

February 25, 2013

John Fischer
MassDEP
One Winter Street
Boston, MA 02108
sent via electronic mail to dep.swm@state.ma.us

Dear Mr. Fischer,

The Partnership for Policy Integrity submits the following comments on the proposed modification of the Massachusetts Solid Waste Management Plan to lift the moratorium on solid waste incineration and allow development of gasification power plants.

Introduction

In 2009, Mass DEP was faced with dwindling landfill capacity, rising volumes of waste and increased pressure to export the Commonwealth's garbage. In 2009, DEP considered lifting the 1990 municipal solid waste incineration ban, commissioning studies and seeking public input, and rejected this approach.¹ At the time, Energy and Environmental Affairs Secretary Ian Bowles stated:

"Focusing on incineration and landfills is the wrong end of the waste equation. While Massachusetts is ahead of the national average in recycling and some communities like Nantucket are leading the way, there is a lot more we can do to increase recycling and reduce disposal of useful materials."²

Little has changed since 2009. Though Massachusetts is still struggling to manage its waste, using incineration as a solution is still a bad idea, for all the same reasons. Waste incinerators, including gasifiers, are toxic to public health, harmful to the economy, environment and climate, and undermine recycling and waste reduction programs.³ We support all the goals in the Solid Waste Management Plan (SWMP) except lifting the ban on the moratorium, which moves in opposition to the other goals of increasing recycling and reducing greenhouse gas emissions (GHG) consistent with the 2008 Global Warming Solutions Act (GWSA).

Our comments on the waste plan are informed by our review of Taylor Biomass, a municipal solid waste gasification facility proposed in Montgomery, NY. This facility is advertised as the "nation's first, commercial-operation, energy generation facility, powered by syngas

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- 1 The Tellus Institute and Cascadia Consulting Group & Sound Resource Management, December, 2008, Assessment of Materials Management Options for the Massachusetts Solid Waste Master Plan Review commissioned by the Massachusetts Department of Environmental Protection.
 - 2 David Abel, "Mass. to Continue Trash Incinerator Moratorium," *The Boston Globe*, December 11, 2009. http://www.boston.com/news/local/breaking_news/2009/12/mass_to_continu.html
 - 3 See "The Viability of Advanced Thermal Treatment in the UK", Fichtner Consulting Engineers Limited (2004).

produced from the sorted and non-recyclable portions of the waste stream.”⁴ Referring to the 1990 moratorium on new incinerators, the waste plan states (p. 58) “since that time, a variety of alternative technologies (such as gasification and pyrolysis) have advanced.” However, this is not exactly the case. In fact, while a variety of facilities and technologies have been proposed, there are still no large-scale operating facilities in the United States that are gasifying MSW or biomass. Our review of the Taylor facility’s application documents for an air permit and a DOE loan guarantee reveal the considerable uncertainties that still exist with regard to operation of gasification facilities.

The state appears to be proposing about 60 MW of new waste-to-energy capacity

Using values for the energy content of waste and daily waste consumption at the Taylor plant, we estimate that the proposal to lift the incinerator ban in Massachusetts to permit the gasification of up to 350,000 tons of waste per year would fuel around 60 MW of gasification capacity.⁵ We guess that this would likely translate into perhaps two or three new waste incinerators in Massachusetts, each potentially extremely lucrative for developers, and we suspect that lobbying by the waste industry has thus been intensive. Yet we are still surprised, given the process leading to Massachusetts’ new science-based regulations regarding biomass energy carbon emissions, that the state would propose lifting the incinerator ban without a similarly careful consideration of the implications.

While the waste plan states, “We must . . . deal responsibly and cost-effectively with the materials that cannot be recycled or reused in ways that do not harm the environment”,⁶ our review of the Taylor documents has led us to conclude that in fact, gasification does harm the environment, both more than the alternatives, and also more than has been “advertised”. We have observed:

1. As incinerators, albeit operating under starved oxygen conditions, gasifiers emit significant conventional air pollutants and hazardous air pollutants. Combustion of the char left over after syngas is produced is also a source of pollution. Gasification does not destroy air toxics – when contaminated materials are used as fuel, toxic emissions increase.
2. As energy producers, gasification facilities emit more greenhouse gases than fossil fuel plants, and as such, are incompatible with the greenhouse gas reduction goals of the MA Global Warming Solutions Act (GWSA).
3. Gasification is incompatible with Zero Waste goals, and will preferentially burn combustible materials that should instead be recycled.
4. While waste incinerators generate millions of dollars from tipping fees, the facilities are nonetheless still dependent on renewable energy subsidies and tax incentives to be financially viable.

4 Taylor Biomass application to Department of Energy Title XVII Loan Guarantee Program, Reference Numbe: DE-FOA-0000140, Sept. 14, 2009. Page 19.

5 The Taylor air permit application states the facility will burn 400 tons MSW per day. Adjusting with a plant availability factor of 92%, this comes to 134,000 tons per year at this 24 MW plant, or about 5,596 tons of material per MW. The proposal to burn 350,000 tons per year would thus support about 62 MW.

6 SWMP p. 1 of main body

Gasification and char combustion emit significant amounts of air pollution

The proposal to lift the incinerator moratorium has presented “gasification or pyrolysis” as “alternative technologies” that are different from and environmentally superior to traditional combustion of solid waste. (As a technical note, talking about “gasification or pyrolysis” can make it sound as if they are separate technologies, which they are not. The terms refer to different processes occurring when fuels are heated at high temperatures and low oxygen. Gasification refers to the driving off of volatiles from solid fuels to create syngas; pyrolysis refers to the change that occurs in the solid fuel as the volatiles are driven off, resulting in creation of a charcoal-like material, char. Since syngas is the primary fuel created by the process, we employ the term “gasification” in our comments). Gasification is still incineration, albeit under starved oxygen conditions. Disposing of char can also require combustion in a separate burner, as the Taylor plant has proposed to do. Both combustion of the syngas in the combustion turbine and burning the char in the char combustor emit significant amounts of pollution.

The rate of char production (and combustion) associated with gasification is surprisingly high. The 24 MW Taylor plant will consume 25,000 dry lb/hr of MSW,⁷ and will in turn produce 8,210 lb per hr of char to be burned in the char combustor. In other words, nearly 33% of the feedstock for gasification is ultimately burned in a conventional boiler after it has been pyrolyzed.⁸ The char burner produces 3,670 lb of ash per hour, which contains heavy metals and anything else that wasn’t volatilized, and therefore may require special disposal. If the char is not combusted, it also may require special disposal, due to the high concentration of heavy metals.

Emissions from the char burner and the combustion turbine are typical of emissions from any combustion process. The CO emission rate is higher from the char burner than the combustion turbine, whereas the NO_x emission rate is higher from the combustion turbine. Total emissions of NO_x from the facility are over 63 tons per year.⁹ The Taylor loan application states that emissions from the facility are only about 34% lower than a traditional MSW incinerator,¹⁰ and this is based on assuming a high and perhaps unrealistic degree of efficacy for the emissions controls, given that the technology is still largely unproven.

Emissions of air toxics by gasification are likely underestimated

The Taylor application shows that emissions of hazardous air pollutants from MSW gasification are also high. The proposed amendment to the SWMP explains that gasification “will be used for those portions of the waste stream for which reuse or recycling are not an option.” Portions of the waste stream which are incinerated because they cannot be reused or recycled can be quite toxic. Identified emissions from incinerators include particulate matter, volatile organic compounds (VOCs), heavy metals, dioxins, sulfur dioxide, carbon monoxide, mercury, carbon dioxide and furans.¹¹ Even small amounts of some of these toxins can be

7 Adjusting for the claimed moisture content of 25%, the 25,000 dry lb of waste per hour equates to 400 tons of waste per day on an “as received” basis.

8 Cornerstone Engineering. Updated engineering report for Taylor Biomass, submitted to NY Dept of Environmental Conservation, March 11, 2009.

9 Taylor Biomass air permit application, May 22, 2008.

10 Montgomery Project DOE Title XVII loan guarantee application, January 15, 2010. Page 16.

11 The Tellus Institute and Cascadia Consulting Group & Sound Resource Management, December, 2008, Assessment of Materials Management Options for the Massachusetts Solid Waste Master Plan Review commissioned by the Massachusetts Department of Environmental Protection, p. 27

harmful to human health and the environment. Dioxin is a potent carcinogen with no known safe level of exposure.¹² Mercury is neurotoxin that impairs motor, sensory and cognitive functions.¹³

No one really knows what the emissions of hazardous air pollutants (HAPs) from MSW and biomass gasification are, thus the Taylor facility used EPA's AP-42 emission factors for natural gas to estimate emissions from the combustion turbine for purposes of their air permit application to New York State. They estimated HAPs emissions from the char burner using the AP-42 emission factors for wood-fired boilers. However, they plan to gasify garbage and construction and demolition wood, thus AP-42 emissions factors for pure natural gas and virgin wood are unlikely to fully represent the range of HAPs that will be emitted by the Taylor facility. In fact, the image of gasification as "clean" is not based on any real data. If the Massachusetts DEP has relied on promises made by facilities like Taylor when considering whether to lift the incinerator moratorium, the Department should be aware of how flimsy and unsupported these promises are.

The engineering report prepared for the Taylor facility tacitly recognizes that real emissions are unknown, including the following as a risk and its mitigation:

"Condensable organics will be polyaromatics and are therefore suspect carcinogens. The gas conditioning reactor will destroy 90% of these materials. The remainder will be removed by scrubbing and disposed of within the process combustor or by treatment of the process waste water stream."¹⁴

Likewise, the air permit application states that the combustion turbine "will also emit unburned hydrocarbons, 20% of which are assumed to fall within the category of volatile organic carbons".¹⁵ Taylor Biomass also identifies "MSW contaminants causing environmental concern" as a risk, and poses as mitigation, "removal of pressure treated and painted wood is monitored and controlled to eliminate those materials from the biomass stream".¹⁶

Such admitted risks for the Taylor facility make it clear that gasification is not a magic technology that makes toxics disappear. Even at a gasification plant, "garbage in equals garbage out" – that is, burning more contaminated materials increases stack emissions of air toxics. In light of this fact, it is important to contrast the ambitious promises the Taylor facility has made regarding removal of contaminated materials from the fuel stream with the admission in the Massachusetts Waste Plan that "Through its own inspections, Mass DEP continues to see high levels of banned materials and large numbers of failed loads, indicating the need to improve waste ban compliance and enforcement among all responsible parties –

12 Mackie et al., No Evidence of Dioxin Cancer Threshold, *Environmental Health Perspectives*, Volume 111, Number 9, July 2003.

13 U.S. EPA, Mercury Health Effects, Available at <http://www.epa.gov/hg/effects.htm> (browsed February 21, 2013)

14 Cornerstone Engineering. Updated engineering report for Taylor Biomass, submitted to NY Dept of Environmental Conservation, March 11, 2009. Page 4-21.

15 Taylor Biomass air permit application, May 22, 2008.

16 Taylor Biomass application to Department of Energy Title XVII Loan Guarantee Program Reference Number: DE-FOA-0000140, Sept. 14, 2009. Page 121.

landfills, municipal waste combustors, and transfer stations, waste haulers, and waste generators.”

Noncompliance with waste bans may result in penalties, but in practice, it appears that notices of noncompliance are issued sparingly and fines not at all.¹⁷ As a result, significant amounts of not only hazardous waste but also recyclable materials currently *do* go to landfills and incinerators - for example, about 17 percent of waste sent to the Commonwealth's seven existing MSW incinerators is recyclable paper.¹⁸ Given the difficulty in enforcing waste bans at landfills and incinerators, DEP is unlikely to have better success at new incineration facilities. Therefore, even with "maximum control technologies" in place, gasification still poses a significant risk of emitting toxic pollution. Until the state can solve these problems consistently, there should be no consideration of any new form of incineration. We suspect that should the state solve these problems, new forms of disposal might no longer be needed.

Gasification facilities emit significant amounts of greenhouse gases

Considering gasification strictly as a means of waste disposal, with regard to GHG emissions, the Tellus report commissioned by the state concluded that landfilling with gas capture is the best option: “On a per ton MSW basis, modern landfills with efficient gas capture systems reduce two and a half times as much CO₂e as gasification and pyrolysis facilities, and three and a half times as much as waste-to-energy incinerators.”

Considering the GHG impacts of gasification as a means of energy production, as has been the case with biomass energy, waste incineration has often been portrayed as having reduced "net" GHG emissions based on discounting for the biogenic portion of the waste stream used for fuel. In some cases, such calculations rely on over-inflated estimates of methane generation and escape if the waste is landfilled instead of being incinerated.

It is not clear how the GHG emissions of waste incineration have been estimated in the waste plan. However it is clear that as an energy source, MSW gasification facilities emit more GHGs per MWh than natural gas facilities. The Taylor application states that the heating value of syngas is only about half that of natural gas, so even though Taylor’s combined cycle gasification process is projected to be more efficient than simple incineration, its stack emissions are still about 1,670 lb/MWh of “raw” CO₂,¹⁹ around twice the emission rate from a natural gas combined cycle plant.

Gasification is incompatible with the state’s GHG reduction goals

If waste burning were simply treated as a means of disposal, and was not treated as a source of “renewable energy” in the state’s RPS, this would permit a more straightforward assessment of its impacts compared to alternatives. However, it is the very eligibility of waste-to-energy for renewable energy subsidies that is intensifying the lobbying on this issue. To the extent that municipal waste incinerators receive subsidies from being treated as renewable energy producers – and those subsidies can be significant, as outlined below – then

17 Beth Daley, "Massachusetts Proposes Loosening Moratorium on Incinerators", *The Boston Globe*, December 30, 2012.

18 Ibid.

19 Taylor Biomass application to Department of Energy Title XVII Loan Guarantee Program Reference Number: DE-FOA-0000140, Sept. 14, 2009. Page 47.

they should be evaluated by the same metrics as other sources of energy, both renewable and fossil-fuel based. In fact, as energy generators with very high net greenhouse gas emissions, waste burners are incompatible with emission reduction goals of the Massachusetts Global Warming Solutions Act.

The goals of the waste plan as currently articulated may actually be muddying the waters regarding the net impacts of incineration. In particular, while it is understandable that the plan focuses on simply reducing the number of tons of waste landfilled each year, rather than expressing the amount of materials landfilled against an economic baseline of materials production, the goal of reducing landfilling by two million tons a year is unfortunately accompanied by the following statement, page 18: “This goal of reduced solid waste disposal could be achieved through any combination of source reduction, reuse, recycling, composting, and other forms of diversion, so Massachusetts would not necessarily need 2 million tons of additional recycling and composting capacity to meet this goal.” (emphasis added).

The phrase “any combination” is notable. In fact, once incineration is back on the table as an option for reducing waste, there are two possible and even probable outcomes. First, alternative fates for waste such as recycling or source reduction can be shortchanged; and second, greenhouse gas emission reductions become much more difficult to achieve, relative to other options. Compounding these outcomes, we are not confident that the proposed cap of keeping new gasification capacity at 350,000 tons per year will be maintained – rather, this cap feels like it could be the camel’s nose under the tent, with inevitable increases to follow.

Gasification is inconsistent with Zero Waste goals

Although the waste plan states that only non-recyclable materials would be burned in gasifiers, it seems likely that new incineration capacity would compete with recycling and anaerobic digesters for materials. Certain recyclable materials have greater heating value than non-recyclables, leading to competition between fates as fuel and re-use. Given the current inability of the state to enforce bans on disposing of recyclable materials, it would be preferable to focus on significantly increasing the efficacy of recycling efforts. Improved technologies such as optical sorting can be implemented anywhere – they do not need to be coupled to new incinerators.

Gasification facilities are heavily dependent on subsidies and tax incentives

Gasification and conventional waste incineration plants can be lucrative for their developers, generating millions of dollars in waste disposal fees each year (“tipping fees” can range from \$50 to more than \$70 per ton). Nonetheless, our review of the Taylor plant struck us with the developers’ seemingly unlimited appetite for publicly funded subsidies and tax breaks in addition to tipping fee revenue. Taylor has applied for a federal DOE renewable energy loan guarantee that would amount to tens of millions of dollars. They also hoped to receive a federal incentive tax credit (ITC) cash grant that would reimburse a full 30% of their development costs (a one-time payment that appears to be around \$21 million). They arranged for a payment-in-lieu-of-taxes scheme at the municipal level that would dramatically reduce their local taxes by about one-half. Tipping fees are a major source of revenue for the plant; in their loan application Taylor projected receiving \$55 per ton of

material as a tipping fee, yielding revenues around \$14.75 million per year.²⁰ In addition, Taylor would sell power to the grid, earning about \$10.5 million per year at 0.065 per kWh, and the plant would also be eligible to sell the “green attributes” of its power. For a plant in Massachusetts, sale of Class II RECs would yield a certain amount of revenue. As “renewable energy” generators, garbage incinerators burn money almost as fast as they burn garbage; we suggest that it may be time for the state to re-examine whether garbage incineration needs, or deserves, renewable energy credits.

Conclusion

Lifting the incineration ban in Massachusetts creates a slippery slope to future modifications, expansions, and potentially invitation of even riskier energy production technologies. Further, the proposal to lift the ban based on the assumption that new technologies have emerged since 1990 is inconsistent with other commitments to reduce risks from toxic emissions. Recognizing that burning C&D in biomass plants could produce toxic emissions, the state committed to performing a risk assessment should a facility propose to use C&D as fuel, as discussed in the waste plan. Yet alongside this promise is the proposal to allow waste gasifiers to be built that can combust materials even more contaminated than C&D, as well as C&D itself, with no comprehensive review of the risks associated with this technology, its feedstocks, and its emissions.

We support the goals in the waste plan to improve emissions controls on existing waste incinerators, but we think the waste plan should have an additional goal – to eventually phase out waste incineration completely, or nearly so. A declining cap for incineration could accompany more robust enforcement of recycling and waste ban rules, as well as implementation of new waste sorting technologies. Gasification remains an overhyped technology with significant risk of negative environmental and public health impacts. Investing in an unproven but admittedly polluting technology contradicts the Plan's goals of increasing recycling and reducing greenhouse gas emissions. We urge the Department to maintain the solid waste incineration moratorium.

Thank you for the opportunity to comment.

Sincerely,

Mary S. Booth, PhD
Director, Partnership for Policy Integrity



Kelly Bitov, Esq.
Partnership for Policy Integrity



²⁰ Plants that dispose of toxic wastes can command even more revenue. A report on facilities in California states, "One example of higher costs are the proposed tipping fee estimates provided by gasification, pyrolysis and plasma incinerator companies to Los Angeles County, California, US in 2005. The estimated tipping fees are two to four times greater than the average U.S. incinerator tipping fee (URS Corp, Conversion Technology Evaluation Report, Prepared for the County of Los Angeles (US), August 18, 2005.)."