

Is One Man's Trash Everyone Else's Undiscovered Treasure?

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By Amber Rose

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Outline

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A main concern in today's environmentally conscious world is how America can solve the problem of solid waste. The increasing population and urbanization of America has, consequently, caused a rise in the amount of garbage, or solid waste. The amount and sizes of landfills are also on a steady incline from year to year, and municipalities are scrambling to find a way to stop this trend and not harm the environment at the same time. What if solid waste is not the problem, but the solution, to some much bigger problems? The problems are the dependency of the United States on foreign oil for energy consumption and the ever-increasing size of landfills in America. Environmentalists are on the hunt for a constant stream of a renewable source to fuel America's energy needs. While trash is already being used as an energy source in states across the country, more development is needed to convert solid waste into a clean, environmentally friendly source of energy. Municipal solid waste (MSW), which is the leftover trash after everything that can be recycled is taken out, can be converted into a viable electricity source through the usage of waste-to-energy facilities (Zeman, 2010, p.756). There are also ongoing developments to turn MSW into a hydrocarbon fuel that can power generators. The current methods of MSW conversion to electricity are a step in the right direction; however, complaints have been made regarding the traffic, noise, and odor involved with turning trash to energy. The negative attributes of MSW will eventually become a thing of the past as progress is made into more efficient energy uses of MSW. Energy derived from MSW will allow the United States to become less dependent on foreign oil and benefit the environment by decreasing the size of landfills.

The Environmental Protection Agency (EPA) states that Americans disposed of 250 million tons of trash in 2010; this number excludes the amount of recycled and composted

trash (“Municipal Solid Waste,” 2012). Municipal solid waste consists of all items found in the garbage: paper, plastic, food, glass, lawn clippings, old/broken furniture and appliances, paint, batteries, etc. The common adage of reduce, reuse, and recycle has been emphasized by the EPA in order to decrease the amount of MSW tossed into landfills; nevertheless, the generation of MSW has increased, but at a slower rate (“Municipal Solid Waste,” 2012). The disposal of this solid waste is what arouses concern in environmentalists. Outside of recycling, there are two common methods of waste disposal: incinerating and landfilling. The process of landfilling is one where a large section of land, known as a landfill, is designated for the dumping of garbage, and then dirt is spread to contain the garbage. Landfills are typically lined to prevent seeping into the ground; however, pollution is still a major drawback of landfills. Incinerating consists of burning the trash. In the past, it was not uncommon for communities to burn certain types of trash in their backyard or along the road, but the negative impact on the environment from trash burning caused many communities to place bans on this type of activity. Now some communities use special incinerators to burn the trash and keep it contained. They process the garbage first to remove any items that can be recycled or reused, and then they burn the garbage, which turns it into small pellets that can be used as fuel (“The Growing Garbage Mess, 2009). Incinerating eliminates the need for landfills, but it is wasteful and harmful to the environment (“Waste Disposal,” 2005). Regardless of which method is chosen to dispose of municipal solid waste, both landfilling and incinerating do nothing but waste the energy potential of MSW.

According to congressional testimony given by the President of American Council of Renewable Energy, Michael Eckhart, “The U.S. imports almost 60% of its oil and is faced with an

aging electric grid dependent on centralized power production” (“Energy innovation: Michael T. Eckhart,” 2007). This dependency on foreign oil increases as each year passes. America must develop alternative sources for energy, and until a sustainable source is found, American life is susceptible to the vulnerabilities of the current electricity production like blackouts and natural disasters. Also, climate change is a major factor in the push for alternative energy sources. Some scientists have connected climate change to the increase of natural disasters that paralyze communities by taking away their access to electricity and leave them with an overabundance of garbage. The ability to use municipal solid waste (MSW) to provide energy to these communities tackles both of these problems. Currently, only 1.4% of the United States’ electricity comes from MSW; this means there is plenty of room for improvement (Koshmrl, 2012, p.28). Energy from MSW will help decrease the demand on the outdated electric grid, thereby decreasing the likelihood of blackouts. Irrespective of the programs developed to reduce the amount of garbage placed in landfills, the amount of garbage continues to increase, and repurposing this garbage into a renewable energy source lessens the burden placed on the current landfills and the environment. The usage of MSW serves two purposes, providing renewable energy to society and a more efficient method for waste disposal (Zeman, 2010, p.758).

The type of energy derived from municipal solid waste (MSW) can be dependent upon the exact type of waste being used, such as food items, paper products, and plastics. The technology in development has taken this renewable resource to new levels of efficiency. Food waste, for example, makes up about 40 million tons of MSW. New companies are focusing on waste-to-energy plants that can turn food waste into a natural gas that can be used

for heating homes or vehicles. One company currently using this process is Harvest Power, which is mimicking forward-moving power companies in Germany and Spain. The process of “using anaerobic digestion--in which bacteria digest organic material and emit biogas, which can then be converted into compressed natural gas or burned for power, with the byproduct used as soil fertilizer,” has seen a drastic increase in world-wide usage in the past few years, but the United States has not caught on to this trend (Chernova, 2012). This highly efficient company has a built-in revenue stream by selling the fertilizer they produce, charging municipalities a trash collection fee, which is less than what they would spend in collecting the trash themselves, and by selling the power from their facilities (Chernova, 2012).

Plastic waste also creates a fuel source that is valuable to America’s energy needs. Plastics inflict a huge problem on landfills because they do not biodegrade; they go through a process called “photo-degradation and turns into plastic dusts which can enter in the food chain and can cause complex health issues” (Sarker, Rashid, & Molla, 2011, p. 489). There is an alternative to these detrimental effects on the environment, and it consists of converting the plastics derived from the MSW into hydrocarbon fuel, which can then be used in vehicles. Thirty million tons of plastic waste are generated per year in the United States; it takes one ton of plastic waste to create 355 gallons of hydrocarbon fuel. This means that plastic waste could provide the United States with 10 billion gallons of fuel nationwide. Using this new alternative fuel could help preserve the natural resource of petroleum by subsidizing its usage. The process of converting the plastic is called “pyrolysis and de-polymerization” (Sarker et al., 2011, p.489). This process involves cutting up various types of plastics and sending the pieces through multiple phases of heating, then distilling the plastics to form the hydrocarbon fuel.

Once the fuel is formed, it can then be used to power vehicles or fuel generators for electricity. While tests have only been performed on a small scale at this time, hydrocarbon fuel has a promising future for becoming America's next big energy source (Sarker et al., 2011, p. 490-491).

New developments have found a way to make MSW energy "scalar and modular," which lends itself to solving the crisis faced when a community is hit by a natural disaster. The United States Army has tested a system that was formulated to convert garbage to energy by using military shipping containers, called "Tactical Garbage to Energy Refinery [TGER]" (Wingfield, 2009, p.73). The system is somewhat similar to the process of converting plastic into hydrocarbon fuel; it goes through a process called pyrolysis. However, this process involves multiple types of waste: food, plastics, and paper (at this time glass, metals, and chemicals cannot be processed). The TGER turns the solid MSW into pellets and then sends them through the pyrolysis process, which breaks them down to a synthetic gas. The liquid and food MSW is processed into a "hydrous ethanol" and mixed with the synthetic gas and turned into a usable gas that can be used to power a standard 60 kilo-watt generator (Wingfield, 2009, p.73). The aspect of TGER technology that is particularly important is the portability of the machines. The two machines that make up the TGER can easily be moved to the sites of natural disaster that are in need of an electricity source and have large amounts of unusable garbage. Americans are all too familiar with the devastation caused by strong storms like Hurricane Katrina and, most recently, Superstorm Sandy. However, even simple power outages for short periods of time can wreak havoc in places that need dependable energy, such as hospitals, schools, and other institutions. The use of portable generators that can be sustained on the waste created

on site makes perfect sense. There are several different methods being developed to turn MSW into a clean source of renewable energy, and the complete potential of this long-lasting resource has yet to be unlocked. Once this development is complete, energy from MSW will reduce the size of landfills and help America move towards energy independence.

Supporters of the development of energy technology from municipal solid waste have been met with a myriad of complaints, many of which are based on old versions of waste-to-energy facilities. Citizens in Maine have a first-hand account of waste-to-energy facilities because Maine is on the path to becoming a leader in turning trash into energy. There have been complaints regarding the large amount of traffic from the trucks transporting the garbage to the facilities. This problem exists because of the scarce number of facilities available for converting the trash, and it must be transported a long distance from different municipalities; as the popularity of waste-to-energy facilities increases, these complaints will be minimized. Noise and odor are also common concerns of the public, and companies venturing out onto this new frontier of energy are taking steps to address these concerns by developing more technologically advanced processes. There is also the question of whether or not the supply of trash is sustainable for the facilities to continue production (Turler, 2012). The EPA's website has shown that in spite of efforts to reduce, reuse, and recycle, America's waste disposal is on a steady incline. With all new forms of technology, there are going to be growing pains as advancements are made. The benefits on the environment from this currently wasted source of energy are well worth the temporary discomforts being experienced by the public.

Municipal solid waste (MSW) is a potential source for renewable energy that has flown under the radar because of its diverse components. However, the combination of paper,

plastic, food, etc., provides for a plethora of uses for the fuel that can be extracted. The EPA has made moves towards minimizing the amount of waste generated in the United States, and those efforts have helped to slow, but not stop, the increase of garbage production. Today's current method of landfilling does nothing to solve the problem; it only serves as a literal cover-up to America's trash. Incinerating is an outdated method that harms the environment and has become very unpopular in today's globally conscious world. In order to counteract these two methods and provide a domestically produced source of energy, MSW-derived energy needs to be the center of attention. MSW can be divided based on the type of waste. Natural gas can be derived from food waste and used to power vehicles and provide heat to American homes. Plastic waste is useful for producing hydrocarbon fuels, which can be used for vehicles, and also used for portable generators. Solid waste can also be converted into a fuel source, syngas, and used to fuel portable generators as well. The negative qualities of waste-to-energy plants, consisting of increased traffic, noise, and odor, all but disappear with the furtherance of energy from MSW technological discoveries. The improvement of America's quality of life can be foreseen based on the decreased impact on the environment and energy independence created by the production of energy from municipal solid waste.

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