

2018 AESC REGIONAL AVOIDED COST STUDY: UPDATE

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2018 AVOIDED COST STUDY (AESC)

- ▶ **2018 Avoided Cost Study (AESC) is underway**
 - Avoided Energy Supply Component (“AESC”)
- ▶ **Intended for use in the next Three-Year Plan, for the 2019-2021 programs; study results are due in late March 2018**
- ▶ **To be developed through and prepared for AESC study group**
 - Regional study, participation of six New England states
 - Dozens of participants in the AESC study group process
 - Weekly AESC study group calls, mid-October through March
- ▶ **AESC study is prepared every three years**
 - 2015 AESC was the most recent prior study, which has been used for the 2016-2018 programs
- ▶ **AESC is a regional study, but each state decides how to apply the study results in its state, and which values to apply**
- ▶ **Synapse selected as the winning bidder for 2018 AESC study**

ILLUSTRATIVE EXAMPLE: CALCULATION OF BENEFITS (\$)

Benefits = net savings * avoided costs

9.215 kW electricity	\$75 per kW electric capacity
13,823 kWh electricity	\$0.07 per kWh electric energy
0 mmbtu natural gas	\$10 per MMBTU natural gas
0 mmbtu other fuel	\$13 per MMBTU other fuel
0 gallons water	\$0.01 per gallon water
0 units non energy impacts	\$(variable) for non-energy impacts

$$\text{Year 1 benefits} = (9.215 * \$75) + (13,823 * \$0.07) + (\$10 * 0) + \dots =$$

Year 1 benefits (in \$)

- The benefits are calculated for each year of the measure life and present-valued using a discount rate to determine lifetime benefits

AESC STUDY TO ESTIMATE MANY AVOIDED COST VALUES

- Natural Gas (as a fuel in power plants, and as a retail fuel)
- Electric Energy (kWh)
 - Driven significantly by natural gas prices
 - Renewables (RPS Compliance)
- Electric Capacity (kW demand)
- Fuel Oil, Propane
- Price Effects for Energy and Capacity (DRIPE)
 - Demand-Reduction Induced Price Effects
- Transmission and Distribution (T&D)
 - Estimate for Pool Transmission Facility; methodology review for local T&D
 - Each PA would calculate its local T&D values using AESC methodology*
- Emissions
 - Avoided cost of compliance with GWSA, & non-embedded cost of carbon
- Reliability
 - Estimate for generation; methodology review for local T&D reliability

BACKGROUND: IMPACTS OF 2015 AVOIDED COST STUDY FOR MA

- ▶ **The 2015 AESC study estimated lower avoided costs for most (but not all) avoided cost values compared to what was used prior to the 2015 study**
- ▶ **For MA, the electric avoided costs were about 15% lower**
- ▶ **For MA, the natural gas avoided costs were about 20% lower**
- ▶ **Significant drivers: the forecast of lower natural gas market prices plus the forecasted construction of new gas pipelines in the region led to long-term lower avoided costs for gas and also drove lower electric avoided costs**
- ▶ **Another outcome was the significant reduction in estimates of DRIPE (price effects due to EE programs)**

CHANGES IN ELECTRIC AVOIDED COSTS IN 2015 AESC

Illustration of Avoided Electricity Cost Components, AESC 2015 BASE vs. AESC 2013
(WCMA Zone, Summer On-Peak, 15 Year Levelized Results, 2015\$)

	AESC 2013 in 2013\$	AESC 2013 in 2015\$ ¹	AESC 2015 BASE	AESC 2015 BASE Relative to AESC 2013	
	cents/kWh	cents/kWh	cents/kWh	cents/kWh	% Difference
Avoided Retail Capacity Costs ^{2,3,4}	2.01	2.08	2.91	0.83	40%
Avoided Retail Energy Cost ^{5, 6, 7}	6.98	7.22	6.28	-0.94	-13%
Avoided Renewable Energy Credit ^{5, 6, 8}	0.66	0.69	0.96	0.27	39%
Capacity and Energy Subtotal	9.65	9.99	10.15	0.16	2%
CO₂ Non-Embedded	4.33	4.48	4.48	0.00	0%
Capacity DRIPE	0.69	0.71	0.00	-0.71	-100%
Intrastate Energy, Own Fuel and Cross-Fuel DRIPE	2.84	2.94	1.08	-1.86	-63%
DRIPE Subtotal	3.53	3.65	1.08	-2.57	-70%
Total	17.51	18.12	15.71	-2.42	-13%



PEAK ENERGY PERIODS WILL BE ANALYZED IN 2018 AESC STUDY

- ▶ **Peak energy periods currently used for EE are based on ISO-NE definitions and are broad (7 am to 11 pm “peak”)**
 - May not capture full value of energy efficiency delivered at times of high demand or high prices (those prices driven by demand)
 - Narrower time periods of peak demand would be more accurate at representing the value of active demand management
- ▶ **“Four-hour peak period” developed in 2015 AESC addendum**
 - Summer weekdays, June through August – 1:00 to 5:00
 - Winter weekdays, December through February – 5:00 to 9:00
 - Better, *but...* still large variation in demand and avoided costs during this period (cool June afternoon vs. hot humid August)
- ▶ **2018 AESC to analyze different peak energy periods**
 - Avoided energy costs for periods of highest demand
 - Actual peak load, often driven by temperature and humidity

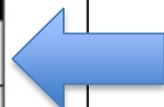
ENERGY COSTING PERIODS, 2015 AESC

Table 1 Electric Energy Costing Periods

Terminology	ISO-NE (Energy Market)			Avoided Energy Costing Periods (Addendum, AESC 2015)		
	Months	Time periods (Days and hours)	# of hours per year	Months	Time periods (Days and hours)	# of hours per year
SUMMER						
On-Peak	June – Sept	Non holiday weekdays, 7am – 11 pm	1,382			
Four-hour On-Peak (NOTE 1)				June - August	Non holiday weekdays, 1 pm – 5 pm	260
Other on-Peak				June – Sept	Non holiday weekdays, 7am - 1 pm and 5 pm – 11 pm	1,122
Off-Peak	June – Sept	weekdays, 11 pm – 7 am; all hours Saturday, Sunday, holidays	1,552	Same as ISO - NE		1,552
WINTER						
On-Peak	Oct-May	weekdays, 7am – 11 pm; all hours Saturday, Sunday, holidays	2,787			
Four-hour On-Peak (NOTE 2)				Dec - Feb	Non holiday weekdays, 5 pm – 9 pm	260
Other on-Peak				Oct-May	Non holiday weekdays, 7am – 5 pm and 9 pm – 11 pm	2,527
Off-Peak	Oct-May	weekdays, 11 pm - 7am; all hours Saturday, Sunday, holidays	3,039	Same as ISO - NE		3,039
ANNUAL total			8,760			8,760

Note 1. Summer Four-hour On-Peak period is identical to the ISO –NE "Demand Resource Forecast Peak Hours", the performance period for DR in the FCM

Note 2. Winter Four-hour On-Peak period contains 1 more month (February) than ISO –NE "Demand Resource Forecast Peak Hours", the performance period for DR in the FCM, and 2 more hours per block, i.e., 5 pm – 9 pm vs 5 pm to 7 pm.



Four-hour peak periods in 2015 AESC

HOURLY AVOIDED ENERGY COSTS FOR ALL HOURS OF YEAR

- ▶ **2018 AESC to provide hourly avoided energy costs for all hours of the year – 8760 hours**
- ▶ **Will enable the users of the AESC study to calculate avoided energy costs for a variety of “peak” energy periods, while providing some flexibility**
 - AESC users could calculate peak periods that better match the load shape (savings shape) and value (avoided costs) of EE and demand management resources
 - Avoided energy costs for the hours of highest peak energy demand (e.g., 40 or 80 hours, or 88 hours/1% of hours)
 - May be particularly useful for active demand management strategies
 - Alternatively, AESC users could use all 8760 hours in their cost-effectiveness screening

CAPACITY AVOIDED COSTS ARE CRUCIAL FOR DEMAND MANAGEMENT

- ▶ **Active demand management measures operate for a small number of hours (often less than 1% of all hours, or less than 88 hours a year)**
 - Therefore, even very significant changes in avoided peak *energy* costs may have a relatively small effect
- ▶ ***Capacity* avoided costs matter most, and are a core task in the 2018 AESC study**
 - Resources bid into the Forward Capacity Market (FCM)
 - Resources not bid into the FCM, but would affect the Installed Capacity Requirement (ICR) and future forecasts
- ▶ **New ISO-NE market rules for 2018 to be considered**
 - Pay for Performance (PFP); energy-market-only bidding
- ▶ **Capacity price effects (DRIPLE) also important**
 - Capacity DRIPLE avoided costs are likely to increase (above the 0 value in 2015 AESC) based on recent auction results

OTHER ASPECTS OF 2018 AESC

- ▶ **Prior AESC studies developed solely for EE measures**
- ▶ **2018 AESC values may also be used for “other DSM”**
 - Demand response, active demand management
 - Storage (behind the meter)
 - Other distributed energy resources (DERs)
 - Non-wires alternatives
 - Electrification (including resources that increase electric use)
- ▶ **For “other DSM” above, relatively small incremental levels could be covered through main AESC forecast; large amounts would require an additional forecast**
- ▶ **Three approaches for CO2 emissions**
 - RGGI forecast
 - Avoided cost of compliance with GWSA (state regulations)
 - Non-embedded costs (damage costs or abatement costs)

Thank you!