Memo to:
Lisa Skumatz and Dakers Gowans, Connecticut Energy Efficiency Board Evaluation Administrators, on behalf of the Connecticut Energy Efficiency Board (EEB)

Memo No: CTULPSD22
From: SUS PAR
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The purpose of this memo is to provide the Connecticut EEB with Upstream Lighting gross and net energy and seasonal peak demand realization rate assumptions for use in the 2022 Program Savings Document (PSD). Whenever available, prospective results for the 2022 program year from recent Upstream Lighting program evaluations performed in Connecticut are applied. Results from recent Upstream Lighting program evaluations performed in Massachusetts are applied in instances where Connecticut-specific results are not available.

At this time, retrospective Connecticut-based net-to-gross results are not available. In its absence, net-to-gross ratios were calculated based on the ratio of Massachusetts 2019 Program Year (PY) prospective and retrospective NTGRs. This was done to "true up" the prospective 2022 PY Connecticut NTGR results based on observations in Massachusetts. Column B in Table 1 shows the prospective 2022 PY NTGRs for each product based on the C1644 study performed in Connecticut. Columns C and D respectively provide the Massachusetts 2019 PY prospective and retrospective NTGRs, while column E contains the ratio between the Massachusetts 2019 PY prospective and retrospective NTGRs for each product. Column F applies the Massachusetts-based ratio in column E to the CT prospective 2022 NTGRs in column B. This assumes that if the Connecticut 2022 PY Upstream Lighting Program were to be studied retrospectively, the NTGRs would experience the same rate of adjustment that Massachusetts experienced in 2019.

Table 1: 2022 CT Upstream Lighting Net-to-Gross Ratio Assumptions

A	B	C	D	E = D/C	F = B*E
Product Description	CT Prospective 2022 PY NTGR[1]	MA Prospective 2019 PY Estimate[2]	MA Retrospective 2019 PY Actual[3]	MA 2019 PY Actual/MA 2019 PY Estimate	CT 2022 PSD Recommendation
Lighting Upstream - LED Screw In	63.00%	73.00%	56.00%	76.71%	48.33%
Lighting Upstream - LED Stairwell Kit	77.00%	80.00%	37.00%	46.25%	35.61%
Lighting Upstream - LED Linear Lamp (TLED)	77.00%	80.00%	40.00%	50.00%	38.50%
Lighting Upstream - LED Linear Lamp (TLED) with Controls	77.00%	80.00%	53.00%	66.25%	51.01%
Lighting Upstream - LED Linear Fixture	77.00%	80.00%	37.00%	46.25%	35.61%
Lighting Upstream - LED Linear Fixture with Controls	77.00%	80.00%	53.00%	66.25%	51.01%
Lighting Upstream - High Bay/Low Bay	77.00%	80.00%	61.00%	76.25%	58.71%
Lighting Upstream - High Bay/Low Bay with Controls	77.00%	80.00%	53.00%	66.25%	51.01%
Lighting Upstream - LED Exterior	77.00%	80.00%	27.00%	33.75%	25.99%
Lighting Upstream - LED Exterior with Controls	77.00%	80.00%	53.00%	66.25%	51.01%

Table 2 provides the gross savings factor, gross energy and demand realization rate, and net energy and demand realization rate assumptions for use in the 2022 PSD. The NTGRs estimated for each product in Table 1 above are used to estimate the net realization rates in Table 2.

[1] https://energizect.com/sites/default/files/C1644%20-%20EO%20NTG%20Final%20Report_9.25.19.pdf, Table 3-15, page 49. Only screw-based and linear results are provided. Screw-based applied to screw-ins and linear applied to all other products.
[2] https://ma-eeac.org/wp-content/uploads/P78_MACI_Upstream_LED_NTG_Report_FINAL_2018.10.18.pdf, Table 2, Page 6. Only screw-based and linear results are provided. Screw-based applied to screw-ins and linear applied to all other products.
[3] https://ma-eeac.org/wp-content/uploads/MA20C10-E-UPLNTG_UpstreamLightingNTG_FinalReport_01JUL2021.pdf, Table 7-1, Page 38

Table 2: 2022 CT PSD Upstream Lighting Realization Rate Assumptions

Product Description	Gross Realization %			Gross Savings Factors			Free Ridership & Spillover		Net-to-Gross Ratio (NTGR)[4]	Net Realization %^		
	kWh*	Winter Seasonal Peak kW	Summer Seasonal Peak kW	In-Service Rate (ISR)	Delta Watts (DW) RR	Hours of Use RR	Free Ridership	Spillover		kWh	Winter Seasonal Peak kW	Summer Seasonal Peak kW
Lighting Upstream-LED Screw In	98.10%[5]	127.91%[6]	110.05%[7]	59.40%[8]	163.20%[9]	101.30%[10]	Not available	Not available	48.33%	47.41%	61.82%	53.19%
Lighting Upstream-LED Stairwell Kit	54.57%	71.22%[11]	61.28%[12]	76.20%[13]	77.00%[14]	93.00%[14]	Not available	Not available	35.61%	19.43%	25.36%	21.82%
Lighting Upstream-LED Linear Lamp (TLED)	121.30%[15]	152.09%[16]	130.86%[17]	97.10%[18]	105.00%[19]	118.97%[20]	Not available	Not available	38.50%	46.70%	58.55%	50.38%
Lighting Upstream-LED Linear Lamp (TLED) w/Controls	90.70%[5]	120.24%[6]	103.46%[7]	91.90%[8]	99.00%[9]	99.60%[10]	Not available	Not available	51.01%	46.27%	61.34%	52.78%
Lighting Upstream-LED Linear Fixture	126.10%[5]	167.68%[6]	144.27%[7]	96.20%[8]	131.90%[9]	99.30%[10]	Not available	Not available	35.61%	44.91%	59.72%	51.38%
Lighting Upstream-LED Linear Fixture w/Controls	90.70%[5]	120.24%[6]	103.46%[7]	91.90%[8]	99.00%[9]	99.60%[10]	Not available	Not available	51.01%	46.27%	61.34%	52.78%
Lighting Upstream-High Bay/Low Bay	107.20%[15]	97.38%[16]	83.79%[17]	99.60%[18]	74.10%[19]	145.25%[20]	Not available	Not available	58.71%	62.94%	57.18%	49.20%
Lighting Upstream-High Bay/Low Bay w/Controls	90.70%[5]	120.24%[6]	103.46%[7]	91.90%[8]	99.00%[9]	99.60%[10]	Not available	Not available	51.01%	46.27%	61.34%	52.78%
Lighting Upstream-LED Exterior	138.00%[5]	183.54%[6]	157.92%[7]	92.30%[8]	150.60%[9]	99.40%[10]	Not available	Not available	25.99%	35.86%	47.70%	41.04%
Lighting Upstream-LED Exterior w/Controls	90.70%[5]	120.24%[6]	103.46%[7]	91.90%[8]	99.00%[9]	99.60%[10]	Not available	Not available	51.01%	46.27%	61.34%	52.78%
* Gross kWh realization rates are the product of the ISR, delta watts RR, and HOU RR for each product group. Any differences are due to rounding.												
^ Net realization rates are the product of the NTGR and the appropriate gross realization rate												

[4] From column F in Table 1 above.
[5] https://ma-eeac.org/wp-content/uploads/MA19C06-E-UPLGHT_Report_Final_2021.03.05-1.pdf, Table 1-1, Page 9.
[6] Connected demand realization rate from https://ma-eeac.org/wp-content/uploads/MA19C06-E-UPLGHT_Report_Final_2021.03.05-1.pdf, Table 5-11, Page 34, multiplied by the overall winter seasonal peak demand coincidence factor (66.2%) from https://energizect.com/sites/default/files/C1635_FINAL%20Report_Energy%20Opportunities%20Impact%20Evaluation%2008272020.pdf, Table 5-20, Page 42, divided by the overall PSD assumption (50.1%) from the same source.
[7] Connected demand realization rate from https://ma-eeac.org/wp-content/uploads/MA19C06-E-UPLGHT_Report_Final_2021.03.05-1.pdf, Table 5-11, Page 34, multiplied by the overall summer seasonal peak demand coincidence factor (76.4%) from https://energizect.com/sites/default/files/C1635_FINAL%20Report_Energy%20Opportunities%20Impact%20Evaluation%2008272020.pdf, Table 5-19, Page 41, divided by the overall PSD assumption (67.2%) from the same source.
[8] https://ma-eeac.org/wp-content/uploads/MA19C06-E-UPLGHT_Report_Final_2021.03.05-1.pdf, Table 5-4, Page 38.
[9] https://ma-eeac.org/wp-content/uploads/MA19C06-E-UPLGHT_Report_Final_2021.03.05-1.pdf, Table 5-6, Page 39.
[10] https://ma-eeac.org/wp-content/uploads/MA19C06-E-UPLGHT_Report_Final_2021.03.05-1.pdf, Table 5-8, Page 40.
[11] Connected demand realization rate from https://ma-eeac.org/wp-content/uploads/Upstream-Lighting-Initiative-Impact-Evaluation-PY2015.pdf, Table 4-7, Page 37, multiplied by the overall winter seasonal peak demand coincidence factor (66.2%) from https://energizect.com/sites/default/files/C1635_FINAL%20Report_Energy%20Opportunities%20Impact%20Evaluation%2008272020.pdf, Table 5-20, Page 42, divided by the overall PSD assumption (50.1%) from the same source.
[12] Connected demand realization rate from https://ma-eeac.org/wp-content/uploads/Upstream-Lighting-Initiative-Impact-Evaluation-PY2015.pdf, Table 4-7, Page 37, multiplied by the overall summer seasonal peak demand coincidence factor (76.4%) from https://energizect.com/sites/default/files/C1635_FINAL%20Report_Energy%20Opportunities%20Impact%20Evaluation%2008272020.pdf, Table 5-19, Page 41, divided by the overall PSD assumption (67.2%) from the same source.
[13] https://ma-eeac.org/wp-content/uploads/Project-81-Final-Final-Report-clean.pdf, Table 5-5, Page 77.
[14] https://ma-eeac.org/wp-content/uploads/Upstream-Lighting-Initiative-Impact-Evaluation-PY2015.pdf, Table 4-6, Page 36.
[15] https://energizect.com/sites/default/files/C1635_FINAL%20Report_Energy%20Opportunities%20Impact%20Evaluation%2008272020.pdf, Table 5-15, Page 38.
[16] Connected demand realization rate from https://energizect.com/sites/default/files/C1635_FINAL%20Report_Energy%20Opportunities%20Impact%20Evaluation%2008272020.pdf, Table 5-13, Page 37 times the winter seasonal peak RR from the same source in Table 5-20, Page 42 (overall result 66.2% divided by the overall PSD assumption 50.1%).
[17] Connected demand realization rate from https://energizect.com/sites/default/files/C1635_FINAL%20Report_Energy%20Opportunities%20Impact%20Evaluation%2008272020.pdf, Table 5-13, Page 37 times the summer seasonal peak RR from the same source in Table 5-19, Page 41 (overall result 76.4% divided by the overall PSD assumption 67.2%).
[18] https://energizect.com/sites/default/files/C1635_FINAL%20Report_Energy%20Opportunities%20Impact%20Evaluation%2008272020.pdf, Table 5-10, Page 36.
[19] https://energizect.com/sites/default/files/C1635_FINAL%20Report_Energy%20Opportunities%20Impact%20Evaluation%2008272020.pdf, Table 5-12, Page 37.
[20] HOU RR not provided; solved for HOU RR by dividing the kWh RR by the ISR and delta watts RR.