

City of San José
Environmental Services Department

INTEGRATED WASTE MANAGEMENT
ZERO WASTE STRATEGIC PLAN
ORGANICS-TO-ENERGY WORKPLAN



August 2009

Organics-to-Energy Workplan



San José Green Vision

In October 2007, San José unveiled its Green Vision for the future. The Green Vision provides a comprehensive approach to sustainability through promoting innovation and new technology. In adopting the Green Vision, the City established 10 goals to be achieved within 15 years; Goal Five is to ***Divert 100 percent of the waste from our landfill and convert waste to energy.*** The Zero Waste Strategic Plan (ZWSP) describes current programs and actions needed to reach the City's zero waste, Green Vision, and related economic development goals. The ZWSP Workplan was adopted by Council on December 16, 2008. This Organics-to-Energy document is an addendum to the ZWSP and outlines specific strategies and initiatives to convert organic waste to energy.

San José remains committed to diversion of waste from landfill through highest and best use principles, including reuse and recycling. The City has already implemented several aggressive recycling programs over the past 20 years and diverts a significant amount of easier-to-recycle material like paper, metals, beverage containers, and yard trimmings. The remaining disposed waste consists of material that is harder to collect, process, and market. This creates the need to reduce the generation of waste in the first place, involving efforts such as extended producer responsibility, social marketing for behavior change, fees, and product bans. It also necessitates evaluating innovative technical solutions for processing waste that is not readily recyclable.

One such solution is the conversion of organic waste to energy. This approach reduces the volume of hard-to-process materials such as food waste and requires the preparing of organic waste feedstock for further processing and captures energy in the process. According to staff analysis, insufficient regional processing capacity exists to manage all of the organics required to meet the City's Zero Waste goals. Infrastructure developed to convert organics to energy could not only help San José meet its Zero Waste goals, but would also become a resource serving other communities in the South Bay region. Such a regional facility could be developed through sharing the costs of construction and operation with other jurisdictions. This workplan provides steps being taken to incorporate energy conversion into the ZWSP and the City's Strategic

Energy Plan initiatives. The City plans to achieve the following goals through conversion of organic waste to energy:

- Divert hard-to-recycle waste from landfills
- Generate renewable energy
- Reduce carbon impacts of organic wastes
- Provide regional solutions for organic waste management
- Leverage private sector investment for technology development
- Maintain leadership in technology innovation

To determine the feasibility of conversion technologies for San José, the City has collected and analyzed data over the past two years. The following documents are available at www.sjrecycles.org/zerowaste-citydocs.asp:

- The [Biomass-to-Energy Technology Evaluation](#) was conducted in 2007 for the San José /Santa Clara Water Pollution Control Plant. This evaluation surveyed available biomass streams in San José including biosolids, wood, and yard waste. It also included a brief analysis of energy technologies that could handle this local material.
- In December 2007, the City of San José Environmental Services Department (ESD) released a Request for Information (RFI) regarding Alternative Technology Energy Facilities to begin determining feasibility and evaluating options for generating energy from selected waste materials. The [RFI](#) and [Review of City RFI Responses](#) outline options.
- The [ZWSP](#) approved by Council in December 2008 includes Appendix E: Conversion Technologies which reviews conversion technologies the City could consider to achieve zero waste. The report recommends appropriate technologies for current implementation as well as next steps for further evaluation of emerging technologies.

Based on criteria outlined in the ZWSP, including scale of operation, regulatory parameters, and potential environmental issues, analysis concludes that anaerobic digestion (AD) and wood waste gasification are the only viable commercial-scale conversion technologies appropriate for San José at this time. Other technologies included in the analysis would need to be demonstrated through incubation-scale tests. Traditional waste-to-energy facilities, whether using moving grates or fluidized bed combustion, are not considered viable at a large scale in San José at this time due to the difficulty of meeting local air pollution control requirements and the challenge of achieving stakeholder approval.

Organic Conversion Strategies

While there are many innovative solutions to consider regarding organic waste management, it is critical to identify the appropriate options based on available waste streams, infrastructure, and community concerns. City staff has implemented a planning process that leverages collaboration with industry experts and members of the public to identify a San José-specific action plan for evaluating and implementing new conversion technologies. Through this process, staff has identified key stakeholders who will contribute to a robust evaluation process and help design practicable solutions for developing the capacity for energy conversion in San José.

Staff identified the following strategies for phased implementation of energy technologies:

1. Add an option to convert organic waste to energy as part of the upcoming Commercial Solid Waste Redesign Request for Proposal (RFP).
2. Develop a conversion technology research and incubation center at or adjacent to the San José/Santa Clara Water Pollution Control Plant in San José.
3. Analyze the benefits and potential risks of a gasification plant in San José to convert wood waste to energy.

Staff is considering the following partnership options to facilitate implementation of the strategies above:

1. Proven commercial-scale conversion technologies and incubator or demonstration-scale projects for emerging technologies
2. Siting support for technology companies wishing to locate headquarters in San José
3. Directing a portion of the City's waste stream to the facility
4. Alternative collection methods that segregate a portion of the waste stream in a manner consistent with the requirements of the technology (such as dedicated routes for food scraps from restaurants)
5. Leasing land for the facility
6. Committing digester capacity at the City's water pollution control plant
7. Revenue sharing
8. Grant proposal support and collaboration

Strategy 1: Energy Conversion Option in the Commercial Solid Waste Redesign RFP

Overview

Including an option for energy conversion as part of the Commercial Solid Waste Redesign RFP could facilitate implementing a renewable energy system that utilizes the waste streams collected through the new exclusive solid waste and recycling collection contracts currently under development for the business sector in San José. Giving proposers the opportunity to present processing options linked to collection provides the private sector an opportunity to identify and invest in the best technologies available for San José-specific logistics and waste feedstocks. This alternative proposal option would facilitate energy technology development that would be integrated into city-wide commercial waste operations if appropriate and cost effective.

Opportunities

- The redesign of the commercial solid waste system presents a unique opportunity for restructuring and implementing innovative methods of collection and processing.
- The term of the new contracts would be at least ten years, creating an infrequent window of opportunity at this time to include energy conversion as part of the system design.
- Federal Stimulus money from the American Recovery and Reinvestment Act of 2009 (ARRA) may be available to provide leveraged support for capital investment in infrastructure, lowering contract costs to the City and reducing risks to private investors and the public.
- Proposers will analyze technology readiness and appropriateness, sharing the responsibility for technology selection.
- The contract can contain an option of committing a certain amount of the waste collected by haulers to use for energy technology demonstration.

Considerations

- Facility development requires significant capital investment and the proposer may require guaranteed quantity of feedstock as a condition for moving forward with developing a facility. The proposals would outline required tons, costs per ton, and impact on diversion. These parameters will determine how many tons of City waste will be allocated for processing to generate energy.
- The Water Pollution Control Plant can upgrade digesters and these could be used for technology implementation as part of the Commercial Solid Waste Redesign RFP. Using Plant facilities necessitates collaboration with the Plant Master Plan on key issues such as land use, transportation, and community outreach.

Current Activity

- 1) Releasing the Commercial Solid Waste Redesign RFP in early Fall 2009, which includes Organics to Energy option for proposers.
- 2) Working with HDR and other subject matter experts to create specialized evaluation criteria.
- 3) Collaborating with the Water Pollution Control Plant Master Plan Team, and Treatment Plant Advisory Committee (TPAC) to evaluate opportunities for potential uses of Water Pollution Control Plant lands for this effort.
- 4) Identifying financing opportunities such as Federal Stimulus Package funding, carbon credits, and land lease to mitigate one-time and ongoing facility costs.

Next Steps

- 1) Establish industry expert panel to review technology proposal submissions.
- 2) Work with awarded proposers on permitting and stakeholder process for technology implementation.
- 3) Identify appropriate technologies not included in responses to Commercial Solid Waste Redesign RFP that could be implemented in a research and incubation center.

Strategy 2: Develop a Conversion Technology Research and Incubation Center

Overview

Technology development and implementation requires testing, demonstration, and expert evaluation. The City and Water Pollution Control Plant Tributary Agencies have the opportunity to use a portion of Plant land for the development of a research and incubation center for emerging technologies. This center could function to identify appropriate technologies for San José and the region through demonstration projects and data collection. The City could collaborate with research and educational institutions in the area such as UC Davis, Stanford, San José State University, and UC Santa Cruz to leverage research experience and expertise in technology analysis, as well as the potential for available research grants.

A demonstration site would focus on incubation-scale projects for technologies not yet developed to commercial scale or technologies that require additional evaluation from stakeholders including the local community and regulatory agencies such as the Bay Area Air Quality Management District (BAAQMD). As a result, the center could become a destination

for other municipalities, institutions, and private companies who want to evaluate new technologies for their own communities. As technologies are tested for implementation, the opportunities for job creation, expanded recycling activities, and infrastructure development provide economic benefits for San José.

Opportunities

- San José would further establish itself as a world leader in driving green technology innovation.
- Demonstration allows side-by-side comparison of technologies to determine the best options for San José.
- Small-scale operations mitigate risks to the City inherent with large-scale infrastructure development.
- Key stakeholders such as BAAQMD could help determine the parameters of projects allowable for consideration.
- Collaboration with research institutions already involved with technology development such as UC Davis, Stanford, San José State University, and UC Santa Cruz would leverage experience and technological expertise from the academic community.
- City may be able to use its Demonstration Partnership Policy as a model for these agreements.

Considerations

- A portion of the San José/Santa Clara Water Pollution Control Plant lands could be offered in order to attract private investment. In conjunction with the Plant Master Plan, the land lease option would explore opportunities to integrate Plant goals such as the use of recycled water, waste heat, and biosolids.
- A small throughput of waste feedstock would need to be dedicated and managed for research projects.

Current Public-Private Partnership: Zero Waste Energy Development Company, Inc.

In June 2009, Council authorized the City Manager to negotiate and execute a Memorandum of Understanding to lease 40-acres of Plant land to the Zero Waste Energy Development Company, Inc., so the company can develop a dry anaerobic digestion facility. The proposed facility would become the first in the United States to use dry anaerobic digestion technology, which has been commercially demonstrated in Europe, to process the relatively dry organic portion of municipal solid waste (primarily food waste and yard waste) to produce two products: a biogas containing methane for energy use, and a compost for sale to the landscape industry. The facility is planned to be developed in three stages, with each stage increasing capacity by 50,000 tons per year, for a total of 150,000 tons per year when completed. Energy from the facility could supply power to the San José/Santa Clara Water Pollution Control Plant or be sold back to the regional utility power grid.

This project is an example of the strategic public-private partnerships that San José wants to facilitate to help drive the Green Vision and future development plans for the Water Pollution Control Plant bufferlands as part of the Plant's Master Planning efforts.

Other Current Activity

- 1) Continuing dialogue with State energy specialists, industry consultants and energy researchers help the City to identify opportunities and develop plan proposals.
- 2) Industry experts reviewing the technology analysis for San José to validate recommendations about appropriate technology.
- 3) Reviewing model innovation centers that can be replicated.
- 4) Collaborating with other leading cities such as Los Angeles to learn from their technology implementation.
- 5) Researching and preparing applications for federal stimulus grants and other funding opportunities.

Next Steps

- 1) Assist with development of an MOU and lease development for Council and Tributary agency consideration for the Zero Waste Energy Development Company biogas facility, including any support, as appropriate with City departments, regulatory agencies, TPAC, and Zero Waste Energy Development Company, Inc. on permitting and other regulatory issues.
- 2) Meet with research institution stakeholders to identify opportunities for academic collaboration.
- 3) Further evaluate potential technologies to be tested or demonstrated.
- 4) Collaborate with TPAC to confirm potential uses of Water Pollution Control Plant lands and determine benefits to tributary agencies.
- 5) Identify auxiliary benefits of technology development such as use of recycled water, waste heat, gas lines, generators etc.
- 6) Identify and evaluate potential locations for incubation center facilities in conjunction with Plant Master Planning process.
- 7) Understand permitting processes which could be required of various technologies.
- 8) Identify and track further funding opportunities and financing mechanisms.
- 9) Develop and release a Request for Proposals for appropriate technologies

Strategy 3: Pursuing a Wood Waste Gasification Facility

Overview

According to analysis completed by the City, gasification is one of the technologies that could be considered for commercial-scale implementation. However, there are many considerations and potential issues for siting such a facility. Because of emissions and processing by-products, building a gasification plant in San José will require buy-in from key stakeholders such as BAAQMD and the community. Input from stakeholders would help avoid political or legal action that can stop facility siting. Benefits to San José would include the production of renewable energy, reduction of the long haul of woody waste to co-generation sites such as China Camp, and development of a regional facility that could potentially receive woody waste and biosolids.

Opportunities

- Siting a plant within the City limits would reduce the climate impact of San José's current wood-to-energy practices.
- A regional gasification facility could generate revenue in the form of lease fees.
- Potential solution for biosolids co-processing in coordination with the Plant Master Plan, and the potential to align with the Regional Biosolids Initiative if it is in the City's best interest.
- Upcoming redesign of the City's Construction and Demolition Diversion Deposit (CDDD) program creates an opportunity to capture additional wood waste.
- Gasification technology could be tested in San José's research and incubation center to determine impacts and gain stakeholder support.

Considerations

- It would be difficult to site and permit a facility given the stringent air regulations and potential for negative community perception of the facility.
- There is a history in California of project cancellation due to public concerns.
- Most of the wood available for gasification is privately hauled from construction projects and thus not currently controlled by city waste hauling contracts.
- Much of San José wood waste may already be diverted – either turned into mulch or sent to the central valley to a biomass power plant. This solution could have a minimal impact on diversion from landfill.
- Water Pollution Control Plant lands could be offered to attract private investment.
- Other energy alternatives exist for this feedstock such as wood waste to ethanol or methanol, biogas to fuel, etc., however, no effort has been proven beyond a pilot scale.

Next Steps

- 1) Meet with BAAQMD to outline acceptable project parameters.
- 2) Evaluate incentives for Construction and Demolition (C&D) debris haulers to use a gasification facility for disposal including terms in C&D Franchise Agreements as part of current C&D redesign effort or through modification of CDDD Program requirements.
- 3) Consider gasification technology on a small scale as part of the research and incubation center to mitigate potential stakeholder opposition to a full-scale commercial facility.

Project Analysis for Risk Mitigation

The ESD plans to undertake all of the following critical steps for each of the conversion technologies under consideration:

- Feedstock Analysis
- Technology Evaluation
- Planning Coordination
- Regulatory Review
- Expert Review and Case Study Comparison
- Funding Identification

Feedstock Analysis

Conversion technologies require facility-specific or technology-specific feedstock. Some of these technologies require significant pre-processing of the feedstock to convert it to a usable form. The completion of a waste characterization for San José was a critical first step in analyzing potential feedstock for conversion technologies. Pilot programs are being developed to further characterize feedstocks, and efforts are underway to coordinate with the City's residential and commercial solid waste collection programs to identify available feedstocks.

Technology Evaluation

Comparisons of technologies for adoption in San José were reviewed as part of the ZWSP process. As part plan development, staff and the City's consultant team determined that AD and gasification are the only appropriate large-scale technologies for San José at this time. However,

ongoing research is being conducted to identify emerging technologies that might be appropriate for incubation-scale projects. This research includes analysis of pilot projects being conducted by other municipalities.

Planning Coordination

In order to ensure resources are leveraged throughout the City and region, the ESD Organics Management Team in the Integrated Waste Management Division is extensively coordinating energy planning with workgroups, including the Green Vision Steering Committee, the City's Envision San José 2040 Task Force, the city-wide Energy Task Force, the Regional Biomass-to-Energy Task Force, the City's Climate Action Team, the Treatment Plant Master Plan Steering Committee, and the ESD Commercial and Residential Solid Waste teams.

Regulatory Review

The Organics Management Team is working with legislative consultants who will help city staff analyze regulatory and community barriers to siting conversion technology facilities. The team is also working with BAAQMD to identify regulatory parameters that will help guide project design and to ascertain all issues that would need to be addressed as part of the California Environmental Quality Act (CEQA) review process.

Expert Review and Evaluation of Statewide Efforts

The City has technical experts available to minimize risk to the City by assuring the planning, technical review, and project decision processes are reviewed by expert third parties. These experts, in conjunction with the City, are carefully monitoring all related waste conversion efforts statewide. They are comparing case studies on recent attempts to site conversion facilities by Sacramento, Santa Cruz, Los Angeles, Salinas, and San Francisco, analyzing these examples, and taking lessons learned to develop an approach customized for San José. These efforts can help San José avoid some critical issues faced in recent processes such as receiving no stakeholder input, mismatching technology and collection infrastructure, not pursuing a proven commercial-level technology, and releasing RFPs with ambiguous criteria resulting in proposals difficult to evaluate.

Funding Identification

The ESD Organics Management Team has begun evaluating funding opportunities for implementing energy conversion technologies provided by the American Recovery and Reinvestment Act of 2009. In addition to identifying potential funding from the federal government, the team tracks State grant opportunities on a daily basis. Further, steps are being taken to leverage opportunities presented by the emerging carbon markets. The team participates on the Climate Registry Panel as well as the State Waste Board Organics Roadmap Task Force and Infrastructure Advisory Committee to ensure that the City of San José remains current on carbon market development issues. Lastly, the team is researching incentives for private investment in order to take advantage of the City's ability to leverage funding for which private sector entities are ineligible to apply.