

Final Report

**Administrative & Technical Support in Evaluating Public Input on Potential Enhancements
to the State Solid Waste Program**

Phase II. Framework for Changing Alabama's Approach to Solid Waste Management

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Executive Summary

The Alabama Solid Waste (ASW) project is being conducted by Auburn University in response to Alabama law placing a moratorium on new solid waste landfill permits. Specifically, Act 2011-297, Bill H-406, placed a 24-month moratorium on the issuance of new permits to allow the Alabama Department of Environmental Management (ADEM) and the Alabama Department of Public Health (ADPH) sufficient time to review their responsibilities under the Solid Wastes and Recyclable Materials Management Act (SWRMMA) and for the update of the state's solid waste management needs. The Alabama legislature extended the moratorium for an additional 12 months through the passage of Act 2012-434, Bill H-556. This law extends the moratorium act to May, 2014.

The ASW project is a two-phased project. Phase I is primarily a study of the current Alabama solid waste landfill permitting process. Phase I results are presented in the final report entitled *Administrative & Technical Support in Evaluating Public Input on Potential Enhancements to the State Solid Waste Program; Phase I. Potential Enhancements to the Alabama Solid Waste Landfill Permitting Process (8)*. Phase II is primarily a study of potential alternative materials management approaches for minimizing solid waste disposal in Alabama landfills. This report addresses Phase II activities, presenting a framework for potential actions ADEM and the state may consider in developing a strategy for future solid waste management in Alabama. This framework seeks to maximize the beneficial reuse of the solid waste through waste reduction, reuse, recycling and composting, and energy recovery; while minimize to the degree possible the amount and composition of solid waste destined for terminal disposal in landfills. This framework includes implementing actions through policy and/or law to de-incentivize landfilling and incentivize several alternatives to landfilling, including:

- Increase disposal fees at Alabama landfills, including C&D landfills
- Require C&D landfills establish and provide financial assurance for final closure
- Require out-of-state waste be comprised of a certain fraction of recoverable/recyclable materials comparable to Alabama's recycling target (currently 25%)
- Modify laws and policy pertaining to landfill permitting
- Strategic enhancement of the State of Alabama Recycling Program, using financial resources acquired through increased disposal fees

- Implement through policy and/or law changes which enhance WTE facility development and other energy recovery technologies

The framework item perhaps most amenable to direct implementation involves the development of a state-level optimized recycling network, including the development of a materials exchange.

A companion appendix to this report provides useful recent information supporting the observations presented here.

Introduction

The recent era of solid waste stream management in Alabama began with Alabama Law 89-824, passed by the Alabama Legislature in 1989 (1). This law amended Alabama's Solid Waste Disposal Act through Article 3, which, among other things:

- Directed the Alabama Department of Environmental Management (ADEM) to prepare the Alabama Solid Waste Management Plan
- Directed Regional Planning & Development Commissions to develop regional solid waste management needs assessments
- Required local governments to prepare and adopt local Solid Waste Management Plans

The events which have occurred since the enactment of Alabama Law 89-824 are summarized in Figure 1. One of the significant outcomes of this law is the development of ADEM's Solid Waste Management Plan. The initial development of this plan was accomplished through a two-phase approach. Phase I provided guidance to local governments in development of local solid waste management plans, and included a statewide survey designed to estimate the amount of solid waste generated per person per day, as well as the make-up of this waste stream (2). Phase II refined previously gathered solid waste management data and recommended statutory improvements to Alabama's management of solid waste (3). In 2002, the Alabama Environmental Management Commission (EMC) adopted Phase I and Phase II of the Solid Waste Management Plan into ADEM's solid waste regulations. However, until 2008, only a portion of the recommendations in Phase II of the plan were adopted by the Alabama Legislature (specifically, the Alabama Scrap Tire Environmental Quality Act, passed by the Alabama Legislature in 2003).

In 2008, the Solid Wastes and Recyclable Materials Management Act (SWRMMA) was passed by the Alabama Legislature. This act considerably modernized the management of solid waste streams in Alabama, and included a number of the recommendations initially proposed in Phase II. Among other things, the bill instituted a statewide solid waste disposal fee (\$1.00 per ton). This fee provided revenue to establish the Solid Waste Fund (to pay costs associated with

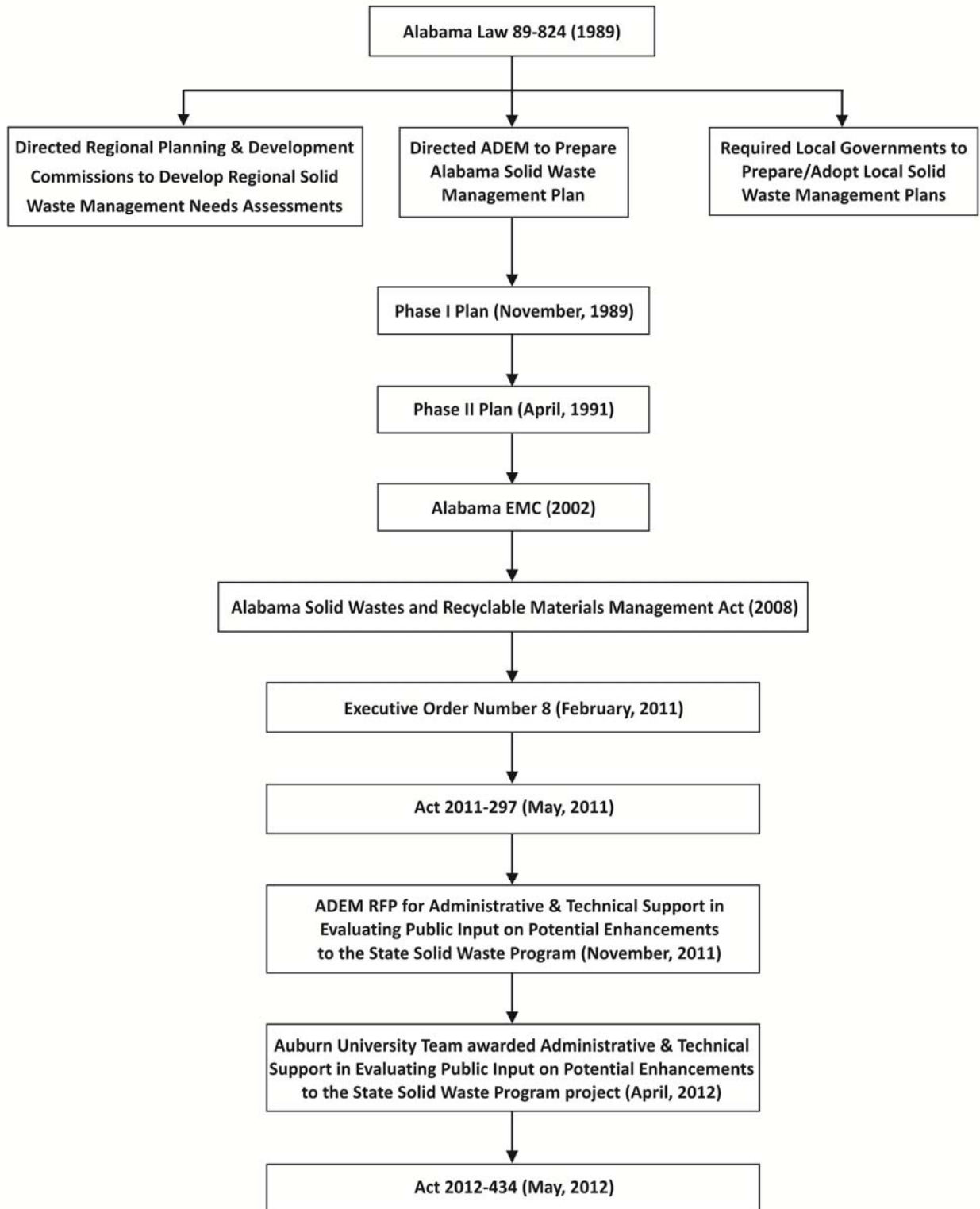


Figure 1. Summary of important events following enactment of Alabama Law 89-824.

remediation of unauthorized solid waste dump sites); and the Alabama Recycling Fund (to provide grants to local Alabama governments and non-profit organizations to develop and enhance recycling and waste minimization programs). Additionally, it provides funding to ADEM to both perform its solid waste management regulatory duties, and fund educational programs related to solid waste management and recycling. Also, it provides revenue to the state to cover the costs associated with collection of the fees (1).

In February, 2011, Governor Robert Bentley signed Executive Order Number 8, which directed ADEM (with input from the Alabama Solid Waste Management Advisory Committee and the Alabama Department of Public Health (ADPH)), to adopt and promulgate new rules, regulations, and requirements for the permitting of solid waste management facilities and landfills meeting certain size/capacity criteria (4). This order also required all solid waste management facilities be approved by the Alabama Solid Waste Management Advisory Committee. Importantly, the order imposed a moratorium on the issuance of new or modified permits (or the transfer of existing permits) for solid waste management facilities until the new rules, regulations, and requirements required by the order were promulgated.

Certain directives contained in Executive Order Number 8 were enacted into law in May of 2011 with the passage of Act 2011-297, Bill H-406, which specified a 24-month moratorium on the issuance of new permits (5). Act 2011-297 states that the purpose of this moratorium is to allow adequate time for ADEM and ADPH to review their responsibilities under the Solid Wastes and Recyclable Materials Management Act and for the update of the state's solid waste management needs (5).

In response to Act 2011-297, in November 2011, ADEM released the request for proposals (RFP) seeking administrative and technical support in evaluating public input on potential enhancements to the state solid waste program (6). In addition to the permitting of new landfills, ADEM's RFP sought insight regarding broader statutory and regulatory change in the overall management of solid waste in Alabama, including sustainable materials management practices. ADEM noted that as the acceptance and use of alternatives to landfill disposal

increases, Alabama's solid waste management program must adapt to accommodate and encourage these changes.

In April 2012, the Auburn University (AU) team was awarded a two-year grant to conduct the study requested in ADEM's November 2011 RFP (referred to as the Alabama Solid Waste (ASW) project). In this role, the AU team is providing technical support to ADEM in gathering and evaluating input from the general public, and solid waste management stakeholders (e.g., local governmental authorities, elected officials, solid waste industry representatives) regarding both landfill disposal and the increased use of alternatives to landfill disposal. Additionally, the AU team is serving in an advisory capacity to assist ADEM in developing and implementing programs to meet future solid waste management goals and challenges. This includes an evaluation of the current and potential future state of solid waste management practice in Alabama and other states, the gathering and evaluation of public and other stakeholder ideas, issues, and concerns; and the synthesis of this information into alternatives for further actions by ADEM, ADPH, and the Alabama Legislature.

Following the award of the ASW project to the AU team, the Alabama legislature extended the moratorium on the issuance of new or modified permits for an additional 12 months through the passage of Act 2012-434, Bill H-556 (7). This law extends the moratorium act to May, 2014.

Project Objectives

The ASW project is a two-phased project. Results of the first phase of the project (Phase I) are presented in the final report entitled *Administrative & Technical Support in Evaluating Public Input on Potential Enhancements to the State Solid Waste Program; Phase I. Potential Enhancements to the Alabama Solid Waste Landfill Permitting Process (8)*. Phase I was primarily a study of the current Alabama solid waste landfill permitting process, while Phase II (reported here) is primarily a study of potential alternative materials management approaches for minimizing solid waste disposal in Alabama landfills.

Phase I Results

Phase I activities included a number of public meetings held throughout Alabama, designed to engage the broader public in a dialog regarding the current and potential future of both solid waste landfill permitting, and alternatives to landfilling solid waste in Alabama. More focused stakeholder dialogs were also included in Phase I activities, designed to engage those within the state who, through employment, political activities, or other means (for example, non-governmental environmental or social justice groups), are more familiar with the current solid waste landfill permitting process. Additionally, Phase I activities included a review of the solid waste landfill permitting process in other states, for comparison with Alabama's current permitting process. The goal of Phase I was to provide ADEM with an assessment of (1) the public's perception of Alabama's current solid waste landfill permitting process; and (2) an assessment of potential enhancements to Alabama's solid waste landfill permitting process. Phase I results revealed the following:

- There are several advantages to Alabama's current solid waste landfill permitting process which make it more efficient than those of other states, including speed, predictability, and separation of community planning decisions and regulatory decisions
- Perceived disadvantages noted by the public include inadequate assessment of landfill need, inadequate early public and local engagement and information transfer, poor host government decision-making process transparency, inability of the Regional Planning Council's to address questions of consistency with regional solid waste management plans, and a default approval mechanism for the host government
- The advantages and perceived disadvantages of Alabama's current solid waste landfill permitting process can potentially be reconciled by making the following changes:
 - 1) Change or modify the 90-day default approval
 - 2) Replace the RPC as the entity assessing consistency of a proposal with the regional SWMP

- 3) Require the applicant to provide fact-based information supporting their proposal to the public and to the host government authority prior to a host government authority decision

Phase II Objectives

This report presents a summary of potential actions ADEM may consider in developing a strategy for future solid waste management in Alabama. A companion appendix to this report provides useful web-based recent documents and other reference material supporting the observations and references presented here.

Auburn University Study Team

The Auburn University study team is comprised of faculty and graduate students from the Samuel Ginn College of Engineering, Civil Engineering Department, and the College of Architecture, Design, and Construction (CADC).

Changing Solid Waste Perspective in Alabama

Solid Waste Disposal and Sustainable Management Models

Regardless of how solid waste is defined, it is and always has been an undeniable by-product of human civilization. Solid waste (either municipal or construction-related) can be defined in a number of ways, many of which depend upon the perspective of the definer. One common definition of solid waste is materials discarded from residential and commercial sources that no longer have value to the holder. On the opposite end of the spectrum, many environmentalists believe that there is no such thing as solid waste, and that landfilling is the result of poor planning or a lack of appreciation of the inherent value of solid waste. In practice, the way solid waste is treated within the solid waste industry reflects its definition. In the past and continuing today to one degree or another, the solid waste landfilling industry has treated most solid waste as having little value except for the fees associated with hauling and disposal. This is particularly true in Alabama, where the incentives for treating the materials comprising solid waste as valuable resource are not generally known, unrecognized, and/or under-appreciated

by the majority of waste generators and many in the solid waste industry. This perspective on solid waste management can be thought of as the *solid waste disposal* model (Figure 2).

However, there is another view of solid waste that has and continues to emerge and mature, which can be thought of as the *solid waste sustainable management* model. This view of solid waste seeks to maximize the beneficial reuse of the solid waste through waste reduction, reuse, recycling and composting, and energy recovery; while minimize to the degree possible the amount and composition of solid waste destined for terminal disposal in landfills (Figure 2).

Although conceptually straightforward, the challenges associated with the practical applications of sustainable solid waste management are varied and complex. These challenges include human nature and behavior, political and economic realities, and technological reality and feasibility. Many of these challenges exist simply because from a societal perspective, we are currently in the transition period between the waste disposal and sustainable waste management models. As our understanding and ability to successfully manage solid waste in more sustainable ways evolves and matures, these challenges will become less daunting.

The Role of Federal and State Regulatory Agencies

With regard to the implementation of policies and technologies leading to sustainable solid waste management, a single rigid hierarchical formula that works everywhere is unrealistic. Rather, an integrated approach to sustainable solid waste management, which accounts for specific local and regional behaviors, norms, and situations, is preferable. From this perspective, the guiding principles underlying sustainable solid waste management are environmental, technological, and economic feasibility, and social acceptability. Importantly, social acceptability requires accommodation and flexibility with respect to local and regional conditions, behaviors, and norms. Thus, if the ultimate goal of sustainable solid waste management (maximizing beneficial reuse through reduction, reuse, recycling, composting, and energy recovery; minimizing landfilling) is to be realized, the role of federal and state agencies tasked with achieving this goal should be to guide and incentivize at all points in the solid waste

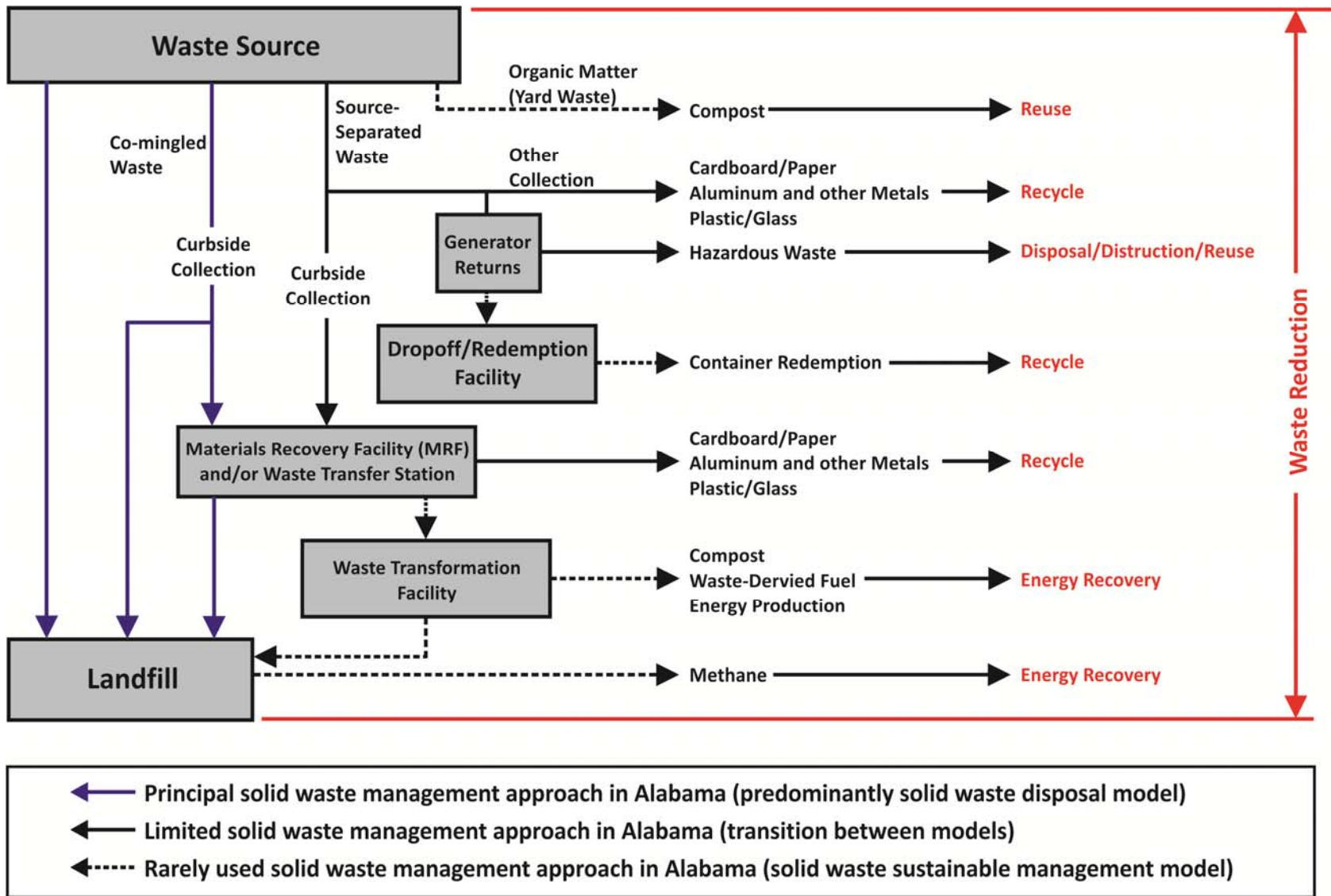


Figure 2. Relationship between solid waste disposal and solid waste sustainable management models.

management chain (from waste producers to landfill owners/operators) in ways that help reach this goal.

Guiding the transition from the solid waste disposal model to the solid waste sustainable management model can and should take several forms. Educating waste generators, waste managers, policy-makers, and law-makers regarding the technological and economic feasibility of various alternatives to landfilling is crucial to successful sustainable solid waste management. Providing policy- and law-makers with the information necessary to motivate and affect changes in policy and law that remove restrictions to sustainable practices, and putting in place restrictions that make non-sustainable practices less appealing, is a legitimate and necessary role of both federal and state regulatory agencies. Two examples from federal law make this point: the Clean Air Act (CAA; 1970) and the Resource Conservation and Recovery Act (RCRA; 1976). By regulating emissions from municipal solid waste incinerators, landfills, and composting facilities, the CAA led to modernization of these operations (and the removal of operators unwilling to meet new air quality standards). RCRA has had an even greater impact in the management of solid waste in the United States. In particular, RCRA established a systematic approach for identifying, characterizing and disposing of solid and hazardous waste. With regard to non-hazardous solid waste, RCRA subtitle D requires the United States Environmental Protection Agency (EPA) to establish baseline technical design and operating criteria which states must incorporate into their own landfill regulations.

RCRA subtitle D was a major positive step in the evolving solid waste management model; however, an unintended consequence of this law is a shift towards larger landfills. This shift towards larger landfills has occurred principally because of the costs associated with complying with RCRA and state laws and regulations regarding solid waste landfills, and the lack of additional guidance and incentives (which include laws, regulations, and economic benefits) necessary to successful sustainable solid waste management (waste reduction, reuse, recycling, composting, and energy recovery). Today, the incentives at all points in the solid waste management chain which motivate beneficial reuse are often perceived by policy- and law-makers, and many in the solid waste industry as less desirable than the landfilling alternative.

Moreover, because of the shift towards larger and more economically costly landfills, the owners and operators of these landfills are incentivized to a large degree to maximize solid waste disposal at the expense of beneficial reuse.

Alabama’s Transition from Solid Waste Disposal to Sustainable Management

Figure 2 illustrates in an overall way the current state of Alabama with respect to the evolving solid waste management model. To a large degree, Alabama is primarily a disposal state. There are exceptions to this general statement within local Alabama municipalities (primarily with respect to recycling of solid waste); however, Alabama’s low landfill tipping fee (average \$25/ton based on 2008 data; nearly the lowest of all states (9)) is a strong disincentive for waste generators to consider other forms of sustainable solid waste management, and a strong incentive for owners and operators of landfills to seek landfill disposal as the primary solid waste management strategy.

Table 1 presents data from 2008 (9) comparing components of the solid waste sustainable waste management model in Alabama to the nation at-large. One surprising outcome of this table is that Alabama exceeds the national average in landfilling by only approximately 16%. Moreover, the majority of this discrepancy is a result of low recycling and composting rates (compared to the national average). Compared to the national average, Alabama appears to be comparable in waste-to-energy (WTE) conversion. However, this is somewhat misleading,

Table 1. Comparison of Components of the Sustainable Solid Waste Model in Alabama to the Nation At-Large (2008 data; (9)).

	Generated	Recycled	Composed	WTE¹	Landfilled
Alabama	5,287,330	472,000	n/a	316,659	4,498,671
Nation	389,488,026	69,283,968	24,497,252	25,926,285	269,780,521
	% Recycled	% Composted	% WTE	% Landfilled	Total
Alabama	8.9%	-	6.0%	85.1%	100.0%
National Average	17.8%	6.3%	6.7%	69.3%	100.0%

¹WTE: Waste-to-Energy conversion

since Alabama has only one WTE facility in the state (located in Huntsville, Alabama) converting approximately 316,659 tons per year of solid waste to steam for use by the U.S. Army at the Redstone Arsenal. In fact, the majority of WTE conversion in the United States (comprising the majority of the national average shown in Table 1) takes place in only 9 states in the United States (Connecticut, Florida, Maryland, Massachusetts, Michigan, New Jersey, New York, Pennsylvania, and Virginia); each of which convert more than 1 million tons of solid waste to energy per year (9).

The data shown in Table 1 and the relationship shown in Figure 2 between the solid waste disposal model and the solid waste sustainable management model provide a basis for a general framework for the future of solid waste management in Alabama. In general, this framework includes implementing actions through policy and/or law to de-incentivize landfilling and incentivize alternatives to landfilling:

- Increase disposal fees at Alabama landfills
- Require out-of-state waste be comprised of a certain fraction of recoverable/recyclable materials
- Modify laws and policy pertaining to landfill permitting (discussed in Phase I report (8))
- Enhance the State of Alabama Recycling Program
- Implement through policy and/or law changes which enhance WTE facility development and other energy recovery technologies

Increasing Disposal Fees at Alabama Landfills

The Solid Wastes and Recyclable Materials Management Act (SWRMMA), passed by the Alabama Legislature in 2008, instituted a statewide solid waste disposal fee of \$1.00 per ton. Fees associated with terminal disposal in landfills are a common strategy for incentivizing the diversion of waste from landfills to alternative uses, both in the United States and in foreign developed countries (e.g., 10-12). Conceptually, fees are set so that the amount of waste diverted to recycle/reuse strategies is maximized, while minimizing negative and/or illegal cost avoidance strategies (e.g., illegal dumping). Studies considering the effectiveness of disposal

fees have shown that when appropriately set, they are very effective in incentivizing waste diversion to alternative reuse (10-12).

Alabama's \$1.00 per ton disposal fee provides revenue to establish the Solid Waste Fund (to pay costs associated with remediation of unauthorized solid waste dump sites); the Alabama Recycling Fund (to provide grants to local Alabama governments and non-profit organizations to develop and enhance recycling and waste minimization programs), provides funding to ADEM to perform its solid waste management regulatory duties and fund educational programs related to solid waste management and recycling, and provides revenue to the state to cover the costs associated with collection of the fees (1). The fee is based on the quantity of material actually landfilled (excluding recycled, reused, or recovered materials), and applies to all solid wastes disposed of in Alabama landfills, regardless of whether the waste is subject to any other disposal fees. However, this financial incentive has little effect on landfilling behavior in Alabama. The reason for this is that landfill tipping fees in Alabama are very low compared to the national average; thus, the sum of all fees (tipping fee, state-mandated disposal fee, and other potential fees) remains below the level necessary to incentivize alternative waste reduction. Low tipping fees can be thought of as an incentivizing strategy for landfill owners and operators in a market with high supply (landfill capacity) and low demand (available solid waste). In this climate, increasing tipping fees through policy or law would be a challenging endeavor. From the perspective of enhancing revenue to the state for purposes specifically addressing actions leading to a solid waste sustainable management model, increasing the disposal fee may be a more achievable goal. This action has several advantages to the state, including:

- Additional revenue for enhancing the State of Alabama Recycling Program
- Revenue for strategic planning and actions leading to an increase in WTE and other energy recovery technologies
- De-incentivizing landfilling of economically viable materials
- Decreasing the financial incentive for creation of new landfills without demonstrable need

One potential strategy for increasing disposal fees is to tie the fee amount to the cumulative amount of material landfilled over a set period of time. Thus, small-scale and/or intermittent disposers will be largely unaffected by the fee increase, while large-scale disposers will see a proportional increase in their disposal fee. The principle underlying this strategy is to place the largest incentive for waste reduction on the parties most capable of executing waste reduction strategies. Another potential strategy that could be included in this approach is to offer a discount on the disposal fee if the cumulative amount of recyclable materials recovered over the set period of time exceeds the state recycling goal of 25%. Independent of the strategy ultimately decided, the principle goals of de-incentivizing landfilling, incentivizing sustainable alternatives to landfilling, and providing additional revenue to the state to accelerate the move to a solid waste sustainable management model are served by increasing the state-mandated disposal fee.

Fee-based waste diversion strategies to incentivize alternative recycling/reuse are equally applicable to construction and demolition (C&D) landfills. In Alabama, there is no fee-based incentive to divert C&D waste to alternative use strategies, although there are potential benefits to having such fees, including recovery of recyclable materials. Also, since C&D landfills are not subject to RCRA subtitle D regulations, there are no federal requirements for C&D landfills to establish and maintain financial assurance for final closure of the facility, similar to municipal solid waste landfills. Financial assurance for C&D landfills would provide indirect environmental protection by ensuring that funds are available to address environmental issues that may arise after a C&D facility is closed. Additionally, financial assurance requirements for C&D landfills would help ensure that future C&D landfill developers are fiscally responsible. Thus, a fee-based disposal requirement for C&D landfills should incentivize diversion of a component of this waste stream to alternative use strategies; while financial assurance requirements should provide a means for ADEM to enforce C&D closure rules and regulations and recover expenses when the state is required to close a C&D landfill.

Require Certain Fraction of Recoverable/Recyclable Materials in Out-of-State Waste

Article I, Section 8, Clause 3 of the U.S. Constitution (the Commerce Clause) is an affirmative grant of power to Congress and does not expressly govern the activities of states or local governments; however, federal courts have interpreted this constitutional provision to prohibit states from advancing their own commercial interests by curtailing the movement of articles of commerce, such as solid waste, either into or out of the state. This aspect of the Commerce Clause is often referred to as the “dormant Commerce Clause.” A state law or local ordinance that discriminates against interstate commerce by treating in-state and out-of-state interests differently is generally invalid under the dormant Commerce Clause. However, requiring out-of-state waste to have defined and specific characteristics similar to those set by the Alabama legislature for in-state waste, as a prerequisite for disposal in Alabama landfills, does not violate the Commerce Clause, since there is no intent to curtail the interstate movement of the solid waste. This is clear when considered from a different perspective, that of bans on certain materials as a prerequisite. Requiring out-of-state solid waste have a known amount of recoverable/recyclable materials in accordance with state-mandated amounts for in-state waste has the potential to de-incentivize the overall landfilling of out-of state waste while incentivizing landfill owners/operators and in-state disposers as a consequence of the supply-and-demand relationship between landfill capacity and solid waste noted earlier. Competition for out-of-state solid waste with a known and predictable recoverable/recyclable content should lead to higher tipping fees and consequently a greater motive for reducing the amount of recoverable/recyclable materials in all solid waste. The key impediments to this approach are: (1) Alabama does not mandate a set fraction of recyclables; rather, it has set a target goal for recycling at 25%, and (2) the state is currently not able to manage an increase in recyclable materials in a systematic, organized way. The first impediment could be addressed through legislative action, which in turn would provide the advantages with respect to out-of-state waste noted above. The second impediment will require a commitment to developing a state-level, optimized recycling network to efficiently manage the recovery, processing, marketing, and distribution of the recycling stream. This notion of a state-level optimized recycling network is discussed more fully in a later section of this report.

Modify Laws and Policy Pertaining to Landfill Permitting

The relationship between existing landfill capacity and the tendency to landfill solid waste as a primary management strategy is essentially an economic relationship. If landfill capacity is high relative to the availability of solid waste, then competition for the waste reduces the cost of landfilling, making landfilling the most economically viable option for waste generators, regardless of the inherent economic value of a component of the waste. The supply component of this relationship (landfill capacity) is governed in part by the ability of potential landfill owners/operators to enter the market. Thus, if the barriers to entry are low, and the margins for return-on-investment are acceptable, excess landfill capacity is an expected result. This is the basis for most business decisions in free markets and is self-correcting, since at some point supply will outstrip demand to the point that profit margins become unacceptable. However, in the case of solid waste landfilling, the state has a compelling interest to manage, to the degree possible without violating free market principles, the amount of solid waste terminally disposed of in landfills, since the consequences of this practice affect all citizens of the state. Moreover, the net value loss of economically-viable materials into landfills represents a lost source of revenue to individuals, businesses, and the state. Phase I of this project presented potential actions to reduce the potential for unnecessary growth in landfill capacity, while ensuring the ability of future landfill need to be accommodated. These potential enhancements were summarized earlier in this report, and are discussed in detail in the Phase I report (8).

Enhancing State of Alabama Recycling Program

The Alabama Recycling Fund (ARF) was established as part of the SWRMMA of 2008 (1). The ARF uses funds collected through the statewide solid waste disposal fee to provide financial resources for grants to local governments and governmental non-profit groups to develop, implement, and enhance recycling and waste education and minimization projects. Also, Alabama adopted a 25% recycling goal in when the SWRMMA was enacted into law. As shown in Table 1, the rate of recycling in Alabama in 2008 was well below this goal, and also well below the national average. It is important to realize that the data shown in Table 1 are

estimates dependent on the confidence in the sources providing these data; therefore, there is some level of uncertainty in these results. More recently, in 2012 ADEM published a document entitled *Economic Impact of Recycling in Alabama and Opportunities for Growth (13)*, citing a maximum recycling rate for Alabama of 8.3%, compared to a national average of 31-34%. In this study ADEM also notes that recycling rates depend in large part on the quality of the waste data used to determine these rates and in general show “great variation.” Regardless, what is not in doubt is the fact that the rate of recycling in Alabama is well below the national average. The primary reasons for this have been previously discussed: incentives that maximize disposal of solid waste in landfills and disincentives to recovering recyclable materials. **Ultimately, the only way to achieve sustainable management of solid waste is for recycling to become a net profit producer at all levels of the recycling chain.** This is widely recognized in the solid waste industry and regulatory communities, and was the rationale for the 2012 ADEM study (13). In this study, ADEM concluded that the annualized net value loss of recyclable materials (based on 2011 data) disposed of in landfills was approximately \$219M. This loss included the value of the actual recyclable materials (\$194M), and the disposal costs associated with landfilling these materials (\$25M). Additionally, this report cited a 2010 study conducted by the Southeast Recycling Development Council (SERDC) that found that a 10% increase in Alabama’s recycling rate would result in \$3M in increased tax revenue to the state, \$66M in personal income, and 1,400 new jobs (13). Taken together, the economic benefits to citizens and the state as a whole provides a compelling rationale for enhancing Alabama’s recycling program.

Another important point made in the 2012 ADEM report (13) is the need for comprehensive and reliable waste characterization data. Such data are a necessary prerequisite to performing a comprehensive economic impact study of recycling in Alabama. Although the ADEM report provides a means for assessing the potential economic benefits of recycling, it is not based on data gathered in a systematic and comprehensive characterization study. It is unlikely that private interests will have the confidence needed to invest the necessary capital to enhance recycling capacity and efficiency in Alabama without a reliable and defensible economic impact study based on reliable waste characterization data. Thus, it follows that a real commitment by the state to reach the 25% recycling rate goal will require the performance of a comprehensive

waste characterization study and economic impact study. One potential avenue for funding this study is through an increase in disposal fees previously discussed, and provides additional justification for increasing these disposal fees.

Although the state, through ADEM, has initiated and successfully managed a recycling grants program to encourage local recycling efforts, a broader strategy designed to optimize the “recycling network” within the state, including the locations of potential recycling facilities (including material recovery facilities and/or waste transfer stations and source separation facilities, either separate or in combined) is needed. In one sense this would represent a fundamental change in ADEM’s current approach to enabling recycling in the state, from funding grants through proposals submitted to the ARF conceived at the local level, to strategically selecting and nurturing recycling projects designed to produce a state-level outcome. In practice, both approaches should be used; thus, well-conceived local-level proposals should continue to be encouraged and nurtured, within the context of an intentional, broader strategy for optimizing recycling at the state-level. The optimization process should be designed to minimize costs associated with acquisition of solid waste “feedstock,” separation and distribution of recovered/recyclable materials, and transport of recovered/recyclable materials to end users. For the most part, the data required to create an optimized recycling network exist in databases within state agencies and universities. The exception to this is the need for reliable waste characterization data noted earlier. Additionally, the technology for designing and maintaining a dynamic optimized recycling network exists (principally geographic information systems). Moreover, efficiently capturing the economic benefits revealed in the 2012 ADEM study in a timely way would be greatly increased with such a network.

An important component of an optimized recycling network is the creation of a materials exchange. An Alabama materials exchange would provide an organized marketplace for buying and selling reusable and recyclable commodities recovered from solid waste. Internet capabilities are well-suited for operating such an exchange, which could be operated by a private entity or university in coordination with ADEM and the broader recycling network. Ideally, an Alabama materials exchange would be created in tandem with an optimized

recycling network. It is important to note that both the optimized recycling network and materials exchange are dynamic in the sense that they should be designed to incorporate new data, network locations, and exchange buyers and sellers in response to changes in these components over time.

Enhance WTE Facility Development and other Energy Recovery Strategies

As noted earlier in this report, there is only one WTE facility in Alabama, located in Huntsville, Alabama. This facility converts heat energy from incineration of combustible solid waste to steam for use by the U.S. Army at the Redstone Arsenal (adjacent to the WTE facility). Although the facility has the capacity to convert a considerable amount of solid waste to energy (including electrical energy), this capacity is unused. Additionally, although a number of solid waste landfills produce a considerable amount of methane with the capacity to generate electricity, only two methane-powered electrical generation systems are currently operational in Alabama (Morgan County Regional Landfill in Decatur, Alabama, and the Scottsboro Landfill in Scottsboro, Alabama). The primary reason for this is the lack of a Renewable Portfolio Standard (RPS) in Alabama. An RPS places an obligation on electricity supply companies to source a specified proportion of their electricity sales from eligible renewable energy sources. Thus, an RPS requires the energy companies operating in the state to purchase electrical power generated from renewable sources (like WTE and methane gas). A guaranteed customer for the power generated from renewable sources is the primary incentive for private entities to invest in developing and managing renewable energy generation facilities. Currently in the U.S., 30 states have RPS's, and these are the states which dominate the WTE and other recoverable energy market (recall Table 1 and the discussion regarding WTE). Instituting an RPS in Alabama will require legislative action, which in turn will almost certainly require the partnership of the major electrical energy providers in the state. Although this is likely the most difficult potential change to the management of solid waste in Alabama, it is a necessary change if the goal of changing the solid waste disposal model to a solid waste sustainable management model is to be achieved.

Conclusions

This report provides a framework for changing Alabama's solid waste disposal model to a solid waste sustainable materials model. This framework seeks to maximize the beneficial reuse of the solid waste through waste reduction, reuse, recycling and composting, and energy recovery; while minimize to the degree possible the amount and composition of solid waste destined for terminal disposal in landfills. In general, this framework includes implementing actions through policy and/or law to de-incentivize landfilling and incentivize several alternatives to landfilling, including:

- Increase disposal fees at Alabama landfills, including C&D landfills
- Require C&D landfills establish and provide financial assurance for final closure
- Require out-of-state waste be comprised of a certain fraction of recoverable/recyclable materials comparable to Alabama's recycling target (currently 25%)
- Modify laws and policy pertaining to landfill permitting
- Strategic enhancement of the State of Alabama Recycling Program, using financial resources acquired through increased disposal fees
- Implement through policy and/or law changes which enhance WTE facility development and other energy recovery technologies

A number of potential enhancements and changes to policy and law are provided in this report addressing the framework items noted above. A companion appendix provides useful recent documents and other reference material supporting the observations presented here. The framework item perhaps most amenable to direct implementation involves the development of a state-level optimized recycling network, including the development of a materials exchange. Ideally, an Alabama materials exchange would be created in tandem with an optimized recycling network. These are necessary precursors to recycling becoming a net profit producer at all levels of the recycling chain.

References

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- (2) Alabama Solid Waste Management Plan, Phase I, ADEM, November, 1989.
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- (4) Alabama Executive Order Number 8, Office of the Governor, February, 2011, http://governor.alabama.gov/news/news_detail.aspx?ID=4704.
- (5) Alabama Legislature Act 2011-297, Bill H-406, May, 2011, http://www.acca-online.org/legis_news/2011_bills/act2011-297.pdf
- (6) Request for Proposals for Administrative & Technical Support in Evaluating Public Input on Potential Enhancements to the State Solid Waste Program, ADEM, November, 2011.
- (7) Alabama Legislature Act 2012-434, Bill H-556, May, 2012, http://www.acca-online.org/legis_news/2012_bills/act2012-434.pdf.
- (8) Administrative & Technical Support in Evaluating Public Input on Potential Enhancements to the State Solid Waste Program; Phase I. Potential Enhancements to the Alabama Solid Waste Landfill Permitting Process, Auburn University, May 30, 2013.
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- (11) New Mexico Landfill Rate Analysis and Opportunities for Increased Diversion with PAYT and Rate Incentives, New Mexico Recycling Coalition, February, 2012.
- (12) Diverting Waste from Landfill; Effectiveness of Waste-Management Policies in the European Union, European Environment Agency (EEA), Copenhagen, 2009.
- (13) Economic Impact of Recycling in Alabama and Opportunities for Growth, ADEM, June, 2012.

Attachment 1. Additional Information on Alternative Use of Solid Waste

1. Useful References Employed in Phase II Effort

Model Compost Rule Template, U.S. Composting Council, Version 1.0, February 11, 2013.

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Yanke, D. and A. Goldsmith, Report on the economic contribution of recycling in the H-GAC Region, SAIC, May 2, 2013.

Presentation of study by SAIC to assess economic impact of increased recycling in the Houston-Galveston, Texas region.

AMERIPEN Recovery Workgroup, AMERIPEN knowledge sharing session, Exploring the preliminary 100 cities findings, December 19, 2012.

AMERIPEN goal is to promote economic, environmental, and social sustainability of packaging through increased material recovery rates, better packaging, and public awareness. Describes preliminary results of study considering recycling in 100 largest cities in U.S. to develop best management practices for recycling.

Yarkosky, S., Employment trends in North Carolina's recycling industry-2010, North Carolina Department of Environment and Natural Resources, 2010.

Results of study considering employment in 630 private sector recycling businesses in North Carolina in 2010. Key findings: greater than 15,000 recycling jobs in North Carolina; private sector recycling jobs increased 4.8% since 2008; total annual payroll of \$395 M.

Final Report of the Dialog on Sustainable Financing of Recycling of Packaging at the Municipal Level, U.S. EPA, EPA-530-R-11-004, September 19, 2011.

Multi-stakeholder dialog convened by the EPA at request of several state agencies. Dialog focused on packaging and printed materials found in the municipal waste stream from households, businesses, and institutions. Included discussions on: optimization of existing components of the recycling system; identification of mechanisms to address shortfalls in current recycling system; maximizing source reduction, collection, reuse, and recycling.

Vergara, S. and G. Tchobanoglous, Municipal solid waste and the environment: A global perspective, *Annu. Rev. Environ. Resour.*, 37, 277-309, 2012.

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Tonini, D., V. Martinez-Sanchez, and T.F. Astrup, Material resources, energy, and nutrient recovery from waste: Are waste refineries the solution for the future? *Environ. Sci. Technol.*, 47, 8962-8969, 2013.

Study of performance of a Danish waste refinery with respect to environmental and economic cost-benefit.

Municipal Solid Waste Generation, Recycling, and Disposal in the United States, Tables and Figures for 2010, U. S. EPA, December, 2011.

Summary of 2010 waste generation and recycling data accumulated by the federal government. Provides insight into general waste characterization stream.

Haaren, N. T., Goldstein, N., The state of garbage in America, BioCycle, October, 2010. 2008 study uses available national data to examine municipal solid waste management in the United States. Determined 69% of waste landfilled, 24% recycled/composted, and 7% used in energy conversion.

Diverting Waste from Landfill, Effectiveness of Waste-Management Policies in the European Union, European Environment Agency, EEA Report No. 7/2009, 2009.

Report examining results of 1999 EU Landfill Directive shifting from landfilling to alternative waste management

Cutting the Waste Stream in Half, Community Record-Setters Show How, U.S. EPA, EPA-530-F-99-013, October, 1999.

EPA report highlighting record-setting waste reduction programs in 18 communities in U.S., using data from early to late 1990's.

Macauley, M. K., Waste not, want not; economic and legal challenges of regulation-induced changes in waste technology and management. Resources for the Future, RFF DP 09-11, 2009.

Review of regulation-induced changes in the U.S. waste management market, its subnational governmental interventions, and protection of interstate commerce when new technology restructures a local service into a national business.

Best Practices for Local Government Solid Waste Recycling, Diversion from Landfill and Waste Reduction, Mecklenburg County Land Use and Environmental Services Agency, Solid Waste Division, December, 2011.

Study conducted by Mecklenburg County, NC solid waste division considering local government recycling and waste diversion programs in 24 municipalities across the United States. Goal of study: identify specific program elements that offer economically acceptable diversion of solid waste from landfills.

New Mexico Landfill Rate Analysis and Opportunities for Increased Diversion with PAYT and Rate Incentives, New Mexico Recycling Coalition, February, 2012.

Study examining New Mexico landfill tipping rates and incentives to reduce landfilling (including Pay-as-you-throw).

Economic Impact of Recycling in Alabama and Opportunities for Growth, ADEM, June, 2012.

Study by ADEM to determine net value loss realized by the state with respect to the value of landfilled recyclable materials, and avoided disposal costs.

2. General Web-Based Links used in Phase II Study

STATE	Recycling	Waste to Energy	Waste Reduction	Grants
Florida	X	X	X	X
Georgia	X		X	X
Mississippi	X	X	X	X
Tennessee	X	X	X	X
South Carolina	X	X	X	X
North Carolina	X		X	X
Louisiana	X		X	
Arkansas	X	X	X	X
Texas	X	X	X	X

Recycling

[Southern WasteXchange](#)

[U.S. EPA International and National Materials Exchanges](#)

[Links to Every State Government/Environment Website](#)

[Earth911 – Recycling Search Engine](#)

[Waste and Recycling News](#)

[BIOMASS Magazine](#)

Rural Recycling/Waste Management

[An Examination of Rural Recycling Drop-Off Participation – Journal of Extension \(2001\)](#)

[Explaining Rural Household Participation in Recycling – Journal of Agricultural and Applied Economics \(1997\)](#)

[Household Willingness to Pay for Dropoff Recycling – Journal of Agricultural and Resource Economics \(1997\) – Have to pay to see entire study](#)

[Distributed Recycling of Post-Consumer Plastic Waste in Rural Areas – Materials Research Society \(2013\) – Have to pay to see entire study](#)

[Rural Recycling: Bridging the Gaps – Speech Transcript of Two Experts Talking About Resources for Implementing Recycling in Rural Communities and Give Examples of Programs that Work \(2010\) – EPA](#)

- [Rural Recycling: Bridging the Gaps Useful Handbook](#)

[Joining Forces on Solid Waste Management: Regionalization Is Working in Rural and Small Communities \(1994\) – EPA Handbook on Regionalization](#)

[The Economics of Recycling in the Southeast: Understanding the Whole Picture – Article Contains Information About Rural Recycling Programs \(2011\)](#)

[Rural School Case Studies in Waste Reduction, Reuse, Recycling, and Composting \(2010\)](#)

[How Waste & Recycling Programs are Adding Value to Rural Communities – Example: Logan County \(OH\) Solid Waste District \(2012\)](#)

[Van Wert County \(OH\) Solid Waste Management District’s Comprehensive Rural Recycling Program \(2013\)](#)

[Appalachia, OH Zero Waste Initiative – Rural Recycling Resources](#)

- [Appalachia, OH Zero Waste Initiative Information Handbook \(2013\)](#)
- [Case Studies of Select Rural Ohio Recycling Programs**](#)
- [Zero Waste Initiative Resources](#)

Waste to Energy

[Waste-to-Energy: A Review of the Status and Benefits in USA – Science Direct \(2009\)](#)

[University of Arkansas Guide to Gasification](#)

[Current List of Waste Power Plants – Global Energy Observatory](#)

[List of Power Plants Utilizing Biomass, Municipal Solid Waste, or Non-Fossil Waste](#)

[Covanta Company Complete List of Waste-to-Energy Facilities](#)

[Powermag](#)

[Waste Management World – Waste to Energy – Main Page](#)

- [Waste-to-Energy State of the Art Report – United States**](#)

[Wheelabrator Technologies Inc. – List of Waste to Energy Facilities](#)

[U.S. Waste-to-Energy Facilities by State](#)

[The 2010 Energy Recovery Council \(ERC\) Directory of Waste-to-Energy Plants](#)

[Guide to How Waste-to-Energy Turns Garbage into Green Power](#)

[Renewable Energy Map – United States](#)

[Rules, Regulations, and Policies on Net Metering for Every State \(Scroll towards bottom of page\)](#)

3. Selected State-Specific Web-Based Links used in Phase II Study

Arkansas

Education

[Arkansas DEQ Educational Programs](#)

Grants & Incentives

[Arkansas DEQ Recycling Grants Program \(and Database\)](#)

Legislation

[Arkansas DEQ Regulations Governing Solid Waste Management](#)

Recycling

[Arkansas DEQ Recycling Branch – Main Page](#)

[Arkansas DEQ Official 2012 Recycling Report](#)

Waste Reduction

[Boston Mountain Solid Waste District – Waste Reduction Page](#)

Waste to Energy

[Arkansas Waste-to-Energy Incinerator Site \(Negative Report\)](#)

[Arkansas Waste-to-Energy Warehouse Site \(Negative Report\)](#)

[City of Osceola Waste-to-Energy Disaster \(Negative Report\)](#)

[Waste to Energy Developments in Arkansas – Encyclopedia of Consumption and Waste](#)

[Waste to Energy Plant Built Adjacent to a Landfill](#)

Other

[Arkansas DEQ Solid Waste Management Division Main Page](#)

[Arkansas Recycling Coalition](#)

Connecticut

Education

[Connecticut DEP Grade School \(K-12\) Recycling Education Resources](#)

[Connecticut DEP College and University Recycling Education Resources](#)

Grants & Incentives

[Connecticut DEP Waste Management Grants and Financial Assistance](#)

Recycling

[Connecticut Resources Recovery Authority \(CRRRA\) – Main Page](#)

[CRRRA Recycling – Main Page](#)

- [Another Page](#)

[Connecticut DEP Recycling – Main Page](#)

[Connecticut DEP Reuse – Main Page](#)

Waste Reduction

[Connecticut DEP Waste Reduction – Main Page](#)

Waste Technologies

[CRRRA Quick Facts](#)

[Connecticut DEP Materials Management – Main Page](#)

Waste to Energy

[Case Study – Waste-to-Energy Facility – Bristol, Connecticut](#)

[Case Study – Waste-to-Energy Facility – Preston, Connecticut](#)

[Case Study – Waste-to-Energy Facility – Wallingford, Connecticut](#)

[Case Study – Waste-to-Energy Facility – Bridgeport, Connecticut](#)

[Case Study – Waste-to-Energy Facility – Hartford, Connecticut](#)

[Case Study – Waste-to-Energy Facility – Lisbon, Connecticut](#)

[CRRRA Trash-to-Energy Facilities – Main Page](#)

Florida

Education

[Florida EPA Recycling Education Resources for Kids and Teachers](#)

Grants & Incentives

[Florida EPA Recycling Recognition Program](#)

[Florida EPA Recycling Program Grants and Loans](#)

Legislation

[Florida EPA 75% State Recycling Goal – House Bill 7243](#)

[State Law Requiring Businesses to Report Annual Amount of Recoverable Materials](#)

Recycling

[Construction and Demolition Debris Recycling – Benefits and Methods](#)

[Best Practices Manual for Recycling Yard Trash in Florida](#)

Waste Reduction

[Florida EPA Waste Reduction Main Page](#)

Waste Technologies

[Florida EPA Technology Library for Waste Issues \(Petroleum Waste\)](#)

[Florida EPA Hazardous Waste Regulation Main Page](#)

Waste to Energy

[Florida EPA Waste to Energy Main Page](#)

[Case Study – Waste to Energy Facility – Doral, FL](#)

- [Another Description](#)

[Case Study – Waste to Energy Facility – Fort Meyers, FL](#)

[Case Study – Waste to Energy Facility – Spring Hill, FL](#)

[Case Study – Waste to Energy Facility – Okahumpka, FL](#)

[Case Study – Waste to Energy Facility – Tampa, FL](#)

[Case Study – Waste to Energy Facility – Tampa, FL \(#2\)](#)

[Case Study – Waste to Energy Facility – Pompano Beach, FL](#)

[Case Study – Waste to Energy Facility – Ft. Lauderdale, FL](#)

[Case Study – Waste to Energy Facility – St. Petersburg, FL](#)

[Case Study – Waste to Energy Facility – West Palm Beach, FL](#)

[Bay County Resource Recovery Center – Panama City, FL](#)

[Guide to Combustion - Florida](#)

[Florida EPA List of Waste to Energy Plants \(Scroll down to midpage\)](#)

[Florida City to Use Sludge-to-Energy Gasifier](#)

Other

[Florida EPA Main Page](#)

Georgia

Grants & Incentives

[Georgia DOCA Grants and Loans to Local Governments 2009 Solid Waste Management Update](#)

Recycling

[Georgia DOCA Solid Waste Management, Recycling and Radon Assistance Program – Main Page](#)

[Georgia DOCA Regional Recycling Hub Program – Award Winning Rural Georgia Recycling Initiative](#)

- [Regional Recycling Collection Hubs Map](#)
- [Case Study: Georgia’s Regional Recycling Transfer Hubs – Improving the Economies of Scale \(Scroll down to read\)](#)
- [EPA Awards Georgia DCA for Recycling Hub Program](#)
- [Transfer Hubs Additional Description](#)

[Georgia DCA Recycling – Main Page](#)

[Georgia DPD Recycling and Waste Reduction Links**](#)

[Georgia DOCA 2011 Solid Waste Management Annual Report](#)

[Georgia Rural Recycling Effort Earns EPA Accolade \(2009\)](#)

Waste Reduction

[Georgia EDP Waste Reduction Unit – Main Page](#)

Waste Technologies

[Georgia Recycled Organics Council \(Composting\)](#)

Waste to Energy

[Gwinnet County, GA - Waste to Energy Plant](#)

[Wood to Waste Plant in N. Georgia](#)

[Wood to Waste Plant – Completed in 2010 and Shut in January 2011 Without Ever Producing Ethanol](#)

- [Failed Georgia-Based Ethanol Plant Sold – Taxpayers Lose Millions](#)
- [Soperton Project Description](#)

[Walker County, GA. Eyes Trash-Energy Facility Plan](#)

[Valdosta, GA – Landfill Gas Facility](#)

[Waste-to-Energy Incinerator Dropped in Elbert County, GA](#)

[Savannah, GA – Waste to Energy Facility](#)

Other

[Georgia DCA Solid Waste Management – Main Page](#)

[Georgia Recycling Coalition](#)

Idaho

Recycling

[Idaho DEQ Recycling Program – Main Page](#)

[Idaho DEQ Profiles of Community Recycling Programs](#)

Waste Technologies

[Idaho DEQ Solid Waste Technologies](#)

Waste to Energy

[Idaho Waste-to-Energy Project Officially Terminated](#)

Other

[Idaho DEQ Waste Management and Remediation – Main Page](#)

Kentucky

Education

[Kentucky Environmental Education Links](#)

Grants & Incentives

[Kentucky DEP Grants Program – Main Page](#)

Recycling

[Kentucky DEP Recycling and Local Assistance Branch – Main Page](#)

Waste Reduction

[Tea Company in Louisville, Kentucky Facility Diverts 95% of its Waste from the Landfill](#)

Waste Technologies

[Kentucky DEP Annual Report \(2012\) on Waste Management](#)

Waste to Energy

[Kentucky Farmers Explore Waste-to-Energy Project](#)

[Louisville to Supply Wood Waste to Energy Company \(instead of landfills\)](#)

[Kentucky Waste-to-Ethanol Plant Closer to Construction](#)

Other

[Kentucky DEP Division of Waste Management – Main Page](#)

Louisiana

Recycling

[Louisiana DEQ Recycling Program – Main Page](#)

[Baton Rouge, LA – Recycling Office – Main Page](#)

[Baton Rouge, LA – Recycling Cart Program \(Single Stream Recycling for Entire City\)](#)

Waste Reduction

[Louisiana DEQ Environmental Leadership Program \(ELP\)](#)

Waste Technologies

[Louisiana Waste Management Article**](#)

Waste to Energy

[Louisiana Gasification Facility](#)

[Biomass Energy Resources in Louisiana](#)

Other

[Keep Louisiana Beautiful](#)

Mississippi

Education

[Mississippi MDEQ Educational Links for Kids](#)

[Mississippi MDEQ Educational Resources](#)

[Mississippi MDEQ Recycling & Solid Waste Questions & Answers](#)

Grants & Incentives

[Company Raises \\$60 Million for Pontotoc Plant](#)

[Mississippi Recycling and Waste Management Grants Information](#)

Legislation

[Mississippi Waste Tire Regulations](#)

Recycling

[Recycling and Solid Waste Reduction Program \(MDEQ\) Main Page](#)

[Community Recycling Program Guide \(MDEQ\)](#)

[Irrigation Tubing Recycling Program](#)

[Pesticide Container Recycling Program](#)

Waste Reduction

[Mississippi MDEQ Waste Minimization Plan for Small Quantity Waste Generators](#)

Waste Technologies

[Mississippi MDEQ Composting Program](#)

[Mississippi MDEQ Waste Tire Management Program](#)

Waste to Energy/Beneficial Use

[Mississippi MDEQ Beneficial Use Program](#)

[Mississippi to Open a Waste-to-Fuel Bio Refinery](#)

[Mississippi Bio Refinery Specifications](#)

[Mississippi Regulations for the Beneficial Use of Nonhazardous Solid Waste](#)

[Mississippi Gasification Project – Main Page](#)

[Proposed \\$2 Billion Mississippi Gasification Plant](#)

Other

[Keep Mississippi Beautiful Main Page](#)

[Mississippi Recycling Coalition](#)

Contact Jimmy - 662-325-3155 for information on Extension quality water programs (Case Studies): <http://msucare.com/environmental/drinkingwater/extension.html>

Missouri

Education

[Missouri DNR Education Program – Main Page](#)

Legislation

[Missouri Construction & Demolition Waste Guidance](#)

Recycling

[Missouri DNR Recycling Program – Main Page](#)

[Missouri DNR Annual Recycling Reports & Other Links](#)

[Missouri DNR Recycling Publications \(a lot of links\)***](#)

Waste to Energy

[Missouri Center for Waste-to-Energy \(from Landfill\) – State Fair Community College](#)

- [Grants for the Missouri Center for Waste to Energy](#)

Other

[Missouri DNR Solid Waste Management Program](#)

Montana

Grants & Incentives

[Montana DEQ Biomass Energy Grants](#)

[Montana DEQ Recycling Tax Incentives](#)

Legislation

[Montana DEQ Integrated Waste Management Act for Landfill/Incinerator Waste Reduction](#)

Recycling

[Montana DEQ Recycling and Waste Reduction – Main Page](#)

[Montana DEQ 2011 Summary of Recycling](#)

[Montana DEQ: The Economic and Ecological Impacts of Recycling in Montana](#)

[Montana DEQ Rural Recycling Program: Hub and Spoke \(2010\)**](#)

- [Hub and Spoke Recycling Grant Application](#)
- [Residents of Valier, MT Awarded Hub and Spoke Grant](#)

[Montana DEQ Rural Recycling Workshop – Main Page**](#)

Waste Technologies

[Montana DEQ Hazardous Waste Program – Main Page](#)

Waste to Energy

[Montana DEQ Bioenergy Program Reports and Publications](#)

[Montana DEQ Biomass Energy Program Description](#)

[Montana Bioenergy Guidebook](#)

Nevada

Education

[Nevada DEP Classroom Educational Lessons and Resources](#)

Grants & Incentives

[Nevada DEP Unable to Fund Grants Until Further Notice](#)

Recycling

[Nevada DEP 2013 Recycling and Waste Reduction Annual Report](#)

[Nevada DEP Recycling Program \(Nevada Recycles\) – Main Page](#)

[Nevada DEP Recycling Rates \(2011\)](#)

[Nevada DEP Recycling at a Glance \(2011\)](#)

Waste Technologies

[Nevada DEP List of Solid Waste Management Facilities](#)

Waste to Energy

[Goodsprings, Nevada Waste Heat Recovery Plant](#)

[Reno, Nevada Waste-to-Ethanol Plant](#)

Other

[Nevada DEP Bureau of Waste Management – Main Page](#)

[Nevada Company Demonstrates Waste-to-Energy Machine](#)

New York

Education

[New York DEC Education Programs and Resources](#)

Grants & Incentives

[New York DEC State Assistance Programs for Waste Reduction and Recycling](#)

Legislation

[New York DEC Regulations for Waste-to-Energy Facilities](#)

[NYC Solid Waste Reduction Plan](#)

Recycling

[New York DEC Recycling Program – Main Page](#)

[NYC Recycles](#)

[NYC Recycling Statistics](#)

Waste Reduction

[New York DEC Waste Reduction Program – Main Page](#)

[More than 100 NYC Restaurants to Participate in Waste Reduction Challenge](#)

Waste to Energy

[New York DEC Municipal Waste Combustion Facilities](#)

[New York DEC List of Active Waste Combustion Facilities](#)

[New York DEC Map of Active Municipal Waste Combustion Facilities](#)

[New York DEC Capacity Data for Landfills and Waste-to-Energy Facilities \(2010\)](#)

[New York DEC 2010 Municipal Waste Combustion Summary Report](#)

[Case Study – Hempstead Resource Recovery Facility, Hempstead, N.Y.](#)

[Case Study – Babylon Resource Recovery Facility, West Babylon, N.Y.](#)

[Case Study – MacArthur Waste-to-Energy Facility, Ronkonkoma, N.Y.](#)

[Case Study – Huntington Resource Recovery Facility, East Northport, N.Y.](#)

[Case Study – Dutchess County Energy-from-Waste Facility, Poughkeepsie, N.Y.](#)

[Case Study – Wheelabrator Westchester Waste-to-Energy Facility, Peekskill, N.Y.](#)

[Case Study – Wheelabrator Hudson Falls Waste-to-Energy Facility, Washington County, N.Y.](#)

[Case Study – Onondaga County Resource Recovery Facility, Jamesville, N.Y.](#)

[Case Study – Oswego County Energy Recovery Facility, Oswego County, N.Y. \(Read 1st page only\)](#)

[Case Study – Covanta Niagara Energy-from-Waste Facility, Niagara Falls, N.Y.](#)

North Carolina

Grants & Incentives

[NCDENR Tax Exemption Allowances for Recycling Equipment](#)

Recycling

[NCDENR Recycling – Main Page](#)

[N.C. Recycling Facts](#)

[Raleigh, N.C. Recycling Program w/ Links](#)

[Reducing Waste in Orange County, N.C. – What Works \(and Doesn't Work\)](#)

Waste to Energy

[Waste to Energy in North Carolina: An Overview](#)

[Case Study – Waste-to-Energy Facility – Wilmington, NC](#)

- [Preserving and Utilizing WASTE C the Right Move for New Hanover – Opinion Article](#)

- [Parts of WASTEC Facility Torn Down; Remaining Building Turned into a Household Hazardous Waste-Collection Facility – May 2013](#)

Other

[N.C. Division of Waste Management – Main Page](#)

[N.C. Solid Waste Management Plan: 2003 – 2013](#)

N.C. buries 84% of its trash according to [this article](#)

Oregon

Education

[Oregon DEQ Education Materials](#)

Grants & Incentives

[Oregon DEQ Solid Waste Grants – Main Page](#)

Legislation

[Oregon DEQ Recycling Laws: A History](#)

Waste Reduction

[Oregon DEQ Waste Prevention and Reuse- Main Page](#)

Waste to Energy

[Oregon DEQ Waste Recovery and Composting – Main Page](#)

[Oregon DEQ Beneficial Use – Main Page](#)

[Case Study – Marion County Energy-from-Waste Facility, Brooks, Oregon](#)

Pennsylvania

Grants & Incentives

[Pennsylvania DEP Recycling Grants and Financial Aid](#)

Recycling

[Pennsylvania DEP Recycling Program – Main Page](#)

[Pennsylvania DEP Recycling – Another Main Page](#)

[Pennsylvania DEP 2011 Annual Recycling Report](#)

Waste to Energy

[Pennsylvania DEP List of Waste-to-Energy Facilities \(bottom of page\)](#)

[Case Study – Delaware Valley Resource Recovery Facility, Chester, PA](#)

[Case Study – Covanta Plymouth Renewable Energy Facility, Conshohocken, PA](#)

[Case Study – Wheelabrator Falls Inc. Waste-to-Energy Facility, Falls Township, PA](#)

[Case Study – Harrisburg Resource Recovery Facility, Harrisburg, PA](#)

- [The Harrisburg Resource Recovery Facility “turnaround”](#)

[Case Study – Lancaster County Waste-to-Energy Facility, Bainbridge, PA](#)

[Case Study – York County Resource Recovery Center, York, PA](#)

South Carolina

Education

[S.C. DHEC Waste Reduction at Home Educational Flyer](#)

Grants & Incentives

[S.C. DHEC Recycling Grants Program](#)

Recycling

[S.C. DHEC Office of Solid Waste Reduction & Recycling – Main Page](#)

[EPA Recognizes S.C. Program for Leadership in Recycling](#)

[S.C. DHEC Solid Waste Management Annual Report \(2012\) – Includes Recycling Statistics](#)

[List of S.C. Recycling-Related Links](#)

[S.C. DHEC Recycling & Buying Recycled – Annual Report \(2012\)](#)

Waste Reduction

[Charleston, S.C. Zero Waste Proposal](#)

Waste to Energy

[S.C. DHEC Approves Permit for Waste-to-Energy Plant](#)

[Clemson SCIES Receives Grant to Develop Farm Waste-to-Energy Facility](#)

[Making an Agricultural Waste-to-Energy Facility Work on a South Carolina Swine Farm](#)

[Georgia, S.C. Wood-to-Waste Plant](#)

Other

[S.C. DHEC Solid Waste – Main Page](#)

Tennessee

Education

[Tennessee Waste-to-Energy \(Incineration\) Education Project](#)

Grants & Incentives

[TDEC Solid Waste Assistance Grants Information](#)

[TDEC Municipal Cost Benefit Analysis – Includes Information on Grants](#)

Recycling

[TDEC Recycling Information](#)

[TDEC 2011 Municipal Recycling Statistics](#)

[TDEC 2010 County Recycling Rankings](#)

[My EcoVille – Tennessee Recycling Information](#)

[Tennessee Recycling Marketing Cooperative – Created for Tennessee Rural Communities](#)

Waste Reduction

[TDEC Waste Reduction Link Archive \(Bottom of Page\)**](#)

[TDEC Waste Reduction Goals - 2010](#)

[TDEC Waste Reduction Taskforce Recommendations - 2008](#)

Waste Technologies

[Tennessee Composting/Wood Waste Diversion](#)

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