

Landfill Gas for Community Development
An International Program of Appalachian State University Energy Center



Background - The World Bank estimates that 1-2% of the world's population earn their living by gleaning through the garbage at landfills, dumps, and in the streets. With the world population at 7 billion people, that would be about 70-140 million people, who must dig through rotting food, hospital waste, and dangerous materials to earn in the neighborhood of \$1-2 per day – less than half of what many people pay to buy one Starbucks coffee in most US cities. This work force of waste-pickers creates a major semi-formal economy, where millions of the world's most marginalized people glean recyclable materials, living and housing materials, and even food from the garbage of others - sometimes at landfills and open dumps. While this way of life is dangerous and pays little, these waste-pickers are the core of a recycling industry which creates wealth (for others) and a more sustainable economy, saves natural resources, and reduces greenhouse gas emissions. Meanwhile, in addition to the human resources, there are two other sources of value in this recycling system – methane gas being produced by decomposing garbage buried in these landfills and recyclable materials (glass, plastic, etc.) gleaned by the waste-pickers from the garbage. Efforts are underway in some countries, such as Brazil, to improve the lives of these people by getting them off of the landfill, either sorting out the recyclables in safer conveyor belt sorting facilities – or intercepting the recyclables at the source. Most of these recyclables are sold by the waste-pickers with little or no processing for very low prices. By using landfill methane gas as fuel to add value to the recyclable materials recovered, many social, economic, and environmental benefits could be created.

Mission - The mission of this Appalachian State University Energy Center effort is to assist waste pickers, communities, local governments, and other partners in developing community-based landfill gas utilization projects which will include value-added processing of recyclable materials from the solid waste stream. This will be done using landfill methane gas generated by the garbage buried in the local

landfill, and in a way that empowers waste pickers, and other marginalized citizens living in the vicinity of landfills; helping them to develop their communities, create better jobs, encourage economic development, improve health and well-being, while reducing greenhouse gas emissions.

The Appalachian State University Energy Center staff has been a leading proponent of community-based landfill gas utilization in North Carolina, USA; having led the development of the award winning EnergyXchange Renewable Energy Center, partnered in facility and program development at the Catawba Eco-Complex, and assisted in the planning and development of 8 new community-based landfill gas utilization projects at small to medium-sized landfills across North Carolina in the last 3 years.



Pilot Project In Brazil – In 2009 the Global Methane Initiative contracted with the Appalachian State University Energy Center to facilitate planning and development of a landfill gas utilization project in Maracanaú, Ceará, Brazil. The Methane Task Force formed by the Municipality and its partners, hopes to create the first “Community-based Landfill Gas Energy Park” in Latin America adjacent to the Maracanaú Landfill, using landfill gas to fuel both a commercial landfill gas utilization project and a value-added processing center for glass and plastic recovered from the municipal solid waste stream by the catadores (Brazilian waste-pickers). Major Brazilian partners of our project include the Municipality of Maracanaú; COOMVIDA (the local association of waste-pickers); ANIMA; a Brazilian NGO which exists to assist COOMVIDA members; AEDI, the Industrial Association of Ceará; and UFC, the Federal University of Ceara at Fortaleza.

Funding – Initial funding of US\$270,000 came from two grants to the Appalachian Energy Center by the Global Methane Initiative of the US Environmental Protection Agency. This resulted in the investigation of several landfills in Brazil with potential for a community-based landfill gas project; the selection of the Maracanaú pilot; organizing of the Brazilian partners; as well as the planning and design of the landfill gas system and the Energy Park adjacent the landfill where value-added processing of glass and plastic will be done. Brazilian government grant funding of over US\$200,000 has also been spent by the local association of waste-pickers to purchase plastic processing equipment. In January 2014, the Brazilian Ministry of the Environment announced the award of approximately R\$1.5 million to the Brazilian partners for the construction of the project. The recent crash of the Brazilian economy has held up the contract for this grant, and the future of this funding is in question. The partners are looking for alternative ways of funding the project.

Replication – The Appalachian State University Energy Center believes there is potential for hundreds of similar projects in Latin America and world-wide, using landfill gas (or biogas from anaerobic digestion of food waste) to fuel value-added processing of recycled glass and plastic and to meet other community needs identified by the local people. Many times, these community needs can be met with a very small percentage of the available gas – gas that otherwise would have been flared off or vented to the atmosphere – while the majority of the gas can be devoted to a commercial project like electricity generation or industrial boiler fuel. These commercial uses of gas can provide the reliable income to provide economic sustainability.

Methods –

1. Facilitate construction of Maracanaú project
2. Create partnerships for the international initiative
3. Create the boiler plate value-added processing system for glass and plastic recyclables
4. Create the business model for this value-added processing system
5. Create the social framework for development of these energy parks
6. Identify other potential project locations
7. Select second project location, recruit project partners, and facilitate project development

What Can Appalachian State University Provide

- Through the ASU International Programs Office, Walker School of Business, and other departments and programs of the University, we can often provide links with Universities in the candidate countries, offering the opportunity to leverage resources for the planning and development of community-based energy projects. ASU presently has formal partnerships with Universities in 25 countries, 15 of which are Global Methane Initiative partners. Special relationships have been developed with universities in Brazil, China, India, and South Africa.
- Through the Appalachian State University Energy Center we can provide assistance to local, state, and federal governments; commercial developers, and consultants in identifying potential projects, recruiting potential project partners and contractors, and facilitating project planning and development.
- Through its Geography Department, the Appalachian State University Energy Center could provide Geographic Information System support to provide mapping and associated data for showing potential, candidate, and operational landfill gas systems and the waste picker population of the world.
- ASU can also provide for the integration of other disciplines into project planning and development by utilizing such university departments as Sustainable Development, Business, Economics, Education, Sociology, Technology (Renewable Energy, Energy Efficiency, Building Science), Geography, Public Administration, etc.

Potential Partners

- Local communities
- Engineering, consulting, and planning firms
- Foundations, corporations, commercial developers, and carbon credit trading companies
- Federal, state, and local government agencies
- Colleges, Universities, and other educational institutions
- World Bank, United Nations, US AID, and other international aid organizations
- NGOs – Sustainable development, energy, agriculture, climate change, social programs, etc.