

**California Integrated Waste Management Board**  
**Session Summary:**  
**Emerging Technology Forum**  
**April 17-18, 2006**  
**Local Government CT Efforts**

The purpose of this session was to hear local government representative perspectives and experiences regarding conversion technologies from representatives of jurisdictions that have researched these technologies.

**Summary of presentation by Coby Skye provided by presenter**

Coby Skye is an Associate Civil Engineer working for the County of Los Angeles Department of Public Works: Environmental Programs Division.

*"The Future of Conversion Technologies in Southern California"*

The County of Los Angeles is a leader in evaluating and promoting alternatives to traditional landfill disposal, due to the constraints facing Los Angeles County and many dense urban regions. With dwindling local landfill capacity and lack of availability of new sites for municipal solid waste landfills and other solid waste management facilities, we must recover more of our waste, in addition there are significant environmental benefits from viewing waste as a resource rather than a liability.

Conversion technologies - a wide array of state of the art technologies capable of converting post-recycled residual solid waste into useful products, such as green fuels and renewable energy, in an environmentally beneficial way - represent a promising alternative to landfill disposal.

This presentation provides a brief introduction to conversion technologies and their significance. It then discusses the barriers to the development of these new technologies in California, and why these should be changed. Finally, the presentation provides an update on the Los Angeles County Integrated Waste Management Task Force's efforts to develop a demonstration conversion technology facility, and touches on other conversion technology efforts in Southern California.

**Summary of presentation by Mark Schleich Prepared by CIWMB staff**

Mark Schleich is the Deputy Director of Resource Recovery and Waste Management Division within the Santa Barbara County Department of Public Works

Mr Schleich provided a very brief presentation to allow more time for questions and answers.

He said that the Solid Waste Task Force in Santa Barbara County, consisting of elected officials, is responsible for developing solid waste management strategies for the County. A subgroup of this Task Force is responsible for evaluating conversion technologies and then making recommendations regarding how these technologies could play a role in Santa Barbara County's materials management future. Mr. Schleich discussed the guidelines used to evaluate these technologies, the types of technologies evaluated, several varying waste management scenarios, and the final recommendations made by the Task Force.

## **Summary of presentation by Ruth MacDougall provided by presenter**

Ruth MacDougall is a project manager for the Sacramento Municipal Utilities District (SMUD), and responsible for SMUD's Biomass Program.

### **Abstract**

Sacramento Municipal Utility District (SMUD) is the 6th largest public municipal utility in the U.S. in terms of customer base, serving primarily Sacramento County. SMUD has long been committed to environmental stewardship and has been a leader in renewable energy, establishing over 10 MW of solar photovoltaics, years before other utilities. We look to continue our leadership in developing SMUD's Biomass Program.

The Biomass Program goals are to "convert local wastes and residues to renewable energy while improving the environment and providing local economic benefits." These goals are supported by decisions of an elected Board of Directors. Among these is SMUD's Renewable Portfolio Standard (RPS), which set a goal of 23% renewable energy by 2011, which includes Greenergy, our voluntary, customer funded renewable energy program.. SMUD has achieved its 2006 goal of 12%, with about 25% coming from Biomass. Local biomass projects can reduce air emissions and reduce risk of groundwater contamination. Biomass conversion technologies are typically mature technologies, benefit from a sustainable fuel supply, and usually serve other waste disposal purposes.

The first activity in our Biomass Program was to take an inventory of local resources and evaluate their potential as renewable energy fuel. We determined that the major biomass resource in the county is municipal solid waste in its various forms: green waste, food waste, landfill gas, wastewater treatment gas, and the organic fraction of municipal solid wastes (OFMSW).

Agricultural wastes are also available in 43 Sacramento County dairies. SMUD offered incentives of 13% of project costs to local dairies for installation of manure digesters. Three such projects were successful in obtaining federal funding. These three digester projects will reduce 910 tons/year of methane emissions, equivalent to 20,000 tons of CO<sub>2</sub>. To support development of local biomass projects several internal policies were developed. In 2005, SMUD established a Biomass Net Metering Rate and Biomass Interconnection Policy for projects owned by customers to serve their own electricity needs. In addition, SMUD is performing several research and development projects to resolve technological barriers. These include: demonstrating emission controls on small dairy biogas systems, side by side testing of low NO<sub>x</sub> engines, a community digester feasibility study, testing results of co-digestion of commercial food waste, and demonstration of other advanced technologies.

In research sponsored by California Energy Commission, Public Interest Energy Research (PIER) Program, we will assess the feasibility of converting municipal solid wastes to energy to reduce the impact of 1.5 million tons/year of waste generated in Sacramento, 46% of which is organic fraction, paper & cardboard. In this project, we will ascertain what are the economic 'tipping points' that would make conversion technologies feasible, what the various environmental benefits are, and what the energy balance is, i.e., if the system is a net energy producer or an energy user.

Many parameters will be compared, including an analysis of emissions and energy balance resulting from transportation, preprocessing, the conversion technology

itself, subsequent disposal of residues, wastewater cleanup, and parasitic losses. The evaluation will include stakeholder interests of the environmental justice community, regulators, citizens groups, the utility, the waste management agencies, the waste management business community, and the financial community.

Engagement of waste management company is most critical part of project. Sacramento is fortunate, in that the City's waste management contractor, BLT Enterprises, is actively investigating conversion technologies for a demonstration plant in Sacramento. BLT is committed to finding superior resource management options. The City of Sacramento is also very forward thinking. It is currently studying the creation of its Sustainability Office and has adopted the UN Urban Environmental Accords, which includes waste reduction and renewable energy goals. It is obvious that by locating conversion technologies at Material Recycling Facilities or Transfer Stations we can reduce trucking pollution, reduce traffic congestion, increase recycling rates, and produce renewable energy.

Another opportunity in Sacramento is the County's effort to site a 100,000 ton/year composting facility to process a portion of the County's green waste. In-vessel anaerobic digestion is a viable option for composting as it produces high quality compost and generates renewable energy, supplanting fossil fuels. Anaerobic digestion is a mature technology, which has been implemented in over 85 full-scale facilities in Europe. This type of facility is easier to site because they have a smaller space requirement, produce little or no odor, and greatly reduce the amount of ammonia and volatile organic compounds (VOCs) normally released from aerobic composting.

SMUD hired RIS International to perform an economic feasibility study where we determined that Sacramento's green waste could produce up to 6 MW or 50,000 MWhr per year of electricity. The study determined that tipping fees of \$45/ton would be needed for a 50,000 ton per year facility, conservatively assuming that the compost had no sale value. Ways to make Anaerobic Digestion more cost-effective are to co-locate with another facility such as a MRF or landfill and to co-digest green waste with food waste and non-recyclable paper. These waste streams can garner higher tipping fees than green waste and will produce more renewable energy, increasing the revenue. At the same time, the price gap between anaerobic and aerobic composting is expected to close due to tighter air quality standards which may require more costly technologies, such as aerated static pile, ag-bag, or possibly in-vessel or indoor aerobic composting.

Food waste is a high value organic that can be diverted, resulting in reduced risk of groundwater contamination and fugitive methane emissions at landfills. A SMUD study identified commercial and residential source separated food waste collection programs in 25 other cities, mostly on the West Coast. We are investigating whether food waste collection would be right for Sacramento and whether food waste is best processed in on-site digesters at food processors, in centralized plants, or at wastewater treatment plants. Through work with UC Davis, we are also investigating the option of co-digestion with manure.

Anaerobic digestion is one emerging technology for converting solid waste to energy to meet SMUD's goals of environmental protection and renewable energy. We are exploring other emerging technologies as well, including gasification and pyrolysis. Each can bring their own set of benefits to our community. However, we recognize that it requires significant effort, coordination, and communication among business stakeholders, regulators, municipalities, environmentalists, and the utility for a

successful project to be built in Sacramento. We will soon launch the Leftovers to Lights Working Group as a forum for this collaboration.

### **Summary of presentation by Steven Brautigam provided by presenter**

#### **Waste Conversion Technologies: Update on New York City's Efforts**

*by Steven N. Brautigam, Esq.*

*Assistant Commissioner for Environmental Affairs  
New York City Department of Sanitation (DSNY)*

#### **Abstract**

New York City is formulating a plan to handle its municipal waste for the next 20 years. Currently NYC sends most of its post-recycling MSW to distant landfills, with about 15% going to modern waste-to-energy (WTE) facilities in the region. The proposed plan would continue such transport and disposal but lessen transport impacts from tractor trailer trucks that carry 48% of such waste by switching to rail and barge transport. Such transport and related infrastructure development will impose disposal costs of approximately \$107 per ton for the 12,000 tons per day of NYC post-recycling MSW and require considerable fossil fuel consumption. Mayor Bloomberg has asked city agencies to incorporate sustainability considerations into programs and policies. DSNY conducted a review of new technologies for consideration in the City's waste plans. DSNY contractor Alternative Resources, Inc. conducted a two-part study of new and emerging waste conversion technologies. Phase I of the study (September 2004) reviewed 43 companies, with a second level review of 33 companies. Fourteen companies were advanced to a third level, comparative review. The Phase I Study concluded that three non-incineration technologies merited further consideration by the City: anaerobic digestion, acid hydrolysis to convert biodegradable waste to ethanol, and thermal technologies such as gasification. The acid hydrolysis technology to produce cellulosic ethanol has already obtained necessary permits in New York State and is arranging financing. These three technologies were judged to be preferable to more established WTE combustion and resource recovery in terms of facility emissions and public acceptability, although air emissions from both WTE facilities and the three waste conversion technologies would be low and within regulatory limits.

Phase II of the study, scheduled for release in Summer 2006, consisted of a focused verification of the claims made by the fourteen technology sponsors (eight thermal, five anaerobic digestion and one acid hydrolysis) that underwent third level analysis in Phase I. Six technologies – two anaerobic digestion and four thermal– were considered in a detailed technical, environmental and economic review. Two other technologies --acid hydrolysis, and mechanical processing with fiber recovery --were also considered, with more limited information. The Phase II study confirmed the Phase I findings with respect to anaerobic digestion and thermal processing technologies. The study suggests that acid hydrolysis, anaerobic digestion and gasification each could be cost competitive compared to current plans and potentially acceptable for New York City, with projected tip fees ranging from \$43/ton to \$129/ton under public ownership and increased diversion rates. Like WTE facilities, such conversion technologies can all achieve net reductions in greenhouse gas emissions compared to landfilling. The study concludes that further consideration by New York City of these technologies is warranted, possibly by means of a pilot or commercial scale facility. The study did not include a comparative environmental life

cycle analysis or ranking of results, and no specific facility sites were considered. The study suggested next steps for the City's consideration.