

The Magic of MagneGas™

Converting Liquid Waste to Clean Fuel

By Justin Davis

A welder zips through a sheet of steel quicker than you'd thought possible, both his apron and the air above him remarkably free of soot. Outside, a Chevy Suburban idles—you look for the usual exhaust belching from the tailpipe and see none. The same can be said for the forklift navigating the shop floor. At the heart of the operation sit two strange machines, rumbling low and quiet. Into one machine flows municipal sewage; into the other corrosive used antifreeze ... and out of each comes what could be the answer to both our liquid waste epidemic and fossil fuel dependency. Welcome to MagneGas Corporation (www.magnegas.com), a small Tampa, Florida startup where very big things are happening.



MagneGas is cleaner, less expensive, and more effective than acetylene or other metalworking fuels.

The Idea

The patented MagneGas™ Technology was invented by company CEO and Nobel Prize-nominated scientist Dr. Ruggero Santilli. The Technology removes municipal, industrial, and agricultural liquid wastes from the environment, converting them to a clean fuel, and in many cases, nutrient-rich water that is perfect for irrigation. The MagneGas fuel is a direct, lower emission replacement for natural gas or propane in every application: it can be used in home heating and cooking and can power industrial vehicles or natural gas-enabled cars. It is also an ideal gas for the metal working market, the first “green” gas alternative in that space. The MagneGas Refineries themselves are quiet, clean, and relatively small—they fit on the back of a flatbed truck and are thus imminently transportable. This is the story of a singular technology providing multiple extraordinary benefits: liquid waste remediation, a potentially limitless clean fuel source, sanitized waters for the parched corners of the world, and an operational flexibility that can enable community self-sufficiency.

The Technology

During the nation's first oil crisis the Carter Administration was looking for ways to reduce America's dependence on foreign oil.

The US Department of Energy tapped an up-and-coming former Harvard, MIT, and NASA scientist to find a solution. Dr. Ruggero Santilli was tasked with creating an American fuel from an American feedstock.

“The answer to me, even before our current environmental catastrophes, was obvious—liquid waste must fuel our future,” states Dr. Santilli. “After 30 years of arduous research and development we have created an entirely novel technology that both cleans our environment and also produces the most effective and efficient gas, across a wide variety of applications, on the market.”

Dr. Santilli's novel solution is named Plasma Arc Flow™. In this process, two carbon electrodes extend into a processing container; the liquid flows into the space and between the electrodes, submerging them. A high-energy current then passes through the electrodes, hyper-heating the flowing liquid waste to temperatures exceeding 10,000°F, breaking the waste down at a molecular level (rather than simply incinerating it), releasing MagneGas to bubble to the surface for collection.

It is not, however, as simple as just that. This ground-breaking technology creates a hydrogen-based gas wholly unique in its properties and effectiveness. Conceptually,

matter like MagneGas is created in nature through the strong electromagnetic forces of lightning in the atmosphere. When applied to atoms, these forces break them into ions and simultaneously create magnetic attraction between these ions and atoms, forming stable atom clusters. In a fuel context, these clusters have the beneficial attribute of allowing for more complete combustion, as less energy is required to separate them than in separating typical valance bonds.

When formed by lighting, these atom clusters are produced in very small quantities. The MagneGas Plasma Arc Flow technology harnesses this process and produces these gas clusters in large quantities by firing an electric arc within liquid waste. The high efficiency of the production and chemical combustion of the end products enables the system to produce more stored energy in the fuel than it uses to produce it. Without the production of these magnetic clusters, this would not be possible. This is the magic of MagneGas.

The Process

Around the globe we are awash in liquid waste, from municipal sewage to agricultural effluent to industrial runoff. The MagneGas Technology may add a valuable assist on all fronts and can help in the clean up.

The MagneGas Technology processes two distinct types of waste, and in two distinct modes. In the Linear Mode it converts sewage, sludge, manure, and other water-based wastes into MagneGas, with a secondary output of sanitized water and carbon residue traces. In the Total Mode, the technology is adept at processing oil-based waste like antifreeze, motor oil, cooking oil, and spilled petroleum (such as in the Gulf Coast). In this mode, the technology cycles the waste perpetually through the arc until the oil-based waste is reduced to the high-energy fuel MagneGas, and what are essentially carbon briquettes, which are easy to cleanly dispose of or are potentially useful in fertilizer manufacturing.

The MagneGas Refineries themselves are notable both for their quiet operation and lack of emissions (heat is the only by-product released to the atmosphere). But what is often most striking to visitors at MagneGas headquarters is the relatively small size of these units. They are not the behemoths typical of other waste-to-energy technologies. At fewer than 50 feet in length and about a quarter as high, the MagneGas Refinery operates on a very small footprint and can be easily transported by flatbed truck. In fact, the very size of the units is part of the genius of the science itself. As Dr. Santilli explains, “Our vision has always been for an environmental and gas production solution that could be readily installed in any community or production facility, helping that host become both cleaner and energy self-sufficient without sacrificing acres of precious space.”

Operationally, the MagneGas Refineries are remarkably efficient. The company just brought on line the first of two next-generation refineries, which is dedicated to processing oil-based wastes like used antifreeze and motor oil. In recent tests independently conducted and certified by German engineers, this refinery used 180 kilowatts per hour, or 565,200 BTU, to process 50 gallons of antifreeze (processing volume is significantly higher with water-based wastes). In so doing it produced 5,240 square feet per hour of MagneGas fuel. Based on testing to date, the company believes this yields a 5–10:1 ratio of commercial energy produced versus energy consumed. Independent certification is forthcoming. The company stresses that the quantity of gas, quantity of feedstock processed, and inherent energy content varies greatly by feedstock, but in all



The new MagneGas oil-based waste refinery can produce more than 5,200 cubic feet of clean fuel per hour.

instances the technology has proven both efficient and economically productive.

MagneGas is currently completing its second next-generation refinery. It will serve as a fixed demonstration unit for the processing of municipal and agricultural waste. Based on successful municipal-scale tests with previous machines, the company anticipates that this unit will be able to process up to a half ton of water-based waste per hour, further emphasizing that this technology is dual purpose: it has the capability of producing extraordinary amounts of clean, high-energy fuel, while removing large volumes of sewage, sludge, and biowastes from the environment.

The Future

Founded in 2007 and taken public in 2008, MagneGas is just hitting its commercial stride. It recently completed its first refinery sale to a group in China, and is quickly growing its fuel business both domestically and abroad. It is also exploring partnerships with municipalities and manufacturers to install refineries that process their own waste and produce their own fuel. The company anticipates that these partnerships will serve as national demonstration centers. In addition MagneGas is working with acetylene producers to become satellite MagneGas manufac-

turers, and thus accelerate market expansion for its fuel gas.

The MagneGas Technology is continually evolving and is currently in R&D to capture heat exhaust from its refineries for the co-generation of electricity. Next, MagneGas plans to initiate R&D to separate hydrogen from its fuel for commercial sale, and is exploring the liquefaction of MagneGas fuel to significantly expand its applications both within the metal working market, as larger users prefer fuel in liquid form, and in the conversion of fuel to electricity for sale back to the grid.

Back on the MagneGas shop floor, Dr. Ruggero Santilli is as high-energy as the fuel he's created, encouraging his engineers and technicians to keep producing quicker, cleaner, and better—and in this, he and MagneGas Corporation are sending a message to both the fuel industry and the world as a whole: The old way is not always the right way ... we can improve in business even as we clean the planet. As both the fuel landscape and environmental movement evolve, MagneGas will be there to help lead the way.

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