

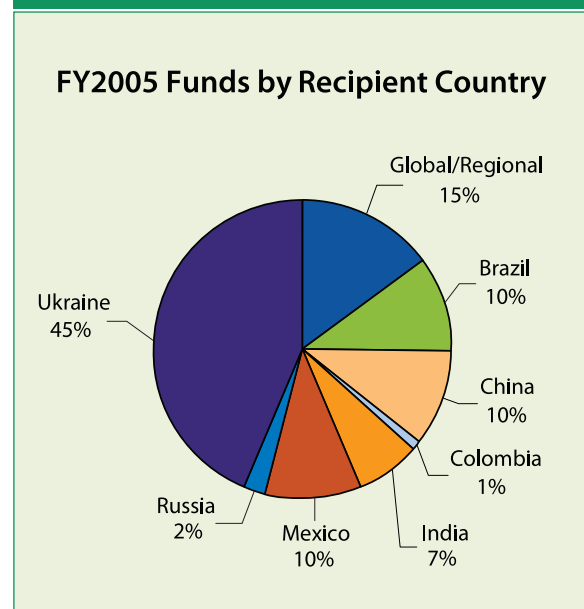
Sector Highlights

The United States, in cooperation with Methane to Markets Partner Countries and Project Network members, has participated in the Partnership's subcommittees to develop action plans to guide the implementation of activities and projects in the target sectors. These action plans identify and address key barriers and issues for methane recovery and use, address market assessment and reform issues, facilitate investment and financing opportunities, and report on progress to the Steering Committee.

U.S.-backed projects and activities directly support the action plans and focus on promoting project development in developing countries and those with economies in transition, including Brazil, China, Colombia, India, Mexico, Russia, and Ukraine (see Figure 2).



Figure 2

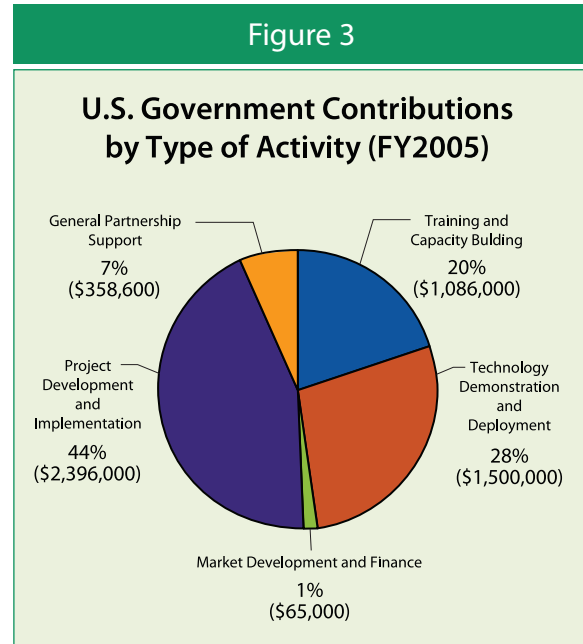


U.S. efforts are targeting near-term methane recovery and use project development by using partnerships and employing innovative approaches that leverage U.S. expertise and yield measurable results. U.S. activities are focused in the following areas:

- **Training and Capacity Building**—Creating the institutional, financial, and technical knowledge and infrastructure necessary to ensure successful short- and long-term project development.

- **Technology Demonstration and Deployment**—Showcasing available, cost-effective methane recovery and use technologies and facilitating their adoption in the global marketplace.
- **Market Development and Finance**— Ensuring the development of fully functional financial and energy markets, addressing legal and regulatory barriers to project development, and matching available investment to sound project opportunities.
- **Project Development and Implementation**—Identifying and characterizing specific project opportunities and providing technical assistance to ensure successful development.
- **General Partnership Support**—Providing support for the ASG, outreach and communication, and meetings.

Figure 3 provides a summary of U.S. government-supported activities under the Methane to Markets Partnership in FY2005.





Agriculture

The agriculture sector is the newest sector in the Partnership. Efforts in this area focus on capturing methane being released from liquid animal waste management systems and using it as a clean energy source to produce electricity. Gas-fired equipment such as engines, boilers, or chillers can be used to meet a portion of a farm's energy requirements. The U.S. government has already been an active participant in the agriculture sector, working to identify and implement improved technologies and management practices and promoting economically viable projects in targeted geographic regions across the globe. As activities in the agriculture sector gain momentum, the U.S. government is poised to make significant contributions. Some key activities and accomplishments in this sector are described below.

Livestock Waste Management in East Asia

EPA is providing technical support to a project promoting livestock waste management in East Asia. The Global Environment Facility and the World Bank are providing a \$7 million grant over 5 years to support a comprehensive approach to reduce the significant environmental and health impacts

Methane to Markets Expands to Realize Opportunities in Agriculture

In November 2005, the Partnership established a new Agriculture Technical Subcommittee to promote methane capture and use opportunities in livestock waste management. EPA, USAID, and USDA will play active roles on this subcommittee by identifying project opportunities; assisting with the development of the action plan; and recruiting participants from the private sector, development banks, and other governmental and non-governmental organizations.

from increasingly concentrated livestock production in China, Thailand, and Vietnam. This project integrates policy development and implementation, technological solutions, capacity building, and regional connections. The grant supports demonstration of cost-effective livestock waste management techniques at selected farms in these countries.

An array of projects are under development, ranging from large, modern methane recovery and waste stabilization systems in China, to smaller household and village-scale systems in Thailand and Vietnam. Multimedia-based, these projects reduce water and air pollution caused by confined livestock production. They also improve public health through the biological treatment of fecal material with anaerobic digestion technologies. These technologies are designed to recover methane that is used in energy applications such as electricity generation, lighting, cooking, shaft power, and water pumping.

Demonstration Farms in Mexico

USAID and EPA are working with the government of Mexico to develop a set of demonstration projects to showcase best practices for the capture and use of methane in large- and small-scale pig farms. EPA will train participants to install and operate biogas recovery systems and to use biogas in energy applications such as electricity generation, lighting, cooking, and water pumping. The lessons learned from these initial demonstration projects will be incorporated into planning efforts for upcoming demonstration farms in Latin America. The projects demonstrate technologies to reduce water and air pollution caused by confined livestock production, thereby improving public health in affected areas.





Coal Mining

Methane gas released due to coal mining can be captured and used as a clean energy source, yielding significant energy, environmental, and mine safety benefits. The United States remains a global leader in the CBM and CMM sector and is working with partners to share expertise, information, and technology to advance project development. Some key U.S. activities and highlights in the coal mine sector include:

Coal Mine Safety and Emission Reductions in Ukraine

USAID provided \$1.5 million in funding to the Partnership for Energy and Environmental Reform (PEER)—a non-governmental organization—and REI Drilling—a U.S.-based drilling company—to implement the Coal Mine Safety Program. PEER and REI purchased a U.S.-manufactured horizontal drill for use at two Ukrainian mines to demonstrate safe drilling techniques and to train Ukrainian crews on how to maintain and operate such equipment. After the training, the drill will remain in Ukraine and will be used to drill drainage holes at other mines in the country. The program is being managed by the U.S. Department of Labor and counterparts in Ukraine, including the Ministry of

Coal, the State Committee on Labor Safety, and selected mines. This project is expected to yield potential emission reductions equivalent to 100,000 MTCO₂E per year and contribute to increased coal mine safety and decreased coal mine mortality.



UNECE Project to Facilitate Project Financing

EPA initiated a 3-year project with the United Nations Economic Commission for Europe to address financial barriers in the development, promotion, and sale of CMM recovery and use projects in Eastern Europe. Beginning in Russia, sector experts will organize workshops and provide support to coal mine staff to develop bankable documents and project-specific business


plans to encourage investor interest in several mines. The workshops will provide a model to be replicated in countries throughout the region.

Technology Transfer in China and India

China has some significant opportunities for CMM projects. EPA co-sponsored a workshop in Beijing in December 2005 along with the Australia Greenhouse Office, Japan's New Energy and Industrial Development Organization, and the People's Republic of China State Administration of Worker Safety to share cost-effective technologies with staff from Chinese mines. The workshop featured presentations on CMM utilization and mitigation technologies; resource, economic, and risk assessment strategies; and experiences at specific Chinese mines.

EPA provided technical and financial support to help establish the China Coalbed Methane Clearinghouse in 1994 and has provided technical and financial support to the Clearinghouse since that time. The China Coal Information Institute, which manages the activities of the Clearinghouse, serves as a focal point for foreign and domestic investors and project developers to gather data and information regarding project opportunities for methane capture and use.

Using the experience in China as a model, EPA and USTDA plan to work with the India Ministry of Coal and the India Ministry of Petroleum and Natural Gas to establish a similar CBM and CMM Clearinghouse in India. The development of this information center will help to increase India's base of clean energy resources and improve mine safety.



World's Largest Coal Mine Methane Project to Be Implemented in China

Caterpillar, Inc., was recently awarded a contract to supply all the power generation equipment for the world's largest CMM-fueled power plant. Under this contract, Caterpillar will provide 60 gas generator sets—manufactured in Lafayette, Indiana—to the Jincheng Anthracite Coal Group in Shanxi Province, China. This power plant will produce 120 MW of electricity plus heat that will be recovered to produce usable hot water/steam (i.e., combined heat and power) for mining operations. Over the 20-year lifetime of this project, it is estimated, 40 MMTCO₂E emissions will be avoided. The full-scale implementation of the project involves a total investment of \$235 million and is being financed by Japan Bank for International Cooperation, Asian Development Bank, the Jincheng municipal government, and the World Bank Prototype Carbon Fund.

USTDA provided a \$500,000 technical assistance grant to support the mine during the final design and procurement phase. EPA provides support to the China Coalbed Methane Clearinghouse, which is housed within the China Coal Information Institute (CCII).



Landfills

Capturing and using methane emitted from landfills is a reliable and renewable fuel option that represents a largely untapped environmental and energy opportunity at thousands of landfills around the world. Many nations lack essential information about their landfill gas-to-energy potential as well as the funding and technical expertise necessary for project development. The United States is working with its partners to ensure that more LFG reaches energy markets. The U.S. government is providing expertise in landfill data collection, developing technical capacity, and funding pre-feasibility studies to catalyze projects. Some of the U.S. governments support activities and accomplishments are highlighted below.

Promoting LFG Projects in Latin America

EPA collaborated with the World Bank to host the Latin American LFG Project Expo in July 2005, in Montevideo, Uruguay. The objective of the event was to discuss the pre-feasibility study results for 10 Latin American landfills developed by the World Bank with financial support from the Canadian International Development Agency (CIDA). The goal of the Expo was

to encourage landfill representatives from the 10 sites to engage the private sector to seek investment opportunities for LFG projects. At least five of the 10 landfills featured at the event are proceeding to implement full-scale methane recovery projects.

Identifying Landfill Gas-to-Energy Project Opportunities

EPA has spearheaded development of a global database of disposal sites and LFG project opportunities in Partner Countries. The database will identify landfill candidates for technical evaluation, project development opportunities, and investment opportunities.

The database will be launched by 2007 on an easily accessible, Web-based platform enabling project developers from any country to easily identify LFG project opportunities and bring more projects online quickly. This will present a crucial tool for the 2007 Partnership Expo, enabling project owners to overcome some of the key challenges to landfill project development.

Landfill Gas-to-Energy Training and Capacity Building

A major barrier to project development in the landfill sector is a lack of knowledge about the opportunities and benefits of LFG capture and use projects by local landfill operators and municipalities. To overcome this barrier and build local capacity in Partner Countries, EPA developed and co-sponsored a number of workshops and training seminars on landfill methane recovery, project planning, technology options, and financing. Some of these included:

- A 2-day LFG workshop in Moscow in May 2005, which attracted more than 80 solid waste professionals from the region.
- LFG workshops in Delhi and Mumbai, India, in March 2006, co-sponsored by the Federation of Indian Chambers of Commerce and Industry (FICCI).

Landfill Gas-to-Energy in Brazil

In Brazil, 84 percent of methane emissions come from municipal solid waste. Landfills across Brazil have an estimated overall generation rate of 303 to 578 million cubic meters per year, capable of providing 60 to 144 MW of electricity. Nevertheless, very little methane is recovered from landfills. USAID is supporting the implementation of a LFG-fired power plant in the city of Fortaleza, Ceará State. As part of this project, USAID is providing technical assistance, conducting a feasibility study, promoting social inclusion activities to benefit the communities of waste scavengers living at the landfill surroundings, and organizing a workshop directed to other municipalities that have landfills with



Landfill Gas Project Development in Mexico

On March 24, 2006, EPA, USAID, and the Mexican Secretariat of Environment and Natural Resources (SEMARNAT) signed a Letter of Cooperation stating their commitment to collaborate on Methane to Markets activities in Mexico. Under this agreement, two landfills along the U.S.-Mexico border were identified for project development. These agencies, in addition to the North American Development Bank, and the Border Environmental Cooperation Commission, subsequently visited the cities of Nuevo Laredo and Ensenada to gather more information and meet with local officials.

These LFG projects are expected to reduce emissions by more than 45,000 MTCO₂E each year. USAID estimates that annual emission reductions of more than 300,000 MTCO₂E could be achieved if projects are implemented in the 14 most important landfills in the region. Replication of similar landfill projects on a national scale could reduce GHG emissions by 3 MMTCO₂E per year.

potential use for methane recovery. As a result of this project, an amount equivalent to 2.5 MMTCO₂E emissions will be avoided from 2007 through 2012.



Oil and Natural Gas

Methane is emitted from oil and gas systems as a result of normal operations, routine maintenance, and system disruptions. These emissions can be reduced by upgrading technologies or equipment and by improving management practices and operational procedures. U.S. technical expertise and leadership in this sector is well recognized around the world. In support of the Methane to Markets Partnership, the U.S. government is sharing its technical expertise and experience and working with governments and the private sector to identify and share best practices and cost-effective techniques for reducing methane emissions, improving system efficiency, and delivering more gas to market. Some of the U.S. government's accomplishments in this sector include:

Project Development in Mexico

In 2006, USAID funded two pilot projects with PEMEX, Mexico's state-owned oil company, with significant potential for methane emission reductions. These projects will upgrade compressors used in the gas pipeline transmission system and implement a technology that captures fugitive gas emissions from oil storage tanks. Implementing these two technologies will

result in estimated annual emission reductions of just over 120,000 MTCO₂E. As a first step, PEMEX and USAID are currently gathering baseline measurements at selected locations. PEMEX is also conducting a larger, company-wide analysis to inventory all oil and gas process components and equipment—including wells, dehydrators, pneumatic controls, and valves—and measuring their effectiveness. These pilot projects will shed light on project opportunities in Mexico and serve as model procedures and best practices for other Methane to Markets countries. It is estimated that replication of the pilot projects and other methane emission reductions measures throughout PEMEX can result in lowering annual emissions by more than 4 MMTCO₂E.

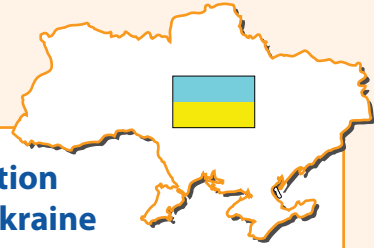




Technology Transfer in Colombia and Russia

To facilitate project development in the oil and natural gas sector, EPA has coordinated and co-sponsored a number of technology transfer workshops on cost-effective emission reduction technologies and pipeline maintenance and repair. Some of these included:

- A 2-day workshop in Bogotá, Colombia, in October 2005, co-sponsored by the Colombian Ministries of Energy and Environment and Occidental Petroleum. This workshop consisted of a series of presentations by oil and natural gas experts. As a direct result of the event, EPA is working with private industry to develop a methane emission reduction project in Latin America. Attendees have also approached EPA to promote similar events in other Methane to Markets Partner Countries, which EPA is actively pursuing.
- A 3-day workshop in Tomsk, Russia, in September 2005, hosted by the Russian Academy of Sciences. The workshop focused on identifying and quantifying oil and gas methane emissions from the Russian and Ukrainian oil and natural gas industry.



Leak Reduction Project in Ukraine

Ukraine has the second largest natural gas transmission system in Europe—35,000 kilometers long, with 171 compressor stations—and a large potential for methane emission reduction projects. Cherkasytransgas, one of the six Ukrainian gas transmission companies, recently won a grant from IUEP to evaluate and implement methane emission reduction technologies and practices at all 23 of its compressor stations. The project will provide an excellent model of best management practices on Soviet equipment for other Byelorussian, Russian, and Ukrainian natural gas companies.

Government Industry Partnerships to Reduce Emissions

The Natural Gas STAR program is a flexible, voluntary partnership between EPA and the U.S. oil and natural gas industry. Through the Program, EPA works with companies that produce, process, transmit, and distribute natural gas to identify and promote cost-effective methane reduction opportunities. Because of the growing importance of global GHG emission reductions and the development of the Methane to Markets Partnership, EPA is launching the Natural Gas STAR International Program, expanding its domestic focus to work with Methane to Markets Partner Countries and international gas companies to identify methane emission reduction opportunities worldwide.