

Gasification: Solving Modern Manure Pollution

In recent decades, raising livestock has shifted from family farms to large commercial operations. With thousands of cattle and hogs or hundreds of thousands of chickens, the old self-contained cycle of farming – manure feeds the crops, then the crops feed the animals – is overwhelmed by the large amount of manure and/or litter. Animal manure has become a modern pollution problem.

Excess manure is a challenge in many ways. A lactating dairy cow, for example, can produce 110 to 130 pounds (50 to 60 kilograms [kg]) of manure per day while 20 broiler chickens will produce almost four pounds (two kg) of manure a day. Beside the pervasive smell, the manure is a growing source of gases such as methane and carbon dioxide. It can wash into streams and waterways and creates air pollution.

When too much manure and/or litter is produced, there is currently no cost-effective way to either use it productively or dispose of it properly. While government regulation and better manure and/or litter management practices can make a difference, animal manure is and will continue to be an issue. However, it also offers opportunities.

A Manure Revolution

A new way of solving the manure problem has arrived in the form of an energy-based environmental solution called gasification. Anaerobic digestion facilities are sometimes faced with a number of challenges, such as partial reduction of the discharge of harmful gases, the issue of digestate, no possible elimination of solid manure and/or litter, and poor protection against leaks or overflows that can contaminate water supplies. Gasification avoids all of these concerns.

Many products are suitable for gasification, including poultry litter/manure, hog and cattle manure, category 1 meat and bone meal from Europe, and biosolids. Through the use of readily available technologies, the resulting clean heat can be

converted into a number of usable energy forms like steam, electricity, hot water, and hot air.

Yield from the gasification process includes valuable energy and formulated “ecochar” that is significantly reduced (more than 85 percent) in bulk from the original material. The ecochar is dry, pathogen-free, has a commercial value, and can be more easily transported. Based on the characteristics of the fuel being gasified, ecochar has variable qualities.

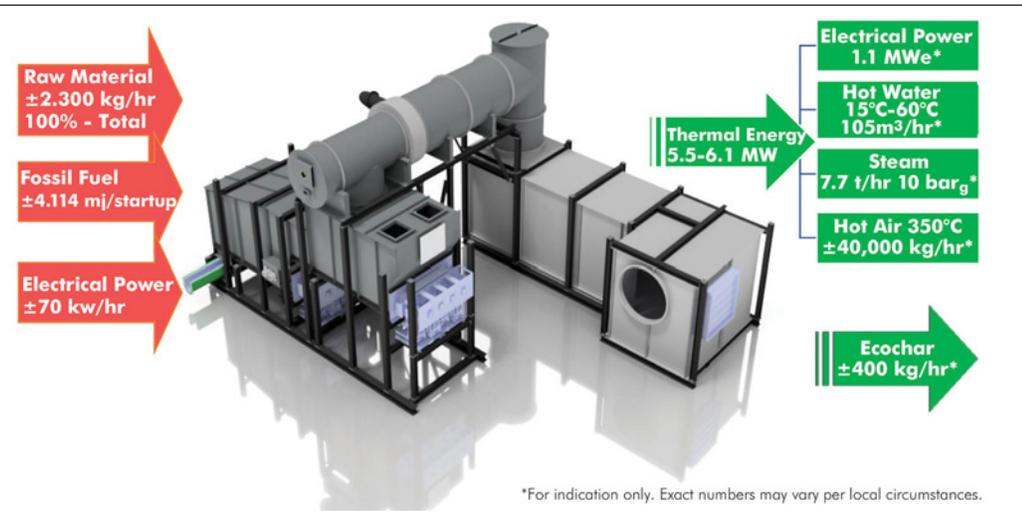
How it Works

Gasification is a chemical reaction caused by heating material in an oxygen-starved environment. The main product of gasification is carbon monoxide (CO) with some hydrogen and methane gases, called synthesis gas, or syngas. The syngas composition is fuel dependent, with temperatures typically ranging between 1,470 to 1,560 degrees Fahrenheit (F) (800 to 850 degrees Celsius [C]). Once the syngas leaves the gasifier and flows into the oxidizer, ambient air is introduced to start a chemical reaction with the syngas (oxidation) while the CO is converted to carbon dioxide. The reaction produces a hot airstream that has an energy content between 5.5 to 6.1 megawatt (MW) thermal at a temperature between 1,800 to 1,980 degrees F (980 to 1,080 degrees C). The base gasification system uses only limited fossil fuel (+/- 4.100 megajoule [mj]) at start up and is switched off completely when the unit is at operating temperature. Further, during operation the system consumes only +/- 70 kilowatt (kw) per hour.

The main component of the gasification technology is a downdraft fixed-bed gasifier. This patented design is generations ahead of wood-fueled systems and is engineered to support a variety of fuels, including manures, category 1 meat and bone meal, and other biomass. The gasification process takes place in the primary unit in an oxygen-starved environment, thus controlling nitrogen oxide formation.

The ability to use the thermal energy product as direct heat, hot water, steam (up to 7.7 metric tons, 10 bar gauge/hour), or electricity (up to 1.1 megawatt equivalent net production) is a simple matter of adding equipment. The modular design makes construction quick and relatively easy, and the addition of components is comparatively simple. Gasification is often confused with incineration, although they are totally different processes.

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Gasification is an economical, ecological, and ergonomic way of handling manure, litter, and organic manure and/or litter challenges while targeting a total supply cycle system and multiple revenue streams. It could be one of the answers to future energy needs that will result in reduced air pollution and a reduction in agricultural manure and litter issues.

A Powerful Soil Enhancer

The ability to control the operating parameters of the gasification technology allows it to produce various grades of ecochar, offering significant economic and environmental value to projects. Ecochar is a solid material obtained from the carbonization of biomass. This carbon-rich material has high levels of phosphorous, potassium, calcium, and magnesium. Furthermore, it is valuable for improving stability in soil as it is retained in the soil over many decades, unlike fertilizers that typically require annual application, due to its superior nutrient-retention properties. Ecochar thus provides benefits to both the environment and agriculture.

It also has a variety of other uses, like bedding additive in stables, animal feed supplements, and as a water filtration medium. Ecochar converts agricultural manure and/or litter into a soil enhancer that can hold carbon, boost food security, and discourages deforestation. It is a technology that is relatively inexpensive, widely applicable, and quickly scalable. Furthermore, it helps animal agriculture and the industry reduce their environmental footprint and become more sustainable.

Mavitec Green Energy has partnered with Earthcare LLC to offer solutions to gasify organic streams into a number of usable energy forms, including heat, steam, electricity, and high-quality ecochar through the use of readily available technologies. In cooperation with Wageningen University in the Netherlands, Mavitec has also researched the characteristics and quality of ecochar. Presently there are five gasifier systems worldwide that are successfully running full-scale with three gasification projects under construction. Mavitec Green Energy is a Dutch company that is part of The Mavitec Group, an exclusive distributor for The Dupps Company in Europe. **R**

AOCS adds “Proteins” to its Updated Mission

The American Oil Chemists’ Society (AOCS) Governing Board approved the addition of “proteins” to the group’s mission as part of the society’s 2018–2020 Strategic Plan. AOCS’ updated mission is to advance the science and technology of oils, fats, proteins, surfactants, and related materials to enrich the lives of people everywhere. The new strategic plan is available on the society’s website at www.aocs.org.

Cargill Acquires Pro-Pet

Cargill rang in 2018 by purchasing Pro-Pet, an Ohio-based manufacturer of private label and co-manufactured pet foods. The acquisition makes Cargill the only national supplier of both animal feed and pet food offerings in agriculture retail.

Pro-Pet has more than 150 employees and three pet food manufacturing facilities in Owatonna, Minnesota; St. Marys, Ohio; and Kansas City, Kansas. The purchase provides Cargill with increased production capacity and proximity to existing agricultural retail customers to better meet the company’s growth needs within pet food. Pet food is a top-growing category among agriculture retailers with an estimated eight percent distribution share and continues to evolve with changing consumer preferences.

Cargill operates 50 animal feed production and distribution facilities across the United States, offering branded and private label pet food to agriculture retailer customers. The company’s animal nutrition business has more than 20,000 employees at over 275 facilities in 40 countries.

Frontline Expands Footprint in Asia

Ohio-based Frontline International, a leading provider of cooking oil management systems for foodservice operators around the world, is expanding its reach in Asia with an agreement with Philippines-based Technolux for distribution and service of its products in the region. Technolux has a 65-year history in the Philippine market and is the country’s largest importer and supplier of food service equipment to the major players in the nation’s food and hospitality industries. Frontline International’s fresh and waste cooking oil management equipment will continue to be designed and manufactured in the United States.

Kemin Acquires Canadian Company

Kemin Industries has created a Canadian division by acquiring the assets of its long-time distributor Agri-Marketing Corp., which was founded in 1973 in Mont-Saint-Hilaire, Quebec, Canada, and has provided exclusive distribution and manufacturing services for Kemin products in Canada. A seamless transition for customers is expected as Agri-Marketing sales employees become Kemin employees. The new location will focus on serving the animal nutrition and health market as well as the pet food and rendering industries.

New Partnership in Australia Meat Industry

The Craig Mostyn Group (CMG) has acquired V&V Walsh to create a major commercial platform to produce food for the Australian market as well as significant export income for Western Australia. A family owned and operated business since 1957, V&V Walsh is one of the largest meat processors and exporters in Western Australia specializing in lamb and beef processing from its meat processing facility in Bunbury. As part of the Australian agribusiness sector for more than 94 years, CMG is one of the leading suppliers of pork into the West Australian market and a significant exporter of food products into Asia. The two companies will jointly employ more than 1,400 Western Australians. **R**