

Waste Management

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Municipal Solid Waste

The generation of municipal solid waste in the United States in 2001 has been estimated by the Environmental Protection Agency to be about 229 million tons. Three large categories are paper, 81.9 million tons, plastics, 25.4 million tons and wood at 13.2 million tons. For example, utilizing RET technology at an overall efficiency of 70%, the amount of hydrogen that can be produced from plastic is approximately 5.53 billion kilograms or 7.76 billion kilograms of hydrogen produced from paper.

Agricultural Residue

This technology is suitable to accept ALL forms of combustible biomass. The integrated system would accept any form of biomass feedstock or residue in a combustion unit. The heat generated from combustion would heat water to steam, which would in turn be used to generate electricity through a steam turbine. The waste steam from the turbine would be cracked using RET technology to hydrogen and oxygen. The hydrogen generated can be used as a fuel or combined with the exhaust CO₂ from the combustion unit and a catalyst to produce a variety of chemicals such as methane or alcohol. Thus, CO₂ is efficiently converted into a highly valued product. The integrated system is highly scalable for different energy or chemical needs. Production of hydrogen or chemicals is limited only by the amount of biomass consumed. The only byproduct of the technology is a small amount of ash that can be used as fertilizer. This technology can be applied in a centralized configuration for several farms or as an individual small generator for a single farm. The system has only one moving part and maintenance can be handled easily.

We believe our technology answers a broad range of economic and environmental concerns regarding biomass waste utilization.

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Biomass waste may be disposed of by converting it selectively into hydrogen or useful chemicals

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CO₂ can be sequestered by converting it into a useful highly valued product (e.g. methane, methanol, ethanol, etc.)

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The system can use a broad range of biomass feedstock.

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The system is simple enough that a well informed farmer can use it without assistance.

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The hydrogen or chemical product is within the competitive range of present gasoline or fossil fuel prices.

The system is completely solid state and rugged. The RET system needs water vapor or steam as a feedstock. Steam generation can be obtained from the combustion of a primary energy source such as biomass. Since the system of creating hydrogen or chemicals is independent of the primary energy source, any biomass source may be used successfully. Our technology is unique in that it addresses all the concerns of biomass utilization, disposal and CO₂ sequestration.

The RET technology system for biomass residue has the potential of displacing fossil fuels in farm operations. Assuming a typical energy value of 16.8 MJ/kg for grain biomass feedstock, at 70% overall process efficiency, approximately 0.1 kg of hydrogen may be produced. Thus, approximately 10 kg of biomass residue would be needed to produce the energy equivalent of about 1 gallon of gasoline. The amount of grain residue attainable per unit area, based on data for corn is a little smaller than 350 t/km². About 35,000 equivalent gallons of gasoline could be produced using the RET process. Residues from an average farm would be enough to sustain conventional farm machinery running on hydrogen or natural gas derived from the RET system. Pooling of farming community biomass would lead to an excess production of energy that could be sold on the open market. This in turn would improve the standard of living for rural communities.