THE IMPACT OF POTENTIAL CLIMATE LEGISLATION AND EPA GHG REGULATORY ACTIONS ON SMALL LANDFILLS

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ABSTRACT

Impending GHG legislation to create a market-based mechanism, like a Federal "cap and trade" program, as well as the Environmental Protection Agency's (EPA) impending regulatory actions could have a significant impact on a small landfill's ability to voluntarily collect landfill gas (LFG) and create greenhouse gas (GHG) reduction credits for sale in various GHG markets.

The current threshold of 50,000 to 75,000 metric tons (tons) of carbon dioxide equivalent (CO_2e) per year proposed by EPA under the "Proposed Rule – Prevention of Significant Deterioration and Title V GHG Tailoring Rule" (Tailoring Rule) represents a significant unfunded mandate on municipalities, counties, and waste authorities, and a significant burden for private landfill owners and operators (conservatively $1.1 billion at the original 25,000 threshold and $533 million at the 75,000 threshold). Further, we conservatively estimate that these thresholds could remove 62 to 84 million tons of CO_2e per year of landfill based GHG credits from the GHG markets. Since smaller landfills are more commonly owned by public entities, the majority of these costs will be unfunded mandates. Additionally, this action would have a disproportionate affect on rural and non-urban areas, as urbanized areas tend to dispose their waste in larger, centralized landfills or waste-to-energy facilities.

If the EPA thresholds are imposed, many of these small and medium sized landfills that have been actively pursuing GHG opportunities in the voluntary markets as a source of revenue would find that their current GHG reduction project opportunities no longer exist, leaving them faced with having to comply with Federal regulations, and having to use their scarce funds for the significant cost of compliance.

It is our opinion that, absent of the stringent thresholds being proposed by EPA, many of the landfills currently not required to collect and destroy LFG (GHG Eligible Landfills) would be voluntarily developed as GHG reduction projects, particularly if the offset price is in the range of $5 to $6 per ton CO_2e. Provided that EPA does not regulate GHG, medium and small landfills should play a significant role in supplying credits to the GHG markets over the near and medium term.

If EPA is successful in regulating GHG under the Tailoring Rule at a 50,000 to 75,000 metric tons (tons) of CO2e per year threshold, some landfills that are currently eligible to implement voluntary GHG projects will continue to have opportunities to participate (particularly at the 75,000 tons CO_2e threshold). At the 75,000 ton threshold, we estimate that about 800 landfills would be required to collect LFG and would no longer be eligible. EPA has indicated that it intends lower the initial 75,000 ton threshold over time.

If the Senate is successful in suspending EPA's efforts to regulate GHG so that Congress can study and potentially pass GHG climate legislation, then all the landfills that are currently eligible to participate in GHG markets will continue to be eligible for some period. However, without a definitive decision on a Federal "cap and trade" program, this environment will continue to create significant uncertainty for the GHG markets.

INTRODUCTION

There are several actions in play at the Federal level which have the potential to affect GHG Eligible Landfills, particularly smaller landfills owned by municipalities, counties, waste authorities, or the private sector. These landfills are currently eligible to participate in most market based voluntary and compliance GHG markets. Recent actions by the Federal government that could have an impact on GHG Eligible Landfills include:

- Potential Federal Legislation
  - House - Waxman-Markey Bill or American Clean Energy Security Act of 2009 (ACES)
  - Senate - Potential GHG legislation still under consideration (e.g. Kerry-Boxer "Clean Energy Jobs and American Power Act and Kerry-Graham-Lieberman).

- US Environmental Protection Agency's (EPA) recent GHG related actions:
    - Endangerment Finding
    - GHG reporting rule
    - Proposed rule "Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule"

This paper will focus on GHG Eligible Landfills that can voluntarily reduce GHG emissions and potentially sell the credits to the market. There are many landfills with Title V permits which are required to collect and destroy LFG, as they are above the current threshold of 50 megagrams (Mg) per year of non-methane organic compounds (NMOCs). These tend to be larger landfills. These landfills are not currently eligible to participate in any present or future voluntary or compliance GHG program. Additionally, there are other landfills in the Title V program, but are below the NMOC threshold, that are currently not required to collect and destroy LFG, and are eligible to participate in voluntary and compliance GHG programs. We estimate that roughly about 800 landfills are in the Title V program, but may or may not be required to collect LFG.

This article is not intended to be a comprehensive analysis of potential GHG Federal legislation or the EPA rulemaking, but rather an investigation of how the above actions could impact small landfills and their communities responsible for the implementation of these potential actions. These landfills may not currently be required to collect and control LFG, either because they are not required to be included in the EPA's New Source Performance Standards (NSPS) program or are in the NSPS program but do not trigger the requirements requiring LFG collection. Currently, many of these smaller landfills have been able to implement GHG emissions reduction projects by voluntarily collecting and destroying LFG. In many cases, this has been an important source of revenue, including paying for the LFG collection systems.

PENDING FEDERAL GHG LEGISLATION

ACES

ACES is a robust climate and energy bill passed by the House in June 2009 which address five overarching areas: (1) clean energy; (2) energy efficiency; (3) global warming reductions; (4) clean energy transitioning; and (5) agriculture and forestry offsets. The bill meets its climate objectives through the implementation of a cap and trade system with complimentary measures, such as the regulation of certain sectors, including landfills. ACES proposes a plan to reduce GHG emissions to 17% below 2005 levels by 2020, 42% below by 2030, and 83% below by 2050. The market for offsets is capped at 2.0 billion tons of CO_2e, with 50% from domestic and 50% from international sources. If there are insufficient domestic offsets, then the amount of internationally sourced offsets can be increased to 75%. EPA's preliminary analysis of ACES reported that methane sources (primarily landfills and coal mine methane) made up 45% of the supply of potential domestic offsets. Domestic offsets can also be supplied through agriculture and forestry sector projects. In ACES, EPA's authority to regulate GHG emissions was superseded by Congress. Oversight of the GHG markets is a shared responsibility between the Federal Energy Regulatory Commission (FERC) and the Commodity Futures Trading Commission (CFTC).

ACES Treatment of Landfills: Under ACES, landfills are not included in the cap and trade program. It forbids EPA from regulating GHGs under the Clean Air Act. However it proposes that EPA regulate through new a NSPS rulemaking of large methane sources (including landfills and coal mine methane) and suggests a limit of >10,000 tons CO_2e per year. Since emissions of 10,000 tons of CO_2e per year translates to roughly an annual LFG collection rate of 100 scfm, the landfills affected could be very small, or very old. It also proposes a renewable portfolio standard with Landfill gas-to-energy (LFGE) as an eligible renewable technology.

Kerry Boxer Draft Senate Bill

The Kerry-Boxer draft bill, Clean Energy Jobs and American Power Act (CEJAPA) was released on September 20, 2009 and is very similar in structure to ACES; it also proposes to use a GHG cap and trade program to meet its climate objectives with many of the same complementary components. CEJAPA is slightly more aggressive than ACES in that it aims to cut the nation's greenhouse-gas emissions 20 percent from 2005 levels by 2020; however, subsequent targets are identical to ACES. Like ACES, the market for offsets is capped at 2.0 billion tons of CO_2e per year, but CEJAPA requires at least 75% of the offsets are to be sourced from eligible domestic GHG reduction projects and only 25% from international sources. The additional domestic credits are being created from a larger pool of eligible GHG project types, including methane collection and destruction at coal mines, landfills, oil and natural gas distribution facilities, and methane avoidance involving organic waste streams (e.g. composting), but leaves the final decision of eligible project types to EPA, provided it furnishes a justification. The bill also proposes to uphold EPA's authority to regulate GHG emissions. Oversight of the GHG markets would be the responsibility of the CFTC only.

CEJAPA Treatment of Landfills: Under CEJAPA, landfills are not included as a stationary source required to participate in the cap and trade program, but *are eligible* to provide offsets to the cap and trade program. Similar to ACES, CEJAPA directs EPA to *inventory* major GHG

emitting uncapped sources (sources not included in the cap and trade program) which produce over 10,000 tons of CO_2e per year that (individually) exceed 10,000 tons of CO_2e and that in aggregate (as a sector) are responsible for emitting a minimum of 20% of total uncapped emissions. A significant number of landfills should appear in this inventory; many of which whom are not currently not required to collect LFG under any program.

EPA can apply standards of performance (e.g. threshold of GHG emissions allowed) to those stationary sources identified in this inventory, provided that EPA studies the impacts of the standards of performance on: (1) the allowance pricing (should have limited price impact); (2) the cost of achieving compliance; and (3) the available supply of offset credits.

For political reasons (outside the scope of this paper), this draft bill is stalled in committee, and has a low likelihood of passage at the time of this writing.

Other GHG Efforts in the Senate

Senators Graham, Kerry, Lieberman, have been working on a bipartisan effort to pass climate change for several months. This potential legislation is said be focused on major sources in three major sectors: fossil fuel electric generation, transportation, and industry. However, due to the recent loss of the super-majority by Democrats in the Senate, recent efforts appear to have de-emphasized climate change (cap and trade) and focused more on a comprehensive energy bill. Democrats have not completely given up on cap and trade for this year. They are willing to consider adding many energy related elements found attractive by the Republicans, including incentives for clean coal technology, incentives for domestic natural gas, loan guarantees for nuclear power, and expanded domestic offshore oil and natural gas drilling, in exchange for cap and trade, a national renewable energy standard and/or energy efficiency provisions. At the time of this writing, there is waning optimism for passing climate change legislation this year with a cap and trade program.

EPA is moving forward aggressively to regulate GHG emissions (see below). Some conjecture that EPA is moving forward aggressively on GHG regulations to put pressure on the Congress to pass climate change legislation which will reduce GHG emissions through a market based solution (e.g. cap and trade). In response to this, the Senate is mounting a bipartisan effort to force EPA to suspend its efforts to regulate GHG emissions for a period of two years to allow time for the Congress to thoughtfully consider and attempt to pass climate legislation.

Recent EPA Actions

Endangerment Finding: On December 7, 2009, EPA finalized and found that six key GHG gases: CO_2, methane (CH_4), nitrous oxide (N_20) hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) threaten the public health of current and future generations. This action was enabled when the Supreme Court, in its April 2007 ruling on Massachusetts v. EPA, found that GHGs are air pollutants covered under the Clean Air Act. The findings give the EPA a vehicle to communicate its justification for regulating GHGs and establish the framework for the EPA to impose requirements on industry.

There are several lawsuits which are currently challenging the EPA's endangerment finding that may stop the EPA from regulating GHGs.

Mandatory GHG Reporting Requirements: On September 22, 2009, EPA finalized its mandatory GHG reporting rule. The rule applies to, among many other facility types, municipal solid waste (MSW) landfills (not industrial or C&D landfills). These MSW landfills are those that:

- Accepted waste after January 1, 1980
- Are estimated to generate at least 25,000 tons of CO_2e annually per the EPA prescribed approach.

EPA requires that MSW landfills run an analytical mathematical landfill gas generation model to estimate the annual tons of CO_2e generated by 2010 (approximately 290 scfm of LFG). If the landfill emits more than 25,000 tons of CO_2e in 2010, then the landfill "trips" the threshold and is required to report under this rule. If the landfill is below this threshold but has a GCCS in place, it must run an additional modeling test by dividing actual LFG recovery by collection efficiency, assuming a default 75% collection efficiency. Using this approach, if a landfill collects more than 185 scfm or more of LFG in 2010, then the landfill is deemed to trip the 25,000 tons CO_2e threshold and is required to regularly report under this rule.

Landfills subject to this rule must begin monitoring on January 1, 2010, for three months using best available methods. Landfill-gas-to-energy (LFGE) projects utilizing landfill gas as a fuel source (e.g. LFG-fired electric generation, direct utilization of LFG as a fuel source) may also be required to report under this rule.

MSW landfills required to report with a GCCS installed must install equipment necessary to measure GHG emissions, including:

- Gas flow meter, measuring continuously, automatically correcting for temperature and pressure.
- At least weekly testing of methane content.

Proposed Rule – Prevention of Significant Deterioration and Title V GHG Tailoring Rule: On September 30, 2009, EPA proposed a rule for large facilities, including landfills emitting over 25,000 tons CO_2e per year. Landfills which trigger this threshold would be required to obtain permits, demonstrating that the facility is using best practices and technologies to control and reduce GHG emissions.

Under the Title V operating permits program, if a Landfill triggers the major source emission applicability threshold of 25,000 tons CO_2e per year, it would be required to obtain a Title V operating permit, if it did not already have a Title V permit. It is interpreted that if the applicability threshold is reached, the landfill would be required to meet best available control technology (BACT) and collect and control GHG emissions. It is important to note that there are many landfills currently in the Title V program due to landfill design size (2,500,000 Mg.), but are not required to collect and destroy LFG, as they do not trigger the current NMOC threshold outlined above. If typical municipal solid waste (MSW) is disposed of in a landfill, a 25,000 tons CO_2e threshold will be a significantly more stringent threshold when compared to the current NSPS trigger of 50 Mg per year.

In addition, if the landfill were a new facility or an existing facility applying for a major modification under its Title V and it exceeded the 25,000 tons of CO_2e per year threshold, under the Prevention of Significant Deterioration (PSD) portion of the New Source Review (NSR), it would be considered a major stationary source and would be required to enter the PSD program.

If the September proposed rule stands as is, EPA would establish a rule with the proposed thresholds outlined above and would study the appropriateness of the threshold for a period of five years, presumably utilizing the data collected under the mandatory GHG reporting rule. EPA would evaluate whether it can administratively implement even *lower* thresholds under PSD and Title V permitting authorities (within the significance band identified above). After reviewing the results of the five year study, EPA will complete a "follow-on regulatory action" within one year (six years after the promulgation of this draft rule). This follow-on action could be confirming the need to keep the current thresholds or establish different GHG thresholds (potentially lower or higher) to more accurately reflect the administrative capabilities of the permitting authorities.

EPA's Response to the 25,000 Tons CO_2e Threshold: In answering concerns from the Senate, the EPA responded on February 26, 2010 that it was considering a significantly higher threshold, and on March 3, 2010 indicated that EPA was considering raising the threshold in the range of 50,000 to 75,000 tons of CO_2e emitted annually. EPA also stated that the regulation would not go into affect until 2011. However, based on the current language, this higher limit would not preclude EPA from lowering the threshold at some point in the future.

EPA GHG Regulations - Landfill Impacts

Currently, there are many small to medium-sized landfills eligible to participate in existing GHG voluntary and compliance programs by virtue of the fact that they are not required to collect and destroy landfill gas. These landfills may or may not have Title V permits.

The EPA's recent promulgated GHG reporting rule and proposed "Tailoring Rule" as originally written, allows for the inclusion of landfills as an eligible GHG project category under most of the cap and trade programs being discussed, provided that emissions are below the proposed threshold of 25,000 tons of CO_2e per year (Scenario 1 below). However, this would have removed a significant number of currently eligible landfills (i.e. not currently required to collect and destroy LFG) from those currently eligible to participate in a market-based solution. Scenario 2 below will analyze the high end of the newly proposed threshold range (50,000 to 75,000 tons of CO_2e).

Scenario 1 - Landfill Impacts at 25,000 Tons CO_2e

Number of Landfills "Taken Off the Table": In the Proposed Rule, EPA estimates that an additional 1,700 landfills would be required to enter the Title V program, and appears to include those landfills that are already in the Title V program but are not required to collect and destroy LFG.

Typical 25,000 Tons CO2e Threshold Landfill: To trigger the 25,000 tons of CO_2e per year threshold using the EPA guidance, a landfill would have a LFG flow of just over 270 scfm in 2010. If the landfill has a LFG collection system, then there is an additional threshold test measuring actual flow and must exceed 185 scfm presumably to account for oxidation in the landfill cap (10%) and a LFG collection efficiency of 75%. To arrive at a typical landfill which trips the 25,000 tons of CO_2e per year threshold only in one year, 2010, we developed a model "Threshold Landfill" which consists of the following characteristics:

- 72,000 tons per year for 10 years beginning in 1999 escalated at 1%[1]
- 674,520 total tons in place
- Medium rainfall (20-40 inches of precipitation per year)
- Square footprint dimension of 820 ft. x 820 ft. and a height of 75 ft. based on a compaction of 1200 lbs/ CY.
- LFG collection and destruction system estimated capital cost:
  - 300 scfm blower / open flare station w/ monitoring equipment and electrical service
  - 16 vertical LFG wells and wellheads with an average depth of 45 ft.
  - Total average cost: $531,000

If we conservatively assume that all of the new landfills estimated to trigger the EPA proposed threshold of 25,000 tons of CO_2e per year have the "Model Landfill" characteristics, we make the following observations for the landfill sector:

- The capital cost of compliance – LFG collection system - $531,000
- The cost of applying for the Title V program – $10,000 - $20,000
- The cost of preparing and obtaining the PSD permit - $30,000 – $150,000[2]
- The annual cost for the O&M of the collection system - $25,000 to $50,000
- The annual cost for the maintenance of the Title V permit - $3,000 to $15,000
- The removal of at least 25,000 tons of CO2e annually from the market per landfill

In summary, at the 25,000 tons per year of CO_2e threshold, with 1,700 new landfills entering the Title V program required to collect and destroy methane, the two major impacts are:

- Conservative Estimate of Costs – Total capital cost - $1.1 billion.
- Conservative estimate of GHG Credits Impact - 84 million tons of CO2e credits removed from the domestic market

Clearly, the original threshold of 25,000 tons of CO_2e would represent a significant unfunded mandate on municipalities, counties, and waste authorities, and a significant burden for private landfill owners and operators.

Scenario 2 - Landfill Impacts at 75,000 Tons CO_2e

Number of Landfills "Taken Off the Table": In the Proposed Rule, and using the data provided by EPA[3], we estimate that at the 75,000 tons of CO_2e threshold, roughly an additional 825 landfills would be required to enter the Title V program, and appears to include those landfills already in the Title V program but are not required to collect and destroy LFG.

Typical 75,000 Tons CO_2e Threshold Landfill: To trigger the 75,000 tons of CO_2e per year threshold using the EPA guidance, a landfill would have a LFG flow of about 815 scfm in 2010. If the landfill has a LFG collection system, then there will most likely be an additional threshold test measuring actual flow at a lower scfm level, presumably to account for oxidation in the landfill cap (10%) and an LFG collection efficiency (75%). To arrive at a typical landfill which trips the 75,000 tons of CO_2e per year threshold only in one year, 2010, we developed a model "Threshold Landfill" which consists of the following characteristics:

- 106,500 tons per year for 25 years beginning in 1985
- 2,662,500 total tons in place
- Medium rainfall (20-40 inches of precipitation per year)
- Square footprint dimension of 1,475 ft. x 1,475 ft. and a height of 75 ft. based on a compaction of 1200 lbs/ CY.
- LFG collection and destruction system estimated capital cost:
  - 1,000 scfm blower / open flare station w/ monitoring equipment and electrical service
  - 56 vertical LFG wells and wellheads with an average depth of 45 ft.
  - Total average cost: $973,500

If we conservatively assume that all of the new landfills estimated to trigger the EPA proposed threshold of 75,000 tons of CO_2e per year have the "Model Landfill" characteristics, we make the following observations for the landfill sector:

- The capital cost of compliance – LFG collection system - $973,000
- The cost of applying for the Title V program – $10,000 - $20,000

[1] Depends on the rate of disposal (tons per year) and the number of years. For example, to meet the threshold in 5 years, landfill would receive 151,970 TPY escalated at 1%; to meet the threshold in 15 years, landfill would receive about 49,100 TPY escalated @1%.

[2] Based on current PSD permitting efforts, depending on state, location, level of air modeling required, BACT analysis, and fees.

[3] EPA-HQ-QAR-2009-0517-0004-GHG Tailor Rule Development.

- The cost of preparing and obtaining the PSD permit - $30,000 – $150,000
- The annual cost for the O&M of the collection system - $25,000 to $50,000
- The annual cost for the maintenance of the Title V permit - $3,000 to $15,000
- The removal of at least 75,000 tons of CO2e credits annually from the market per landfill

In summary, at the 75,000 tons per year of CO_2e threshold, with 825 new landfills entering the Title V program required to collect and destroy methane, the two major impacts are:

- Conservative Estimated Cost –Total Capital Costs – $533 million.
- Conservative estimate of GHG Credits Impact - 62 million tons of CO2e credits removed from the domestic market

Summary of Scenarios and Potential Impacts to Medium and Small Landfills

The current threshold of 50,000 to 75,000 tons of CO_2e per year proposed by EPA under the Tailoring Rule represents a significant unfunded mandate on municipalities, counties, and waste authorities, and a significant burden for private landfill owners and operators (conservatively $1.1 billion at the original 25,000 threshold and $533 million at the 75,000 threshold). Further, we conservatively estimate that these thresholds could remove 62 to 84 million tons of CO_2e per year of landfill based GHG credits from the GHG markets. Since smaller landfills are more commonly owned by public entities, the majority of these costs would be borne by the public sector. Additionally, this unfunded mandate could have a disproportionate affect on rural and non-urban area landfills. Most urban areas dispose their waste in large landfills or waste-to-energy facilities, and many of these large landfills already have Title V permits, have typically tripped the NMOC threshold, thus are already required to collect and destroy LFG. Rural and non-urban areas tend to dispose their waste in smaller landfills that are not typically required to collect and destroy LFG.

Many of these small and medium sized landfills have been actively pursuing GHG opportunities in the voluntary markets as a source of revenue, particularly as budgets have been reduced with the financial crisis. Now, many of these same landfills could find that their GHG reduction project opportunities evaporate and they will be faced with having to comply with Federal regulations, using their scarce funds for the significant cost of compliance. It is our opinion that absent of the stringent thresholds being proposed by EPA, many of the GHG Eligible Landfills would be voluntarily developed as GHG projects, particularly if the offset price is in the range of $5 to $6 per ton CO_2e. Provided that EPA does not regulate GHG, medium and small landfills should play a significant role in supplying credits to the GHG markets over the near and medium term.

If EPA is successful in regulating GHG under the Tailoring Rule at a 50,000 to 75,000 tons of CO2e per year threshold, some landfills that are currently eligible to implement voluntary GHG projects will continue to have opportunities to participate (particularly at the 75,000 tons CO_2e threshold). At the 75,000 ton threshold, we estimate that about 800 landfills would be required to collect LFG and would no longer be eligible. EPA has indicated that it intends lower the initial 75,000 ton threshold over time.

If no cap and trade legislation is passed and EPA is forced to suspend its efforts to regulate GHG by Congress, GHG markets may continue to weaken due to the significant market uncertainty. From the GHG credit supply side, medium and small landfills should play a significant role in supplying credits to the GHG markets over the near and medium term, as all the landfills that are currently eligible to participate will continue to be eligible for some period. From the demand side, GHG market demand will be driven by the voluntary GHG markets and from compliance and pre-compliance buying for the state and regional GHG markets over the near term (State of California, Regional Greenhouse Gas Initiative or "RGGI", Western Climate Initiative or "WCI"). However, much of the GHG credit market activity had been driven by speculation and pre-compliance buying in anticipation of a Federal "cap and trade" program. Landfills can expect limited interest in developing GHG projects and flat pricing in selling GHG credits over the near term until the uncertainty in the GHG market is reduced. We understand that most GHG developers are interested in hedging their GHG project development activities by demanding that the project have a potential for electric generation or other LFGE option.

If a "Federal cap and trade" program is passed and US landfills are eligible to participate, we would anticipate a robust expansion of the GHG markets, significant interest by the GHG development community in landfill projects, and higher pricing for GHG credits.

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