Biogas to Hydrogen for Asphalt Heat

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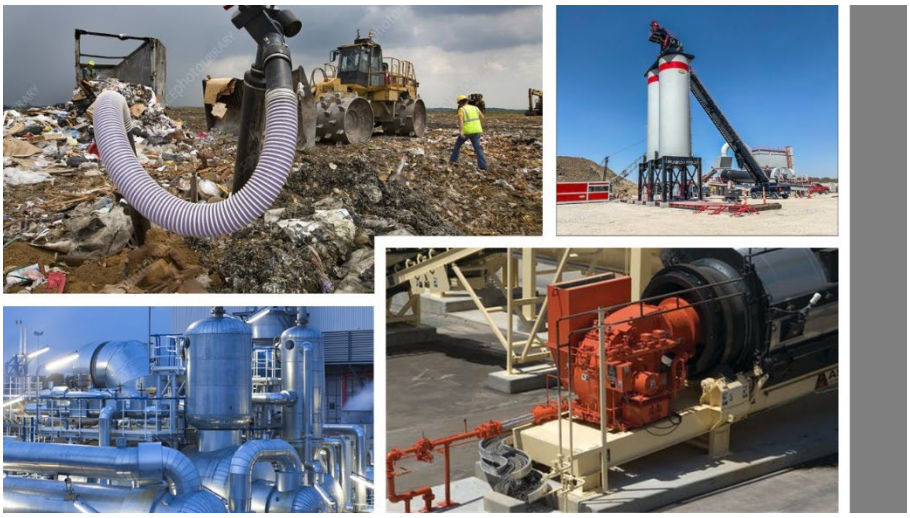
Biogas production at landfills, where economic reserves of biogas exist, has been an important pathway for the mitigation of methane released into the atmosphere from the natural decomposition of organic matter for some time now. The sale of this biogas upon removal of impurities as pipeline grade natural gas, and in some cases, flaring of the same where no pipeline exists, has been extensively developed at many landfill sites worldwide.

Landfill sites with adequate reserves for the economic development of biogas production are generally located around large cities. Roadway construction and repair is also concentrated around large cities.

Most of the roadway construction and maintenance performed throughout the United States utilizes asphalt concrete as the paving material. Given the very high viscosity of asphalt binder (it remains solid even in extreme Texas heat), heating is required to maintain adequate flow of the binder for mixing with rock aggregates to form asphalt cement and for transportation of the final product. Stationary and portable hot mix asphalt plants are used in the industry to mix asphalt binder with aggregates for final delivery.

Where a roadway project location exceeds a certain distance from the location of a stationary plant, portable mixing plants are required. These plants utilize portable fuels such as diesel or, more recently, LNG, for fired heaters in mixing drums to maintain asphalt temperatures of approximately 350F.

The quantity and proximity of available biogas production at landfill sites near cities throughout the USA matches well with the demand for asphalt, making the delivery of hydrogen at small scale plants viable for this application. Hydrogen as a substitute fuel for diesel has the environmental benefit of generating no CO2 byproduct, and hydrogen burners have recently been optimized to eliminate or greatly reduce NOX associated with higher temperatures produced when burned.



Our project involves the development of small-scale hydrogen production at landfill sites, the capture of CO2 generated as a byproduct of the production of hydrogen from methane, and the sale of the hydrogen to a pre contracted network of asphalt producers for use in their respective supply chains. The concept harnesses the proximity of supply and demand centers and the synergies in the available volumes of biogas and asphalt heating demand to substantially reduce or eliminate emissions from both the burning of biogas, as well as the burning of diesel as a fuel for heat at portable hot mix plants.

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