

2020-2022 Demand Side Management (DSM) Resource Plan (NSUARB M09096)
NSPI Responses to EAC Information Requests

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1 **Request IR-1:**

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3 **Please provide NSP's most current avoided costs for both energy and capacity from years**
4 **2020-2040.**

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6 Response IR-1:

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8 Please refer to NSUARB IR-7.

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Request IR-2:

Have you done any analysis on the maximum cost-effective level of achievable efficiency?

(a) Please provide costs and savings by year from this scenario

(b) Please provide all analyses and workpapers supporting these values

(c) If avoided costs are different from those provided by interrogatory one, please provide these avoided costs and explain the reasons for the differences.

Response IR-2:

(a-c) Please refer to SBA IR-8.

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Request IR-3:

Please provide any analysis and workpapers related to the scenario Synapse analyzed in the 2018 GUO.

(a) Please provide the avoided costs used by Synapse in this report

(b) Do you believe that the scenario that Synapse looked is not cost-effective? If so, please provide all assumptions, rationale, analysis and workpapers supporting that assertion.

Response IR-3:

(a) The avoided costs were not used by Synapse in the scenarios analyzed in the 2018 Generation Utilization and Optimization (GUO) proceeding. Avoided costs of DSM were produced by Synapse in an Addendum to the GUO Final Report, which NS Power understands were calculated based on the “Scenario 2” resource plan from the GUO study. Please refer to Attachment 1.

(b) The objective of the GUO proceeding was to determine the cost-effectiveness of retention of NS Power’s thermal fleet through 2030, and possibly beyond. The process was not intended or designed to provide guidance on other energy and capacity resources. NS Power has not undertaken an examination of Synapse’s underlying analysis and approach from the GUO.



Memorandum

TO: M08059 GENERATION UTILIZATION AND OPTIMIZATION STAKEHOLDERS
FROM: BOB FAGAN – SYNAPSE ENERGY ECONOMICS
DATE: OCTOBER 19, 2018
RE: AVOIDED ENERGY AND CAPACITY COSTS ASSOCIATED WITH DSM RESOURCES

This memo presents the results and describes our computation of the avoided energy and avoided capacity costs associated with the energy efficiency savings represented in Scenario 2, “Medium DSM”, in the Generation Utilization and Optimization Study.¹ Avoided energy and avoided capacity costs represent the costs – both fixed and variable – that are avoided when energy efficiency resources reduce the overall requirements for system energy and capacity, and thus reduce the associated revenue requirements.

We used a differential revenue requirements approach to estimate the avoided energy and capacity costs. We computed the difference in revenue requirements (between Scenario 1 – reference, and Scenario 2 – medium DSM) associated with the variable (energy related) and the fixed (capacity related) costs and divided those differences by the saved energy or saved capacity, in each of the study years (2018 through 2042). This results in a per-MWh-saved, and a per-kW-saved, avoided cost value for each year of the study.

We extracted the outputs of the Plexos modeling results, and the associated post-processing data used in the Study. Total revenue requirements as computed in the Study are composed of fixed and variable costs. Fixed (or capacity related) cost components include costs associated with fixed O&M, new construction/build costs, and sustaining capital costs. Variable (or energy related) cost components include fuel, variable O&M, renewable energy provision, interchange, and startup/shutdown elements.

¹ Final Report, “Nova Scotia Power Inc. Thermal Generation Utilization and Optimization, Economic Analysis of Retention of Fossil-Fueled Thermal Fleet To and Beyond 2030”, M08059, Prepared for Board Counsel, Nova Scotia Utility and Review Board. May 1, 2018.

Addendum to Final Report - M08059 Generation Utilization and Optimization - DSM Avoided Costs

We computed avoided capacity costs by dividing the total fixed cost difference in revenue requirements between the two scenarios by the peak load savings seen between the two scenarios, for each year. We computed avoided energy costs by dividing the total variable cost difference in revenue requirements between the two scenarios by the energy savings seen between the scenarios, again for each year.

Table 1 below shows the results of the analysis.

The results seen in Table 1 include the effect of “avoided emissions”, since the modeling explicitly included the emissions constraints present in the Province. These values exclude any additional avoided costs that could be seen for transmission and distribution infrastructure under the medium DSM scenario. We also included a third, “Total – energy basis” computation, that provides a single stream of avoided (energy + capacity) costs, on a per MWh basis.

The results reflect the build and dispatch patterns seen in the Study results. For example, avoided energy costs drop after the commencement of the Maritime Link / Nova Scotia Block energy in 2020. Avoided capacity costs show a noticeable increase beginning in 2023, the year in which the reference case was seen to build a new combined cycle resource. In all years, the general nature of marginal energy sources in the Province – interchange, Maritime Link surplus energy, and oil/gas sourced energy – is reflected in the relatively higher avoided energy costs, since in general DSM resources are not displacing coal energy, but instead are displacing the more-expensive resources further up the system supply curve. The Study report contains discussion of this phenomenon.

Addendum to Final Report - M08059 Generation Utilization and Optimization - DSM Avoided Costs

Table 1. Summary Avoided Energy and Capacity Costs – 2018-2042

Avoided Energy and Avoided Capacity Computation - Reference Scenario vs. Medium DSM Scenario																										
Differential Revenue Requirements (Wholesale) Basis																										
Variable Cost Components	Fuel, VOM, RE, Interchange, Startup/Shutdown	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Ref	Sc 1 energy related costs \$000	\$534,475	\$570,999	\$559,945	\$520,616	\$520,950	\$541,105	\$558,318	\$562,059	\$588,495	\$606,388	\$616,302	\$623,633	\$663,509	\$660,884	\$679,356	\$676,628	\$714,087	\$723,742	\$735,546	\$736,439	\$763,442	\$782,747	\$800,384	\$834,914	\$837,866
MedDSM	Sc 2 energy related costs \$000	\$530,193	\$565,586	\$558,826	\$514,698	\$515,851	\$527,585	\$531,335	\$545,571	\$549,327	\$566,576	\$564,516	\$582,009	\$617,198	\$603,382	\$613,690	\$608,053	\$629,545	\$659,681	\$649,628	\$653,622	\$662,560	\$676,993	\$676,156	\$701,412	\$701,125
	Avoided Energy Costs, = Sc 2 vs Sc 1, \$000	\$4,282	\$5,413	\$1,119	\$5,918	\$5,099	\$13,520	\$26,983	\$16,488	\$39,168	\$39,812	\$51,786	\$41,624	\$46,311	\$57,502	\$65,666	\$68,575	\$84,542	\$64,061	\$85,919	\$82,817	\$100,882	\$105,754	\$124,228	\$133,502	\$136,741
	Sc 1 Energy, GWh	11,098.1	11,098.3	11,060.6	11,043.3	10,990.6	11,155.7	11,171.1	11,046.7	11,044.2	11,068.9	10,980.9	11,107.2	11,136.0	11,029.0	11,057.4	10,985.3	11,179.5	11,126.1	11,015.8	11,032.3	11,047.6	10,968.5	11,138.5	11,168.4	11,012.0
	Sc 2 Energy, GWh	11,083.8	11,077.1	11,035.0	10,983.2	10,870.9	10,940.2	10,866.8	10,663.4	10,583.7	10,540.9	10,399.3	10,462.8	10,438.6	10,281.3	10,253.0	10,130.0	10,256.1	10,151.0	9,998.7	9,960.9	9,921.9	9,795.2	9,895.5	9,877.0	9,680.8
	GWh Saved by Sc 2 DSM relative to Sc 1	14.3	21.1	25.6	60.1	119.7	215.5	304.2	383.3	460.5	528.1	581.6	644.4	697.4	747.8	804.3	855.4	923.4	975.1	1,017.1	1,071.4	1,125.7	1,173.2	1,243.0	1,291.4	1,331.2
	Avoided energy cost, \$/MWh saved	\$299.68	\$256.24	\$43.71	\$98.53	\$42.61	\$62.73	\$88.69	\$43.02	\$85.06	\$75.39	\$89.05	\$64.59	\$66.41	\$76.90	\$81.64	\$80.17	\$91.55	\$65.70	\$84.47	\$77.30	\$89.61	\$90.14	\$99.94	\$103.38	\$102.72
Fixed Cost Components	FOM, SusCap, New build	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Ref	Sc 1 capacity related costs \$000	\$73,630	\$81,885	\$109,448	\$114,237	\$126,040	\$175,502	\$185,203	\$193,719	\$201,912	\$211,113	\$221,458	\$232,573	\$242,591	\$254,264	\$270,306	\$277,340	\$290,350	\$301,347	\$315,153	\$327,228	\$354,068	\$366,570	\$378,413	\$392,423	\$412,746
MedDSM	Sc 2 capacity related costs \$000	\$73,630	\$81,885	\$109,448	\$112,810	\$124,613	\$135,665	\$145,278	\$153,705	\$161,807	\$170,916	\$184,980	\$195,999	\$205,918	\$204,924	\$220,152	\$229,833	\$240,918	\$251,801	\$262,526	\$274,484	\$293,332	\$307,557	\$320,420	\$336,666	\$385,865
	Avoided Capacity Costs, = Sc 2 vs. Sc 1, \$000	\$0	\$0	\$0	\$1,427	\$1,427	\$39,838	\$39,925	\$40,014	\$40,105	\$40,197	\$36,478	\$36,574	\$36,673	\$49,340	\$50,155	\$47,506	\$49,432	\$49,546	\$52,626	\$52,744	\$60,736	\$59,013	\$57,993	\$55,757	\$26,881
	Sc 1 Peak Load, MW	1,993.0	2,010.0	2,029.0	2,038.0	2,053.0	2,073.0	2,080.0	2,084.0	2,083.0	2,086.0	2,096.2	2,106.5	2,116.8	2,127.2	2,137.6	2,148.1	2,158.6	2,169.2	2,179.8	2,190.4	2,201.1	2,211.9	2,222.7	2,233.7	2,244.8
	Sc 2 Peak Load, MW	1,980.2	1,993.4	2,014.5	2,016.9	2,022.5	2,024.9	2,014.3	2,003.0	1,986.8	1,977.0	1,976.4	1,975.7	1,975.0	1,974.3	1,973.6	1,973.0	1,972.3	1,971.6	1,970.9	1,970.2	1,969.5	1,968.9	1,968.2	1,967.6	1,967.1
	Peak Savings Delta, Sc 2 vs. Sc 1, MW	12.8	16.6	14.5	21.1	30.5	48.1	65.7	81.0	96.2	109.0	119.9	130.8	141.8	152.9	164.0	175.1	186.3	197.6	208.9	220.2	231.6	243.0	254.5	266.1	277.7
	Avoided capacity costs, \$/Kw saved	0.00	0.00	0.00	67.78	46.76	828.69	608.13	493.89	417.07	368.94	304.32	279.56	258.56	322.72	305.85	271.26	265.30	250.78	251.97	239.53	262.26	242.83	227.87	209.53	96.78
Total - Energy basis		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
	Avoided Costs, \$000	\$4,282	\$5,413	\$1,119	\$7,345	\$6,526	\$53,358	\$66,908	\$56,502	\$79,272	\$80,010	\$88,264	\$78,198	\$82,984	\$106,842	\$115,820	\$116,081	\$133,974	\$113,607	\$138,545	\$135,561	\$161,618	\$164,766	\$182,221	\$189,259	\$163,621
	Delta GWh	14.3	21.1	25.6	60.1	119.7	215.5	304.2	383.3	460.5	528.1	581.6	644.4	697.4	747.8	804.3	855.4	923.4	975.1	1,017.1	1,071.4	1,125.7	1,173.2	1,243.0	1,291.4	1,331.2
	Cost per MWh, Capacity + Energy	\$299.68	\$256.24	\$43.71	\$122.30	\$54.54	\$247.58	\$219.92	\$147.42	\$172.16	\$151.52	\$151.77	\$121.35	\$119.00	\$142.88	\$143.99	\$135.70	\$145.08	\$116.51	\$136.22	\$126.53	\$143.57	\$140.44	\$146.60	\$146.55	\$122.91
Note: All avoided energy costs included the avoided emissions costs associated with the emission caps in Nova Scotia. No additional avoided T or D costs are included.																										

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1 **Request IR-4:**

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3 **Please provide all analysis and workpapers associated with the latest rate analysis and bill**
4 **impact analysis performed for the preferred plan, and any other higher or lower scenarios**
5 **that NSP has analyzed.**

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7 Response IR-4:

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9 Please refer to NSUARB IR-20.

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1 **Request IR-5:**

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3 **Do you believe that it is possible for E1 to become a “leading” program administrator?**

4 **Why or why not?**

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6 **Response IR-5:**

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8 NS Power does not agree with the definition of “leading” provided in the E1 evidence. Please
9 refer to the evidence of Richard Levitan at pages 26 to 35 in Appendix A to NS Power’s
10 evidence.

2020-2022 Demand Side Management (DSM) Resource Plan (NSUARB M09096)
NSPI Responses to EAC Information Requests

NON-CONFIDENTIAL

1 **Request IR-6:**

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3 **Please provide the avoided costs used in the 2014 IRP.**

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5 Response IR-6:

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7 Please refer to NSUARB IR-7.

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1 **Request IR-7:**

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3 **Please provide all analyses and workpapers of any scenarios besides the preferred plan that**
4 **would result in a lower total revenue requirement for NSP.**

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6 Response IR-7:

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8 Please refer to SBA IR-8.