Installation and Evaluation of an Innovative Swine Waste-to-Energy Management System

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**Anticipated Benefits**
1. Simple yet comprehensive waste management system
2. Renewable energy production (~500 MWh; ~500 RECs per yr)
3. GHG emission reductions (~5000 tons CO2e per yr)
4. Nitrogen loading/sprayfield reductions
5. Secondary benefits (barn air quality & animal health, odors, improved water quality)

**R&D wish list:** The specific objectives are to:
1. Evaluate, optimize and document the performance and multiple benefits of the innovative waste-to-energy management system on the Loyd Ray Farms;
2. Conduct a detailed economical assessment of the system to support future deployment of the proposed technology and to build a strategic plan for the widespread adoption of innovative waste management alternatives, including systems that generate energy from waste; and
3. Engage in technology transfer and outreach activities to facilitate adoption of innovative systems and help others access emerging renewable energy and ecosystem service markets

**System Performance Data**
- **Microturbine run time**
  - August: 79%
  - September: 87%
- **Energy production**
  - September: 36,400 kWh or an average of 51 kW
- **Biogas analysis**
  - methane content: 60%

**Project Partners:** Loyd Ray Farms, Duke University, Duke Energy, Google
**Funding Support from:** USDA NRCS and NC Lagoon Conversion Program
**System Design:** Cavanaugh & Assoc. **System Construction:** Romeo Guest

**Current lagoon**
Storage (10.5 MGal)

**Aeration Basin** (1.1 MGal)

**Anaerobic Digestion** (2 MGal)

**Pig barns:** ~8600 pigs

**Microturbine**
65 kW

**Biogas**

**Irrigation**

**Flare**

**Recycle**

**Flush**

**Food + water**

**Pig**

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