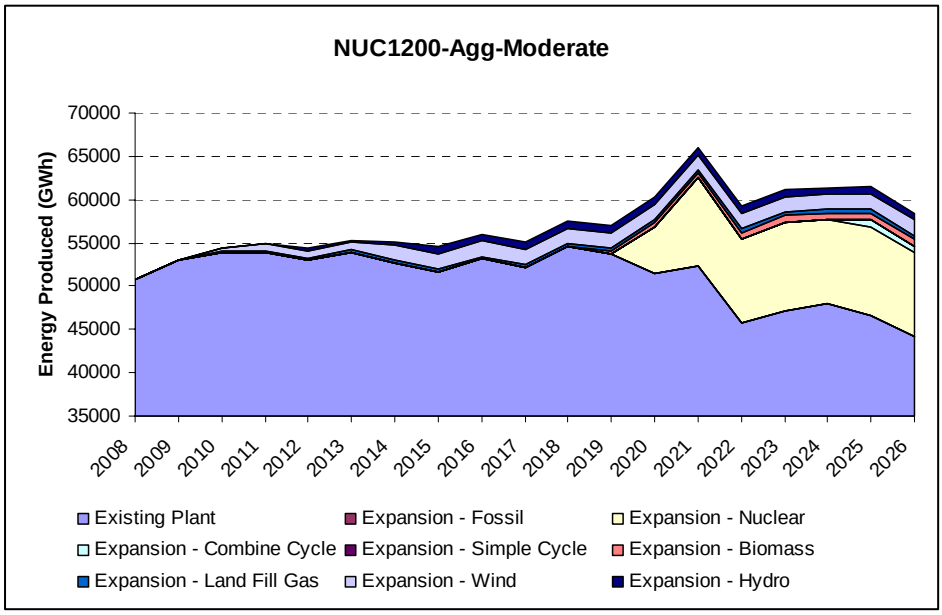
(5) The composition, by program, of the annual energy provided by demand-side resources;

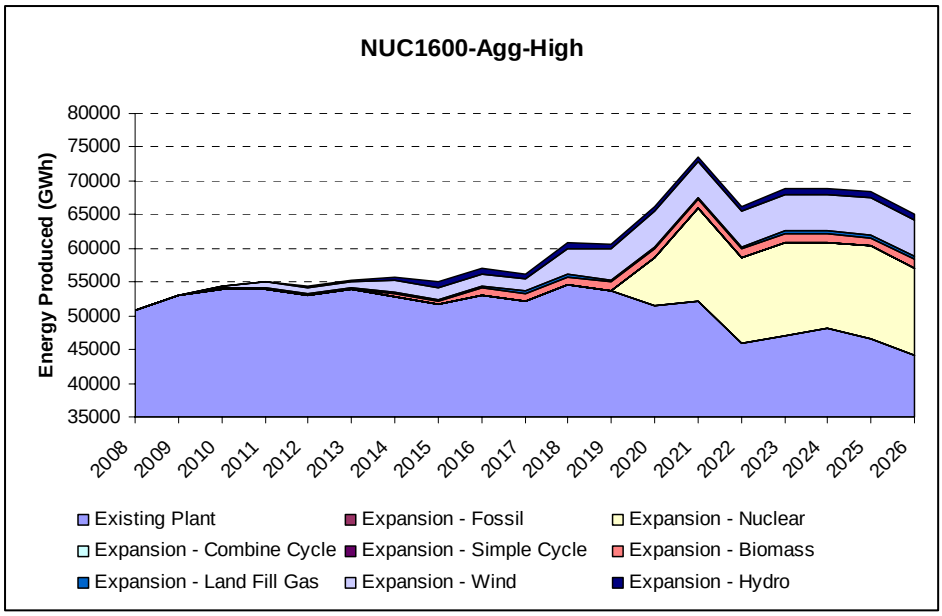


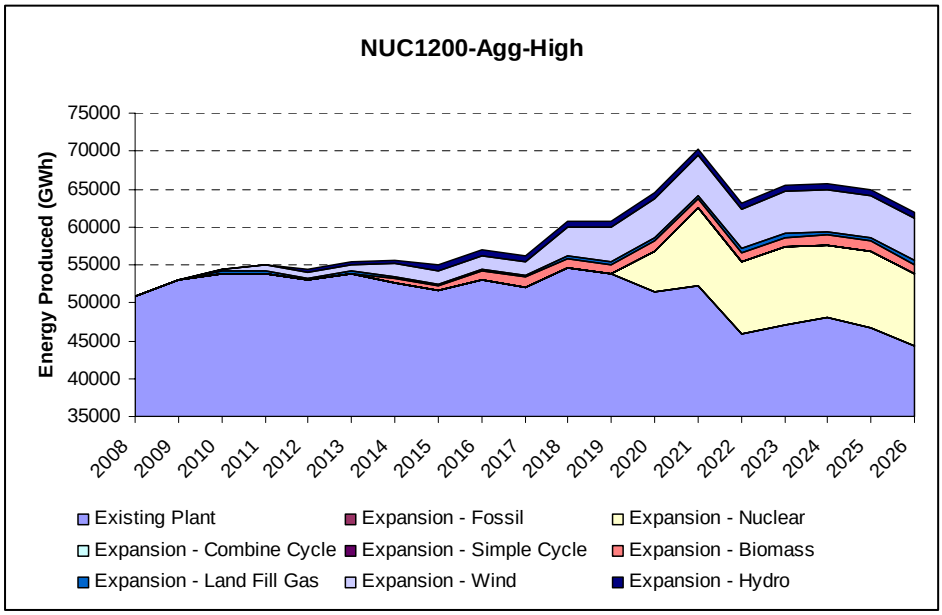
(6) The composition, by supply resource, of the annual energy (including losses) provided by supply resources. Existing supply-side resources may be shown as a single resource;

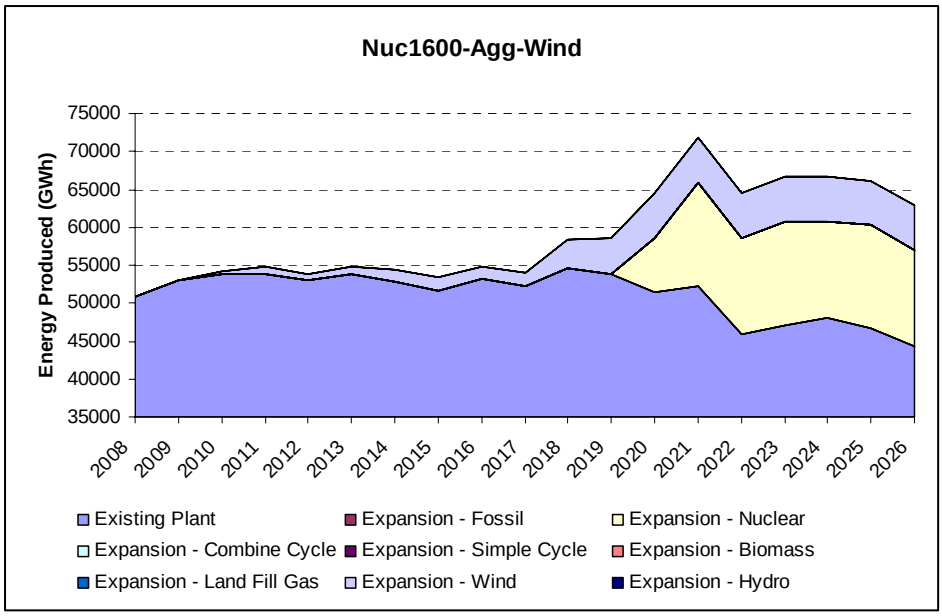
Plots are show for the top 18 plans. Names of the plans are in the title of the chart, using supply-side, DSM , and renewable types as the names of the plans.

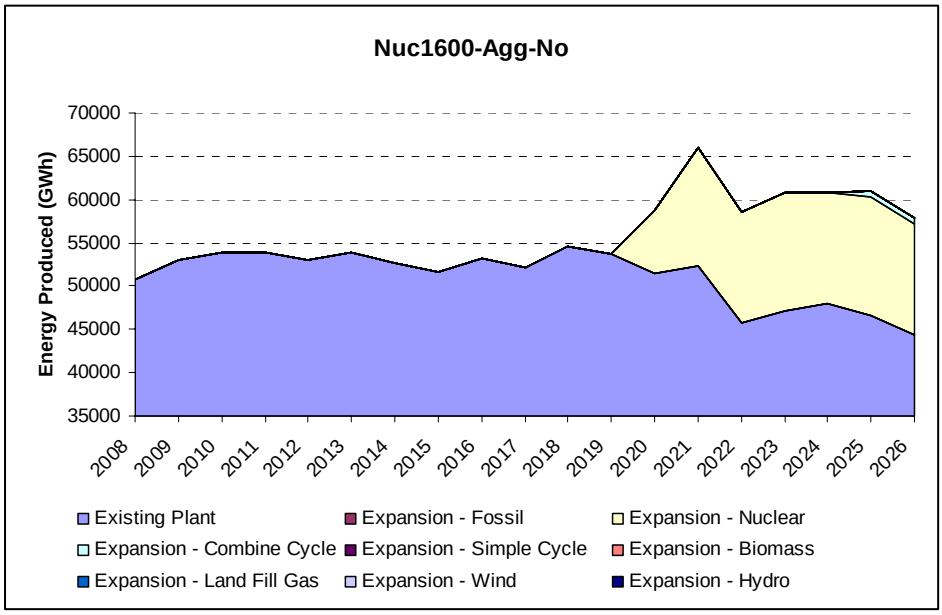


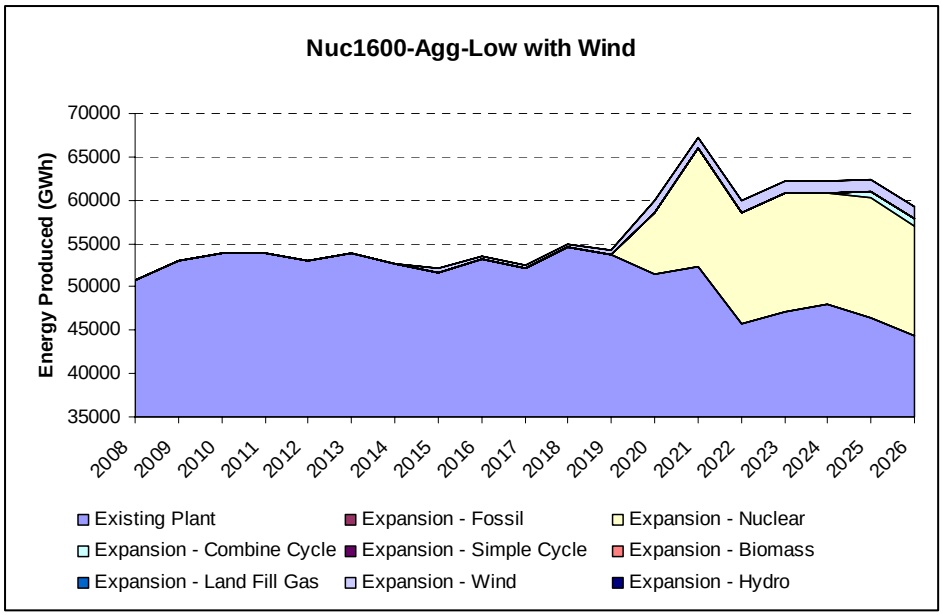


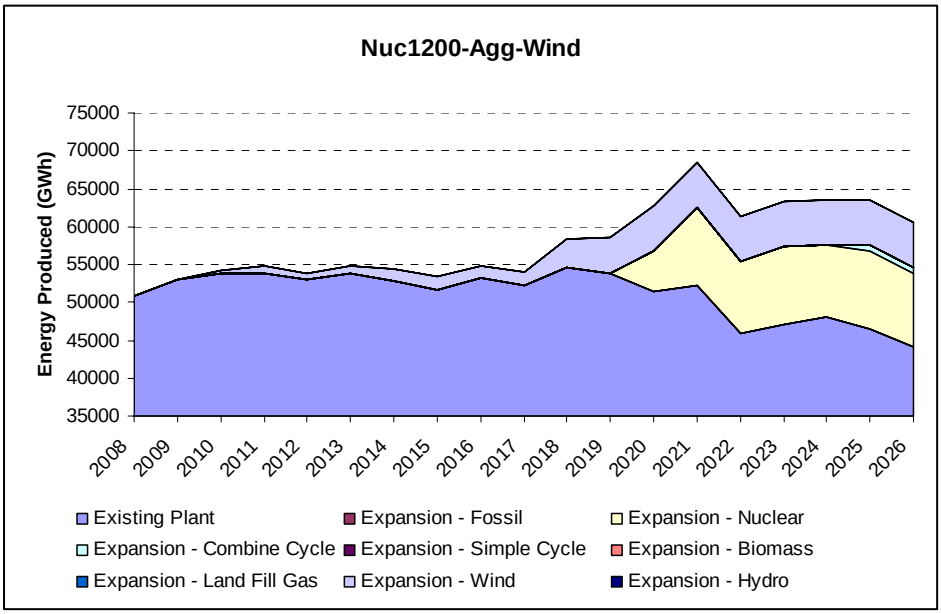

NUC1600-Agg-High
Energy Produced (GWh)
80000
75000
70000
65000
60000
55000
50000
45000
40000
35000
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Existing Plant
Expansion - Fossil
Expansion - Nuclear
Expansion - Combine Cycle
Expansion - Simple Cycle
Expansion - Biomass
Expansion - Land Fill Gas
Expansion - Wind
Expansion - Hydro

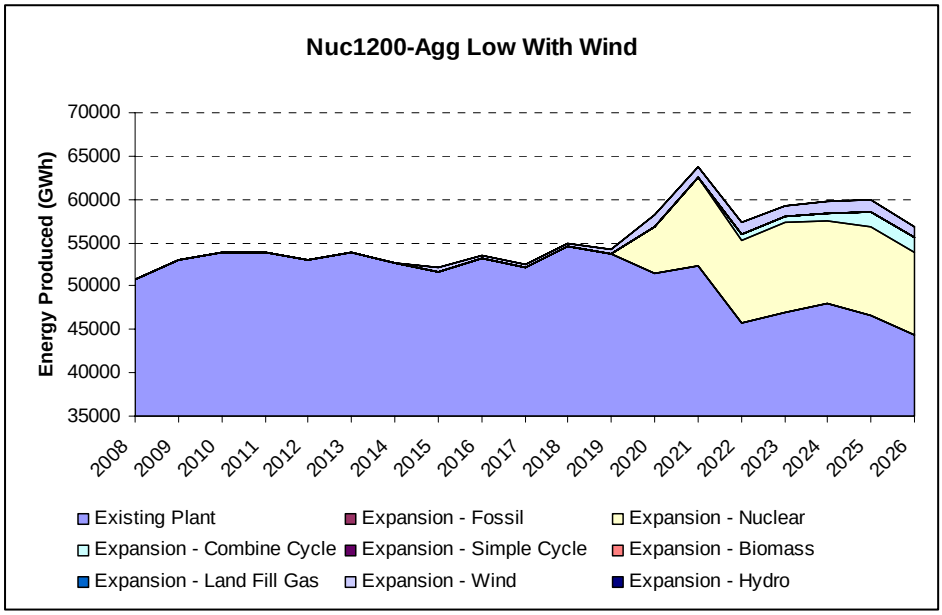

NUC1200-Agg-High
Energy Produced (GWh)
75000
70000
65000
60000
55000
50000
45000
40000
35000
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Existing Plant
Expansion - Fossil
Expansion - Nuclear
Expansion - Combine Cycle
Expansion - Simple Cycle
Expansion - Biomass
Expansion - Land Fill Gas
Expansion - Wind
Expansion - Hydro

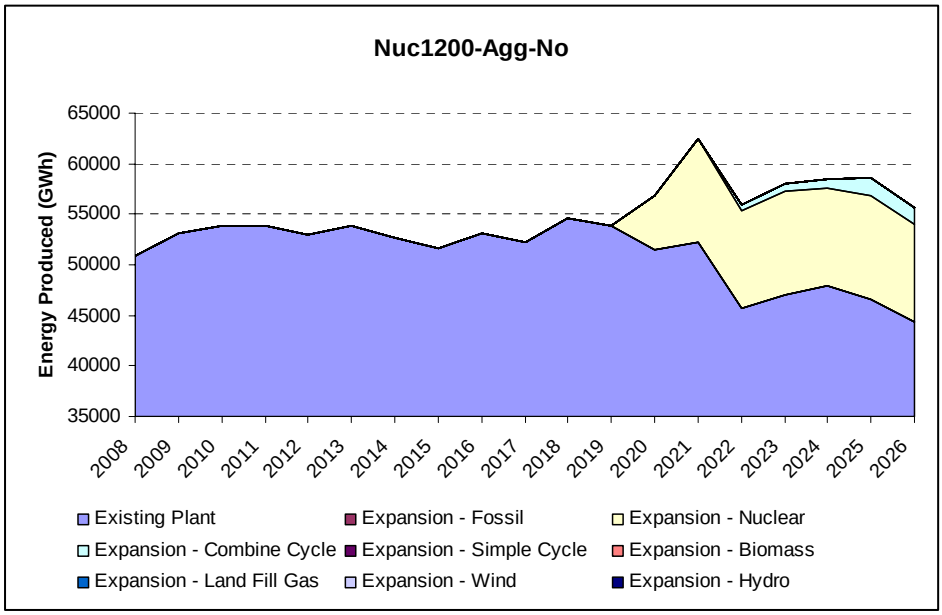

Nuc1600-Agg-Wind
Energy Produced (GWh)
75000
70000
65000
60000
55000
50000
45000
40000
35000
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Existing Plant
Expansion - Fossil
Expansion - Nuclear
Expansion - Combine Cycle
Expansion - Simple Cycle
Expansion - Biomass
Expansion - Land Fill Gas
Expansion - Wind
Expansion - Hydro

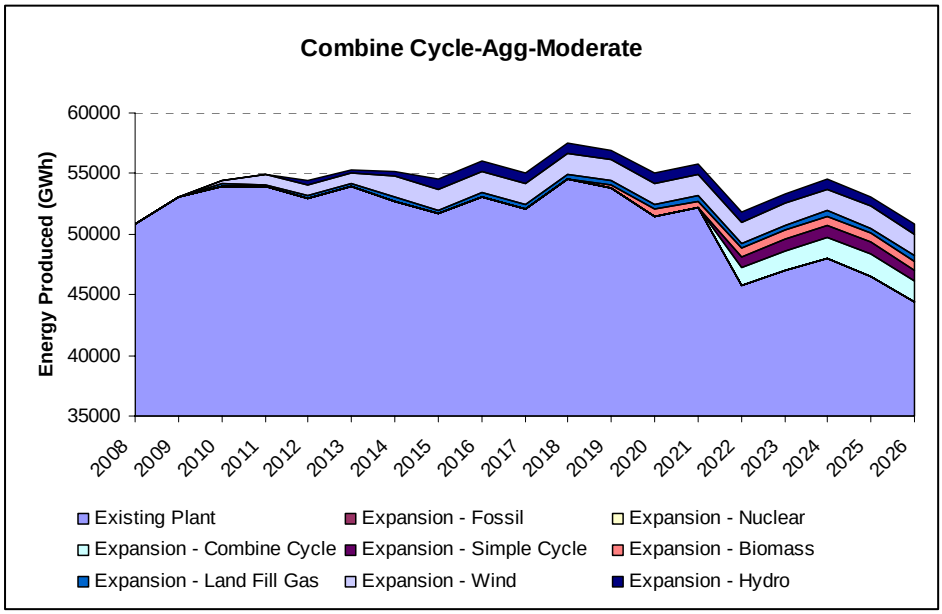

Nuc1600-Agg-No
Energy Produced (GWh)
70000
65000
60000
55000
50000
45000
40000
35000
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Existing Plant
Expansion - Fossil
Expansion - Nuclear
Expansion - Combine Cycle
Expansion - Simple Cycle
Expansion - Biomass
Expansion - Land Fill Gas
Expansion - Wind
Expansion - Hydro

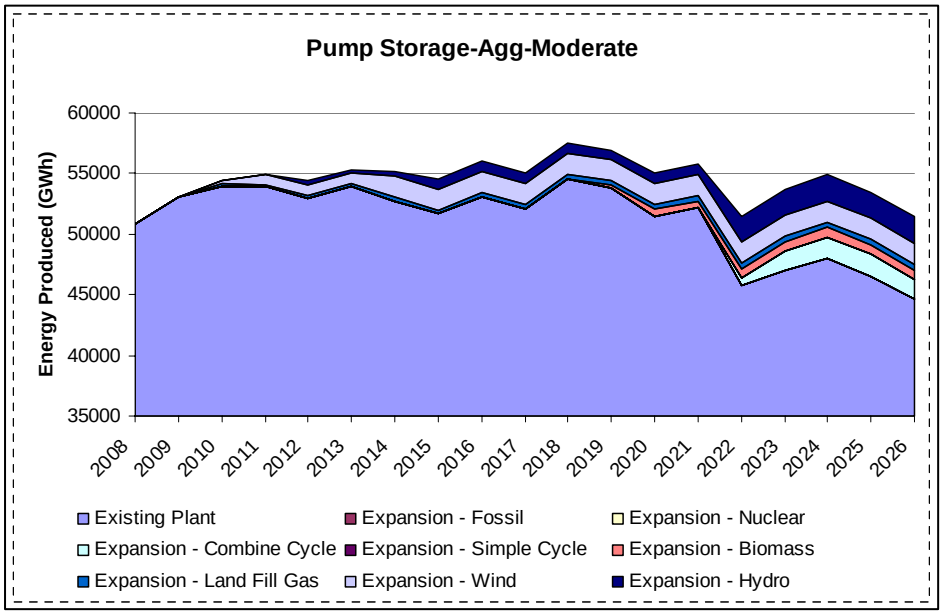

Nuc1600-Agg-Low with Wind
Energy Produced (GWh)
70000
65000
60000
55000
50000
45000
40000
35000
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Existing Plant
Expansion - Fossil
Expansion - Nuclear
Expansion - Combine Cycle
Expansion - Simple Cycle
Expansion - Biomass
Expansion - Land Fill Gas
Expansion - Wind
Expansion - Hydro

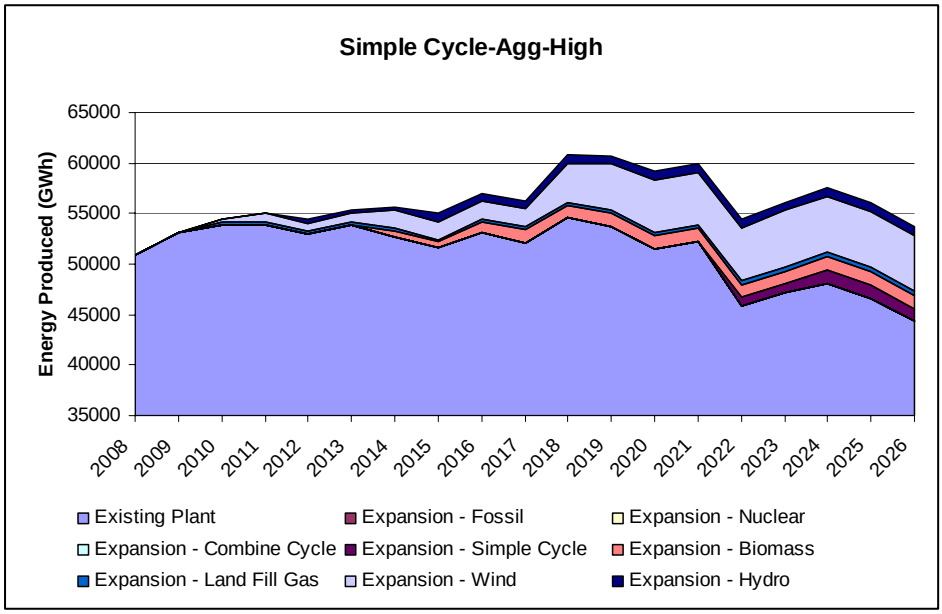

Nuc1200-Agg-Wind
Energy Produced (GWh)
75000
70000
65000
60000
55000
50000
45000
40000
35000
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Existing Plant
Expansion - Fossil
Expansion - Nuclear
Expansion - Combine Cycle
Expansion - Simple Cycle
Expansion - Biomass
Expansion - Land Fill Gas
Expansion - Wind
Expansion - Hydro

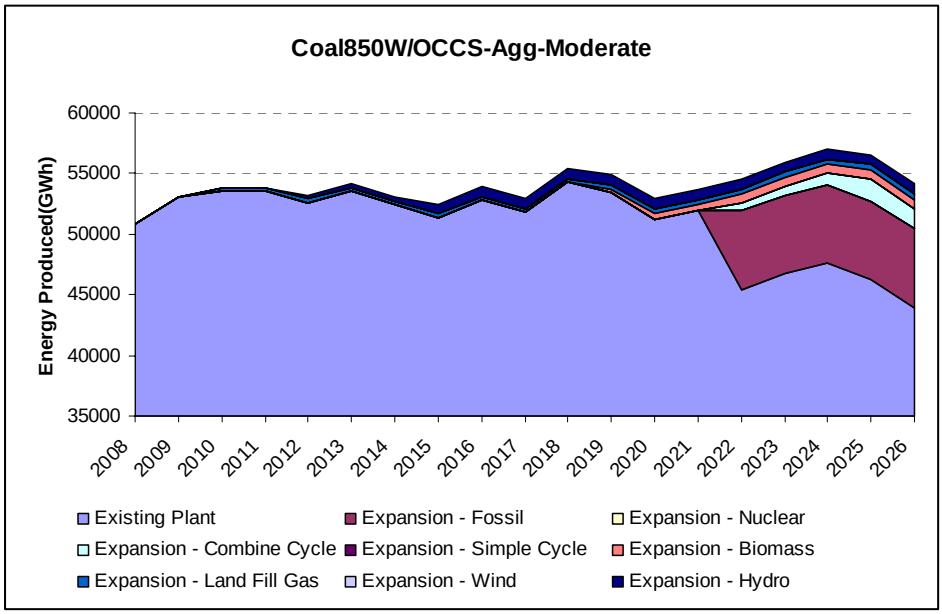

Nuc1200-Agg Low With Wind
Energy Produced (GWh)
70000
65000
60000
55000
50000
45000
40000
35000
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Existing Plant
Expansion - Fossil
Expansion - Nuclear
Expansion - Combine Cycle
Expansion - Simple Cycle
Expansion - Biomass
Expansion - Land Fill Gas
Expansion - Wind
Expansion - Hydro

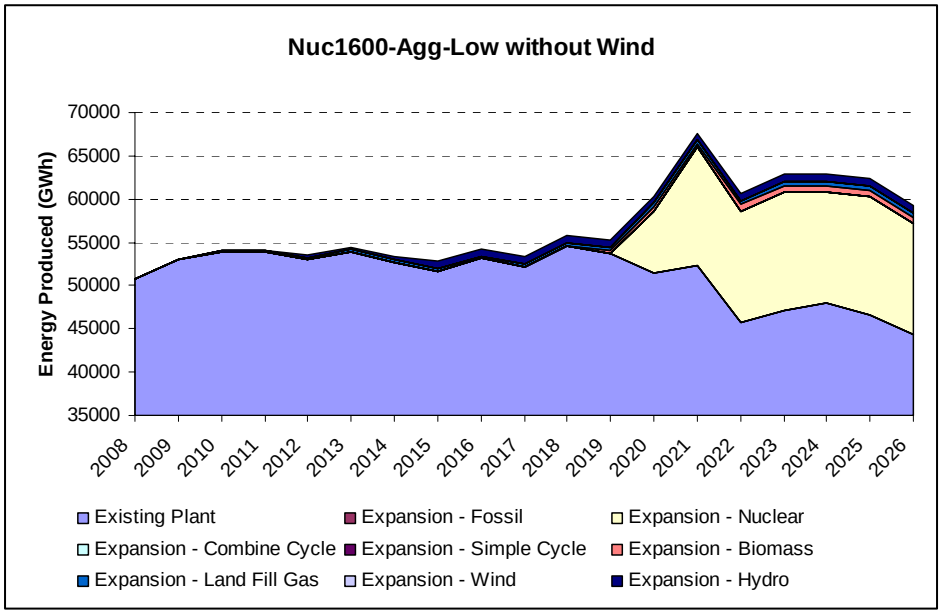

Nuc1200-Agg-No
Energy Produced (GWh)
65000
60000
55000
50000
45000
40000
35000
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Existing Plant
Expansion - Fossil
Expansion - Nuclear
Expansion - Combine Cycle
Expansion - Simple Cycle
Expansion - Biomass
Expansion - Land Fill Gas
Expansion - Wind
Expansion - Hydro

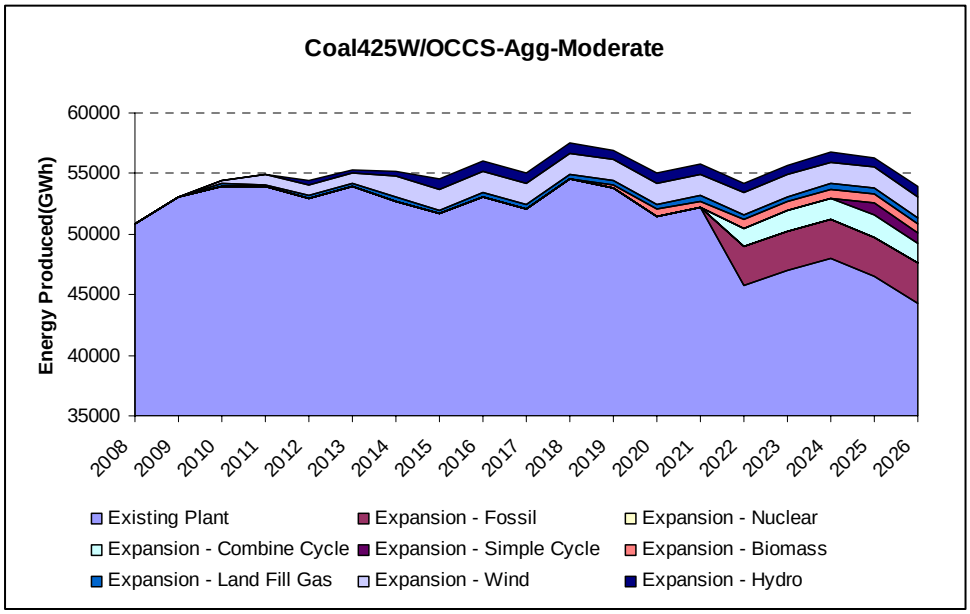

Combine Cycle-Agg-Moderate
Energy Produced (GWh)
60000
55000
50000
45000
40000
35000
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Existing Plant
Expansion - Fossil
Expansion - Nuclear
Expansion - Combine Cycle
Expansion - Simple Cycle
Expansion - Biomass
Expansion - Land Fill Gas
Expansion - Wind
Expansion - Hydro

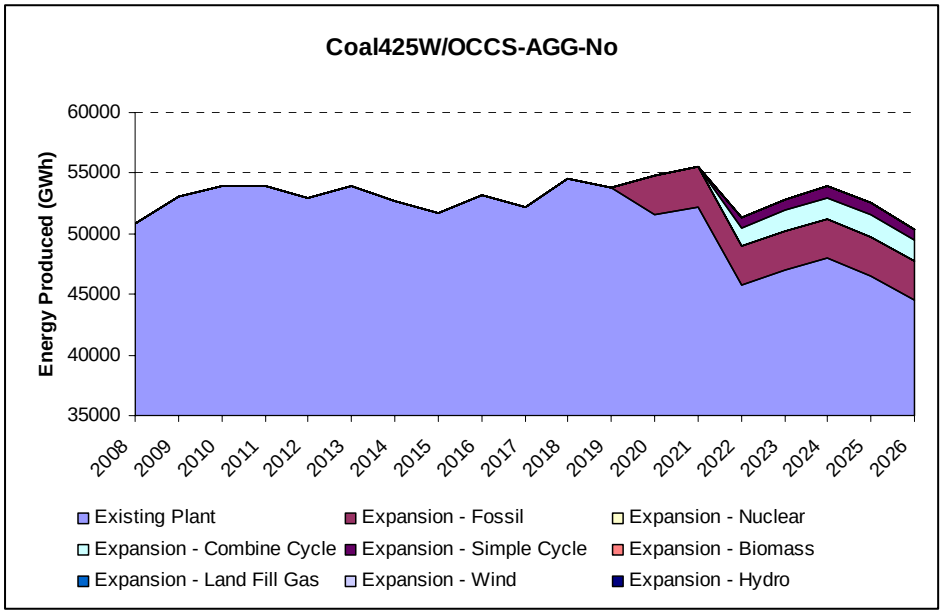

Pump Storage-Agg-Moderate
Energy Produced (GWh)
60000
55000
50000
45000
40000
35000
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Existing Plant
Expansion - Fossil
Expansion - Nuclear
Expansion - Combine Cycle
Expansion - Simple Cycle
Expansion - Biomass
Expansion - Land Fill Gas
Expansion - Wind
Expansion - Hydro

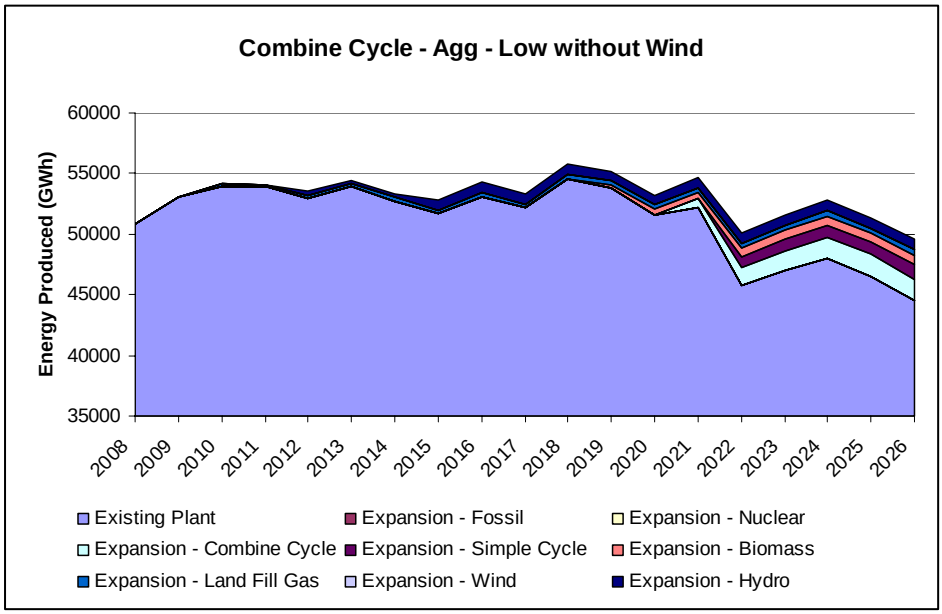

Simple Cycle-Agg-High
Energy Produced (GWh)
65000
60000
55000
50000
45000
40000
35000
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Existing Plant
Expansion - Fossil
Expansion - Nuclear
Expansion - Combine Cycle
Expansion - Simple Cycle
Expansion - Biomass
Expansion - Land Fill Gas
Expansion - Wind
Expansion - Hydro


Coal850W/OCCS-Agg-Moderate
Energy Produced(GWh)
60000
55000
50000
45000
40000
35000
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Existing Plant
Expansion - Fossil
Expansion - Nuclear
Expansion - Combine Cycle
Expansion - Simple Cycle
Expansion - Biomass
Expansion - Land Fill Gas
Expansion - Wind
Expansion - Hydro

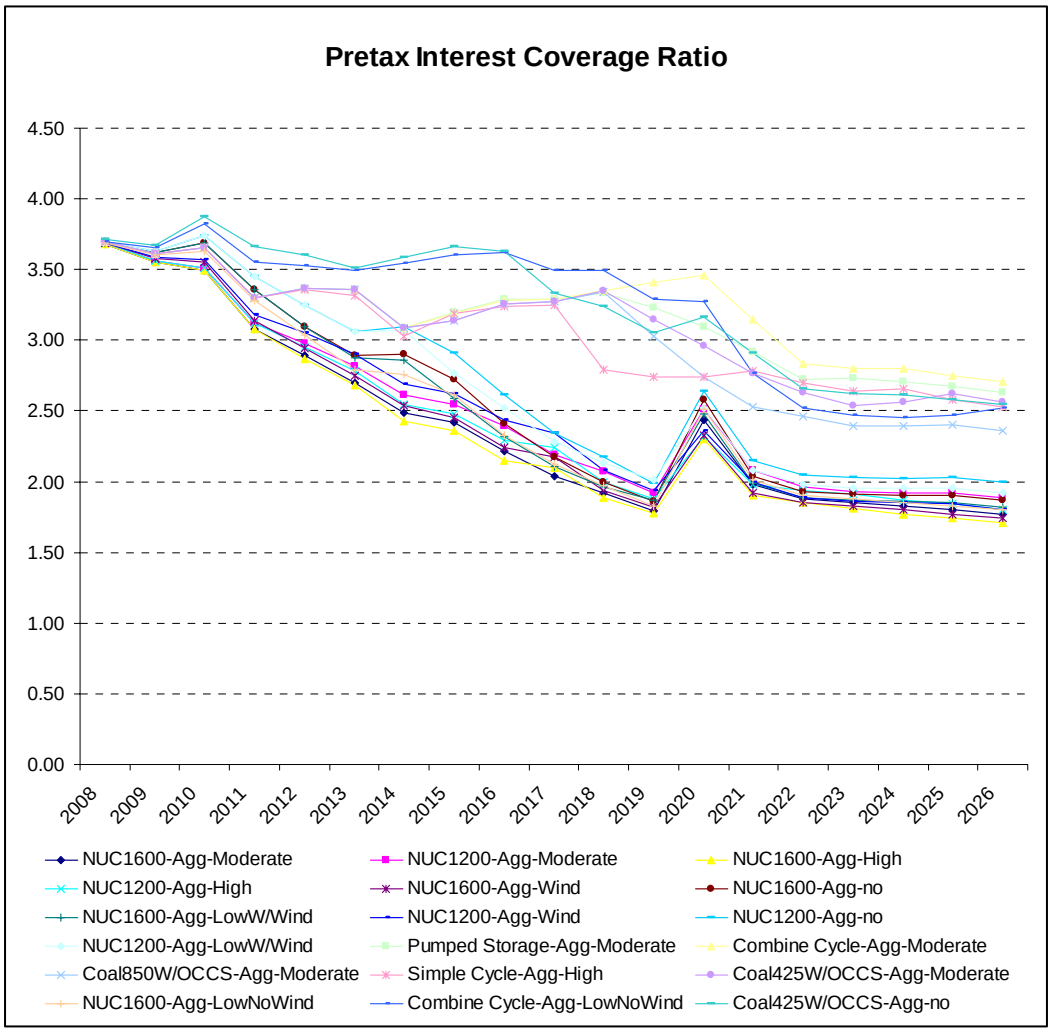

Nuc1600-Agg-Low without Wind
Energy Produced (GWh)
70000
65000
60000
55000
50000
45000
40000
35000
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Existing Plant
Expansion - Fossil
Expansion - Nuclear
Expansion - Combine Cycle
Expansion - Simple Cycle
Expansion - Biomass
Expansion - Land Fill Gas
Expansion - Wind
Expansion - Hydro

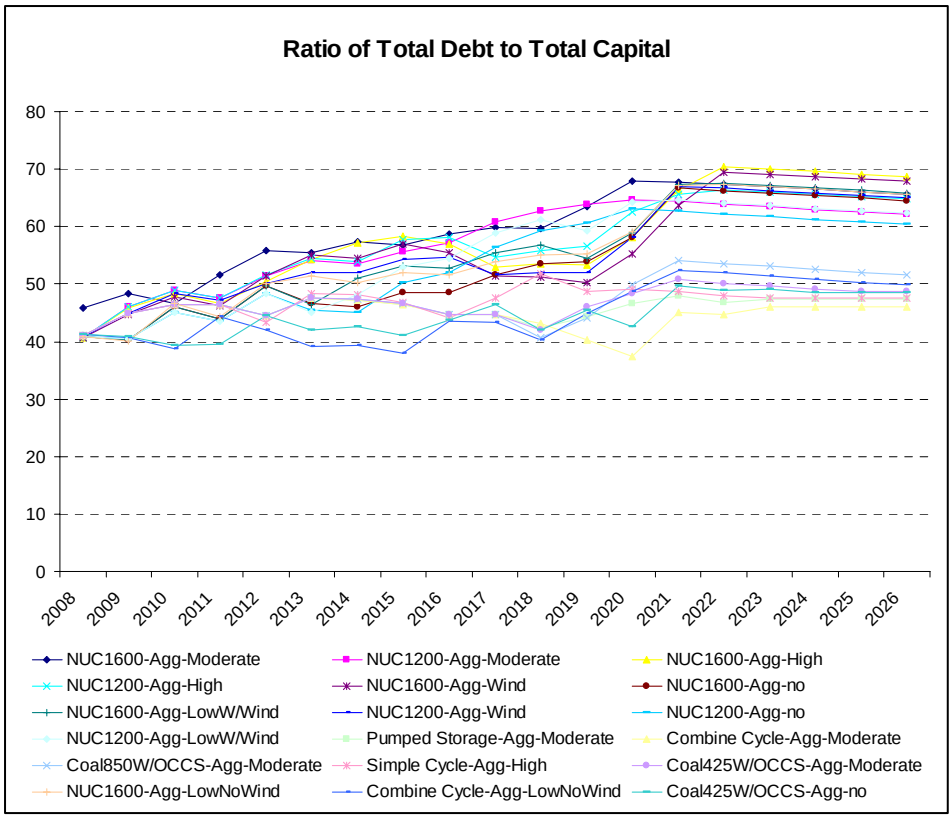

Coal425W/OCCS-Agg-Moderate
Energy Produced(GWh)
60000
55000
50000
45000
40000
35000
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Existing Plant
Expansion - Fossil
Expansion - Nuclear
Expansion - Combine Cycle
Expansion - Simple Cycle
Expansion - Biomass
Expansion - Land Fill Gas
Expansion - Wind
Expansion - Hydro

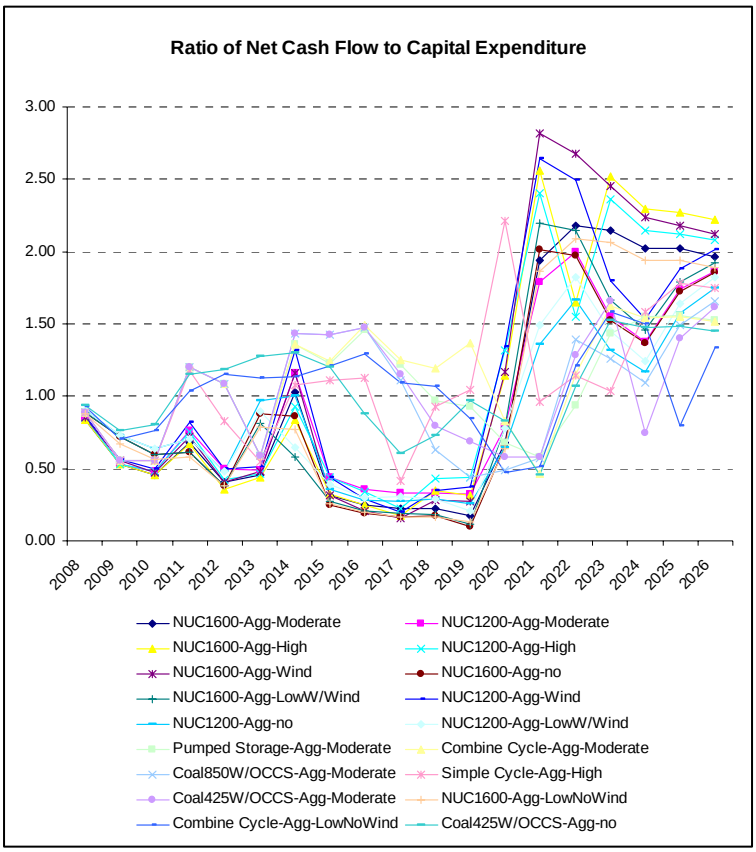

Coal425W/OCCS-AGG-No
Energy Produced (GWh)
60000
55000
50000
45000
40000
35000
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Existing Plant
Expansion - Fossil
Expansion - Nuclear
Expansion - Combine Cycle
Expansion - Simple Cycle
Expansion - Biomass
Expansion - Land Fill Gas
Expansion - Wind
Expansion - Hydro


Combine Cycle - Agg - Low without Wind
Energy Produced (GWh)
60000
55000
50000
45000
40000
35000
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Existing Plant
Expansion - Fossil
Expansion - Nuclear
Expansion - Combine Cycle
Expansion - Simple Cycle
Expansion - Biomass
Expansion - Land Fill Gas
Expansion - Wind
Expansion - Hydro

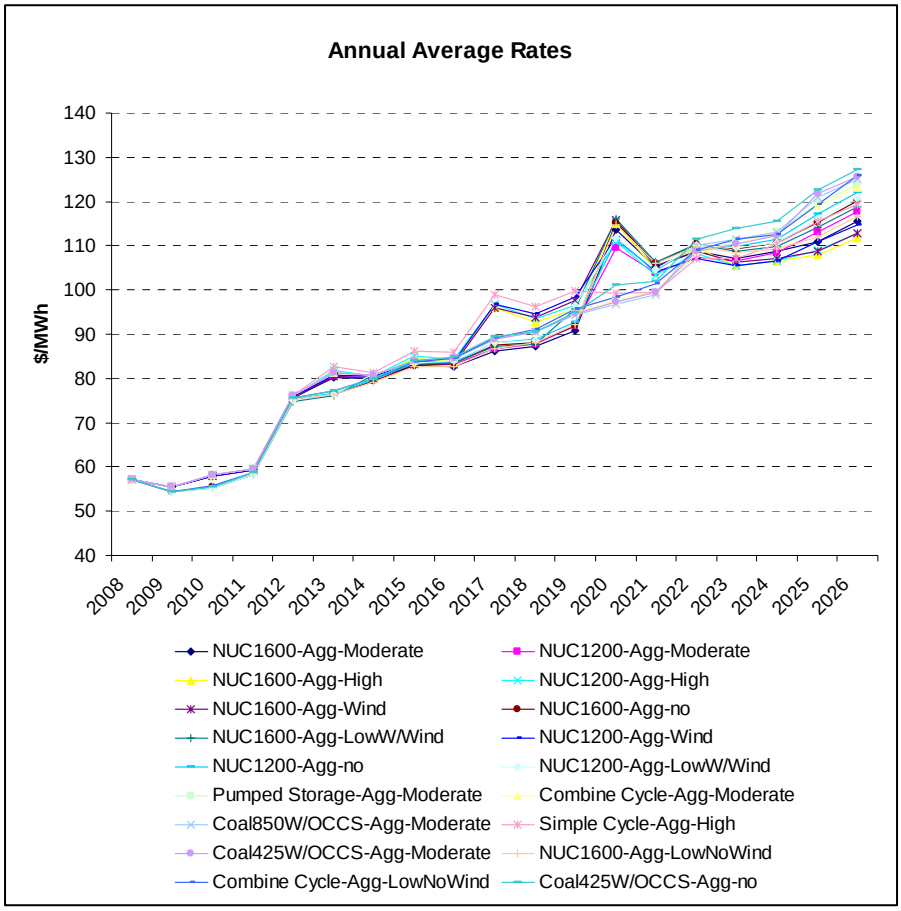
(7) The values of the three (3) measures of financial condition identified in subsection (4)(A);



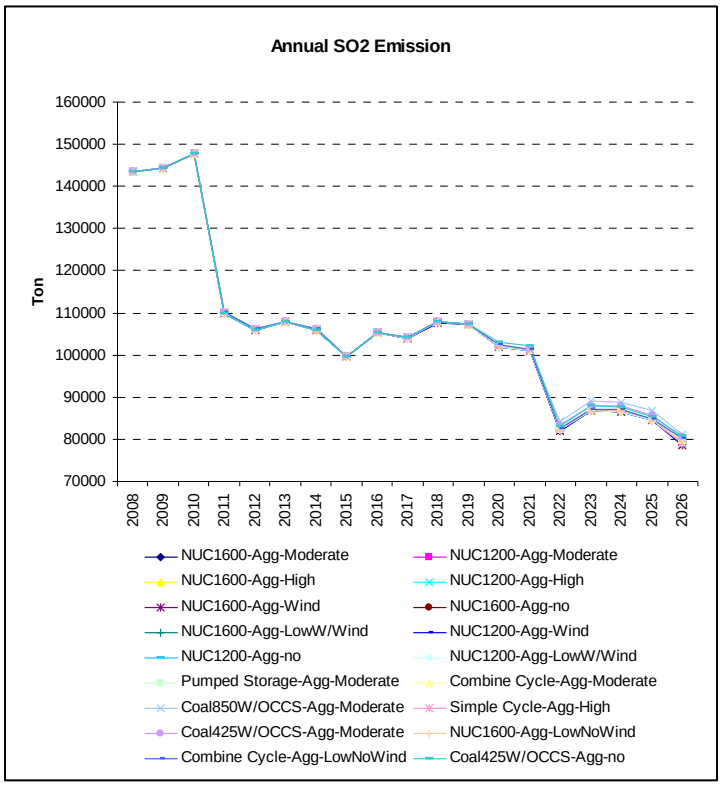

Ratio of Total Debt to Total Capital
80
70
60
50
40
30
20
10
0
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
NUC1600-Agg-Moderate
NUC1200-Agg-Moderate
NUC1600-Agg-High
NUC1200-Agg-High
NUC1600-Agg-Wind
NUC1600-Agg-no
NUC1600-Agg-LowW/Wind
NUC1200-Agg-Wind
NUC1200-Agg-no
NUC1200-Agg-LowW/Wind
Pumped Storage-Agg-Moderate
Combine Cycle-Agg-Moderate
Coal850W/OCCS-Agg-Moderate
Simple Cycle-Agg-High
Coal425W/OCCS-Agg-Moderate
NUC1600-Agg-LowNoWind
Combine Cycle-Agg-LowNoWind
Coal425W/OCCS-Agg-no

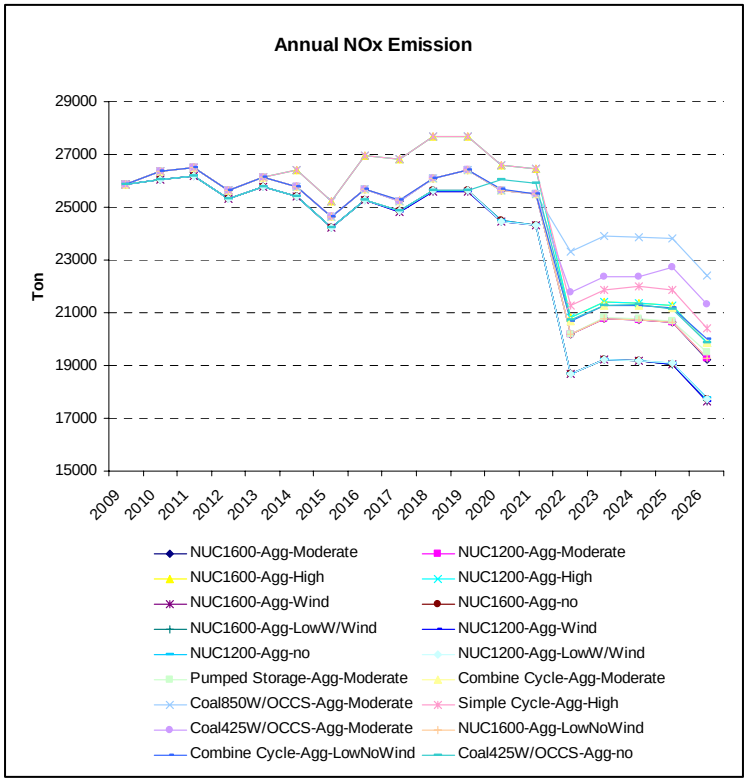

Ratio of Net Cash Flow to Capital Expenditure
3.00
2.50
2.00
1.50
1.00
0.50
0.00
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
NUC1600-Agg-Moderate
NUC1200-Agg-Moderate
NUC1600-Agg-High
NUC1200-Agg-High
NUC1600-Agg-Wind
NUC1600-Agg-no
NUC1600-Agg-LowW/Wind
NUC1200-Agg-Wind
NUC1200-Agg-no
NUC1200-Agg-LowW/Wind
Pumped Storage-Agg-Moderate
Combine Cycle-Agg-Moderate
Coal850W/OCCS-Agg-Moderate
Simple Cycle-Agg-High
Coal425W/OCCS-Agg-Moderate
NUC1600-Agg-LowNoWind
Combine Cycle-Agg-LowNoWind
Coal425W/OCCS-Agg-no

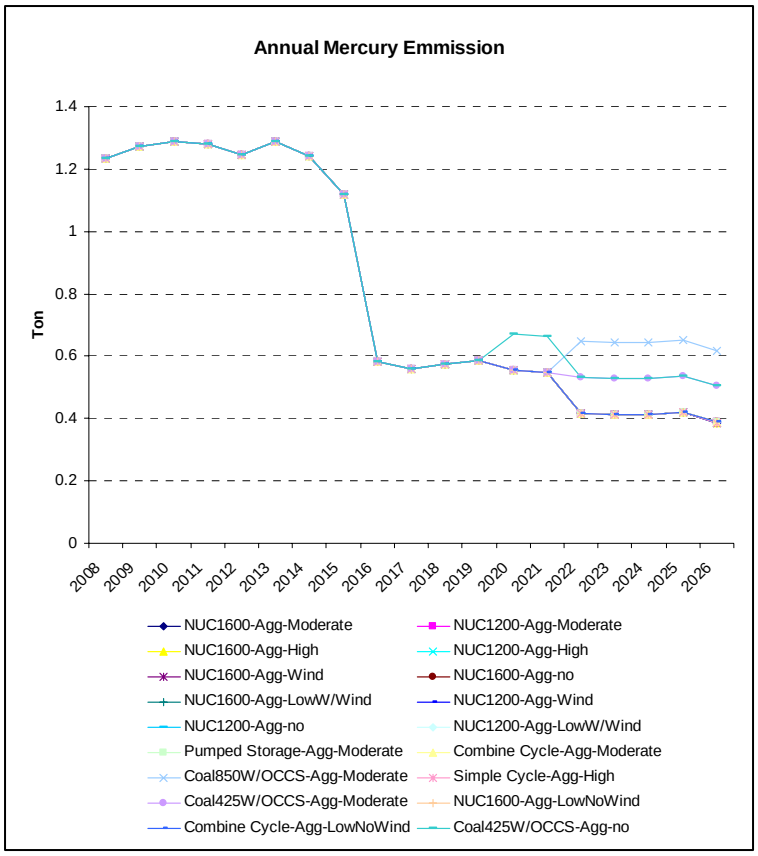
(8) Annual average rates;

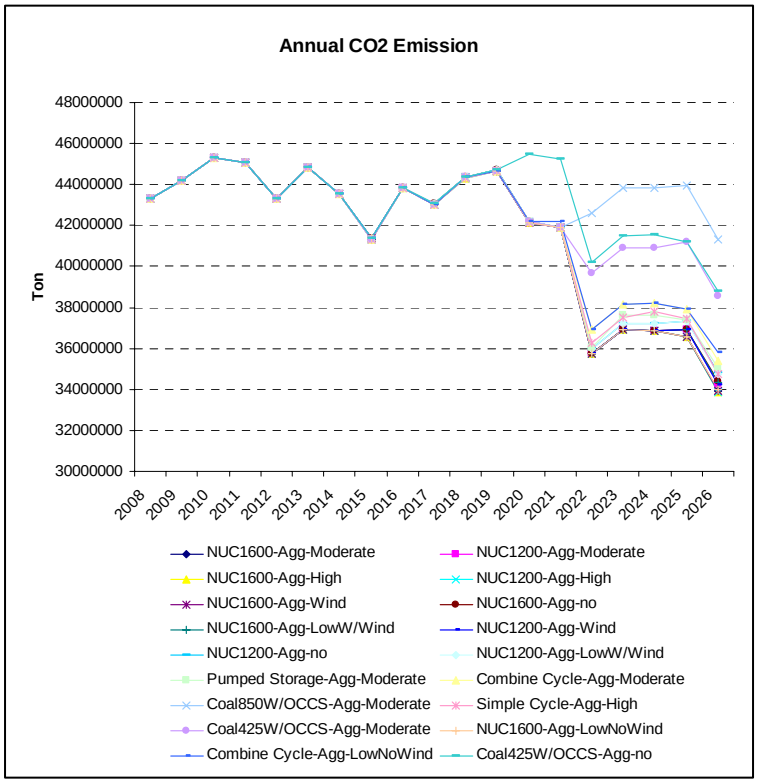


(9) Annual emissions of each environmental pollutant identified pursuant to 4 CSR 240-22.040 (2) (B) 1; and

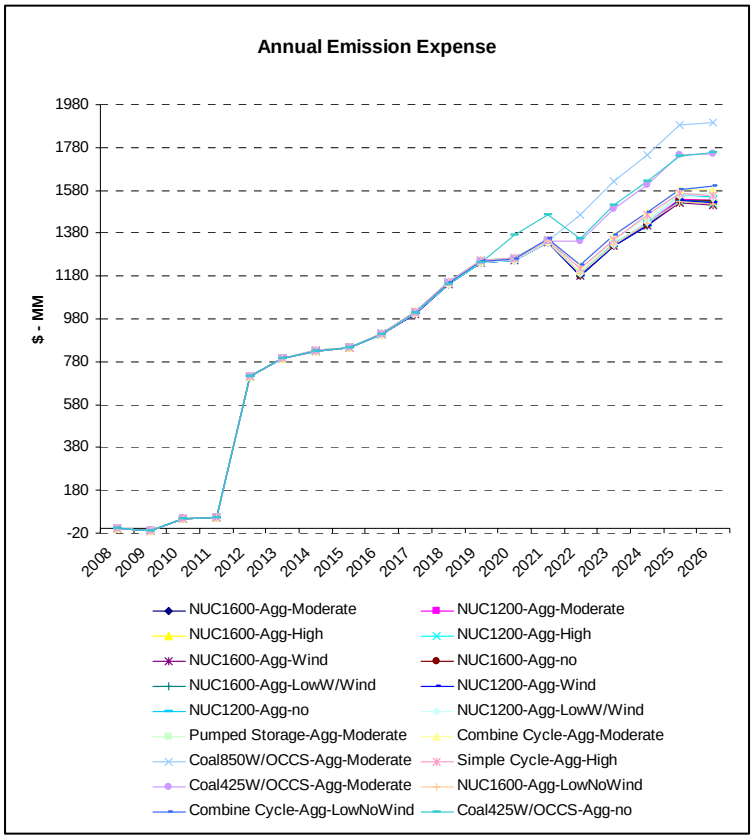





Annual Mercury Emmission
Ton
1.4
1.2
1
0.8
0.6
0.4
0.2
0
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
NUC1600-Agg-Moderate
NUC1200-Agg-Moderate
NUC1600-Agg-High
NUC1200-Agg-High
NUC1600-Agg-Wind
NUC1600-Agg-no
NUC1600-Agg-LowW/Wind
NUC1200-Agg-Wind
NUC1200-Agg-no
NUC1200-Agg-LowW/Wind
Pumped Storage-Agg-Moderate
Combine Cycle-Agg-Moderate
Coal850W/OCCS-Agg-Moderate
Simple Cycle-Agg-High
Coal425W/OCCS-Agg-Moderate
NUC1600-Agg-LowNoWind
Combine Cycle-Agg-LowNoWind
Coal425W/OCCS-Agg-no


Annual CO2 Emission
Ton
48000000
46000000
44000000
42000000
40000000
38000000
36000000
34000000
32000000
30000000
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
NUC1600-Agg-Moderate
NUC1200-Agg-Moderate
NUC1600-Agg-High
NUC1200-Agg-High
NUC1600-Agg-Wind
NUC1600-Agg-no
NUC1600-Agg-LowW/Wind
NUC1200-Agg-Wind
NUC1200-Agg-no
NUC1200-Agg-LowW/Wind
Pumped Storage-Agg-Moderate
Combine Cycle-Agg-Moderate
Coal850W/OCCS-Agg-Moderate
Simple Cycle-Agg-High
Coal425W/OCCS-Agg-Moderate
NUC1600-Agg-LowNoWind
Combine Cycle-Agg-LowNoWind
Coal425W/OCCS-Agg-no

(10) Annual probable environmental costs.



(D) A discussion of how the impacts of rate changes on future electric loads were modeled and how the appropriate estimates of price elasticity were obtained.

The MRN-NEEM model used to evaluate electric sector impacts for AmerenUE's IRP is a combination of the MRN model and the NEEM model, as described in the 4 CSR 240-22.030 Appendix B. The MRN model is a computable general equilibrium ("CGE") model that is a top-down model with representation of the entire U.S. economy. As such, it captures all economy-wide relationships, including responses to price changes (in electricity, other energy inputs and relative price changes between energy and non-energy goods and services).

The production functions in the model, including those for the energy sectors, the non-energy sectors, and the household sector, capture the impacts of rate changes on electricity demand. When energy prices increase (as under a carbon policy) more capital and labor (and possibly materials) are substituted for energy in the production of each unit of output. That is, production becomes less energy-intensive relative to the BAU case. An analogous shift occurs within households so that a unit of energy service (e.g., a particular number of lumens of light received, or the annual service of a refrigerator) require less energy because of the purchase and operation of more capital-intensive (but more energy-efficient) appliances. Households may also simply reduce their demand for energy services in response higher prices. Thus, household demand-response involves both increased adoption of energy-efficient technologies and behavioral changes that result in lower overall (direct) consumption of energy services. Because MRN is a general equilibrium model, final demand decreases (as the prices of products containing embodied energy rise under carbon cap) for products that contain embodied energy – this indirectly lowers energy demand in the model.

The price elasticity of electricity demand is not a direct input of the MRN model, but is implied. The demand elasticity depends on the elasticity of substitutions (most notably between 1) energy inputs and 2) composite energy inputs with all other inputs) and the value shares of the inputs that characterize the household consumption functions. There is a separate elasticity of substitution for the residential sector and the commercial sectors and this elasticity is time varying.

The model's electricity demand response implies a range of demand elasticity of electricity between -0.35 to -0.7 in the short run (2015) and a range of -0.8 to -1.0 in the long run (2030). The two scenarios with short-run elasticities of approximately -0.7 in the short run are both associated with scenarios that have high natural gas prices, and the elasticity is capturing both the impact of higher natural gas prices and the CO2 policy. The longer-run elasticities are higher, but this is precisely because these are long-run measures – in the long-run capital is more malleable (movement of capital is less restrictive) and hence becomes more energy-efficient in response to sustained higher energy prices.

There has been much economic research on the topic of electricity demand responses to changing electricity prices. A primary source for the short-run and long-run elasticities cited above is a 2004 study by James Espey and Molly Espey (Espey 2004).1 In Espey 2004 the authors analyzed 36 peer-reviewed studies on residential electricity demand, which resulted in 123 estimates of short-run price elasticity and 125 estimates of long-run price elasticity. The short-run elasticity estimates ranged from -2.01 to -0.004 and had a mean of -0.35 and a median of -0.28; the long-run elasticity estimates ranged from -2.25 to -0.04 and had a mean of -0.85 and a median of -0.81.

In addition, the U.S. Department of Energy's Energy Information Administration (EIA) released a paper on price responsiveness.2 The paper describes the price responses of different energy inputs, including electricity, used in the EIA's Annual Energy Outlook. These price responses are based on model simulations in which the price of energy inputs were doubled. Short-run response (response in the year of a price change and in the two following years) and long-run responses (based on 20 years following sustained price increases) were estimated for residential and commercial electricity consumers. Short-run own-price elasticity for residential

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[1] "Turning on the Lights: A Meta-Analysis of Residential Electricity Demand Elasticities,"*Journal of Agricultural and Applied Economics*, April 2004

[2] Wade, Steven H., "Price Responsiveness in the AEO2003 NEMS Residential and Commercial Buildings Sector Models." Available at http://www.eia.doe.gov/oiaf/analysispaper/elasticity/.

electricity demand ranged from -0.20 to -0.34 and long-run own-price elasticity for residential electricity demand was -0.49. For commercial electricity demand, the short-run elasticity ranged from -0.10 to -0.20 and the long-run elasticity was -0.45.3

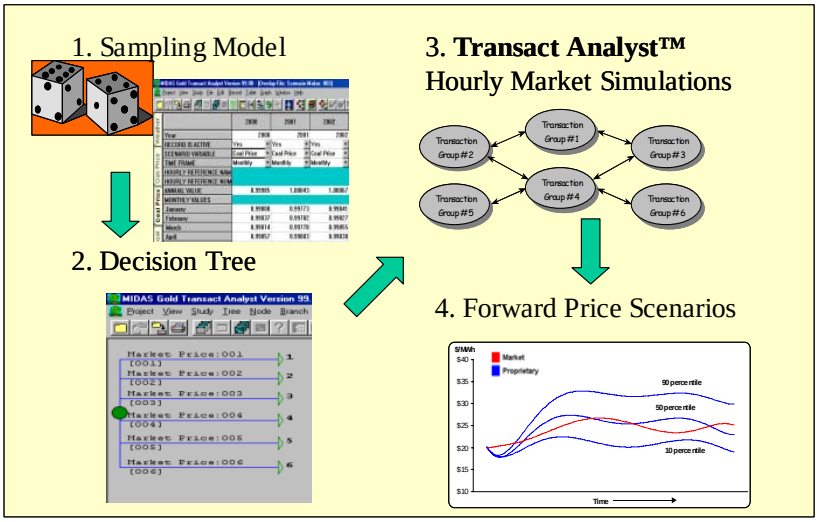
Based on these sources and other work performed by CRA experts, the MRN-NEEM analysis calibrated the utility and production function elasticities of substitution to target a short-run elasticity of -0.20 and a long-run elasticity of -0.80.

[3] *Ibid.*, Table 1. Available at http://www.eia.doe.gov/oiaf/analysispaper/elasticity/table1.html.

(E) A description of the computer models used in the analysis of alternative resource plans; and

Strategic Planning *powered by* MIDAS Gold® is an integrated, fast, multi-scenario zonal market model capable of capturing many aspects of regional electricity market pricing, resource operation and asset and customer valuation. It is comprised of four modules: markets, portfolio, financial and risk. The markets and portfolio modules are hourly, multi-area, chronologically correct, market production costing modules used to derive market prices, evaluate power contracts and develop regional or utility-specific resource plans. The financial and risk modules provide full financial results and statements and decision-making tools necessary to value customers, resource portfolios and business unit profitability. Each module is discussed separately.

Overview of Process



Portfolio Module

Once price discovery has been completed in the markets module the portfolio module may be used to perform utility or region specific portfolio analyses. Simulation times are faster and it allows for more detailed operational characteristics for a utility specific fleet. The generation fleet is dispatched competitively against pre-solved market prices from either the markets

module or other external sources. Native load may also be used for non-merchant/regulated entities with a requirement to serve.

Portfolio module operates generation fleet based on unit commitment logic which allows for plant specific parameters of:

- Ramp rates
- Minimum/maximum run times
- Start up costs

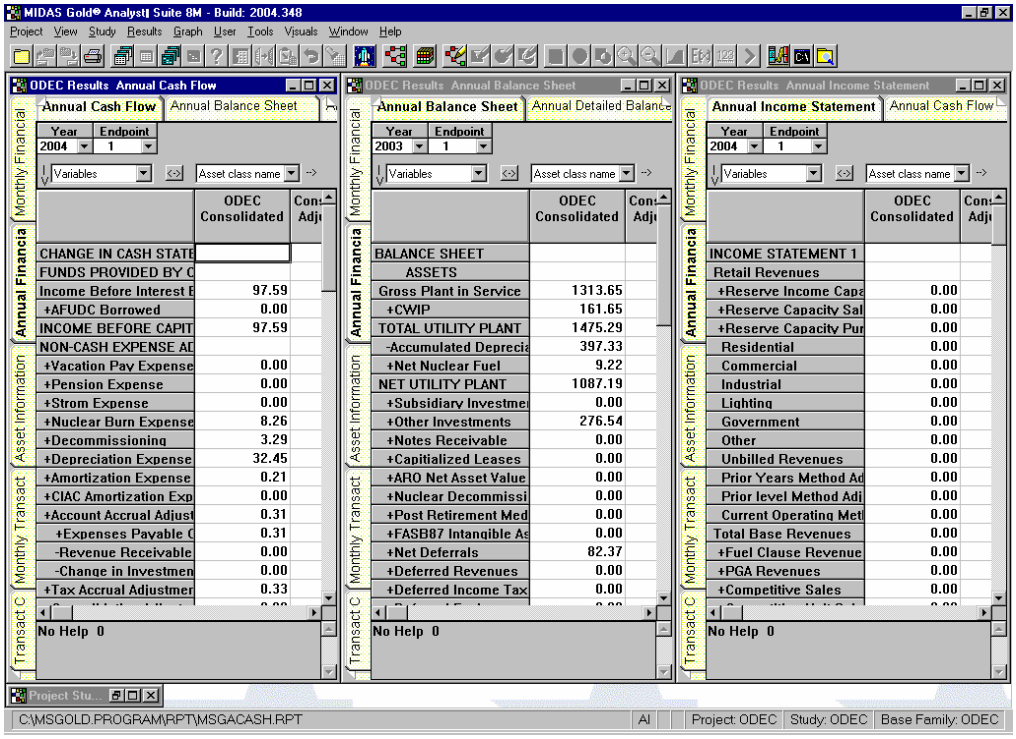
The decision to commit a unit may be based on one-day, three-day, seven-day and month criteria. Forced outages may be based on Monte-Carlo techniques or frequency duration with the capability to perform detailed maintenance scheduling. Resources may be de-committed based on transmission export constraints.

Portfolio module has the capability to operate a generation fleet against single or multiple markets to show interface with other zones. In addition, physical, financial and fuel derivatives with pre-defined or user-defined strike periods, unit contingency, replacement policies or load following for full-requirement contracts are active.

Financial Module

The financial module allows the user the ability to model other financial aspects regarding costs exterior to the operation of units and other valuable information that is necessary to properly evaluate the economics of a generation fleet. The financial module produces bottom-line financial statements to evaluate profitability and earnings impacts.

Sample Reports



Common Functionality of All Modules

- Input information organized in logical tables by type of information in a format similar to spreadsheets for ease of use
- Operates as a desk-top application without the need for servers
- Fully integrated and seamless to user with no additional installation or IT support required
- Results are presented in a pivot-table spreadsheet format
- Internal graphics capability available on results
- User-defined customization of results exported
- Information available to the lowest level defined by user
- May roll up results to mid levels to group assets
- Multi-tool applications available to:
    - Run multiple studies

- Convert files from multiple formats
- Manage results

Strategic Planning *powered by* MIDAS Gold® documentation is available for review in the Company's Corporate Planning Department or may be obtained from Ventyx subject to appropriate licensing restrictions imposed by them.

(F) A description of any proposed load-building programs, a discussion of why these programs are judged to be in the public interest and, for all resource plans that include these programs, plots of the following over the planning horizon:

(1) Annual average rates with and without the load-building programs; and

4 CSR 240-22.060 (6) (F) (1) is not applicable because AmerenUE does not have any load-building programs.

(2) Annual utility costs and probable environmental costs with and without the load-building programs.

4 CSR 240-22.060 (6) (F) (2) is not applicable because AmerenUE does not have any load-building programs.