



# The Global Methane

Climate change is affecting life as we know it around the globe, and urgent efforts are needed to address this challenge. Emissions of methane, the second most important greenhouse gas (GHG),<sup>1</sup> are responsible for more than a third of total anthropogenic climate forcing. As a constituent of natural gas, however, methane offers a unique opportunity to mitigate climate change and simultaneously increase available energy supply. Therefore, efforts to prevent or utilize methane emissions can provide significant energy, economic, and environmental benefits.

# Initiative

The goals of the Global Methane Initiative (GMI), an international public-private partnership, are to reduce global methane emissions to fight climate change, enhance economic growth, strengthen energy security, and improve local environmental quality and industrial safety. Building on experience from the U.S. Environmental Protection Agency's (EPA's) successful domestic methane emission reduction programs, GMI brings together the public and private sectors to develop projects that can reduce emissions from the agriculture, coal mine, landfill, oil and gas systems, and municipal wastewater sectors. GMI was launched in 2010 based on the strong foundation of the accomplishments of the Methane to Markets Partnership, which was formed in 2004.

GMI now comprises 40 Partner Countries and the European Commission, as well as more than 1,100 members of the Project Network—the public, private, and non-governmental organization partners that are critical to facilitating methane reduction project development.<sup>2</sup> Today, GMI Partners collectively contribute approximately 70 percent of the world's anthropogenic methane emissions. Cumulative methane emission reductions achieved through GMI total more than 128 million metric tons of carbon dioxide equivalent (MMTCO<sub>2</sub>E).

128 MMTCO<sub>2</sub>E

*cumulative methane emission reductions  
attributed to GMI*

Significant progress remains to be made, as global methane emissions continue to contribute to climate change and air pollution worldwide (see page 5).

<sup>1</sup> Intergovernmental Panel on Climate Change (IPCC), *Contribution of Working Group I to the Fourth Assessment Report*, 2007. [http://ipccwg1.ucar.edu/wg1/Report/AR4WG1\\_Print\\_Ch02.pdf](http://ipccwg1.ucar.edu/wg1/Report/AR4WG1_Print_Ch02.pdf).

<sup>2</sup> As of 31 July 2011.

## GMI: Building a Better Partnership

GMI Partner Countries work with both public and private sector organizations to advance methane abatement, recovery, and use by providing project development support, training and capacity building, technology demonstration, and market development.

Significant potential exists for cost-effective methane emission reductions. By 2020, global methane reduction potential is estimated to approach 1,800 MMTCO<sub>2</sub>E at a breakeven price of \$30 MTCO<sub>2</sub>E.<sup>3</sup> Because methane is a short-lived atmospheric gas, reducing methane emissions will have important near-term benefits for mitigating climate change.

In 2010, building on the strong foundation and successful track record of international cooperation through the Methane to Markets Partnership, GMI was launched with an emphasis on the following features:

- **Expanded Scope.** In addition to methane recovery and use, methane abatement and avoidance are explicitly included as part of the GMI mission. In addition, GMI includes the municipal wastewater sector.
- **GMI Partner Action Plans.** Partner Countries have agreed to develop national action plans to coordinate methane reduction efforts domestically and abroad, appropriate for both developing and developed Partner Countries to outline their needs and opportunities and their plans and potential to assist other countries.
- **New Resource Commitments.** Developed Partner Countries, as well as others in the broader international community, are encouraged to provide additional commitments to accelerate global methane abatement efforts.

GMI retains the organizational structure of the Steering Committee, the Administrative Support Group (ASG), technical subcommittees (Agriculture, Coal Mines, Landfill, and Oil & Gas) plus a Wastewater Task Force, and the Project Network (see page 8).

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<sup>3</sup> U.S. EPA, *Global Mitigation of Non-CO<sub>2</sub> Greenhouse Gases* (EPA Report 430-R-06-005), 2006. [www.epa.gov/climatechange/economics/downloads/GlobalMitigationFullReport.pdf](http://www.epa.gov/climatechange/economics/downloads/GlobalMitigationFullReport.pdf).

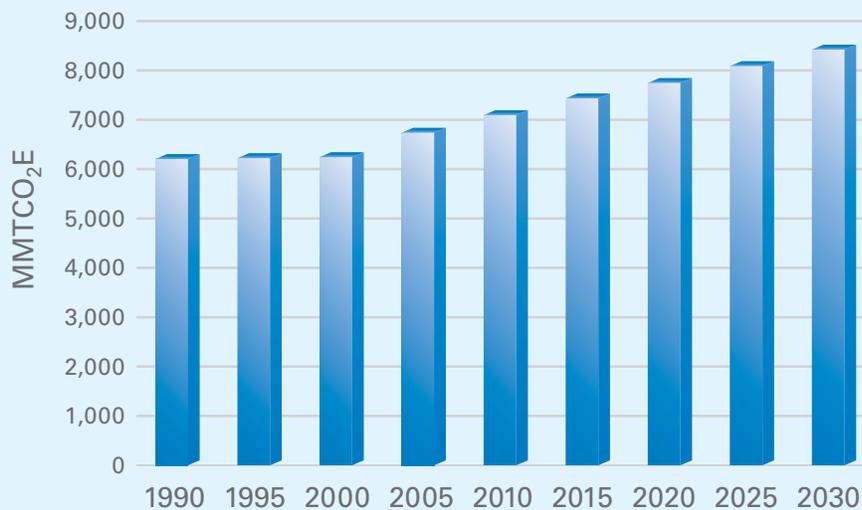
# Importance of Methane

Methane (CH<sub>4</sub>) is a potent GHG that is 25 times more effective at trapping heat than carbon dioxide (CO<sub>2</sub>) over a 100-year timeframe.<sup>4</sup> Annual methane emissions are the second most abundant GHG after CO<sub>2</sub>, with an estimated 7,194 MMTCO<sub>2</sub>E emitted from anthropogenic (or manmade) sources in 2010.<sup>5</sup> Anthropogenic sources of methane come from oil and natural gas production, coal mining, municipal landfills, wastewater, and agricultural practices, including livestock manure.

Reducing methane emissions can significantly slow near-term climate change impacts because methane traps heat more effectively than other GHGs and dissipates more quickly in the atmosphere because it has a relatively short atmospheric lifetime. Additionally, reducing methane emissions can deliver a host of other energy, safety, and local water and air quality benefits. Methane is a precursor to ground-level ozone, which, at increased levels, can cause breathing problems, trigger asthma, reduce lung function, and cause lung diseases. Recent studies estimate that reducing global methane by 20 percent could avoid more than 370,000 ozone-related mortalities between 2010 and 2030.<sup>6</sup>

Over time, anthropogenic sources of methane have increased, causing the atmospheric concentration of methane to grow 150 percent since 1750. Without more aggressive measures, methane emissions are expected to increase approximately 45 percent by 2030, continuing an upward trend far above the natural level of methane (see Figure 1).<sup>7</sup> The technologies and practices that reduce methane emissions also reduce associated volatile organic compounds (VOCs), odors, and other local air pollutants, generating additional health benefits.<sup>8</sup>

**Figure 1: Growth in Global Anthropogenic Methane Emissions**



<sup>4</sup> IPCC, 2007.

<sup>5</sup> U.S. EPA, DRAFT: *Global Anthropogenic Emissions of Non-CO<sub>2</sub> Greenhouse Gases: 1990–2030* (EPA Report 430-D-11-003), 2011. [www.epa.gov/climatechange/economics/downloads/EPA\\_NonCO2\\_Projections\\_2011\\_draft.pdf](http://www.epa.gov/climatechange/economics/downloads/EPA_NonCO2_Projections_2011_draft.pdf).

<sup>6</sup> West, J.J., Fiore, A.M., Horowitz, L.W. and Mauzerall, D.L., 2006. "Global health benefits of mitigating ozone pollution with methane emission controls." *Proceedings of the National Academy of Sciences (PNAS)*: Vol. 103 No. 11: 3988-3993.

<sup>7</sup> U.S. EPA, 2011.

<sup>8</sup> West, et al., 2006.

## GMI Launched in 2010

In October 2010, a Ministerial meeting was convened in Mexico City, Mexico, to announce a new charge for the future. Hosted by Mexico's Ministry of Environment and Natural Resources (SEMARNAT), the meeting brought together more than 65 participants from 19 countries, as well as representatives from the European Commission, the Asian Development Bank, and the Inter-American Development Bank.

During the meeting, key addresses were presented by Secretary Juan R. Elvira Quesada of SEMARNAT; Dr. Adrián Fernández Bremauntz, President of Mexico's National Institute of Ecology; and Gina McCarthy, Chair of the Steering Committee and Assistant Administrator at EPA.

The meeting concluded with adoption of a Ministerial Declaration. The Declaration formally acknowledged the success of the Methane to Markets Partnership and the need to expand and enhance global efforts to reduce methane emissions by launching the Global Methane Initiative. The Ministerial Declaration highlighted the progress made to identify and reduce barriers to technology deployment and project development, and emphasized the need for further action.

Preceding the Ministerial meeting, the Steering Committee met to approve a revised Terms of Reference (TOR) that expands the Partnership's scope to include municipal wastewater and methane abatement, development of Partnership action plans, and incorporates the name change to "Global Methane Initiative." The new TOR is effective for a five-year period through October 2015.



**GMI Partner Country delegates at the October 2010 Second Ministerial Meeting in Mexico City.**

## U.S. Government Leadership in Reducing Methane Emissions

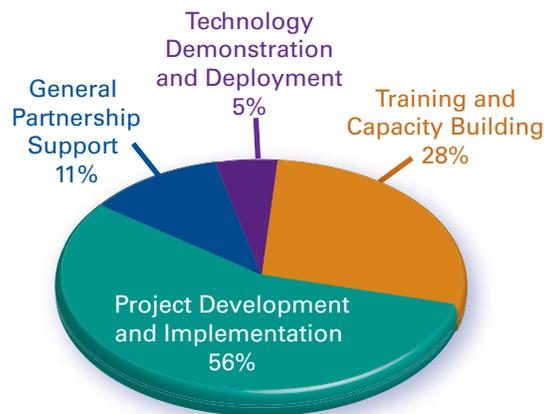
U.S. government efforts under GMI are led by EPA and involve the collective efforts of other federal agencies and departments, including the Department of State, the Department of Agriculture, the Department of Energy, the Agency for International Development (USAID), and the U.S. Trade and Development Agency (USTDA).

In 2004, the United States pledged up to \$53 million over a five-year period to help facilitate the development and implementation of methane projects in developing countries and countries with economies in transition. In 2010, the United States pledged another \$50 million to ensure the success of the GMI over the next five years. These resources will help support diverse activities, including prefeasibility and feasibility studies at potential project sites and capacity-building through technology transfer and training. Funding will also be used to support the development of tools and resources and the work of the ASG across more than two dozen Partner Countries (see Figures 2 and 3).

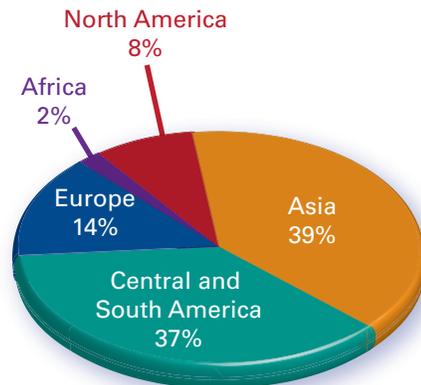
### United States Awards Grants for International Methane Projects

For 2010, EPA awarded more than \$4 million in competitive grant funding to applicants proposing methane reduction projects in GMI Partner Countries. The GMI grant solicitation was highly competitive; 115 proposals were submitted for work in 23 different countries. EPA awarded a total of 27 cooperative agreements to support methane capture and use projects in GMI Partner Countries around the world.

**Figure 2: FY 2010 U.S. Expenditures by Type of Activity**



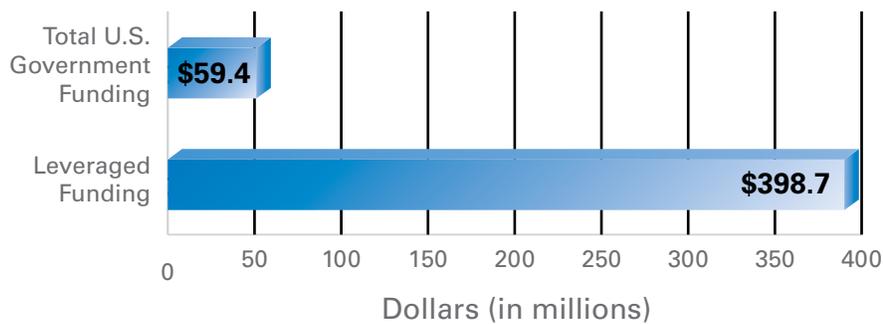
**Figure 3: FY 2010 U.S. Expenditures by Region**



Region	GMI Partner Countries in Which U.S. Government Funded Activities in 2010
Africa	Ethiopia, Nigeria
Central and South America	Argentina, Brazil, Chile, Colombia, Ecuador, Nicaragua, Peru
Europe	Bulgaria, Poland, Russia, Serbia, Turkey, Ukraine
Asia	China, India, Mongolia, Republic of Korea, Philippines, Thailand, Vietnam, Pakistan
North America	Dominican Republic, Mexico

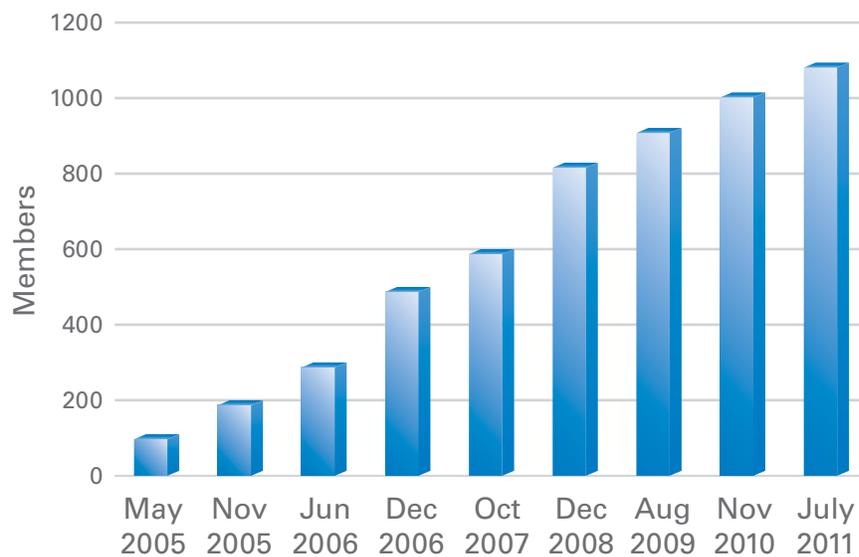
The funds committed by the United States have been instrumental in leveraging funding from other sources, dramatically increasing the reach and influence of U.S. financial support (see Figure 4). The consistently strong support provided by the U.S. government has been a major factor in the Initiative's growth in size, scope, and influence. This solid foundation will help GMI reach its expanded goals as it works to advance methane projects around the world.

**Figure 4: U.S. Government Funding and Leveraged Funding, FY 2005–FY 2010**



The GMI Project Network also contributes significantly to the leveraged funding. Today, more than 1,100 diverse organizations from six continents participate in the Project Network—a 10-fold increase from 110 members following the launch of the Methane to Markets Partnership at the end of 2004 (see Figure 5).

**Figure 5: Project Network Approaching 1,100 Members**



## Tracking Emission Reductions in Partner Countries

In 2010, GMI initiated the development of a new database to improve tracking of project-related information, particularly as it relates to emission reductions. The new system will replace the Online Project Tracking database (see text box) and integrate project data from GMI's International Coal Mine Methane (CMM) and Landfills databases. This data system will greatly improve GMI's ability to track and report information on approximately 1,500 methane project sites around the world, of which, the United States is providing technical, financial, or capacity building support to about 550 projects.

As a result of improved tracking and centralized data, GMI has better access to more accurate emission reduction project information. From 2005–2010, potential and actual emissions reductions from U.S.-supported projects approached nearly 100 MMTCO<sub>2</sub>e and more than 125 MMTCO<sub>2</sub>e, respectively (see Figure 6).<sup>9</sup> In 2010, U.S. efforts in support of GMI yielded actual annual emission reductions totaling more than 28 MMTCO<sub>2</sub>e.

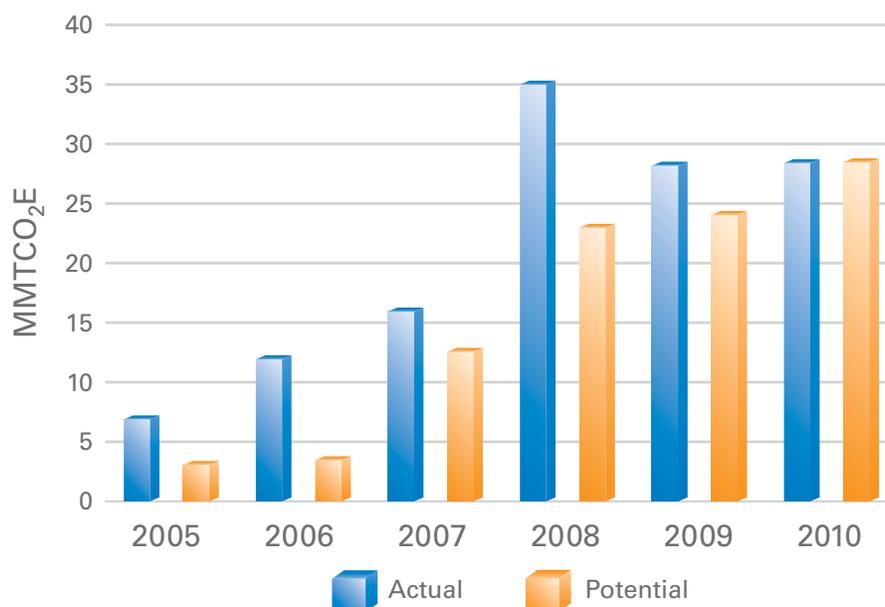
### GMI Project Tracking: Background

In 2005, the Steering Committee charged the ASG with developing an online project tracking system to serve as the central location for all projects. The database was intended to connect a variety of stakeholders and help promote the development of new projects. The tracking system allowed users to submit information and data on ongoing or proposed methane capture and use projects. Partner Countries and Project Network members seeking technical or financial support, or consultation were also invited to add project ideas and activities to this database. Additionally, the ASG input multiple projects and activities from all sectors, as well as information on projects featured at both Partnership Expos.



<sup>9</sup> U.S.-supported emission reductions are greater than previously reported values due to increased data quality, including revised estimates of potential emission reductions based on project opportunities showcased at the two Partnership Expos, and improved information on dates when projects became operational.

**Figure 6: Annual Methane Emission Reductions from U.S.-Supported Projects, 2005–2010<sup>10</sup>**



### *Capacity Building/Technology Transfer*

U.S. expertise has helped build institutional capacity and provided technical skills to many Partner Countries. By sponsoring GMI subcommittee meetings, sector-specific technical workshops, site visits, technology transfer workshops, training, and other events, the United States has transferred valuable knowledge and expertise to its international counterparts to advance methane abatement, capture, and use project development. These events are often joined with carbon reduction, renewable energy, and other incentive-based programs that provide a foundation for developing commercial-scale projects.

In 2010, U.S. agencies held 39 workshops and “hands-on” technician training in more than nine Partner Countries throughout the world, building awareness among and training nearly 1,700 individuals in all four sectors. EPA also conducted site visits at various project locations, hosted several U.S. study tours, and supported ongoing technology demonstrations (see Table 1).

The following sections of this report outline some of the notable activities and projects supported by the U.S. government in the four sectors (i.e., agriculture, coal mines, landfills, and oil and gas) over the past year and also introduce the new municipal wastewater sector.

<sup>10</sup> Potential emission reductions reflect the methane mitigation anticipated from proposed or planned activities or projects, if fully implemented. Actual emission reductions are associated with active or operational sites that have existing methane mitigation results.

Table 1. 2010 Site Visits, Study Tours, and Technology Demonstrations

Activity	Sector	Locations/Participants
Site Visits	Agriculture	<ul style="list-style-type: none"> <li>• Farm digester in Argentina.</li> <li>• Slaughterhouse in Colombia.</li> <li>• Milk production (dairy) and processing facilities in India.</li> <li>• Large-scale and small household-scale piggeries in the Philippines.</li> <li>• Swine farms in Tarlac, Philippines.</li> </ul>
	Coal	<ul style="list-style-type: none"> <li>• Guizhou Nengfa Power Fuel Development Company's Linhua Mine in Guizhou Province, China.</li> </ul>
	Landfills	<ul style="list-style-type: none"> <li>• Ensenada, Neuquen, and Villa Dominico Landfills in Argentina.</li> <li>• Changsha, Jinan, and Wuhan Landfills in China.</li> <li>• Bantar Gebang Landfill in Indonesia.</li> <li>• Norte Landfill in Mexico.</li> </ul>
Study Tours to the United States	Coal	<ul style="list-style-type: none"> <li>• China's Jincheng Anthracite Coal Mining Group and the Coalbed Methane Clearinghouse staff of the China Coal Information Institute (CCII).</li> <li>• China's State Development and Investment Corp (SDIC).</li> <li>• India's CMM Clearinghouse staff of Central Mine Planning and Design Institute (CMPDI).</li> </ul>
	Landfills	<ul style="list-style-type: none"> <li>• Representatives from Brazil's Department of Infrastructure of the State of Ceara and the Municipality of Maracanaú.</li> <li>• India's Federation of Indian Chambers of Commerce and Industry (FICCI), Geetha Environmental Solutions India Pvt. Ltd., and the Municipal Corporations of Coimbatore City, Delhi, and Madurai.</li> <li>• Representatives from Mexican companies, including: ALFA, CEMEX, Kimberly-Clark of Mexico, and Solvay.</li> </ul>
Technology Demonstrations	Agriculture	<ul style="list-style-type: none"> <li>• Biodigesters in Nueva Ecija, Nueva Vizcaya, and Batangas Provinces in the Philippines.</li> <li>• Small household-scale demonstrations in Batangas, Rizal, and Solano, Philippines.</li> </ul>
	Landfills	<ul style="list-style-type: none"> <li>• Infrared Heating Project at Escobar Landfill in Argentina (ongoing).</li> </ul>