



WM Renewable Energy L.L.C.

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May 19, 2019

Mr. Greg Maurice  
Director of Health Protection  
DeKalb County Health Department  
2550 North Annie Glidden Road  
De Kalb, IL 60115

Re: Landfill Gas Development Overview  
DeKalb County Landfill

Dear Mr. Maurice:

As you know, Special Condition 15 of Resolution #R2010-31 Approving the Request of Waste Management of Illinois, Inc. for Site Location of the DeKalb County Landfill Expansion and adopted by the DeKalb County Board on May 10, 2010 states that within four years from receipt of the IEPA operating permit for the landfill expansion, Waste Management of Illinois, Inc. shall construct and operate a gas to energy facility, unless it can be demonstrated that this timing cannot be met. The four-year period comes to term in May 2019 and this letter addresses this special condition.

The development, construction, and operation of Waste Management ("WM") gas to energy facilities is the responsibility of the Waste Management Renewable Energy ("WMRE") group, in coordination with local WM landfill management. This letter provides 1) a summary of the landfill gas flow projections for the DeKalb County Landfill; 2) a discussion of the currently proven applications for utilization of landfill gas, and 3) our evaluation of the most promising application for development within the next two years.

### **I. Landfill Gas Flow**

As shown on the table below, the landfill gas flow at DeKalb County Landfill has nearly doubled in the past two years, with most of that increase coming in the last 9 months. The actual flows are in relatively close alignment with our landfill gas prediction model. Based on the model, the flow may increase another 50% in the next five years, and more than double in the next 10 years. This projection is of course contingent on model assumptions such as annual waste receipts and waste types being representative of future conditions.

Year	Quarter	Average Flow (scfm)	Average Methane Content	LFG Model Projection (scfm)
2015	1	647	56%	
	2	770	55%	
	3	840	55%	
	4	768	57%	
2016	1	740	55%	
	2	918	56%	
	3	1,156	55%	
	4	1,247	56%	
2017	1	1158	56%	
	2	1165	56%	
	3	1251	55%	
	4	1219	54%	
2018	1	1149	53%	
	2	1170	53%	
	3	1527	55%	
	4	1527	56%	
<b>2022</b>				<b>2291</b>
<b>2027</b>				<b>3175</b>

## II. Landfill Gas Applications

**Direct gas sale** – The simplest technology utilizing landfill gas is the sale to a nearby industrial facility or end user as a heating fuel in lieu of fossil fuel or to produce energy for the facility power demand. There are over 100 of these projects nationwide, with sixteen projects supplied with landfill gas from WM landfills. This type of project consists of a compressor station at the landfill, landfill gas treatment if needed, and a pipeline constructed from the landfill to the end user. Project feasibility depends on a combination of various factors, including sufficient and consistent fuel demand by the end user, the distance to the end user (preferably within about 6 miles), the availability of right-of-way and cost to construct the pipeline, the end user’s specifications for gas delivery pressure and quality, and the end user’s current cost for fossil fuel. The development of these projects has declined recently due to more strict regulations on pipelines and the decrease in fossil fuel prices. We do not feel a direct gas sale is feasible for the DeKalb County Landfill at this time as no buyers have been identified, energy prices are low and renewable incentives are lacking.

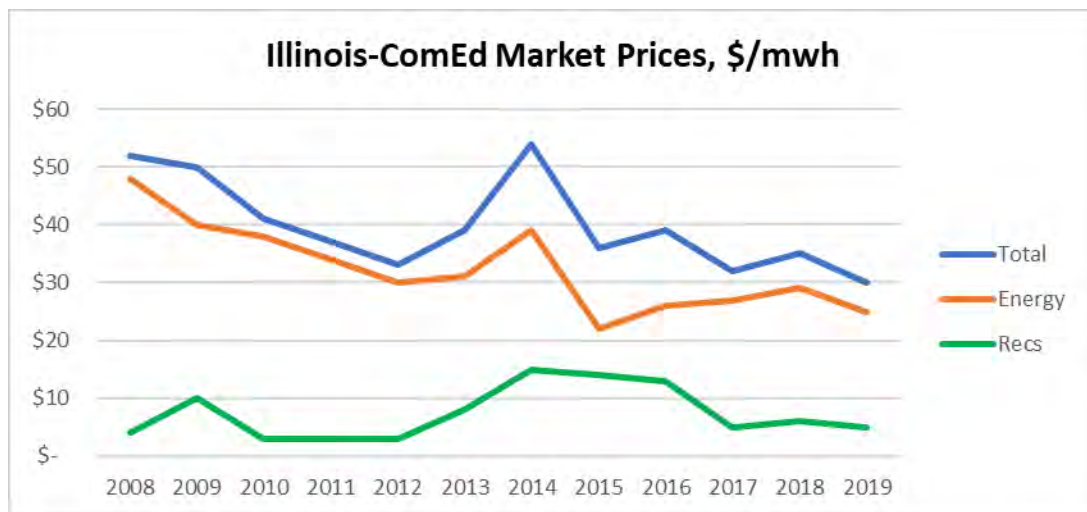
**On-site power plant** – By far the most common application for landfill gas is fuel for on-site power plants that sell the energy output to a utility or retail energy provider. There are over 450 on-site landfill gas power plants nationwide, with 98 located on WM landfills, of which WM owns 70. The technology is well-proven, operating expenses are predictable, and access to the utility grid is universal. The Caterpillar engines that we use require no gas cleanup other than dewatering and filtering. The principal factor for project feasibility is the revenue stream, which is derived from the combined energy price and the renewable energy credits (“RECs”) from state renewable portfolio standards.

The standard prime mover for new WM power plants is the Caterpillar G3520 engine which has a capacity of 1.6 megawatts (“mw”). Each engine requires about 560 scfm of landfill gas, so the gas flow at Dekalb County Landfill could currently support two engines (3.2 mw), and potentially three engines (4.8 mw) in the next few years if the gas flow continues to increase as predicted in the gas model.

To achieve our minimum threshold for financial returns, a 3.2- to 4.8-mw plant requires a price of at least \$60 per megawatt-hour (“mwh”) for combined energy plus RECs. Federal Section 45 tax credits (26 U.S. Code § 45) were available for new plants constructed between 2006 and 2016, and were worth \$12 per

mwh for a period of 10 years. These credits added to the cash flow of a project and reduced the threshold price by about \$10 per mwh. However, these tax credits expired at the end of 2016 and there is no certainty that they will be extended by the new Congress and Administration.

WM has six existing power plants in the Illinois Commonwealth Edison territory. These plants are paid the ComEd market price for energy. ComEd is in the PJM<sup>1</sup> ISO<sup>2</sup>, and the RECs at each plant qualify for all the various state renewable portfolio standards within the PJM territory. RECs are sold to the highest bidder in the highest state market. As shown in the chart below, energy prices have steadily declined to 20-year lows in the past 8 years, with the exception of the “polar vortex” impact on winter pricing in 2014. REC prices are volatile depending on the supply and demand within the state renewable portfolio standards. After a strong price surge to +\$16 per mwh in 2014 and 2015, REC prices declined to \$10 per mwh in 2016 and the current asking price is \$6 per mwh. The combined market prices for energy and RECs have been consistently below our +\$60 per mwh price threshold for the past nine years, even in the peak years.



About half of WM’s power plants have long-term power purchase agreements with a fixed price for “bundled” energy and RECs. These contracts were obtained through successful bidding into utility request for proposals (“RFPs”) for renewable energy, utility standard offers or tariffs for renewable energy, or local municipal utilities or co-ops wanting to support their sustainability program goals. These long-term contracts provide a known future revenue stream and eliminate the investment risk. ComEd or other retail energy providers in Illinois are not willing to pay a premium of nearly double the market prices for long-term commitments at this time. This situation is not unique to Illinois. Between 2006 to 2013, WM built 47 new plants, with most of them having long-term contracts or the expectation of a rapid rebound of energy/REC prices, and most of them eligible for tax credits. Between 2014 to 2016, WM built no new plants due to the drop in energy prices and the decline in utility RFPs and standard offer pricing. Because of both low power prices and low renewable energy prices and the expiration of federal tax credits, an on-site power plant at the DeKalb County Landfill is not feasible at this time.

**Renewable Natural Gas** - Landfill gas can be cleaned to pipeline quality natural gas and sold as “renewable natural gas”, or RNG. The minimum landfill gas flow to support an RNG plant is typically about 2,000 scfm. The landfill gas flow at DeKalb County Landfill should approach this flow in the next few years. The cost to produce RNG from landfill gas is typically \$4 to \$6 per mmbtu, while natural gas prices have persisted below \$3 per mmbtu for the last several years. However, there is a premium available for RNG in the form

<sup>1</sup> PJM is a regional transmission organization that coordinates the movement of wholesale electricity in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia.

<sup>2</sup> Independent system operator. ISOs operate, but do not own, transmission systems in order to provide open access to the grid for non-utility users.

of federal renewable fuel credits under the USEPA's Renewable Fuel Standard. These credits are created when the RNG is inserted into a natural gas pipeline and matched to compressed natural gas ("CNG") used as fuel in a transportation vehicle. The producer of the RNG sells the credits to fuel refiners who use the credits to meet their USEPA annual renewable fuel volume obligations.

WM owns RNG plants at three landfills in East St. Louis, Illinois, Louisville, KY and Waynesburg, Ohio, and is now building 4 more plants in Ferris, TX, Hutto, TX, Oklahoma City, OK and Springdale, AR. We have been participating in the registration, certification, and sale of renewable fuel credits since 2014. WM is uniquely qualified for this market because we own both ends and the middle of the renewable fuel "pathway" – the landfill, the RNG plant, the CNG fueling stations, and the CNG truck fleet – and can therefore internalize the complete value of the credits.

The current value of renewable fuel credits from landfill gas is over \$25 per mmbtu. However, there is significant regulatory risk in the credit market price. The market demand for the credits is driven by the volume obligations set annually by the USEPA, while the supply is incrementally increasing as new projects come on line each year. Developers of RNG projects can accept the market price risk to maximize revenue in the short term while prices are high, or minimize their risk with a long-term fixed rate contract. Fixed rates are currently in the \$10 - \$13 per mmbtu range. Additional uncertainty has been introduced to the market with the current administration and whether or not the renewable fuel standard will be continued or significantly modified.

We believe that the landfill gas flow at DeKalb County Landfill warrants a due diligence effort for installation of an RNG plant. We propose to evaluate the feasibility of an RNG plant over the next twelve months, with due diligence specifically addressing:

- Location of a nearby natural gas pipeline that is accessible to the landfill, has the capacity to accept the RNG flow, has a reasonable interconnect cost, and has achievable natural gas specifications.
- Technical and operational review of the sustainability of landfill gas flows for the life of the project.
- Availability of sufficient power to support the project equipment loads. Typical power demand is 2 to 3 megawatts for the anticipated plant capacity.
- Assessment of the current administration's impact on the future of the renewable fuel standard and credit prices, and the interest from third party buyers to execute long-term fixed rate contracts for the credits.

At the end of the twelve month period, we will provide the County with the findings of our due diligence and whether we will proceed with an RNG plant project. As with any WM project requiring capital investment, this project, if feasible, would be subject to approval by our executive management.

Sincerely,  
WM Renewable Energy, LLC

Randy Beck  
Senior Director

CC: Dale Hoekstra, Mike Wiersema, Scott O'Neill