**Challenge:** Farms both large and small produce waste products and strive to control costs.

**Solution:** Some, including Stahlbush, have put waste products to environmentally and financially friendly use by installing biodigesters.

**Conclusion:** Biodigesters can generate electricity and eliminate greenhouse gas. Those featuring forward osmosis technology also can produce a concentrate that qualifies as an organic fertilizer.

**Green Waste**

Digestate waste streams are very high in solids, making traditional separation technologies useless for concentrating the stream. Stahlbush turned to Hydration Technology Innovations (HTI), an Oregon company whose proprietary forward osmosis technology has proven itself in other challenging applications such as the concentration of landfill leachate.

HTI was founded in 1986 in Albany, Ore., and quickly established itself as a leading innovator in membrane technology. HTI is the first company in the world to commercialize forward osmosis products, a technology it applies to such diverse markets as personal hydration products and oil field waste stream cleanup. Dewatering, or concentrating, a digestate waste stream is extremely challenging. On the one hand, a concentrated waste stream would be rich in nutrients and have value as an organic fertilizer. Retaining those nutrients in the concentrate is critical but requires very tight separation technology. On the other hand, the waste stream is high in solids and would quickly foul traditional filtration processes that are tight enough to retain the nitrogen, phosphorous, potassium and other desirable components.

The methane production in a digester does not reduce the water and nutrient load from the digested waste: What goes into the digester at the front end is what comes out. Any technology used to concentrate this stream must be able to handle this high-volume continuous flow.

HTI’s forward osmosis systems are designed for this type of challenge. Instead of hydraulic pressure, the process uses salt brine on one side of a membrane. When the waste stream is introduced on the other side of the membrane, the salt pulls water from the waste stream by osmosis. Because hydraulic pressure is not required, the process is extremely resistant to fouling or clogging. Forward osmosis removes 75% to 90% of the water from the waste stream, and the membrane is tight enough to retain the nutrients. The diluted salt brine is then reconcentrated using standard reverse osmosis technology, recovering the brine for reuse and generating clean water for use in the food plant or disposal.

**Sustainable Farming**

Because no additional chemistry is required, the separation process produces a concentrate that potentially qualifies as an organic product. While the organic fertilizer market still represents a niche in the larger fertilizer market, the organic food market is both profitable and growing in the U.S. and represents a viable strategy for farms to remain profitable.

HTI’s forward osmosis concentration system is expected to be fully operational by 2011. When it is, instead of buying expensive organic fertilizer, Stahlbush will be producing it internally, transforming what was once waste into a valuable resource and furthering the Stahlbush goal of sustainable farming.