

Memo



STATE OF RHODE ISLAND
**ENERGY EFFICIENCY &
RESOURCE MANAGEMENT COUNCIL**

CONSULTANT TEAM

To: RI Energy Efficiency and Resource Management Council
From: Matt Socks, EERMC Consultant Team
Date: May 20, 2021
Subject: 2021 Avoided Energy Supply Component (AESC) Study Overview

AESC STUDY OVERVIEW

The 2021 Avoided Energy Supply Component (AESC) Study (AESC 2021) was published on March 15, 2021¹. The AESC study is completed on a triennial basis and the work is funded and overseen by a group representing all six New England states that includes Program Administrators (utility companies), State agencies and non-government organizations. The objective is to allow all Program Administrators to have current and accurate information to estimate avoidable energy, capacity transmission and distribution and other costs for calculating energy benefits of energy efficiency program plans to be filed with state regulators. For Rhode Island, a group including representatives from National Grid, the Office of Energy Resources, the Division of Public Utilities & Carriers and the EERMC Consultant Team actively participated in the process from the beginning, covering regional meetings and regular Rhode Island-specific meetings (bi-weekly or monthly over the last 8 months depending on scale of regional activities). The results of the study will be applied in the 2022 Energy Efficiency Program Plan to be presented to the EERMC and stakeholders by National Grid and then filed with the RI Public Utilities Commission on October 1, 2021.

It should be stressed that the AESC results are not a forecast of energy prices, but rather a forecast of energy prices absent future program-induced demand-side management activities. As program activities reduce total energy system demand, they also reduce future energy costs. The avoided future energy costs are used to quantify benefits for cost-effectiveness analysis purposes. In contrast to previous installments of the study, AESC 2021 included the analysis of multiple counterfactual scenarios that excluded different DSM components from the underlying load forecasts. For purposes of simplification, this memo discusses the results of Counterfactual #4 as this scenario most closely reflects RI's policy and planning context. Counterfactual #4 assumes a future in which no program-induced energy efficiency or active demand management resources are installed in 2021 or later years but does model some amount of building electrification installed by program administrators.

AESC 2021 Results Summary

The following section presents a summary of the avoided costs for each category of costs calculated in AESC 2021 along with comparisons to results from AESC 2018.

¹ <https://www.synapse-energy.com/project/aesc-2021-materials>

Electricity

Table 1 below presents an illustration of summer on-peak avoided cost components for electricity for Counterfactual #4. As the exact avoided costs are dependent on characteristics specific to a given energy efficiency measure, these are only illustrative but reflect the general trends identified in AESC 2021.

Table 1: Illustration of avoided retail summer on-peak electricity cost components, AESC 2021 Counterfactual #4 versus AESC 2018 (15-year levelized, real 2021 dollars)²

	AESC 2018	AESC 2018	AESC 2021	AESC 2021, relative to AESC 2018	
	2018 cents/kWh	2021 cents/kWh	2021 cents/kWh	2021 cents/kWh	% Difference
Avoided Retail Capacity Costs	2.00	2.11	1.22	-0.89	-42%
Avoided Retail Energy Costs	5.05	5.32	3.90	-1.42	-27%
Avoided RPS Compliance	0.39	0.41	1.40	0.98	237%
Subtotal: Capacity and Energy	7.48	7.85	6.52	-1.33	-17%
GHG non-embedded	2.69	2.83	4.69	1.86	66%
NO_x non-embedded	0.18	0.19	0.08	-0.11	-55%
Transmission & Distribution (PTF)	2.26	2.38	2.02	-0.36	-15%
Value of Reliability	0.02	0.02	0.01	-0.01	-32%
Electric capacity DRIPE	0.97	1.03	0.41	-0.62	-60%
Electric energy and cross-DRIPE	2.08	2.19	1.21	-0.98	-45%
Subtotal: DRIPE	3.05	3.22	1.62	-1.60	-50%
Total	15.68	16.49	14.94	-1.54	-9%

Source: *Avoided Energy Supply Components in New England: 2021 Report*, Synapse Energy Economics, ES-Table 4, p.8.

AESC 2021 generally forecasted lower avoided costs of capacity due to a relatively flat supply curve based on observations of recent forward capacity auctions. Energy avoided costs are generally lower due to lower natural gas prices at national hubs, lower estimated Regional Greenhouse Gas Initiative compliance costs, and increased quantities of zero-marginal-cost renewables. Estimated avoided costs for renewable

² Note: The avoided costs presented in this summary table represent the West/Central Massachusetts (WCMA) zone as is customary for data presented in the AESC Executive Summary; however, the illustrative trends presented are reflective of the results for the Rhode Island reporting zone.

portfolio standard (RPS) compliance are higher primarily due to increases in RPS target obligations combined with expected increases in load due to electrification.

AESC 2021 estimated lower energy DRIPE and capacity DRIPE values, due to changes in utility long-term energy purchases, updated market data, and new commodity forecasts.

AESC 2021 presents a number of different non-embedded costs for environmental regulations (that are not otherwise included in the above projections) for use in different state policy contexts; the values presented in Table 1 reflect the New England marginal abatement costs which assumed offshore wind energy as the marginal abatement technology.

AESC 2021 estimated lower avoided costs for pooled transmission facility (PTF) costs, as a result of a switching to a forward-looking methodology and lower avoided costs for reliability, due to a flatter supply capacity market supply curve.

Natural Gas

Table 2 below presents a summary of the natural gas avoided cost estimates by end-use assuming some avoidable LDC margin. Avoided costs for the Southern New England analysis region are applicable to Rhode Island.

Table 2: Avoided costs of gas for retail customers by end-use assuming some avoidable margin (15-year levelized, real 2021 dollars per MMBtu)

	Residential				Commercial & Industrial			All retail end-uses
	Non Heating	Hot Water	Heating	All	Non Heating	Heating	All	
Southern New England								
AESC 2018	\$6.51	\$8.31	\$9.66	\$9.04	\$7.37	\$8.79	\$8.17	\$8.61
AESC 2021	\$5.63	\$6.48	\$8.81	\$7.86	\$6.38	\$8.27	\$7.45	\$7.67
2018 to 2021 change	-14%	-22%	-9%	-13%	-13%	-6%	-9%	-11%
Northern New England								
AESC 2018	\$6.28	\$8.06	\$9.30	\$8.73	\$7.01	\$8.30	\$7.73	\$8.06
AESC 2021	\$5.47	\$6.35	\$8.76	\$7.79	\$6.26	\$8.19	\$7.35	\$7.58
2018 to 2021 change	-13%	-21%	-6%	-11%	-11%	-1%	-5%	-6%

Source: *Avoided Energy Supply Components in New England: 2021 Report*, Synapse Energy Economics, Table 12, p.46.

AESC 2021 generally estimated lower avoided natural gas costs for retail end-users primarily driven by lower long-term projections of wholesale natural gas prices but are partially offset by increased incremental gas pipeline expansion costs.

Other Fuels

Table 3 below presents a summary of the avoided costs for fuel oil and other end-use fuels.

Table 3: Avoided costs of retail fuels (15-year levelized, real 2021 dollars per MMBtu)

	Residential						Commercial		Transportation	
	No. 2 Distillate	Propane	Kerosene	Bio-Fuel (B20)	Cord Wood	Wood Pellets	No. 2 Distillate	No. 6 Residual	Motor Gasoline	Motor Diesel
AESC 2018	\$23.36	\$32.78	\$20.95	\$24.06	\$14.12	\$22.76	\$19.46	\$17.13	-	-
AESC 2021	\$24.04	\$38.79	\$29.59	\$21.64	\$20.84	\$22.47	\$22.25	\$15.74	\$22.07	\$22.76
Percent change	2.9%	18.3%	41.3%	-10.1%	47.6%	-1.3%	14.3%	-8.2%	-	-

Source: *Avoided Energy Supply Components in New England: 2021 Report*, Synapse Energy Economics, ES-Table 8, p.10.

AESC 2021 estimated higher avoided costs for fuel oil and other fuels and lower costs for biofuel, wood pellets, and residual fuel oil due to updates to recent historical data in the underlying sources used to calculate these values.

Illustrative Impacts on RI DSM Portfolio Cost-Effectiveness

This section presents a comparative analysis of AESC 2018 and AESC 2021 within the context of the 2021-2023 Energy Efficiency Program Plan. The BCR models for the 2021 Plan Year were updated to reflect the avoided costs presented in AESC 2021 and the resulting RI Benefit Cost Test benefits were tabulated.

Figure 1 below presents the planned benefits for the electric portfolio by sector for the 2021 Program Year using both the avoided costs from AESC 2018 and AESC 2021. The resulting impacts are fairly modest when applied to the entire portfolio, yielding a 3% reduction in total benefits. No single sector experiences an outsized impact of the avoided cost updates.

Figure 1: 2021 Plan RI Benefit Cost Test, Total Electric Portfolio Benefits by Sector (2021\$)

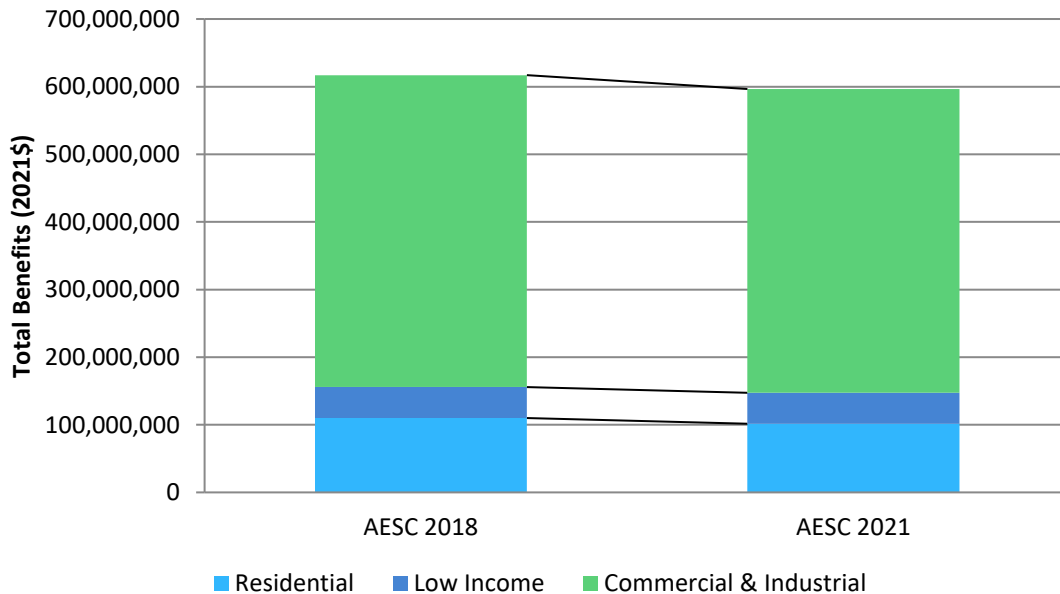
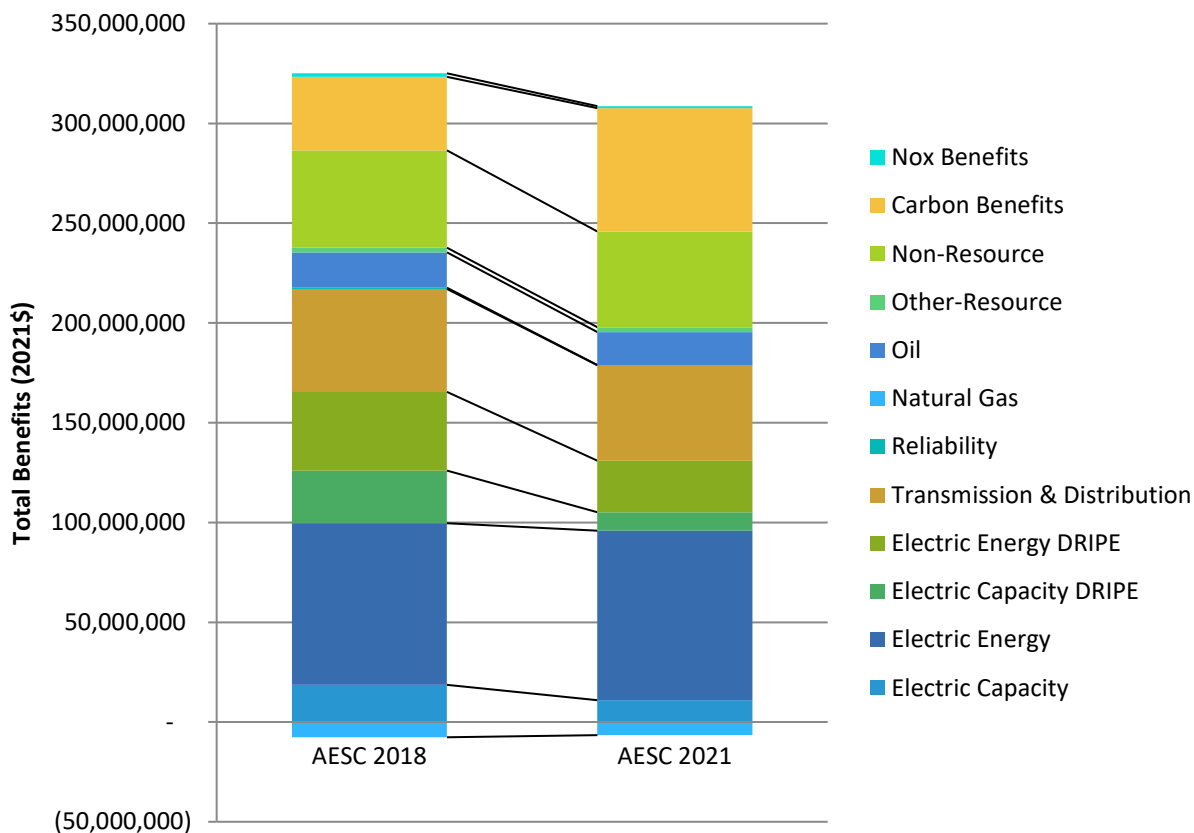


Figure 2 below presents the planned benefits for the electric portfolio by benefit category for the 2021 Program Year. Note that the economic benefits have been omitted from this comparison in an effort to highlight the benefit categories that change due the new AESC.

Figure 2: 2021 Plan RI Benefit Cost Test, Total Electric Portfolio Benefits by Category (2021\$)



As illustrated in the figure, most avoided cost categories only experience small changes. Electric capacity and energy and capacity DRIPE benefits are reduced; however, electric energy benefits actually increase slightly in contrast to the illustration presented in Table 1. This is primarily due to the fact that the estimated increase in RPS compliance costs is higher for RI relative to MA-based cost depicted in that table. The various decreases in benefit cost categories are nearly entirely offset by increases in non-embedded greenhouse gas benefits.

Figure 3 below presents the planned benefits for the gas portfolio by sector for the 2021 Program Year using both the avoided costs from AESC 2018 and AESC 2021. As with the electric portfolio analysis, the resulting impacts are fairly modest when applied to the entire gas portfolio yielding a 7% increase in total benefits with C&I experiencing the largest increase in benefits at 11%.

Figure 3: 2021 Plan RI Benefit Cost Test, Total Gas Portfolio Benefits by Sector (2021\$)

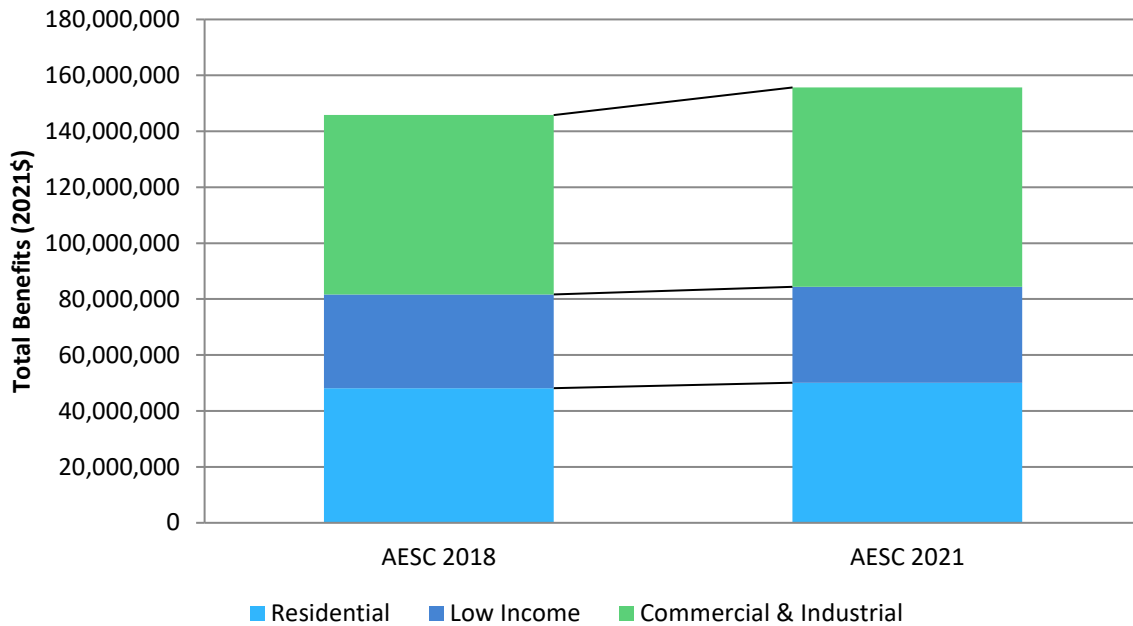
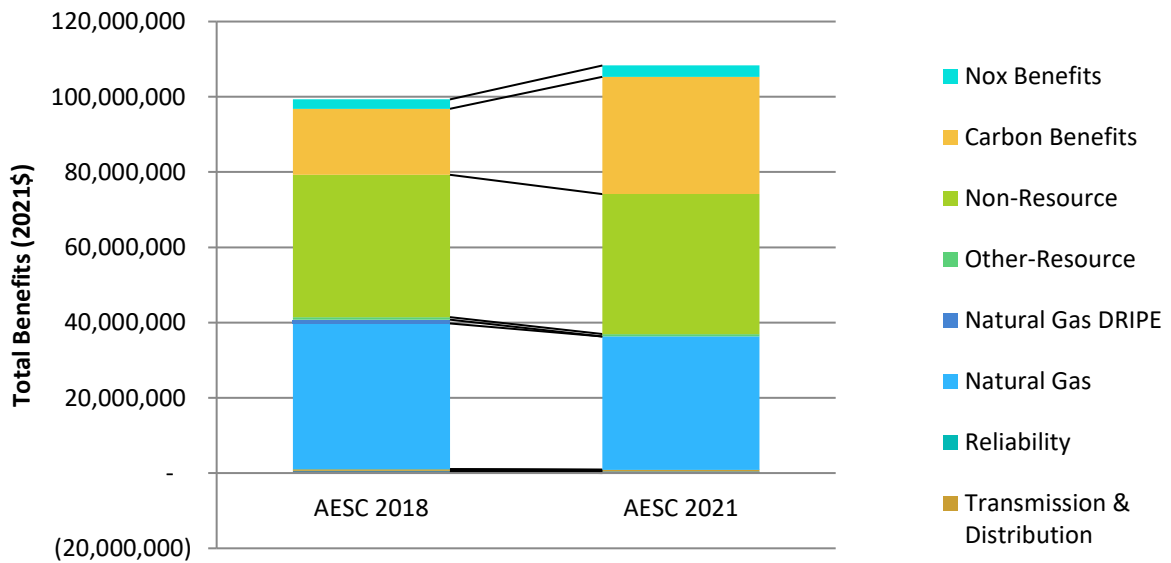


Figure 4 below presents the planned benefits for the gas portfolio by benefit category for the 2021 Program Year. Note that, as with the electric portfolio analysis, the economic benefits have been omitted from this comparison.

Figure 4: 2021 Plan RI Benefit Cost Test, Total Gas Portfolio Benefits by Category (2021\$)



Again, as with the electric portfolio analysis, most avoided cost categories experience only minor changes. While avoided natural gas benefits decrease by approximately 9%, this is more than offset by a 78% increase in non-embedded greenhouse gas benefits.

Conclusion

While the AESC 2021 updates have resulted in nontrivial changes to certain avoided costs categories, when assessed on a portfolio-wide basis, the updates should not drastically impact the cost-effectiveness of DSM portfolios in Rhode Island. Electric portfolios will be negatively impacted whereas gas portfolios could see benefits increase. Reductions in energy, capacity, and DRIPE avoided costs are partially or fully offset by increases in non-embedded greenhouse gas and RPS compliance costs.

Active demand management (ADM) initiatives are a possible exception to this generalization. As ADM programs currently realize the majority of benefits from capacity DRIPE, major reductions in this benefit category will have an outsized impact on total ADM benefits. However, even with diminished benefits, ADM programs still comfortably pass the RI Benefit Cost Test.