MUNICIPAL SOLID WASTE THERMAL TECHNOLOGIES
(June 18, 2013 Draft)

I. INTRODUCTION

The primary focus of this paper is to identify opportunities, challenges and potential solutions for achieving greenhouse gas (GHG) and waste reduction goals from municipal solid waste thermal technology (MSW Thermal) projects in California. The MSW Thermal processes discussed in this paper are thermochemical processes: MSW combustion, gasification systems and closely related technologies (e.g., pyrolysis and plasma arc), and the use of MSW as a supplemental fuel.

The sections that follow describe MSW Thermal processes, the current utilization of MSW Thermal in California, and the goals, challenges, and potential solutions for achieving additional reductions in GHG emissions and waste through the use of MSW Thermal facilities. This paper is one of five papers providing information on the role various waste treatment technologies can play in meeting California's GHG and waste reduction goals. Companion papers discuss Recycling, Reuse, and Remanufacturing; Composting and Anaerobic Digestion; Biomass Conversion; Municipal Solid Waste Thermal Technologies; and Landfilling of Waste.

II. GENERAL DESCRIPTION OF THE MSW THERMAL PROCESS AND FACILITIES IN CALIFORNIA

What is MSW Thermal Technology?

MSW Thermal Technologies are processes that create energy in the form of electricity, fuel, or heat from thermochemical processes such as combustion or gasification of municipal solid waste. MSW Thermal facilities are also referred to as waste-to-energy or transformation facilities. Combustion processes involving biomass, and biological processes, such as composting and anaerobic digestion are discussed in other technical papers.

What are the MSW Thermal systems currently being used?

There are three main types of MSW Thermal systems being used worldwide: conventional combustion systems, gasification systems, and the use of MSW (or components of MSW) as a supplemental fuel along with conventional fossil fuels. Each of these systems is described below. Other thermochemical processes, such as pyrolysis and torrefaction, are less prevalent and not discussed extensively in this paper. Only combustion and supplemental fuel systems are in commercial use in California.

A. <u>Conventional combustion ("transformation") systems</u>

Conventional combustion systems combust mixed (unprocessed or minimally processed) solid waste in an incinerator. There are about 90 such systems in the U.S, 3 in California. While designs vary, a typical system involves the transfer of waste by crane from a pit to a moving grate incinerator where combustion takes place. Combustion gases flow through a heat recovery boiler, where water is heated to produce steam. The steam can be used to power a turbine and associated generator, producing electric power that can be provided to the electric power grid. MSW combustion systems will have multiple air pollution control devices to control emissions of sulfur oxides, nitrogen oxides, particulate matter, and other pollutants.

After combustion, the waste volume is typically reduced by 90% or more. Ash and metals are the primary residual materials. Ferrous metals are typically recovered from the residual material and recycled. Some newer facilities can recover nonferrous metals such as aluminum, copper, bronze, and brass. Ash can be landfilled with other wastes, used as a landfill cover material, or sent to a "monofill," where only ash is disposed of. The ash may contain heavy metals and other toxic components. However, research is underway to identify beneficial uses for the ash, such as use in road paving materials or construction materials. It may also be possible to recover nonferrous metals from monofilled ash.

There are three MSW combustion facilities in California, as shown in Table 1 below. These facilities utilize combustion technology to combust unprocessed or minimally processed solid waste. Collectively, they have the capacity to process about 2,500 tons per day (TPD) of MSW, producing about 68 megawatts (MW) of electrical power. The three plants generally operate close to their rated capacity, although with scheduled downtime for maintenance, output may be 10-20% below capacity on average. All of the facilities have systems to collect ferrous metals, and one is currently planning to install a collection system for nonferrous metals as well. All of these facilities exceed the 25,000 metric tons CO2e threshold and are subject to the AB 32 mandatory reporting requirements. However, as discussed later in this paper, their status under the Cap-and-Trade Regulation is under review.

Table 1: MSW Thermal Combustion Facilities in California

Facility Name	Location	Start Date	Waste Capacity (TPD)	Electrical Capacity (MW)
Covanta Stanislaus	Crows Landing	1989	800	22
Commerce Refuse-to-Energy Facility	Commerce	1987	360	10
Long Beach SERRF	Long Beach	1988	1,380	36
Totals			2,540	68

B. <u>Gasification systems</u>

There are three main types of gasification systems: conventional, pyrolysis, and plasma arc gasification.

Conventional Gasification

Conventional gasification systems heat solid waste at high temperatures in an oxygen-deficient environment within a reactor vessel to produce synthesis fuel gases (syngas). The principal syngas products are carbon monoxide, hydrogen, methane, and other lighter hydrocarbons. Gasification processes may also produce liquids in the form of tars or oils, and solids such as char and ash. There are gasification systems operating in Japan that use MSW, but no syngas facilities are operating commercially in the U.S.

Electricity and heat can be produced by burning the syngas gas in a steam boiler and turbine plant, a gas turbine, or an internal combustion or Stirling engine generator. The process may result in fewer pollutants than combustion, depending on whether the syngas is cleaned prior to combustion. Syngas can also be further processed to produce liquid fuels, fertilizers, and other chemicals by chemical reactions such as Fischer-Tropsch synthesis.

Pyrolysis

Pyrolysis systems thermally degrade solid waste usually without the addition of any air or oxygen. The process is similar to gasification but generally optimized for the production of fuel liquids or pyrolysis oils (sometimes called bio-oils if biomass feedstock is used). Pyrolysis also produces gases and a solid char product.

Pyrolysis liquids can be used directly (e.g. as boiler fuel and in some stationary engines) or refined for higher quality uses such as motor fuels, chemicals, adhesives, and other products. Direct pyrolysis liquids may be toxic or corrosive.

Plasma Arc Gasification

Plasma arc gasification systems use high voltage to create an electric field that heats MSW to extremely high temperatures. The intense heat breaks up the organic molecules into simpler gaseous molecules such as hydrogen, carbon monoxide, and carbon dioxide. The inorganic portion of the MSW is vitrified into a glassy residue that can be used in construction or paving materials. There are no plasma arc gasification systems in commercial operation in the U.S. There are a few systems operating outside the U.S., but they only use segregated MSW (such as auto shredder residue), and the waste must be shredded.

C. MSW as a Supplemental Fuel

MSW or specific types of waste that are segregated from the waste stream but would otherwise be deposited in municipal landfills can be used as a supplemental fuel in some facilities. For example, scrap rubber tires are used by some cement manufacturing plants in California. Specifically, according to data reported in response to the Air Resources Board's Energy Efficiency and Co-Benefits Assessment of Large Industrial Facilities Regulation (EEA Regulation), about 7 percent (1.8 million MMBtu) of the total energy consumed in 2009 by reporting cement plants was derived from scrap tires. According to the EEA data, dried sewage sludge was also used by some cement plants (less than 1 percent of total energy reported by cement plants). Some electricity generating plants have used scrap tires as a fuel in the past, but we are not aware of any of these facilities that currently combust scrap tires. In some cases, biomass is also used as a supplemental fuel, as discussed in the companion paper Biomass Conversion.

III. CURRENT STATUS OF MSW THERMAL FACILITIES IN CALIFORNIA

How much MSW is handled by MSW Thermal combustion facilities in California?

As shown in Table 2, the three MSW Thermal combustion facilities in California are processing about 2,500 tons of MSW per day, or about 900,000 tons per year. This is about 1 percent of the 73 million tons of waste material generated in 2010. It is not likely that there will be additional MSW Thermal facilities in the near-term without changes to existing State policies. The three existing MSW Thermal facilities were all built in the late 1980s, and there are significant barriers to the construction of new facilities. These barriers include economics, restrictions on siting, air quality concerns, and the lack renewable energy and waste diversion credits.

How much GHGs and co-pollutants are emitted from MSW Thermal facilities?

According to data reported for ARB's Greenhouse Gas Reporting Regulation, the three MSW Thermal facilities emitted about 747,000 metric tons of CO2 equivalent (CO2e) emissions in 2011, of which about 498,000 metric tons were biomass based (biogenic). The distinction between biogenic and non-biogenic GHG emissions is important because only the emissions from non-biogenic organic matter (fossil fuel based material such as plastics) are counted per protocols established by the Intergovernmental Panel on Climate Change (IPPC). A summary of the emissions from each of the three plants is shown in Table 2 below.

Table 2: GHG Emissions from California's MSW Thermal Facilities[1]

Facility Name	Total CO2e Tonnes	Non-biogenic CO2e tonnes	Biogenic CO2e tonnes
Covanta Stanislaus	222,310	79,590	142,710
Commerce Refuse to Energy	108,920	53,760	55,160
Long Beach SERRF	415,650	115,790	299,860
Total	746,870	249,150	497,730

1 ARB 2011 Greenhouse Gas Reporting Regulation

How much GHG emissions are avoided due to MSW Thermal systems?

Although the California MSW combustion operations have not been fully assessed for their lifecycle GHG emissions benefits, there appear to be GHG emission reduction benefits to MSW Thermal compared to landfilling. The U.S. EPA's Municipal Solid Waste Decision Support Tool has demonstrated that modern conventional MSW Thermal combustion facilities avoid GHG emission in three ways:

- MSW Thermal facilities produce electricity that can offset electricity produced at conventional, petroleum-based, power plants.
- MSW Thermal facilities recover ferrous and/or nonferrous metals for recycling, which is more energy efficient than mining virgin materials for metals.
- MSW Thermal facilities remove material from the landfill waste stream thus eliminating methane emissions that would have occurred if this material were landfilled.

U.S. EPA's Waste Reduction Model "WARM" provides estimates of the life-cycle GHG emissions from different waste management practices, including conventional combustion facilities. Table 3 shows the estimated direct and avoided GHG emissions for MSW Thermal using combustion technology. Direct emissions include non-biogenic CO2 and N2O from solid waste combustion and from transporting waste material. Avoided emissions include reductions in utility emissions from displaced electricity and emission reductions associated with recycled metals. While not California-specific, it is illustrative of the direct and avoided emissions from MSW combustion facilities. As shown in Table 3, direct GHG emissions from mixed MSW combustion (0.40 MTCO2e per ton of waste) are less than the avoided emissions from both utilities and ferrous metal production from virgin ores. WARM also provides data for specific types of waste, some of which are included in Table 3. Yard trimmings and mixed paper result in very little emissions because CO2 emissions from biogenic waste are not counted under WARM, but burning this waste results in significant avoided utility emissions. In contrast, HDPE plastic results in significant direct facility emissions that are only partially offset by avoided utility emissions. Steel cans primarily result in avoided emissions due to recycling of the recovered metals.

Table 3: Estimated MSW Combustion Direct and Avoided GHG Emissions[1] (MTCO2e/Ton Waste)

Material Combusted	Direct Emissions (CO2,N2O, transportation)	Avoided Emissions (Utility)	Avoided Emissions (Metal Recovery)	Net GHG Emissions
Mixed MSW	0.40	-0.39	-0.05	-0.04
Yard Trimmings	0.06	-0.22	0	-0.15
Mixed Paper	0.06	-0.55	0	-0.49
HDPE Plastic	2.82	-1.55	0	1.27
Steel Cans	0.03	0.02	-1.59	-1.59

1. Estimated based on U.S. EPA WARM (Version 12, February 2012). Direct Emissions of CO2 excludes biogenic CO2.

Since waste treated at a MSW Thermal facility would currently otherwise likely be landfilled, a comparison to landfill emissions based on the WARM model is provided below. (This landfilling assumption would not be valid in the future under a 75% recycling scenario.) As shown in Table 4, WARM estimates higher GHG emissions for landfills on average. However, the comparison varies with how the landfill gas is controlled. Net GHG emissions are very similar to MSW plants for landfills with gas recovery systems and electricity generation from the collected gas. However, WARM estimates that landfills which do not generate electricity from collected gas will have higher emissions per ton of waste, and landfills without gas recovery will have dramatically higher emissions.

Table 4: Estimated Direct and Avoided Landfill GHG Emissions[1] (MTCO2e/Ton Waste)

Material Combusted	National Average	No Landfill Gas (LFG) Recovery	LFG Recovery with Flaring	LFG Recovery with Electricity Generation
Mixed MSW	0.98	3.10	0.31	-0.03

1. Estimated based on U.S. EPA WARM (Version 12, February 2012)

Official lifecycle emissions data for the three California MSW Thermal facilities is not available. However, preliminary staff estimates shown in Table 5 below indicate that disposing of waste in the three MSW Thermal facilities in California results in net negative GHG emissions, ranging from -0.16 to -0.45 MT CO2e per ton of waste disposed, when considering that the waste currently would otherwise be deposited in landfills resulting in higher emissions. The estimates include the direct CO2 equivalent emissions (excludes biogenic CO2 emissions consistent with IPPC protocols and U.S. EPA WARM Model), and emissions credits for avoided utility emissions, recycling of metals, and avoided landfill methane emissions. Depending on the methodology used, avoided landfill emissions may range from 0.24 to 0.53 MT CO2e/MT of MSW. Emissions from the transportation of waste were not included (as they are in WARM), but this is a relatively minor factor in the overall emissions. Emission estimates related to landfill carbon storage associated with buried material was also not included.

Table 5: ARB Staff Preliminary Estimates of Net GHG Emissions from California MSW Thermal Facilities* (MTCO2e/Short Ton Waste)

Facility	Waste (TPY)	Non-biogenic MT CO2E Emissions	Energy Credit MT CO2E[1]	Metal Recycled (Tons)	Metal Recycling Credit MT CO2E[2]	Avoided Landfill Methane Emissions MTCO2e[3]	Net MT CO2E per Ton Waste
Covanta Stanislaus	800	79,590	-48,920	5,690	-10,240	-70,080 to -154,760	-0.17 to -0.46
Commerce Refuse to Energy	360	53,760	-22,240	920	-1,660	-31,540 to - 69,640	-0.01 to -0.30
Long Beach SERRF	1380	115,790	-80,050	6,500	-11,700	-120,890 to -266,960	-0.19 to -0.48
Total	2,540	249,150	-151,200	14,120	-25,410	-222,500 to -491,360	-0.16 to -0.45

1 Uses a grid emission factor of 657 lb. CO2e per MWh, and assumes facilities produce 85% of rated power capacity per Table 1.
2 Uses a metal recycling credit of 1.8 MT CO2e per short ton of ferrous metal.
3 Estimated avoided landfill methane emissions 0.24 to 0.53 MTCO2e/MT.

While waste thermal treated at MSW Thermal Facilities produces less GHG emissions than landfilling waste, recycling waste rather than landfilling or thermal treating would likely produce greater GHG reductions.

Can GHGs and co-pollutants from existing MSW Thermal facilities be reduced?

GHGs and co-pollutants from MSW Thermal facilities can be reduced. However, the available options may only achieve modest emissions reductions. One option to reduce GHGs is to decrease the amount of non-biogenic organic waste (e.g. plastics) in the material being combusted. This is because only the GHG emissions from non-biogenic organics are counted per IPPC protocols. Other options to reduce GHGs and co-pollutants, when a full "life-cycle" approach is used include: (1) improvements in front end pre-processing to recover more recyclables (e.g., glass, plastics, cardboard) prior to combustion (2) upgrades to the incinerator, boiler, turbine, or generator that could provide some modest improvements in the efficiency of the plant, and associated electricity generated per ton of waste, (3) improvements in metals recovery equipment to increase the recovery of metals from the waste ash, or (4) increases in the use of ash in products such as construction materials where it could replace virgin materials that would be mined or otherwise produced through processes that result in more GHG emissions. Over the long term, newer MSW combustion technologies, such as gasification, may offer additional GHG benefits beyond existing mass-burn technology especially for residual streams where recyclable materials have already been recovered.

What is the current status of emissions control at MSW Thermal facilities?

The primary GHG emitted from MSW Thermal plants is carbon dioxide, which is not controlled. MSW Thermal plants have extensive air pollution controls to reduce emissions of criteria pollutants and toxic air contaminants. For example, the Covanta Stanislaus Facility utilizes flue gas scrubbers with lime injection to control acid gases such as sulfur oxides, fabric filter baghouses for particulate matter, selective non-catalytic reduction (ammonia injection) for nitrogen oxides, activated carbon injection for mercury, and a continuous emissions monitoring (CEM) system.

IV. GOALS FOR REDUCING GHG FROM MSW THERMAL FACILITIES

MSW Thermal facilities can play a role in achieving California's goals for reducing GHG emissions and reducing the volume of material deposited in landfills. MSW Thermal facilities can help reduce GHG emissions from the waste sector in two ways: (1) new MSW Thermal facilities could handle waste that could not be recycled and would otherwise be sent to landfills, where GHG emissions may be higher over the long-term; and (2) the emissions from the three existing facilities in California could be modestly reduced, as discussed above. GHG emissions reductions are maximized when recyclable and compostable materials are removed from the MSW prior to use at MSW Thermal facilities.

Discussed below are some existing state programs that will affect the extent to which GHG emissions can be reduced through MSW Thermal facilities.

MSW Thermal Facilities and the Cap-and-Trade Program

California's Global Warming Solutions Act (AB 32) established a goal of reducing GHG emissions to 1990 levels by 2020, and then reducing GHG emission to 80% below 1990 levels by 2050. A central element of AB 32 is the Cap-and-Trade Program, which specifies an enforceable GHG emissions cap that will decline over time. The program applies to major sources of GHG emissions in the State, including the three MSW Thermal facilities in California. However, there are a number of concerns about including these facilities in the program, including the possibility that it may result in a shift of waste to landfills, which are not under Cap-and-Trade. Due to these concerns, ARB has proposed to temporarily exclude these three facilities from the Cap-and-Trade Program until 2015 to provide the time necessary to decide how best to treat MSW Thermal facilities in the context of the entire waste sector. Some potential options include: (1) remove MSW Thermal facilities from the Cap-and-Trade Program; (2) include the non-biogenic portion of emissions from MSW Thermal facilities in Cap-and-Trade (3) include MSW Thermal facilities in Cap-and-Trade and bring in landfills under Cap-and-Trade as well. These options are discussed in Section V below.

Renewable Portfolio Standard

The Renewable Portfolio Standard (RPS) program requires utilities to increase their procurement from eligible renewable energy resources to 33% of total procurement by 2020. Under the program, utilities will pay a premium for energy from renewable sources. This could make existing and new MSW Thermal facilities more economical to operate. However, under existing state law, only one of the three existing MSW plants (Covanta Stanislaus) is eligible for renewable energy credit, and new combustion facilities would not be eligible. New MSW Thermal facilities that meet the statutory definition of gasification (PRC 40117) would qualify as RPS eligible if the facility meets all the criteria in Public Resources Code Section

25741, Subdivision (b). Other MSW Thermal technologies, such as pyrolysis, that fall under the definition of transformation (PRC 40201) would not be RPS eligible.

V. CHALLENGES TO MEETING GOALS

This section discusses the current and future challenges facing MSW Thermal facilities in meeting California's waste diversion and GHG reduction goals. The challenges discussed below are divided into short-term and long term actions. In the short-term, many of the challenges will depend on the regulatory structure that applies to MSW Thermal facilities. Most of the challenges are interrelated. For example, government policies affecting MSW Thermal facilities will affect the financial challenges municipalities face in siting new MSW Thermal facilities. In turn, the economics of MSW Thermal plants can affect the viability of other waste options, such as recycling, composting, and anaerobic digestion.

A. Short-Term Challenges

Permitting of New MSW Thermal facilities

MSW Thermal facilities operators are required to obtain several permits from different agencies in order to operate. They are required to obtain a full solid waste facility permit as described in the Public Resources Code Sections 44001 - 44018 and California Code of Regulations, Title 27, Chapter 4, Subchapter 3. In addition, they are also required to obtain permits from local jurisdictions, the Regional Water Quality Control Board, and local air quality management districts. The overall permitting process, including the local planning process and local land use decisions, along with large capital costs and local opposition to MSW Thermal facilities, makes it very difficult to construct new plants. The three existing MSW Thermal plants were all built in the late 1980s when government policies encouraged the construction of new MSW Thermal facilities. Staff anticipates that the overall permit and construction process will take 5 to 10 years.

Renewable Energy Credit

The ability to generate electricity that qualifies for renewable energy credit is an important factor in the development of new plants. Only one of the three existing MSW Thermal plants (Covanta Stanislaus) is eligible for renewable energy credit, and new combustion facilities would not be eligible without a legislative change.

Potential Conflict with Recycling Goals

As noted above, MSW Thermal facilities have the potential to reduce GHG emissions compared to landfilling of MSW. However, other waste options such as recycling, composting and anaerobic digestion, and biomass conversion result in even lower GHG emissions. However, there is not clear guidance on the extent of the efforts required to remove recyclable and compostable materials from the MSW stream prior to MSW combustion. One concern expressed is that the provision of incentives to MSW Thermal facilities could lead to increased use of feedstocks that could otherwise go to recycling, composting, and/or anaerobic digestion facilities. .

Cap-and-Trade Program Impacts

Currently MSW Thermal facilities are regulated under the Cap-and-Trade Program. However, the ARB has proposed to temporarily exclude them from the program until 2015 to provide the time necessary to decide the best regulatory framework for these facilities and for the Waste Sector as a whole with respect to Cap-and-Trade. If MSW Thermal facilities are under the Cap-and-Trade Program, GHG emissions from these facilities would be capped and need to decline over time. The main argument against this is that reducing the amount of MSW combusted or purchasing GHG credits are the only viable options for meeting the cap requirements. Some argue that reducing the amount of MSW combusted defeats the purpose of these facilities and will end up forgoing GHG emission reductions. Further, purchasing credits is likely to require increasing tipping fees to a point where it cannot compete with landfilling. This competitive disadvantage compared to landfilling will result in more waste being landfilled, resulting in more GHG emissions. MSW Thermal operators also report that they are already facing an uncertain economic future even without the potential impacts of the Cap-and-Trade Regulation.

Financial Risk

Municipalities face numerous financial risks in proposing new MSW Thermal facilities. MSW Thermal facilities are costly and face a lengthy process to obtain the necessary permits and address community concerns. There is a risk that new facilities will not perform as expected, especially with newer technologies. Finally, long-term financing may be necessary, but government policies and revenue generated from electricity can change over time in a way that affects the economic viability of a MSW plant. Even some of California's existing MSW Thermal facilities (Long Beach SERRF and Commerce Refuse to Energy) face an uncertain future in the next few years as electricity contracts expire. The current contracts provide price "floors" that provide much higher prices than current rates. When these contracts expire, rates paid for their electricity may fall by two-thirds, making these MSW Thermal plants potentially uncompetitive with landfills that are less expensive to operate and offer lower tipping fees.

B. Long-Term Challenges

Emerging MSW Thermal Technology

As noted above, conventional combustion MSW Thermal plants produce combustion byproducts that require extensive air pollution control equipment, and result in ash with limited or no market value. Gasification and related technologies may offer advantages in these areas, but the technologies are not yet mature. There are applications outside the U.S. handling relatively homogeneous waste. However, it is unclear whether the technology is feasible for unsegregated MSW.

Beneficial Uses for MSW Thermal Byproducts

In order to achieve a sustainable, waste management system, beneficial uses need to be identified for the MSW Thermal combustion byproducts. Finding beneficial uses for incinerator "bottom" ash and "fly ash" from the air pollution control systems could reduce the carbon footprint of these facilities. However, care needs to be exercised in reusing ash since it often contains hazardous or toxic components such as heavy metals and dioxin.

VI. Potential Solutions for Meeting Goals

Discussed below are some potential solutions to the challenges discussed. Many of the potential solutions are discussed in the 2012 Bioenergy Action Plan. There may be additional solutions to the challenges beyond those discussed below.

A. Short-Term Solutions

Permitting of New MSW Thermal Facilities

Building new MSW Thermal facilities could help California meets its GHG and waste reduction goals and increase ownership for the waste generated within California. If this path is taken, action could be needed to facilitate the permitting of new MSW Thermal facilities for the portion of the waste stream that cannot be managed via recycling, composting and anaerobic digestion, or biomass conversion. If needed, State and local agencies could work together to streamline the permit and siting process. The 2012 Bioenergy Action Plan also suggested the development of a programmatic Environmental Impact Report (EIR) for facilities using thermal technologies. The EIR could assist State and local agencies in preparing site-specific environmental documentation that may be required for conversion technology facility applications and/or permits. In order to address the concern that these types of facilities may use feedstocks that could otherwise be recycled or composted, a performance standard would need to be developed, to allow regulators and operators to determine when sufficient recyclable and/or compostable materials have been removed.

Renewable Energy Credit

The ability for MSW Thermal facilities to generate qualified renewable energy will become increasingly important as utilities move toward the 33% renewable energy mandate in 2020. As stated above, only one of the three existing MSW Thermal facilities in California qualifies. In addition, there is some uncertainty about the status of other thermal conversion processes. Potential solutions include allowing all MSW Thermal facilities to generate renewable energy credits, subject to meeting requirements that protect air quality, recycling, and composting programs. The 2012 Bioenergy Action Plan also proposes a review of proposed legislation and statutory definitions relating to conversion technologies to clarify which processes can qualify for renewable energy credit.

Potential Conflict with Recycling Goals

To protect recycling programs, front-end processing standards could be developed for waste sent to MSW Thermal plants to ensure that recyclable and compostable materials are removed prior to MSW conversion since removal would result in greater GHG reductions. These standards should incorporate safeguards to protect existing recycling and composting systems and markets and allow for growth of these systems.

Cap-and-Trade Program Impacts

As discussed above, ARB staff is proposing to temporarily exclude the three MSW Thermal facilities from the Cap-and-Trade Program until 2015 to allow time for further investigation of the best approach for handling MSW Thermal facilities as part of an overall Waste Sector Plan. Discussed below are some potential options for addressing the issue of MSW Thermal facilities under Cap-and-Trade.

Remove MSW Thermal Facilities from Cap-and-Trade post-2015

Under this option, MSW Thermal facilities would be removed from the Cap-and-Trade Regulation for the foreseeable future. This approach would put MSW Thermal facilities on a level playing field within the Waste Sector, where none of the methods of handling MSW would be subject to the Cap-and-Trade Regulation. Under this approach, the incentive to reduce GHG emissions provided by the Cap-and-Trade Regulation would be removed. However, the GHG emissions from these facilities are already capped since they are operating at capacity. Further, given the age of these facilities and the uncertainty in long-term rates, the operating life of these facilities is likely to be limited. At the same time, the operation of MSW Thermal facilities (and other waste handling options) may need to be monitored over time to determine whether existing programs to increase recycling, minimize waste generation, and reduce emissions are sufficient to reduce GHG emissions over time. As necessary, additional programs or regulations may be needed that are tailored to MSW facilities or other waste handling processes. This approach may allow for diversity of waste handling options that meets some local needs (rural, urban, etc.) for both waste minimization and GHG reductions goals at an overall statewide level.

Add MSW Thermal Facilities into Cap-and-Trade in 2015

Another approach is to add MSW Thermal facilities to the Cap-and-Trade program in 2015, while leaving other Waste Sector sources out. Under this approach, MSW Thermal plants would have an incentive to reduce their GHG emissions over time through control of input feedstock and other techniques. However, a challenge with implementing this approach is that MSW Thermal plants have a modest potential to reduce their GHG emissions. Over time, they may have to purchase more emissions credits, making them increasingly less competitive compared to traditional landfills. This approach could result in more GHG emissions if it results in an increase in MSW going to landfills. On the other hand, it could also encourage increased recycling prior to MSW thermal treatment and/or landfilling.

Add MSW Thermal Facilities and Other Waste Sector Sources to Cap-and-Trade in 2015

Under this approach, MSW Thermal facilities and other options for handling waste (such as landfills) would be subject to the Cap-and-Trade Regulation. This would provide a level playing field for power generation and potentially avoid increases in waste disposal at landfills from a reduction in combustion of MSW. However, accurately quantifying the emissions from some waste sectors will be very difficult. For example, landfill emissions occur over a large surface area, and will vary based on the specific location on the landfill. Emissions are likely to vary based on environmental factor (temperature, climate, and moisture), system design and operation consideration, landfill activities, and other factors.

Financial Risk

All of the potential solutions discussed above could help reduce the financial risk that municipalities face in siting new MSW Thermal facilities. For example, streamlining the permitting process, developing a programmatic EIR, developing a performance standard regarding the processing of feedstock to remove recyclable and/or compostable materials, allowing MSW Thermal facilities to generate qualified renewable energy, and changing MSW facility's status under the Cap-and-Trade Regulation, could lead to projects that are more economically viable and thus less financially risky. In addition, the 2012 Bioenergy Action Plan discusses a number of potential options for providing low interest loans for renewable energy projects. To address the risk of implementing new MSW Thermal plants, state agencies could develop a guidance document on existing MSW Thermal facilities and their performance, both in and outside California.

B. Long-Term Solutions

Emerging MSW Thermals

State (and potentially Federal agencies) could coordinate resources to pursue research, development and commercialization of emerging state-of-the-art thermal technologies. Research could include a survey of existing technologies, the economic and technical performance of existing facilities worldwide, new technologies under development, and funding of pilot projects.

Beneficial Uses for MSW Thermals

State (and potentially Federal agencies) could fund research to supplement existing programs seeking to identify safe and beneficial uses for MSW ash. Existing research is underway looking at construction materials such as cement/ash blocks and roadway materials.