



More

Green Garbage to Black Gold

The roll out of a digestate standards program will help assure customers of the value this often-overlooked coproduct of anaerobic digestion possesses.

By [Katie Fletcher](#) | October 19, 2016

CR&R Environmental Services' massive Perris, California, anaerobic digestion (AD) project is being built out in four phases, each processing about 83,000 tons of mixed green and food waste annually into 1 million diesel gallon equivalents of renewable natural gas (RNG). While this project was built to upgrade biogas to RNG, it also recognizes the value associated with each phase's inherent production of some 35,000 tons per year of a compostlike soil product and 10 million gallons of liquid soil amendment. "We see the success of anaerobic digestion of organic wastes directly tied to the ability to generate usable soil products on the back end," says Clarke Pauley, vice president of the organics and biogas division with CR&R.



BYPRODUCT UPGRADE: The University of Wisconsin Oshkosh composts its urban anaerobic dry digester (BD1) digestate material, produced from one of the university's three digesters, and sells it as a soil amendment under the brand Titan Gold.

Photo: American Biogas Council

These soil products are derived from digestate—the nutrient-rich, solid fibrous material fraction and liquid portion left over from the AD process. Digestate is no longer the same as the input organic material to the digester, nor is it a final fertilizer or compost, but through digestion, the organic material gains desirable qualities that allow CR&R to offer a closed-loop recycling solution. "Nothing is wasted and nearly all inputs are either converted into energy or a usable product," Pauley says.

Unlike CR&R, many early biogas systems were developed simply to reduce odor or the volume of waste being dealt with. The benefits of renewable energy generation have now been widely recognized, but what producers can do with their digestate coproduct to get an economic return has been overlooked. "That's changed lately," says Patrick Serfass, executive director of the American Biogas Council.

Five years ago, it was easier to develop a biogas system because the revenue from the sale of energy, whether in the form of gas or electricity, was more economically attractive. Weak or lacking renewable energy programs in many states adds to the difficulty of digester project success on energy sales alone, according to Brian Langolf, director of biogas systems and research development at the University of Wisconsin Oshkosh. "Creating value-added end products from digestate can be an additional revenue source for a project," he says.

Although CR&R's soil product sales will be dependent on a number of interrelated factors—supply, demand, processing cost and product quality—Pauley acknowledges that they've put a great deal of effort into this part of their AD business model. "Organic residual sales will be a big boost to our bottom line; by how much remains to be determined," he says.

Until now, digestate from the processing of nonsewage derived organics (such as household organic waste) has been largely unregulated and ill-defined. As a result, selling this product has proved challenging for producers who have encountered both market and regulatory barriers. Headed by the American Biogas Council, the biogas industry recognized the need to fill gaps in the marketability of digestate and digestate-derived products, and with extensive outreach to industry entities, including the EPA, created the ABC Digestate Standard Testing and Certification Program.

This voluntary, industry-led program sets forth testing methods and a quality management system for characterizing digestate-derived products, which will provide some standardization and product quality targets that operators can subscribe to. As an environmental lawyer helping draft the standards, Amy Kessler, cofounder of Turning Earth LLC, sees it as an "unprecedented opportunity for an industry to get together and say this is a reasonable amount of regulation and oversight."

Numerous meetings, conference calls and workshops were held over the two-year period during which a coproducts working group developed the bulk of the program. When developing the program, Kessler says, one model they've looked to is the U.S. Composting Council's. "They've recognized that in order for compost to become a household name and a recognized mainstream commodity, there needed to be some standards around it—some accountability and understanding of what's in it, what makes a good compost and how you might use it," she says. Kessler's interest stems from her company Turning Earth, an organics recycling company that is developing a facility in Connecticut to produce biogas as well as compost for a variety of soil products. "Compost is very familiar for folks, and we want to achieve that for digestate as well," she says.

This program also builds upon digestate standards programs in other countries—like the U.K.'s digestate quality protocol—and integrates relevant portions of existing U.S. EPA regulations—like Part 503, 40CFR biosolids rule under the Clean Water Act. "Right now, if you produce digestate from biosolids, you don't need our program necessarily because EPA Part 503 tells you exactly what should and should not be in your digestate," Serfass says.

This program is to “fill the gap of the nonbiosolids digestate, because there is nothing out there to help improve customer assurance for buying digestate that doesn’t have biosolids in it,” he adds. For digestate subject to specific regulations per EPA Part 503, like digestate derived from waste activated sludge and other sewage products, the producers must still comply with those regulations, but can also participate in ABC’s program to bring additional value to their digestate. “The objective is to create an inclusive program that any digestate producer can participate in,” Serfass says. This program is not replacing Part 503 or any other applicable local, state or federal regulations that producers must comply with outside this voluntary program.

The testing conducted through the program measures the beneficial physical and chemical changes resulting from digestion, and defines the physical and agronomic properties of the digestate products. These results will be issued on a summary digestate technical datasheet by certified labs participating in the program. “It is like a nutrition label—here is what’s all in the digestate,” says Kim Busse, laboratory manager with the Environmental Research and Innovation Center at UW Oshkosh. Serfass adds that like a nutritional label, it doesn’t necessarily tell you how much sugar you should have, but keeps it open for the customer’s interpretation while providing some general recommendations.

Standardizing digestate allows for the composition and beneficial use of the product to be accurately and appropriately represented by biogas project owners, and understood and accepted by regulators and offtakers. “Our main goal is to assure digestate customers that they are purchasing digestate products that are within nationally established safe pathogen and heavy metals limits,” Pauley says.

Beyond that, testing for a variety of parameters of stability and chemical composition will be required. Tests include: feedstocks, moisture content, pathogens, macronutrients (nitrogen, phosphorus, potassium), micronutrients, pH, soluble salts, total solids, volatile solids, organic matter content, physical particle size, metals, visible contamination, stability (volatile fatty acids or CO₂ respiration), and maturity. According to Busse, the amount of required testing is really dependent on the digestate’s end use. The testing protocol breaks down digestate into three broad end-use classifications: alternative daily cover or landfill or refused-derived fuel, restricted land application, and generally unrestricted bulk sales or land application.

Busse’s UW Oshkosh lab is one of a handful that are already planning to become certified under ABC’s Digestate Lab Certification Program. Once certified, these labs will test digestate using the prescribed standardized methods. UW Oshkosh already performs digestate tests for a number of clients, and Busse assumes most digesters are probably being tested at some level, but standardization will ensure everyone is “doing the same testing so that we can compare it to different kinds of digesters across this country,” she says.

Labs must meet certain parameters in order to become certified in the program, including paying an annual fee and taking a proficiency test each year. Labs are also required to follow a set of approved quality assurance standards and will occasionally be verified by a third party. “We don’t want it to be difficult to qualify as a lab,” Busse says. “We want it to be inviting, but we also want standardization, so we need some standards to uphold.”

The working group is still fine-tuning some of the requirements for labs to become certified and determining how much testing is necessary, a balancing act between achieving good, accurate test results and making participation economical. According to Pauley, the working group is currently developing the financial model for the program. “The key is to make sure that the investment in participation is worth it for all participants,” he says. “We anticipate a flat fee for company registration, a one-time enrollment fee, plus an annual maintenance fee.”

Pauley reiterates that they’re striving to make the program economical for all participating members, but “the bottom line is that participants will need to see the value of their certification to make the digestate certification program work.”

Digestate producers who are interested in participating will fill out an application with ABC, and once qualified, will receive access to all of the program details, such as tests needed, how the participant should use the program, which laboratories it can work with and how often testing needs to occur. Instructions and training on proper sample collection will be provided as well, to ensure that test results are representative of production over a given period of time, and adjusted based on size and complexity of the facility.

Both the participating producer and ABC will be issued test results. Referred to as a “nutritional label,” this datasheet will not only contain many important parameters users will be interested in, but also explain why the characteristics are important for digestate end users. Program participants will be able to use these certified results in the marketing and sale of their products, on product packaging and their websites, etc., as well as for regulatory submissions. Certified producers can use the ABC logo on these documents. Pauley says CR&R plans to have a “diverse marketing plan with a variety of users from agriculture to municipalities for use in their landscapes and parks.”

The coproducts working group is also trying to find balance between making the results transparent and allowing the producers autonomy to conduct their own business. “We [ABC] will be in possession of the results, but we’re going to want the digestate producer to be the one interacting with customers,” Serfass says. “It all revolves around customer assurance and helping people to realize the full potential, the full value of digestate.”

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