

Carbon Neutral Farm Demonstration

Problem/Issue Statement

Agriculture is energy intensive, consuming more than 1,714 Trillion BTUs (USDA ERS, 2016) for production inputs and equipment operation, and generates large amounts of liquid and solid waste. Currently, energy inputs are primarily from non-renewable resources, making carbon neutral farming impossible, while decreasing sustainability and increasing waste. By linking new nuclear energy technology (e.g. microreactors) with cutting-edge resource recovery systems (Anaerobic Membrane Bioreactor- AnMBR), it is possible to reduce carbon emissions, recover valuable resources from a variety of agricultural wastes (e.g. nutrients, organic acids, and water), generate new products (hydrogen, ammonia), and improve agricultural sustainability. Microreactors and AnMBRs are ideally suited for integrated remote operations that can run autonomously and have the potential to transform agriculture and rural America with carbon neutral farming.

Request Description

AnMBRs are an emerging environmental biotechnology with greatest potential to enable agricultural, industrial, and municipal waste treatment to achieve simultaneous, energy- positive treatment and valuable recovery of water for reuse and nutrient products. Kansas State University is currently operating the largest AnMBR pilot in the continental U.S. as part of the K-State Animal Science Farm waste management system. As part of the new infrastructure legislation, there are several new microreactor demonstration projects to improve the critical, reliable and clean energy infrastructure. Kansas State University, in partnership with the Idaho National Lab Microreactor Program and the Ultra-Safe Nuclear Corporation, is requesting \$160 million to acquire a microreactor and equipment necessary to link with the AnMBR and develop a carbon neutral demonstration facility for agriculture.

Request Goals and Expected Outcomes

K-State is a world leader in agriculture systems and engineering, developing a carbon neutral demonstration farm that links sustainable energy production from a microreactor with the current AnMBR system will revolutionize agriculture and bring about a paradigm shift. This coupled energy and resource recovery system can lead the state of Kansas and Mid-West region to support sustainable agriculture. A new factory fabricated microreactor can provide energy independence, demonstrate sustainable agriculture and provide economic opportunities to the community. K-State will house the microreactor end-use demonstration facility which will showcase the hydrogen production and Bio or Agro-waste gasification for agricultural communities and will accelerate the deployment of clean energy microreactors in Mid-west region, while ensuring water security when faced with unpredictability due to climate change.

Appropriations Subcommittee

- Agriculture, Rural Development, Food and Drug Administration, and Related Agencies
- Commerce, Justice, Science, and Related Agencies
- Energy and Water Development, and Related Agencies
- Interior, Environment, and Related Agencies

Request Type (See examples in instructions)

Funding Request Bill Language Request