



MEMORANDUM

Hatch Hill Landfill Gas and Solar PV Evaluation

TO: City of Augusta
FROM: Competitive Energy Services
DATE: December 21, 2016
RE: **Hatch Hill Landfill Gas and Solar PV Evaluation**

The City of Augusta has retained Competitive Energy Services (“CES”) to evaluate a landfill gas-to-energy (“LGTE”) proposal and solar photovoltaic (“PV”) development opportunities at the Hatch Hill Landfill. The following memo presents CES’ findings on the economic feasibility of the two prospective projects based on initial designs and cost estimates prepared by New England Energy Solutions. As we note in our discussion, we believe that the City should subject New England Energy Solutions’ designs and cost estimates to further review and our use of these does not imply our acceptance.

LGTE Feasibility

The City can either finance, own, and operate a generation system itself or execute a long-term contract with a third party owner of the system for the electricity produced. Under municipal ownership, the system would be built by a third-party contractor under a turn-key contract. Once completed, all of the electricity generated would be “sold” to the City. Under the latter arrangement a third party would develop, own and operate the generation system and sell all power produced to the City at an agreed upon price per kWh, through what is referred to in the industry as a Power Purchase Agreement (“PPA”).

The lower cost option for the LGTE is municipal ownership. Assuming a 350 kW system installation is financed with 100% debt with a 4% interest rate and New England Energy Solutions’ cost estimates, a municipally-owned LGTE system requires the City to pay a rate of approximately \$0.0622 per kWh for energy produced over the system’s estimated 15-year lifetime to produce a positive net present value for the City. This rate takes into account system capital costs, operating costs, and debt service. A third-party owned system would require an estimated PPA rate of \$0.0880 per kWh over the same term to achieve a middle of the range after tax return on equity (“ROE”) target of 9%.

This difference does not represent the savings to the City from the LGTE facility, however. To compute the savings, we need to compare the \$0.0622 per kWh cost of owning and operating the LGTE facility to the cost the City would otherwise pay for electricity bought in the market and

delivered by Central Maine Power Company (“CMP”). To do this, we need to compute the value of the generation output under CMP’s Net Energy Billing (“NEB”) program.

For a 350 kW municipally-owned LGTE system, the effective value of the energy output over the estimated 15-year lifetime is approximately \$0.1087 per kWh. This value includes the value of electricity savings (market energy and CMP delivery charges via NEB credits) and the associated environmental attributes (Renewable Energy Credits or “RECs”) of the LGTE generation output. This value assumes the City allocates NEB credits produced by the LGTE facility to its nine Medium General Service (“MGS”) electric accounts with the largest annual usage, and that the City sells the associated RECs into either the Massachusetts or Connecticut REC compliance market.¹

Based on initial designs and updated cost estimates prepared by New England Energy Solutions, the City would realize savings from LGTE development. However, there are several factors that may change the above calculations. First, the Maine Public Utilities Commission (“MPUC”) recently proposed new rules phasing out compensation of CMP’s delivery components in the NEB program. The proposed rules changes were issued in September 2016, and a decision on implementation has yet to be reached.² If implemented, the proposed rules would grandfather current NEB incentive levels for 15 years for generation systems installed before January 1, 2017. For new generation systems installed after 2016, the rules would cut compensation on the CMP delivery rate components by 10 percent per year through 2025. For a NEB arrangement with the City’s MGS accounts, the effective value for LGTE is only reduced to \$0.1031 per kWh, which reflects the current limited value of MGS NEB credits.

Second, New England Energy Solutions assumed a total capital cost of approximately \$1.260 million, which consists of \$1,857 per kW in generator equipment costs and \$3,599 per kW all-in system installation costs. This total capital cost does not include interconnection cost for CMP to extend three phase overhead service to the landfill. Based on operating expenditures for other comparable generation systems, CES and the City have estimated an annual service agreement cost of \$60,000 to cover all operating and replacement costs. If New England Energy Solutions’ pro forma cost estimates change, the PPA rate and effective energy value will be impacted.

Finally, some of the costs associated with developing the LGTE may have to be costs the City would otherwise incur to meet environmental standards regarding landfills in Maine. CES has not reviewed this issue in this case. We are aware, however, of other towns in New England where federal and state environmental regulations imposed or were expected to impose costs on landfill operators, and that some of those costs were included in the costs to develop an on-site generation project.

¹ While Small General Service accounts provide greater value through avoided CMP delivery costs, CES estimates an LGTE system would be limited to 33 kW in size based on the cumulative usage of the City’s top nine SGS accounts that could be credited. Utilizing its top nine MGS accounts, the City can develop an LGTE system up to approximately 400 kW in size without wasting NEB credits, assuming the generation capacity factor New England Energy Solutions has estimated.

² On December 19, 2016, the MPUC issued a press release stating that a decision on the matter will not be issued until early 2017.

PV Feasibility

The options for developing a solar PV system are similar to those for the LGTE discussed above. However, for the solar PV system the lower cost option is third party ownership and a long-term PPA with the City to purchase the electricity output. Partnering with a third party system owner is the most effective option for PV because public entities cannot take advantage of available federal tax incentives. CES projects a third party developer could offer a 20-year PPA at a rate of approximately \$0.1353 per kWh and still meet the target ROE noted above, whereas a municipally-owned project would require an equivalent PPA rate of nearly \$0.1877 per kWh to produce a positive net present value over its expected 20-year lifetime. This \$0.1353 per kWh PPA rate assumes the City sells the associated RECs into either the Massachusetts or Connecticut REC compliance markets.

We note that in each case we have assumed that the interconnection costs necessary to deliver electricity to the CMP grid from the solar PV system are zero – that is, the costs are incurred by the LGTE and there are no incremental costs that arise when the solar PV system is added. If the LGTE is not built and the solar PV system had to bear the entire interconnection costs, the costs of developing the solar PV system would be much higher and likely prohibitive.³

CES has done its calculations assuming that the PV installation would participate in the NEB program. Unlike the LGTE project, which operates around-the-clock and produces many kWhs for each kW of installed capacity, the PV installation has a much lower annual capacity factor and produces far fewer kWhs. This allows the generation to be net metered against the City's nine Small General Service ("SGS") accounts with the largest annual usage to take advantage of a much higher credit value under the NEB rules. However, doing so imposes a size limit of approximately 180 kW (AC).⁴ CES projects the effective value of the energy output from a third party PV system under a 20-year PPA to be approximately \$0.1717 per kWh. This is the cost of the energy the City would otherwise purchase but for the PV installation. Under the proposed NEB rule changes, the effective value of the system's energy output is reduced to \$0.1166 per kWh. The change to the NEB rules has a more pronounced impact on the solar PV project than on an LGTE system as a result of differences in CMP's tariff rates for MGS and SGS customers.

³ This PPA rate assumes the CMP interconnection cost is paid for through the LGTE project or electrical service is established for another reason. An estimated \$350,000 cost would increase the PPA to over \$0.30 per kWh.

⁴ SGS NEB credits provide over \$0.05 per kWh in additional effective value over MGS NEB credits. While the City's top nine MGS accounts could support a PV installation up to 2,190 kW without wasting NEB credits, which would produce an effective value almost equal to the 181 kW system, CES assumes these accounts are allocated to the LGTE system.

Next Steps

This memo provides an overview of projected economic feasibility for LGTE and PV development opportunities at the City of Augusta's Hatch Hill Landfill. The best way to gain more in depth knowledge of the LGTE opportunity is to conduct detailed design and cost engineering, as it is critical to validate the production estimates based on gas availability to determine which system design is optimal for the City. As PV is only viable with LGTE (or once electrical service is established for another reason) this can be put on hold until a decision is made on LGTE. If the City proceeds with LGTE following additional engineering, the appropriate next step would be to solicit proposals from developers and contractors. CES has facilitated these services for government clients, where we provide a framework and process for proposal submission and evaluation.

