



## MEMORANDUM

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**TO:** Dover City Council  
**FROM:** J. Michael Joyal, City Manager  
**DATE:** October 2, 2020  
**SUBJECT:** Analysis of Solar Performance – Dover High School

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This memo documents the performance of the solar array installed at the Dover High School. It is exceeding projections for energy production and is having a positive fiscal impact to the City and School Department.

The solar array began service in late September of 2019. The terms of the contract, outlined via a Power Purchase Agreement (PPA), states that the City will purchase the electricity generated by the array at a set rate per the schedule below. Projections also assumes that the performance of the array will decline each year by 5%. While the PPA rate increases by 2% per year, default utility costs are projected to increase by 2% or more. The first 10 years of the PPA are highlighted below.

<b>Contract Year</b>	<b>Estimated Energy Production (kWh) (-5%/year)</b>	<b>PPA rate (\$/kWh) (+2%/year)</b>
1	1,055,330	0.0880
2	1,050,053	0.0897
3	1,044,803	0.0915
4	1,039,579	0.0934
5	1,034,381	0.0952
6	1,029,209	0.0971
7	1,024,063	0.0991
8	1,018,943	0.1011
9	1,013,848	0.1031
10	1,008,779	0.1051

As of August 31, 2020, generation from the array totaled 994,739 kWh, or 94% of the projected year 1 production in approximately 11 months since coming online. Therefore, it is expected to exceed the year 1 production estimate.

To determine savings or costs to the City/School Department, one must compare the price of solar electricity generated on site and paid for at the PPA rate, against the avoided cost of purchasing that electricity directly from Eversource. It is difficult to make a direct cost comparison as Eversource has multiple billing items, including separate rates for distribution, stranded cost, system benefits, and demand, some of which will vary month to month while the PPA rate remains constant over the contract year. The primary fiscal benefit of using solar

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electricity generated on site is avoiding many of the delivery-related costs associated with the transmission of electricity through the utility.

City staff evaluated recent Eversource bills and determined an average delivery and supply rate for the High School to be \$0.0958/kWh. Note that the City and School have contracted slightly different third-party supply rates for the electricity purchased through the utility. Demand charges, which represent the greatest amount of power drawn from the grid during any single 15-minute interval during the billing period, have been excluded for the purpose of this analysis.

Average Delivery and Supply Rate:	\$0.0958/kWh
PPA Year 1 Rate:	\$0.0880/kWh
PILOT (FY 2020):	\$2,161.38

The cost of purchasing electricity from Eversource is approximately \$0.0958/kWh, while the cost of each kWh produced by the Dover High School solar array is \$0.0880, a difference of \$0.0078 avoided per kWh produced on site. Savings (avoided costs) are calculated thus:

Month	Solar Electricity Generated (kWh)	PPA Rate (\$/kWh)	Solar Electricity Cost (Actual \$)	Average Utility + 3rd Party Rate (\$/kWh)	Utility + 3rd Party Cost (\$ Avoided)	Savings per month
September-19	16057.29	0.088	1413.04	0.09580	1538.29	125.25
October-19	64055.30	0.088	5636.87	0.09580	6136.50	499.63
November-19	55642.31	0.088	4896.52	0.09580	5330.53	434.01
December-19	18432.18	0.088	1622.03	0.09580	1765.80	143.77
January-20	20774.91	0.088	1828.19	0.09580	1990.24	162.04
February-20	41460.79	0.088	3648.55	0.09580	3971.94	323.39
March-20	98548.70	0.088	8672.29	0.09580	9440.97	768.68
April-20	98328.56	0.088	8652.91	0.09580	9419.88	766.96
May-20	159382.85	0.088	14025.69	0.09580	15268.88	1243.19
June-20	137594.44	0.088	12108.31	0.09580	13181.55	1073.24
July-20	148643.44	0.088	13080.62	0.09580	14240.04	1159.42
August-20	135818.37	0.088	11952.02	0.09580	13011.40	1059.38
<b>Totals</b>	994739.14		\$ 87,537.04		\$95,296.01	<b>\$7,758.97</b>

Savings in the first 11 months of the PPA agreement total approximately **\$7,750**. The owner of the solar array pays the City a payment in lieu of taxes (PILOT) based on the roof area used for solar. When factoring in the PILOT (\$2,161.38 in 2020) – the array is generating a net positive impact of roughly **\$9,900** in 2020.

In general, the solar array appears to be matching the small positive trends that were originally presented in the PPA projection.

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Beginning in Year 10 (2029), the City will have the opportunity to purchase the array at fair market value, which is expected to be just under \$1 million at that time. Additional purchase options will be available in Year 15 (for approximately \$775k) and every other year thereafter. Alternatively, the City may choose to extend the Power Purchase Agreement for up to 25 or 30 years.

The sooner the array is purchased, the sooner the greatest savings will be realized, once the generation of “free” electricity exceeds the costs of purchasing the equipment. Utility prices are expected to increase at the same or a greater rate than the PPA rate escalator of 2% per year. While the City remains under the PPA agreement, operations and maintenance are included at the responsibility of the array’s owner. On the other hand, until the City owns the equipment, it cannot make direct claims in regard to the reduction of carbon emissions.

Further analysis of the magnitude and timing of High School’s electricity *demand*—the greatest amount of electricity demanded by the facility at one time—would enable staff to identify additional savings that are occurring or could occur as a result of strategic operations.