Agriculture (Manure Management)

Globally, agricultural sources of methane emissions include enteric fermentation, rice planting, and livestock manure. Methane to Markets' agricultural activities focus on emissions from livestock manure, although the Partnership is exploring opportunities to expand to other methane sources. Methane produced and emitted during the anaerobic decomposition of livestock manure can be reduced, captured, and used as clean energy with anaerobic digestion technology. In 2005, the total amount of global methane from livestock manure that could potentially be utilized in this manner was estimated to be slightly more than 230 $MMTCO_2E$. Through Methane to Markets, the United States spent more than $1.9 million in 2008 advancing the recovery and use of methane at agricultural operations. Highlights of these activities are presented below.

Support for Livestock and Agro-Industrial Wastes

To stimulate the market for methane capture and use, EPA is conducting anaerobic digester feasibility assessments and technology demonstration projects in 11 countries in Southeast Asia, Latin America, and Eastern Europe. As a first step, EPA and in-country partners are identifying the resource potential for livestock manure and agro-industrial wastes by evaluating the methane reduction potential for specific sub-sectors (e.g., wineries, slaughterhouses, rice processing, dairy, fruit processing). The team is focusing on the sub-sectors with the greatest opportunities for cost-effective implementation of anaerobic digesters with methane recovery. As part of this effort, Methane to Markets developed a methodology for determining the feasibility of anaerobic digester systems at individual facilities, taking into account the size of the operation, waste management systems currently in place, potential for co-digestion of manure with agro-industrial wastes, and climate.

To date, resource assessments have been completed in Argentina and the Philippines and are underway for India, Mexico, Thailand, and Vietnam. During the project's next phase,

Reducing Methane Emissions in Vietnam

In Vietnam, swine farmers are recovering methane through household, farm, multiple-family, and communal demonstration systems. Many of these projects use recovered gas for cooking fuel, reducing the harmful health impacts of cooking with wood fuels by improving air quality in enclosed kitchen spaces. For example, in northern Vietnam's Tu Duong village, communal project participants collect pig wastes from 100 family-owned backyard piggeries. The waste is transferred through a gravity-based village canal system to a series of anaerobic digesters. The gas is piped back to the families and used as cooking and lighting fuel. The fee charged for the gas pays for system maintenance and a full-time operator.

An anaerobic digester in northern Vietnam's Tu Duong village helps provide fuel for the kitchen.

feasibility studies will be conducted at five facilities that will provide models for replication at other locations. As part of this effort, a feasibility study is being prepared for a covered lagoon for slaughterhouse wastes in Colombia, which (once completed) could provide the basis for replicating the covered lagoon design for other slaughterhouses in the country. In the final phase, the project will support construction, startup, operator training, and performance monitoring for systems at eight locations.

Improving Livestock Waste Management in Southeast Asia

Since 2004, EPA and the World Bank have supported improved livestock waste management projects in Southeast Asia. The World Bank has provided $21 million to China, Thailand, and Vietnam to develop affordable methods to help control pollution at livestock waste management facilities. As part of this program, EPA has provided financial support for demonstration projects, reviewed all technical aspects of livestock waste management programs, and begun developing sustainable policies to foster the replicating of and support for pollution control technologies, such as anaerobic digesters, over the long term. Individual countries are sharing their approaches to technical demonstrations, measuring impacts, and developing regional support infrastructure. Through the deployment of anaerobic digestion technologies and land application of waste to crops, these initiatives are mitigating water pollution from confined swine production while achieving other environmental and human health benefits. To date, six projects are in operation in China, three in Vietnam, and one in Thailand. A number of other projects are currently in the planning or construction phases.

Livestock Waste Management and Emissions Reductions in China

Dengdaming Pig Farm is a project demonstration site located in Changning Township in Guangdong Province, a major livestock production region in China approximately 90 kilometers from the provincial capital of Guangzhou. This farrow-to-finish swine farm has a standing pig population of 3,000, a typical number for swine farms in this region. An up-flow anaerobic digester with a separate floating type gas storage recovers gas to power a 60-kilowatt engine generator and produces electricity for 12 hours a day. The Chinese are also starting to demonstrate digesters that combine gas production with gas storage in factory fabricated steel tanks. These technical elements reduce costs and are critical in China's replication strategy.

Anaerobic digester at Dengdaming Farm in Changning Township, China.

International Protocol for Anaerobic Digestion

EPA is developing an international protocol to evaluate the environmental performance of anaerobic digestion systems. Currently, comparison of various anaerobic digestion technologies is difficult because system data have not been collected following a standardized methodology. The ability to compare different system design approaches with respect to biogas production, waste stabilization, and cost effectiveness on a uniform basis has been lacking. The purpose of this protocol is to provide a standardized method to evaluate different anaerobic digestion technologies and allow for comparison of the technologies. EPA assembled a panel of international experts on anaerobic digestion to review the protocol in order to assure its applicability to systems used in different regions around the world. The final protocol was completed in September 2009.