



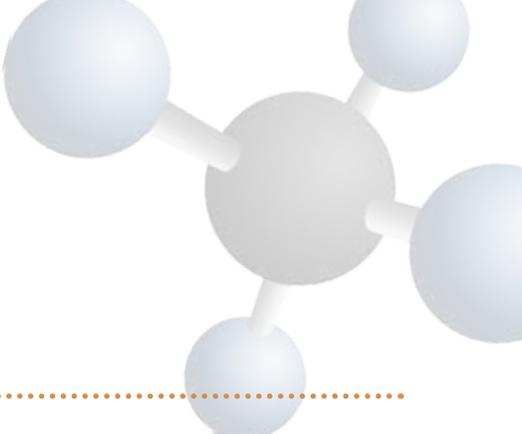
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Methane Finance Study Group Report

*Using Pay-for-Performance Mechanisms
to Finance Methane Abatement*

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About

This report looks at whether and how public funds, utilizing pay-for-performance mechanisms, may be used to incentivize reductions of methane emissions. The work is the product of an international group of experts, the Methane Finance Study Group, convened in late 2012 at the request of the G8, and facilitated by the World Bank.

This report documents the discussions of the Methane Finance Study Group. The views expressed in this report are not necessarily those of the agencies or their representatives participating in the Study Group. Group members expressed a range of views and the drafters have made every effort to reflect those views in the report. This report is not an official publication of the World Bank Group.

The report was drafted on behalf of the Study Group by Scott Cantor and Brice Quesnel with support from Peter Maniloff, Alexandrina Platonova-Oquab, and Joshua Schneck and inputs from Jessica Wade-Murphy de Jimenez, Zhuo Cheng, Claudia Barrera, and Sintana Vergara.

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To download the Study Group's report and its related appendices please visit publications at www.carbonfinance.org.

Executive Summary

An international Study Group of experts evaluated new approaches for financing projects that reduce methane emissions, including “pay-for-performance” mechanisms. Requested by the G8 and convened by the World Bank, this group recognizes the potential for these innovative mechanisms to deliver cost-effective, transparent results for climate change mitigation.¹

Why Focus on Methane?

According to two 2011 studies by the World Meteorological Organization and the UN Environment Program, aggressive reduction of methane emissions, together with actions on black carbon, can substantially slow the rate of climate change over the next few decades. Methane actions alone are responsible for approximately half of the potential identified in these reports of 0.4–0.5°C in avoided global warming by 2050, complementing the international community’s critical measures to reduce CO₂ emissions in order to avoid catastrophic climate change. Full implementation of the technically feasible

and cost-effective methane reduction measures identified would also contribute to improvements in local air quality (which will have a positive human health impact) and food security, by avoiding 27 million tons per year of crop losses in four major staple crops. Additionally, captured methane can be burned for cooking or electricity generation, contributing to increased access to clean energy. (see section I).

Unlocking Established Sectors to Reduce Emissions

Reducing methane can be achieved in a range of sectors, including oil and gas production and natural gas processing, transmission, and distribution; coal mine methane; solid waste and wastewater management, and agriculture. Across these sectors, the Study Group found that a large and growing number of abatement opportunities have been identified in developing countries, but in many cases these were not implemented due to financial and other barriers. Yet the additional revenue required to unlock these investments is often small. The methane sectors studied could deliver as much as 8,200 Mt of CO₂e over the period 2013–2020 in emission reductions in developing countries at less than \$10 per ton in incremental cost financing. Pay-for-performance mechanisms are well adapted to closing this narrow funding gap. (see section II).

¹ While the Study Group focused on financing methane mitigation using pay-for-performance in developing countries, it notes that these mechanisms could also be applied to reduce methane emissions in OECD countries (23% of the global amount in 2010, US EPA).

...the Study Group found that a large and growing number of abatement opportunities have been identified in developing countries, but in many cases these were not implemented due to financial and other barriers.

Paying-for-Performance: An Attractive Funding Mechanism

Pay-for-performance mechanisms disburse cash on the delivery of pre-determined and independently verified results. This makes them attractive instruments for governments facing expanding funding needs and scrutiny on achievements. These mechanisms can be used alone or in combination with traditional instruments such as loans, guarantees, or capacity building. Compared to traditional funding mechanisms, pay-for-performance provides increased transparency and accountability along with greater scope for innovation. They establish additional incentives that directly place a value on the public good in the real economy and offer increased scope for aid coordination and effectiveness. Such mechanisms can also be a powerful catalyst for private investment when they create creditworthy, hard-currency revenue streams which reduce emerging-market financing risks. Importantly, pay-for-performance mechanisms can be designed to directly incentivize private investment through allocation methods that maximize public value for money. (see section III).



The Study Group identifies three major opportunities for applying pay-for-performance mechanisms to methane mitigation.

Deliver a Quick-Win: Paying for Methane Emission Reductions as a Climate Finance Pilot

First, the Study Group examined an innovative approach to financing methane reductions that aims to combine immediate impact and maximum cost-effectiveness. As an alternative to up-front grants, payments are made to project implementers based on independently verified emission reductions measured in terms of CO₂ equivalent. Such an approach builds on the technical work of carbon offset standards such as the Clean Development Mechanism (CDM), the Verified Carbon Standard and the Climate Action Reserve. To date, in the CDM alone, over 2,000 projects have already issued certified emission reductions, and over 300 of these projects reduce methane. A payment program for CO₂e would not be intended to support the existing carbon markets. Instead, it would make use of all the work that has already been completed internationally to design rigorous and transparent methodologies for calculating emission reductions through offset standards. A payment program would also rely on existing offset standards' systems for monitoring, reporting and independently verifying emission reductions, thereby minimizing administrative costs. This results-based approach would use a competitive auction to determine the level of funding each project will receive, guaranteeing the lowest possible cost to the funder.

The Study Group discussed various implementation options for the payment program, such as multi-donor funding, bilateral programs or a specialization of the Green Climate Fund’s private sector facility. Regardless of the institutional arrangement, interested donors could consider a pilot on the basis of a sector’s co-benefits, or the funder’s regional preferences. More specifically, the Group found an immediate opportunity to jump-start some of the 1,200 new methane mitigation projects that were initiated, but not implemented, under carbon offset standards in developing countries, representing at least 850 Mt of CO₂e in emission reductions over the period 2013–2020. A pilot payment program could target these 1,200 “shovel ready” projects and start delivering methane reductions in as little as 1 to 2 years. (see section IV).

Scaling-up Methane Mitigation Actions of Multilateral Development Banks

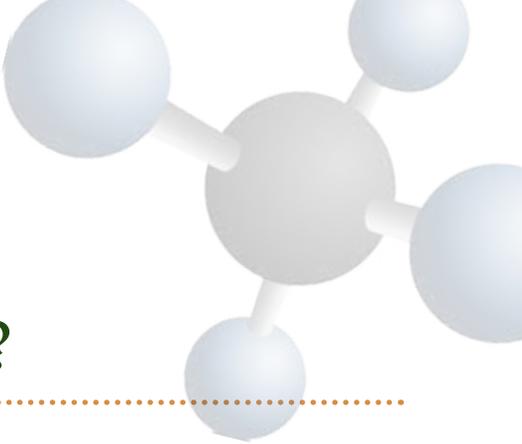
Secondly, the Group notes that pay-for-performance instruments are increasingly being used by multilateral development banks and encourages their further adoption. Output-based aid, a form of pay-for-performance, can support policy reform as well as investment programs, by linking payments to reaching milestones or meeting performance targets—such as the quantity and quality of separated waste. In particular, output-based aid or other pay-for-performance approaches could be mutually reinforcing with existing and planned methane reduction



investments of international finance institutions and development banks. (see section V).

Applying Pay-for-Performance to Methane NAMAs

Thirdly, there is an opportunity over time for pay-for-performance to support Nationally Appropriate Mitigation Actions (NAMAs) that include methane reduction activities, for instance in the waste management sector. NAMAs will target broad segments of the economy and are expected to be funded through a variety of channels, including domestic resources, donor support and private sector investments. These activities could also be supported through carbon market mechanisms—both existing and new ones. Depending on the scale and types of activities, this might require developing new methods for baseline setting and monitoring, reporting and verifying methane reductions. (see section V).



I. Why Focus on Methane?

Methane Reduction Activities Deliver Quick and Significant Climate Change Mitigation

The Group's tasking to focus on innovating financing for methane is highly relevant to address the urgency of the climate challenge. Methane emissions caused by human activities are the second largest driver of climate change behind carbon dioxide. Methane is also a short lived climate pollutant (SLCP) with an average life-time in the atmosphere of around 12 years. It joins black carbon, tropospheric ozone, and some hydrofluorocarbons in this category of pollutants where near term action can have a significant effect on near term climate change. According to recent estimates (UNEP, 2011; Shindell et al. 2012), a concerted program to reduce methane and black carbon emissions would slow global warming by approximately 0.4 to 0.5°C by 2050. In isolation, methane measures alone are estimated in the same study to lessen warming by approximately 0.3°C by 2050.

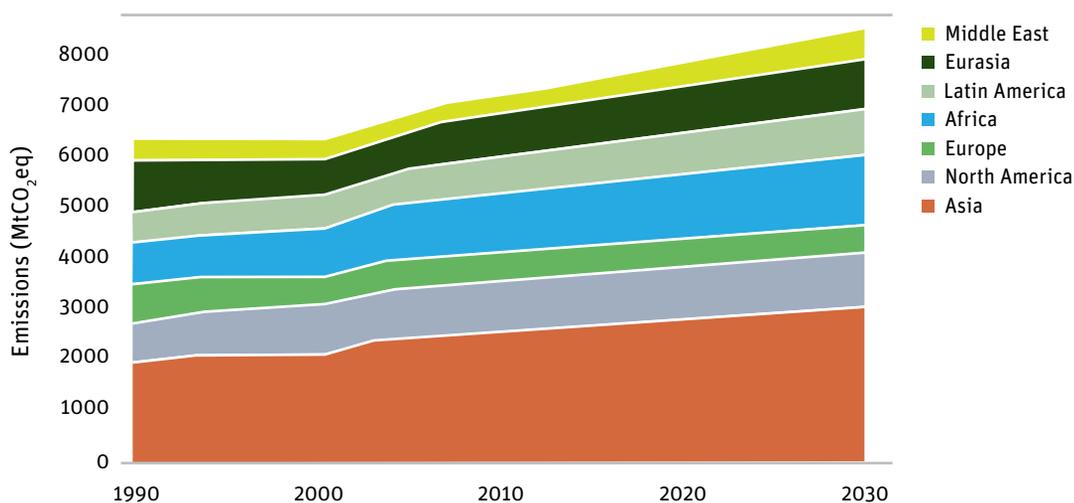
Over the next 20 years methane emissions are expected to grow by 19 percent, accounting for nearly half of all warming over this period. In its Global Non-CO₂ GHG Emissions 1990-2030 report released in December 2012, the US EPA estimates that 7,196 Mt of CO₂e of methane was emitted globally in 2010. In the absence of concerted action, this figure is expected to grow to 7,888 Mt by 2020 and 8,586 Mt by 2030. **Figure 1** shows that the growth in methane emissions over the period is expected across all regions and at similar rates.

If achieved together, a group of key measures (highlighted below in **Table 1**) would reduce methane emissions by approximately 139 Mt per year relative to a baseline scenario in 2030 and achieve the global benefits of slowing global warming mentioned above. This reduction would also contribute to narrowing the multi-gigaton gap in greenhouse gas emissions likely to occur in 2020 between the lower emissions consistent with the 2 degree target and the higher emissions expected according to country pledges (UNEP, 2012). Lowering methane emissions along these lines would also reduce the concentration of ground-level ozone and

help avoid tens of thousands of premature deaths and substantial crop losses caused by this type of ozone every year (UNEP, 2011).

As highlighted for policy makers by the 2009 Methane Blue Ribbon Panel report, some consider curbing methane emissions even more critical over shorter time horizons. The report noted “methane reductions anywhere will slow Arctic warming and relatively quickly. When measured on a 20-year timescale gram for gram methane reductions have at least 70 times the cooling effect as the same amount of CO₂ reductions...[and] Twenty years represents a

FIGURE 1: Global Emissions of Methane by Region, 1990–2030



Region	1990	1995	2000	2005	2010	2020	2030
Africa	841	846	911	1037	1,154	1,275	1,409
Central and South America	606	639	663	795	784	856	911
Middle East	277	291	400	405	41	519	585
OECD	1,666	1,668	1,617	1,572	1,628	1,708	1,807
Non-OECD Asia	1,784	1,933	1,936	2,150	2,286	2,535	2,829
Non-OECD Europe & Eurasia	1,095	829	799	857	901	994	1,045
World Total	6,269	6,205	6,324	6,816	7,196	7,888	8,586

Source: EPA 2012. Global Anthropogenic Non-CO₂ Greenhouse Gas Emissions: 1990–2030.

critical time period for the Arctic and other sensitive areas” (Methane Blue Ribbon Panel, 2009).

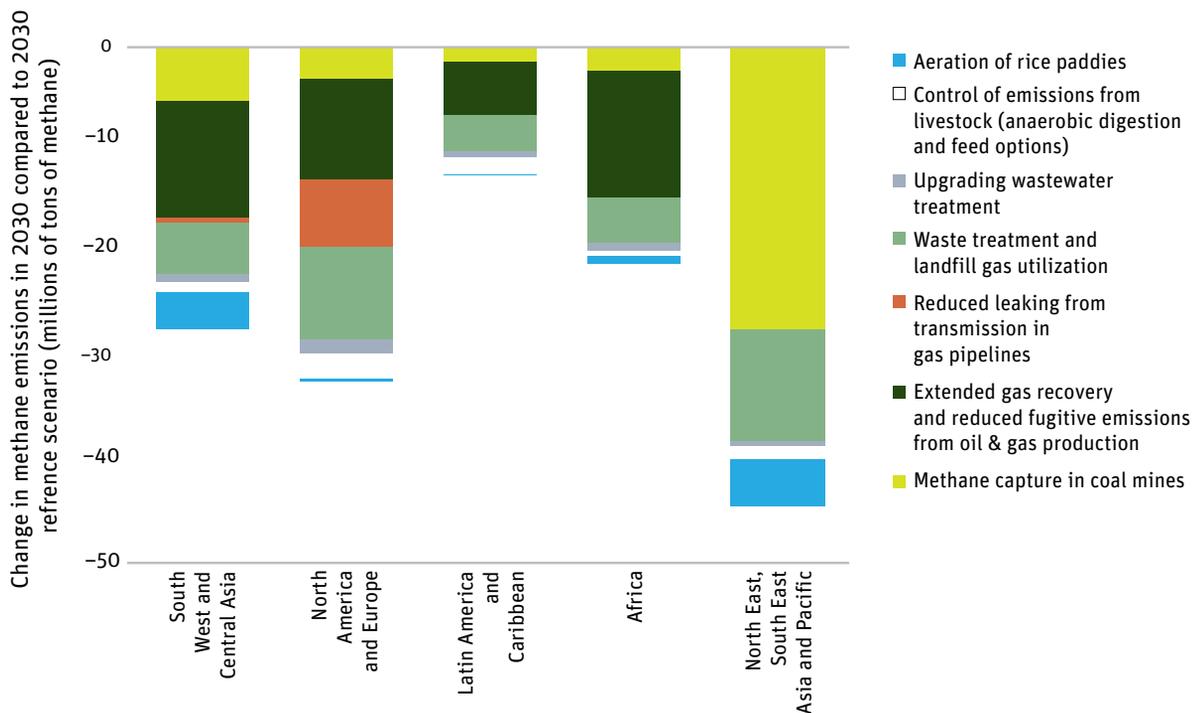
While methane has the potential to provide low-cost abatement, the Study Group

emphasizes that near-term efforts to curb emissions of it and other SLCPs must be matched with near term measures and longer term structural changes that reduce carbon dioxide and other longer-lived greenhouse gases.

TABLE 1: Seven Key CH₄ Measures Identified by UNEP for Methane Abatement

Measure	Sector
Extended pre-mine degasification and recovery and oxidation of methane from ventilation air from coal mines	Fossil fuel production and transport
Extended recovery and utilization, rather than venting, of associated gas and improved control of unintended fugitive emissions from the production of oil and natural gas	
Reduced gas leaking from long-distance transmission pipelines	Waste management
Separation and treatment of biodegradable municipal waste through recycling, composting and anaerobic digestion as well as landfill gas collection with combustion/utilization	
Upgrading primary wastewater treatment to secondary/tertiary treatment with gas recovery and overflow control	
Control of methane emissions from livestock, mainly through farm-scale anaerobic digestion of manure from cattle and pigs	Agriculture
Intermittent aeration of continuously flooded rice paddies	

FIGURE 2: Regional and Sector Distribution of 139 Mt of Methane Emission Reductions in 2030 Achieved with the Identified Measures in Table 1, Compared to the Reference Scenario in 2030



Source: UNEP Synthesis Report Near-term Climate Protection and Clean Air Benefits: Actions for Controlling Short-Lived Climate Forcers.

Methane Mitigation Activities also Provide Important Co-benefits

In addition to mitigating climate change, reduced methane emissions will deliver significant additional benefits including reduced air pollution, increased agriculture yields and improved public health. Methane is a precursor to tropospheric ozone, an air pollutant that is ubiquitous in the modern urban and rural environment. At high concentrations, ozone is phytotoxic and leads to crop losses. The effects of measures to reduce tropospheric ozone from methane tend to be global and not constrained to the regions implementing those measures as methane has a longer atmospheric lifetime than other ozone precursors and travels longer distances becoming mixed in the atmosphere (UNEP Synthesis Report, 2011). It is estimated that if action is taken on the methane measures referenced in table 1, as much as 27 million metric tons of crop yield losses in just four staple crops (wheat, rice, maize and soybeans) could be avoided in 2030, saving \$4.2 billion (Shindell et al., 2012).

In addition to mitigating climate change, reduced methane emissions will deliver several significant additional benefits including reduced air pollution, increased agriculture yields and improved public health.

High ambient concentrations of tropospheric ozone can also significantly

increase the risk of many respiratory and cardiac health endpoints including asthma and heart attack (US EPA, 2006). Ozone is a strong oxidant and respiratory irritant; it can damage the surface of the lungs and the lining of the esophagus (US EPA, 2006). The same study by Shindell et al. estimates that if action is taken on the key methane measures by 2030 47,000 premature deaths could be avoided annually, saving an estimated \$148 billion.

Improved air quality has many other benefits, including increased visibility, reduced infrastructure damage, reduced acid deposition, and other local welfare benefits (US EPA, 2006). In addition to these general co-benefits, methane reduction activities can deliver important localized benefits such as reduced pollution run-off, improved municipal solid waste management and wastewater collection and clean power generation (therefore contributing to the universal goal of providing “sustainable energy for all”). These are often the motivating drivers locally for methane abatement action.

Relative to other Abatement Opportunities, Methane Is among the Lowest Cost Options

Relative to other global greenhouse gas abatement opportunities, methane is among the lowest cost options. Methane is unique as a greenhouse gas because, being a combustible fuel source, it can have a monetary value. Consequently, several activities that capture methane emissions have a negative or positive, but very low economic cost when the value of the captured methane is considered.

As highlighted by the McKinsey Global Abatement Cost Curve, landfill gas for electricity and waste recycling have the potential to be economically profitable under appropriate conditions, while livestock management practices and composting of new waste are estimated as a low-cost option (depending on scale and technology employed). Also, several activities in the oil and gas sectors, including a reduction in flaring can be economically profitable (McKinsey, 2009).

In addition, top-down academic studies have also pointed to methane for its potential to deliver some of the least-cost opportunities to reduce global greenhouse gases. Highlighted are the low abatement costs from capturing vented gas associated with oil production, fixing gas pipelines, livestock waste management, landfill gas utilization for energy, flaring and composting as well as the recovery of coal mine methane (UNEP, 2011, Smith et al., 2007, Delhotal et al., 2006).

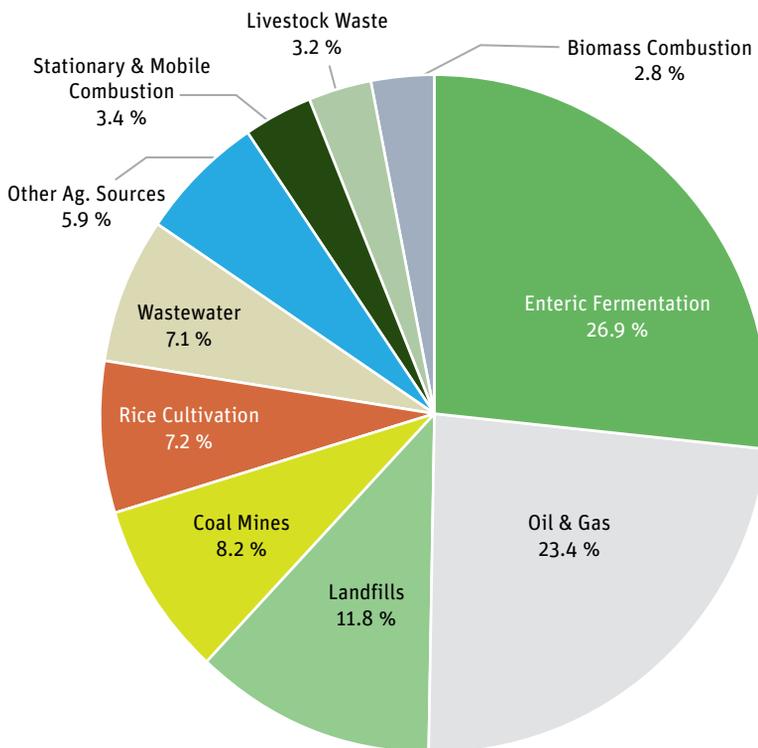




II. Unlocking Established Sectors to Reduce Methane Emissions

Most methane emissions come from a limited number of sectors. The study group focused on five with the identified potential for mitigation finance: the oil and gas sector, solid waste management, wastewater treatment, coal mining, and the livestock waste sector.

FIGURE 3: Global Anthropogenic Methane Emissions by Sector, 2010



Source: US EPA 2012. Summary Report: Global Anthropogenic Non-CO₂ Greenhouse Gas Emissions: 1990–2030.

Methane emissions can come from all stages of the natural gas value chain, including production, processing, and pipeline transport. Emissions from both leaks and deliberate releases may comprise over 4 percent of global natural gas production. Emissions in the oil sector arise from leaks in both production and processing because methane-rich natural gas deposits are often co-located with oil deposits. Meanwhile, in the waste management sector, landfills give off methane during the breakdown of organic matter. This can be reduced by either capturing the methane via installed pipes and burning it or using it for electricity, or by broader efforts to reduce the amount of organic matter entering the landfill, including recycling and composting or anaerobic digestion. Examples from EU-27 countries show that restricting untreated municipal solid waste from landfills leads to significant reduction in GHG emissions, at the same time contributing to higher resource efficiency (EEA 2011; UBA 2010).

A wide range of methane abatement opportunities have low or negative economic cost.

Wastewater gives off methane produced during anaerobic breakdown. At centralized treatment facilities this methane can be captured and combusted. However, many areas lack centralized treatment facilities for wastewater, instead using septic systems, latrines, and open sewers, which give off methane. Replacing latrines and open sewers with centralized sewers and treatment facilities not only reduces

methane, but also dramatically reduces human disease transmission. The health benefits of disease reduction are typically even larger than the benefits of greenhouse gas reductions.

Like landfills and wastewater, livestock solid wastes give off methane during the anaerobic decomposition of organic matter. Anaerobic decomposition typically occurs when the wastes are stored in liquid systems for extended periods of time. Methane is also released from coal and surrounding rock strata due to mining activities. This coal mine methane is a direct safety hazard and is thus vented to the atmosphere. Capturing and burning this methane reduces its global warming impact and the gas can also be utilized for power generation, district heating, boiler fuel, town gas, and in the case of high-quality gas, can be sold to a natural gas pipeline.

As highlighted above, a wide range of methane abatement opportunities have a low or even negative economic cost. **Table 2** illustrates this by providing an estimate of the millions of tons that could be avoided in developing countries cumulatively between 2013 and 2020 given a certain economic incentive, presented as a price per ton of CO₂e. Clearly, effective and low-cost abatement measures are available in coal mine methane. These reduction technologies are well understood, and often low-cost, with 1,900 million tons of CO₂e reductions possible between 2013 and 2020 if a \$10 per ton or lower financial incentive is added. Options for capturing gas from landfills and for using it to produce electricity are well-tested and often low-cost, with a number of CDM projects ongoing, and an estimated 1,600 million tons of CO₂e

Table 2: Needed Incremental Cost Finance to Incentivize Abatement**Mt CO₂e Abatement Potential in Developing Countries^a by Sector at Break-Even Price \$/tCO₂e (Cumulative 2013–2020)^a**

	\$0	\$5	\$10	\$15
Coal Mine	404	1,763	1,902	2,088
Landfills/Waste Management	814	1,293	1,581	1,776
Wastewater	6	10	13	27
Oil & Gas ^b	2,647	3,427	4,122	4,368
Livestock Management ^b	357	450	538	633
Approximate Total	4,200	6,900	8,200	8,900

Source: US EPA 2012. Preliminary Draft Global Mitigation of Non-CO₂ Greenhouse Gases Report, March 2012.

^a Non-Annex I countries are proxy for developing countries; Analysis uses US EPAs 'global' figures and excludes US, Canada, Australia and Europe (as defined by EPA study).

^b Preliminary data from US EPA; Global Mitigation of Non-CO₂ Greenhouse Gases Report.

reductions available between 2013 and 2020. For both oil and gas emissions, it is estimated that approximately 4,100 million tons of CO₂e reductions are available between 2013 and 2020 at or below \$10 of incremental incentive. In the wastewater sector where local benefits of wastewater treatment and methane capture outweigh the mitigation benefit, the incremental cost of methane capture is relatively high with just 13 million tons of CO₂e estimated to be available with a \$10 per ton incremental financial incentive. Finally, with livestock management, the projects can vary in size from smallholder to industrial scale. By 2020 it is estimated for the sector as a whole that about 540 million tons of CO₂e could be abated with an addition of \$10 or less financing per ton. In total, by summing the potential of these five sectors between 2013 and 2020 with a \$10 or less financial incentive per ton, it is estimated that

emissions could be reduced by 8,200 million tons of CO₂e.

By definition, all activities with a positive abatement cost face a “financial barrier” and need to find a source of revenue to overcome it. But the financial barrier is not the sole reason methane abatement projects are not being implemented anywhere near the pace and scale at which they should be to meet short-term climate goals. Despite low or even negative costs, methane mitigation activities are not being carried out due to a range of non-financial barriers (see **Box 1**). The study group concluded, based on members’ experience and analysis of existing offset markets that methane abatement project developers are able to overcome both financial and non-financial barriers if incremental financing is offered, such as with a pay-for-performance mechanism.

Box 1. Overcoming Non-financial Barriers

In the agricultural sector, documented barriers include limited local bank knowledge about the technical aspects of the methane emission reduction processes. Also, local farmers are sometimes unaware of affordable methane reduction technologies and can be concerned about the scrutiny public stakeholder consultations will bring.

In the solid waste and wastewater sectors barriers include poor local or community enabling environments. Often municipal governments provide insufficient fees for the disposal of waste. Newly elected public officials have also been known to stymie the work of past administrations. With landfill gas, the project may be located far from gas demand sources or pipelines. With wastewater, working closely with the local water utility and within its policies has proven important to overcome risks that are outside the control of the methane reduction project developer.

In the oil & gas and coal mine sectors, there is a wide range of capacity among operators. Some firms lack access to capital and technology, while in other cases it is difficult to convince managers to focus on methane reducing revenue generating projects that are not related to the firm's core business. In the pipeline sector it is documented that the contractual nature of the relationship between the owner of a gas pipeline and the owner of the gas itself can fail to provide incentives for fixing leaky pipes.





III. Results-Based Finance: An Attractive Approach to Public Spending

Results-based Financing is Receiving Growing Attention

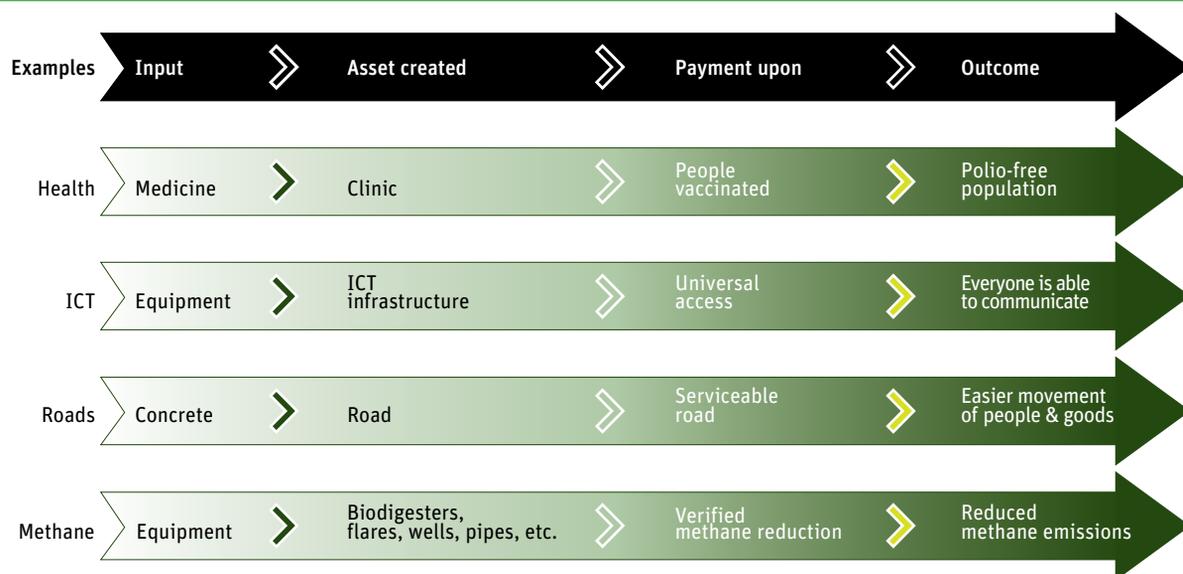
Pay-for-performance mechanisms, also known as results-based financing (RBF), are increasingly considered and employed by donors and governments to support development objectives and domestic policy goals. RBF was pioneered in the health sector, and has been used successfully as a form of payments for ecosystem services in Costa Rica. RBF serves as the backbone of anticipated payments for REDD+ and is increasingly being considered as a means for financing the adoption of low-carbon development pathways and GHG emissions abatement, including through the Green Climate Fund.

The defining element of RBF is that payments are made upon the delivery of pre-defined, verified results. In doing so much of the performance risk is shifted from the funder to the project implementer, which creates added incentives for these providers to succeed. Offset schemes such as the Clean Development Mechanism (CDM) of the Kyoto Protocol are forms of RBF that reward the production of a specific and quantified outcome—the reduction of greenhouse gas (GHG) emissions equivalent to one ton of CO₂. The CDM has delivered significant results to date, including the registration of 6,500 projects and the issuance of 1.2 Gt of CO₂e from nearly 2,100 projects, of which more than 300 are in methane sectors.

A successful RBF approach requires three main conditions be met. First, both the funder and the project implementer must possess institutional capacity to, respectively, set up and respond to an RBF incentive mechanism. Second, the project implementer must be able to access sufficient amounts of capital to undertake the project. Lastly, the funder and project implementer need the ability to monitor and verify results against which payments are made.

A number of factors impact the costs faced by project implementers under an RBF contract. These include the extent to which results being incentivized are largely under the control of project implementers, the size of the upfront investment, and the length of time between project

FIGURE 4: Sector-by-Sector Examples of Results Based Finance



Source: Adapted from the Global Partnership for Output Based Aid

investment and RBF payout, with longer time horizons corresponding to increased costs. RBF instruments can be used in conjunction with other more traditional financing instruments such as up-front grants, loans, equity, or guarantees.

RBF is attractive to funders

From the point of view of the donor or funder, RBF is very attractive since it ensures that resources will only be spent if and when a result is achieved. In the area of climate change mitigation, donors see RBF as an attractive avenue to reconcile increased funding needs and growing fiscal and political pressures to demonstrate value for money. RBF provides funders increased transparency and accountability—with clearly defined targets and the linking of payment to a robust, independent, and transparent verification process. This leads to the argument that RBF can lead to greater aid effectiveness—with clearer linkages of public expenditures to

outcomes of interest. RBF mechanisms also transfer much of the project performance risk to the service provider, whose payment is now contingent upon delivery of results, creating added incentives for providers to succeed. RBF can also improve cost-effectiveness—by providing an opportunity to use a competitive allocation to identify lowest-cost providers, and only paying for desired outputs and outcomes.

RBF is attractive to recipients

RBF allows for increased scope for innovation—as service providers typically have a greater choice in deciding how results are to be achieved. When used to disburse official development assistance, RBF intrinsically enhances aid harmonization, since all donors will disburse their aid under the same conditions and procedures—if and when pre-agreed outcomes are achieved. This reduces aid transaction costs and provides more flexibility for the aid recipient.

IV. Deliver a Quick-Win: Paying for Methane Emission Reductions as a Climate Finance Pilot

The Study Group considered a number of RBF instruments in the methane sector. The Group noted that providing results based finance to methane abatement projects by paying for emission reductions measured and verified in terms of CO₂ equivalent is a unique opportunity to deliver quickly, and in a highly cost-efficient way, a large volume of methane reductions. The RBF instrument would take the form of a contract between a funder (such as an individual donor, a multilateral fund, or a specific window of a multilateral institution) and a project implementer (in most cases a private sector entity), whereby the funder commits, under specified conditions, to pay an agreed amount for each ton of CO₂e in emission reduction achieved by the project implementer. The emission reduction would be independently verified by a third-party auditor.

This approach builds on the successful experience of over 10 years with offset mechanisms in the carbon markets. As demonstrated in this context, the revenues associated with a contract for units of CO₂e reduction can provide the missing incentive for the project entity to invest in a methane mitigation activity, and help raise the needed equity and debt or overcome other barriers to implementation. In some cases, such as when the collected methane is destroyed rather than sold or used for power generation, these emission reduction payments will be the only source of income for the project. This approach takes advantage of existing carbon accounting methodologies, the large institutional architecture for monitoring, reporting and verification, as well as the transparency of the CDM (as well as other standards, for example, Verified Carbon Standard (VCS) and Climate Action Reserve (CAR)).

Figure 7: Steps to use CO₂e to Pay-for-Performance for Methane



carbon markets their rigorous and tested infrastructure for independently quantifying and verifying emission reductions, with little to no impact on the supply of credits in the market. Funders choosing this approach would, in effect, be providing results-based climate finance. Conversely, some payment approaches work in connection with a carbon market, and can be ultimately less costly to the funder. One unique feature of one of these payment approaches is that it contains an embedded financial incentive for the project implementer whose project is at risk of failure to find another project more likely to deliver methane reductions. The funder in this case would not only be certain to pay only when methane is abated, but would also have the additional comfort that its funding commitment will eventually deliver the expected reductions.

The Study Group noted that paying for CO₂e reductions offers a number of strengths

The Study Group noted that funders can choose to provide payments for methane emission reductions in different ways (see explanation of Quantity Performance Instruments in appendix 1). The choices differ in how payments for emission reductions relate to an underlying carbon market, and in their degree of flexibility. It is possible to implement payment instruments in ways that only borrow from

among RBF instruments for methane. First, and by design, they provide a direct measure of the climate benefit achieved by the funder (e.g., the methane reduction). Second, they allow a direct engagement with the private sector. Third, and uniquely, they can be allocated in the most cost-efficient way, using an auction mechanism to ensure price discovery (as discussed in appendix 1), therefore guaranteeing to the funder that

the project implementer receives only the minimum amount of subsidy required. By creating a predictable revenue stream, payments for CO₂e reductions can be a powerful catalyst for private investment, especially when they come from a AAA credit rated (or similar) institution or fund, and are paid in hard currency. These payments help reduce emerging market financing risks for foreign investors and project implementers and facilitate raising equity and debt finance.

A final positive feature of delivering RBF by paying for CO₂e, is that by relying on existing regulatory standards it would also benefit from these standards' pipeline of early stage projects that have been identified, but are not moving forward to be implemented because of low prices in the carbon market (or "stranded assets"). The study group noted a conservative estimate of 850 Mt CO₂e of emission reductions from methane abatement projects that could immediately move forward if offered access to a buyer (see appendix 4). Funders choosing to buy CO₂e reductions have the power to allocate capital to the lowest cost and low risk abatement projects (i.e., the low hanging fruit), and when used in conjunction with auctions, ensure that these projects are funded at the lowest possible cost. Meanwhile, purchasing emission reductions can also be tailored to allow funders to target certain methane reducing technologies or countries. To do

this, the purchase rules could dictate the technologies eligible for funding or the countries permitted, as funders may demonstrate preferences for project types with the most environmental or developmental co-benefits and countries where results based finance can achieve the greatest impact.

Beyond mobilizing these "stranded projects", buying methane emission reductions could also incentivize additional ("new") projects, where the average "time-to-market" in the case of the CDM has been found to be about 1.8 years to achieve registration. The Study Group therefore noted that a purchase scheme has the potential to quickly start



generating methane emission reductions and disbursing funds.

The Study Group encourages all interested donors to consider this innovative and highly attractive approach which combines immediate impact and maximum cost-effectiveness. Various implementation options can be envisaged. A fund could be established within an international financial institution, allowing interested funders to pool resources for maximum efficiency. A number of bilateral donors have developed

deep in-house expertise on methane mitigation and carbon offsets and could implement such mechanisms rapidly. A sub-theme of the Green Climate Fund private sector facility may also be devoted to these approaches. Regardless of the institutional arrangement, a pilot targeting a sub-set of the 8,200 Mt available at \$10 per ton or less between 2013–20, could be selected on the basis of co-benefits or regional preferences, and start delivering methane reductions in as little as 1 to 2 years.



V. Scaling-up Methane Mitigation through Pay-for-Performance

Multilateral Development Banks

The Study Group highlighted the potential for results based finance to be delivered through Multilateral Development Banks. While the size of Official Development Assistance (ODA)—about \$134 billion (OECD, 2011)—is small in comparison to global foreign direct investment of \$1.6 trillion (World Bank, 2011), or local private investment, multilateral institutions, by incorporating results-based financing principles can have a demonstration and leveraging effect, proving RBF’s merit and impact.

In 2012 the World Bank approved a new lending instrument, the Program-for-Results (PforR), which aims to strengthen government programs by working with a program’s own systems and linking the disbursement of funds directly to the delivery of results. Disbursements are directly linked to the achievement of tangible and verifiable results. Disbursement-Linked Indicators, or DLIs, are used to provide governments with incentives to achieve critical program milestones and improve program performance. DLIs can be outcomes, outputs, intermediate outcomes, or process indicators that are key actions needed to address specific risks or constraints in order to achieve development objectives. The first operations to use this new approach were in Morocco (education), Nepal (transport), Tanzania (urban), Vietnam (water and sanitation) and Uruguay (transport). Early results indicate that the overall engagement and discussions on results and DLIs have fundamentally changed the dialogue between recipient countries and the World Bank.

The Asian Development Bank (ADB) is pursuing piloting of results-based lending (RBL) for programs, with the acceptance of a policy paper on the topic approved by its Board in March 2013. According to the paper, “the program will support government-owned sector programs, and link disbursements directly to the achievement of

program results. The design and implementation of programs supported by RBL will include ex ante assessments of the program and its systems, ex post results verification, and systematic achievement of program results. ADB is also working with the Government of Norway on implementing results based financing in the energy sector in Bhutan and has started implementing output based aid modality in urban, water and now in energy sectors in various countries in Asia. Other MDBs, including the IADB, the EBRD, and the AfDB are incorporating results-based financing features in their lending.

The methane sectors within the MDB lending portfolios provide fertile ground to expand RBF. In manure management, gas flaring/leak reduction and municipal solid waste the World Bank is active, having invested

approximately \$1.2 billion from FY2007–12. RBF is being successfully employed in projects through traditional carbon finance as well as Output-Based Aid, which provides a performance based subsidy, usually to make an unaffordable outcome affordable to households. The Global Partnership on Output-Based Aid, hosted by the World Bank with partners AusAID, Sida (Sweden), DFID, DGIS (Netherlands) and the IFC is piloting projects in the solid waste sector that use performance based incentive payments to holistically improve the management of municipal solid waste, by reducing the volume of waste that is landfilled (through composting, recycling, etc.), therefore acting at the source of the methane emission (see **Box 2**). The Study Group recognized the down-stream impact such approaches can have on methane emissions and encourages MDBs to extend their application.

Box 2. Achieving Methane Reductions through Results-based Financing (RBF) and Output-based Aid (OBA) for Integrated Solid Waste Management (SWM)

Upstream investments in integrated waste management, such as waste minimization and source separation, can lead to greater downstream benefits, including reducing methane (and other GHG) emissions. These approaches face two main challenges: (1) solid waste investors' focus on capital investments, particularly disposal infrastructure, and (2) how to incentivize the behavioral changes needed to separate waste into reusable components. RBF delivered through OBA can be used to address these challenges. By paying directly for the desired outputs (e.g., quantity and quality of source separated waste), rather than for the downstream infrastructure (e.g., landfills), RBF can incentivize critical actions that reduce methane, complementing downstream investments.

The World Bank-funded Ningbo Waste Minimization and Recycling Project (\$4 million) will apply an RBF approach to incentivize source separation of waste and achieve global environmental benefits. The objective of the project is to divert municipal solid waste from landfills and incinerators for productive reuse. Towards this aim, an RBF scheme will provide incentive payments to neighborhood resident committees, based on the quantity and quality of their separated waste (recyclable material, food waste and household hazardous waste). Increasing source separation reduces the quantity of waste going to landfills, thus preventing methane emissions. Organic waste will be anaerobically digested, and the resulting methane (up to 30,000 m³ biogas per day) will be used for electricity generation. Separating the organic waste will allow for improved material recycling (thus reducing natural resource extraction), and using the resulting compost will further reduce GHG emissions from waste management, and will contribute to soil fertility. The municipality will also save money from an extended life of the landfill, which will receive less waste.

Sector and Policy Level Action Policy

RBF and NAMAs

The Study Group also considered another promising opportunity for using RBF in the methane sector—to finance countries’ Nationally Appropriate Mitigation Actions (NAMAs), where RBF could be structured to make payments against a variety of outcomes, including implementation of policy actions made by governments.

NAMAs were introduced at the United Nations Bali Climate Change Conference in 2007. While there is no unique or agreed definition of a NAMA, the concept focuses on the voluntary implementation of GHG reduction activities in developing countries that are not subject to mitigation commitments. The Cancun Agreements (2010) recognize two kinds of NAMAs—those developed with domestic resources (“unilateral NAMAs”) and those requesting international support (“supported NAMAs”). NAMAs can also comprise elements of technology transfer or capacity building. Supported NAMAs are expected to receive financing from bilateral or multilateral donors, or through facilities such as the Green Climate Fund or the Global Environment Facility. Such approaches are also being considered and discussed in the context of future carbon market mechanisms under the United Nations Framework Convention on Climate Change (UNFCCC), and some countries have proposed ‘credited NAMAs’ which are financed through the generation and sale of carbon credits.

While a NAMA may encompass a specific project or measure to reduce emissions in the short-term, it may also include policies, strategies and research programs that lead to emission reductions in the long-term. Many developing countries are now developing NAMAs based on their national development plans,

where GHG emission reductions are considered in the context of broader strategic, long-term sustainable development benefits and aim at catalyzing transformational change towards a low carbon society. While momentum on NAMAs is accelerating, with many international activities and proposals underway, few NAMAs have reached the implementation stage. International support currently focuses on creating ‘readiness’ by building capacity and raising awareness, by setting up processes and institutions, and by developing NAMA proposals.

As of March 2013, among the NAMAs that are seeking international finance, technology or capacity building support, and that indicate specific actions, nine were targeting the waste sector (Ecofys 2013). Examples include an organic waste NAMA in Tunisia which envisages a coordinated package of measures to significantly reduce methane emissions from agricultural waste, market waste, waste products from food production, and sewage sludge (Wuppertal Institute, 2011). NAMAs offer the possibility to work beyond the level of individual projects and reward government regulations or other policy actions that restrict methane emissions.

RBF has a role to play together with other financing instruments to support policy-level or other broad approaches to methane mitigation within NAMAs. RBF could be used to disburse ODA or climate finance to the host government (in the case of supported NAMAs), but also as a financing instrument within the NAMA itself, to support methane reducing activities or investments



implemented inside the country. Another form of RBF support to a NAMA would occur in the case where its implementation would lead to the generation of carbon credits to be sold in carbon markets. While using RBF to support NAMAs offers wide flexibility in choosing the outcomes against which payments will be made, significant conceptual work will be required to develop methodologies and protocols for evaluating the resulting emission reductions. Piloting the actual implementation activities (to confirm feasibility at scale) should be prioritized.

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