Preface
The NAMA executive summaries contained in this document have been compiled for the Global NAMA Financing Summit, May 15-17, 2013, in Copenhagen, Denmark, hosted by the Danish Ministry of Climate, Energy and Building, and the Center for Clean Air Policy’s (CCAP). The primary objective of the Summit is to advance nationally appropriate mitigation actions (NAMAs) towards implementation by providing an opportunity for developing countries to present their proposed NAMAs and obtain feedback from contributing countries, development banks, and private sector investors. At the same time, contributing countries, banks and investors have an opportunity to learn about the range of NAMAs under development and begin to identify actions that match their own funding criteria.

The NAMAs presented here have all been developed and proposed by the developing country governments. The proposals vary in their stage of development. Some proposals are more at the conceptual stage and will need additional input, resources, and/or technical assistance to further structure the NAMA. Other proposals are the result of previous or ongoing initiatives, and some have benefited from international support to more fully develop the NAMA. These proposals are now seeking funding for NAMA implementation. CCAP has provided policy and technical support for NAMA development through regional dialogues in Latin America and Asia, workshops, webinars, in-country meetings, and in certain cases, on-the-ground technical assistance.

This work is part of CCAP’s effort to support the development of NAMAs in developing countries through our Mitigation Action Implementation Network (MAIN) program. We are grateful to the German International Climate Initiative (ICI), Environment Canada, and the Danish Ministry of Climate, Energy and Building for their generous support of the MAIN initiative.
# Table of Contents

Preface .....................................................................................................................................................................................3
Argentina - PROBIOMASA: Project for the Promotion of Energy from Biomass .................................................................5
Chile - Renewable Energies Price Stabilization Fund ..............................................................................................................8
Chile - Self-supply Renewable Energy ..................................................................................................................................10
Chile - Catalyzing Organic Waste Diversion in the Chilean Industries ..................................................................................13
Colombia - Transit-Oriented Development ..........................................................................................................................15
Colombia - Solid Waste NAMA ...............................................................................................................................................18
Costa Rica - Low Carbon Urban and Housing NAMA ...........................................................................................................27
Costa Rica - Ordinary Solid Waste NAMA ............................................................................................................................31
Dominican Republic - Tourism and Waste NAMA Executive Summary .............................................................................34
Pakistan - Energy Efficient Lighting in Residential, Commercial, Industrial and Outdoors Sectors ....................................37
Pakistan - Waste Sector NAMA ...............................................................................................................................................40
Peru - Scaling up Waste-to-Energy Activities in the Agricultural Sector ..............................................................................44
Peru - Sustainable Housing and Construction Sector NAMA .............................................................................................47
Peru - Programme for the Support of Up-scaled Mitigation Actions within the Solid Waste Management Sector ..........50
Philippines - Construction Financing Facility to Support Private Sector Participation in Renewable Energy ..................53
Philippines - Revolving Fund for Waste-to-Energy Projects ...............................................................................................56
Uruguay – Solar Thermal NAMA .........................................................................................................................................59
Appendix - NAMA Host Country Contacts ............................................................................................................................67
Argentina - PROBIOMASA: Project for the Promotion of Energy from Biomass

Replacing fossil fuels with biomass as an appropriate national mitigation action


Contact: Moira Laura Achinelli
Phone: +54 11 41203121 / +54 11 43497585
Email: machinelli@minplan.gob.ar / info@probiomasa.gob.ar

Introduction
The PROBIOMASA program started in 2013 and aims to boost production, management and sustainable use of biomass for energy purposes.

The domestic energy supply in Argentina is mostly based on hydrocarbons: 51% comes from natural gas and 35% from oil and its derivatives. Studies carried out by the Government with FAO assistance show the great potential of biomass as an energy source; however, institutional, legal, economic, technical and sociocultural barriers must be overcome first.

Currently, banks do not have a tool for technical evaluation of biomass projects, and this results in poor access to financing for this kind of facilities. In addition to that, environmental requirements in the Argentinean electricity sector have only been designed for large thermal energy projects, leaving the Provincial Environmental Agencies without a methodological tool to evaluate this type of projects. The private industry sector, that has the capabilities to invest in the energy switch to biomass, has expertise in other core business different from the energy production and therefore without knowledge about this market since the biomass generation is not still developed in Argentina. Consequently, there are many risks due to the performance uncertainty, low market share of the new technology adopted and the logistic challenge of biomass supply. In addition, biomass projects can probably have an impact on local stakeholders; in consequence the development of these kinds of projects must be very well communicated and the social participation be allowed from the very beginning with access to information and capacity building. One of the purposes of PROBIOMASA is to prepare a methodology tool for the banks to technically evaluate different biomass projects. Therefore, the banks will be able to finance projects that are technically sound. It will also develop a multicriteria methodology that will help compare the impact of different biomass projects.

NAMA Description
PROBIOMASA pursues, during its execution, to secure the establishment of provincial-level bioenergy strategies aligned with national policy regarding energy, agricultural and environmental dimensions. The project will develop the necessary mechanisms at local, provincial and national level to ensure implementation, supervision and monitoring of the production, management and sustainable use of biomass. According to previous studies (WISDOM, 2009)\(^1\) the potential of biomass consumption could be increased from 2.5% (BEN 2006) to 10%, which represents a total of 12,000,000 ton/year of the final energy consumption. This, in turn, involves avoiding emissions by 8,727,788 tons of CO\(_2\)eq/year. To reach that challenging goal it would be required the inclusion

---

\(^1\) FAO. 2009 Woodfuel Integrated Supply/Demand Overview Mapping, Argentina.
of 2000 electric MW and 2000 thermal MW that is 10 times more than the goal of PROBIOMASA for 2016.

**Goal:** PROBIOMASA aims to generate a total of 200 electric MW and 200 thermal MW by 2016. Also, it expects to generate other benefits such as:

- Annual savings by replacing imported fossil fuels.
- Creation of a significant number of new jobs.
- Generation of new capabilities focused on renewable energy management.
- Energy security improvement in isolated areas (30 communities in total).
- Reduction of local pollution of soil and water as well as fire reduction.

### CO₂ reduction from electricity energy production using biomass

<table>
<thead>
<tr>
<th>Capacity to be installed</th>
<th>200</th>
<th>MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversion factor</td>
<td>1 kWh= 860 kCal</td>
<td></td>
</tr>
<tr>
<td>Annual electricity energy production</td>
<td>1,401,600</td>
<td>MWh/yr</td>
</tr>
<tr>
<td>Dispatch factor</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>Fuel Replaced</td>
<td>Diesel</td>
<td>1.1.1</td>
</tr>
<tr>
<td>Grid emission factor</td>
<td>0.338</td>
<td>tCO₂eq/MWh</td>
</tr>
<tr>
<td>Quantity Replaced</td>
<td>400</td>
<td>M m²</td>
</tr>
<tr>
<td>Annual Emissions reductions</td>
<td>473,741</td>
<td>tCO₂ eq.</td>
</tr>
<tr>
<td>Aggregate emission reductions in 20 years</td>
<td>9,474,820</td>
<td>tCO₂ eq.</td>
</tr>
</tbody>
</table>

### CO₂ reduction from renewable thermal energy production

<table>
<thead>
<tr>
<th>Capacity to be installed</th>
<th>200</th>
<th>MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dispatch factor</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td>Annual thermal energy production</td>
<td>1,576,800</td>
<td>MWh/yr</td>
</tr>
<tr>
<td>Conversion factor</td>
<td>1 kWh= 860 Kcal</td>
<td></td>
</tr>
<tr>
<td>Performance of the equipment</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>Input Energy required</td>
<td>1,69506E+12</td>
<td>Kcal/yr</td>
</tr>
<tr>
<td>Diesel oil Low Heating value</td>
<td>8619</td>
<td>Kcal/l</td>
</tr>
<tr>
<td>Diesel oil savings</td>
<td>196,665,506</td>
<td>l/yr</td>
</tr>
<tr>
<td>Diesel oil CO₂ emission factor</td>
<td>2.683</td>
<td>kgCO₂/l</td>
</tr>
<tr>
<td>Annual Emission Reductions</td>
<td>527,681</td>
<td>tCO₂/yr</td>
</tr>
<tr>
<td>Aggregate emission reductions in 20 years due to thermal energy displacement</td>
<td>10,553,624</td>
<td>tCO₂/l</td>
</tr>
</tbody>
</table>

**Support Requested**

The estimated cost for one electric MW generated using biomass is 2.5 USD million and 1 to 1.5 USD million for one thermal MW. Taking into consideration that PROBIOMASA’s goal is to generate a total of 200 electric MW and 200 thermal MW, the investment required amounts to 750 USD million. The total funding support provided by the host country is $USD 5,488,975.
Financial support is required for:

1) Funding is necessary for building capacity of institutions involved in the preparation and presentation of the NAMA.

2) The development an MRV strategy. The main indicator is the capacity substitution of fossil fuels with biomass, considering the access to biomass, as well as the existence, type and cost of the technology.

3) 84 projects were identified in different stages of implementation. Some of the pilots projects that could be included in the NAMA are the following:

- Biomass drying technology, sawdust, 215 ton / day of biomass, $USD 15 million. Province of Misiones
- Combined heat and power using cane harvest, generation capacity / production of: 62 MW, investment of $USD 49 million. Province of Tucumán,
- Combined heat and power using cane harvest, generation capacity / production of: 16 MW, $USD 10 million. Province of Tucumán,
- Biogas production for electricity generation, 1 MW investment of USD 2.5 million. Province of Córdoba,
- Combined heat and power using forest industry waste, 400,000 ton / year of waste with a investment of USD 65 million and a generation capacity / production of: 15 MW. Province of Misiones
- Biogas production for electricity generation, using guano-laying chickens generation capacity / production: 4,642,800 kWh/year, investment of $USD 6,618,700. Province of Buenos Aires
Nationally Appropriate Mitigation Action

Chile - Renewable Energies Price Stabilization Fund

Executive Summary

Sponsoring Country: Chile
Sponsoring Agencies: Chilean Ministry of Energy, Center for Clean Air Policy

Main Contacts: Tatiana Molina
Advisor to the Minister of Energy
Alameda 1449, 13th floor, Santiago, Chile
tmolina@minenergia.cl
+(56 2) 2365 6800

Introduction

Chile’s power sector is on a trajectory to add 8,000 – 10,000 megawatts of new capacity by 2020, from the current 16,000. If all of this new demand was met through additional coal-powered generation, carbon dioxide emissions could increase by 32 to 40 million tons over current levels. In an effort to make Chile’s electricity supply less dependent on fossil fuels and to encourage the development of renewable energy sources, Chile is developing a NAMA to support the development of Price Stabilization Funds (PSF).

Chile currently has a Renewable Portfolio Standard Law, which requires that by 2024, 10% of the energy sold comes from renewable sources. In addition, increasing the percent requirement is currently under consideration. The government has also developed several programs through its development agency (CORFO) to promote renewables, including soft loans, financing for pre-investment studies, and subsidies for the installation of a concentrated solar power plant in the north as a demonstrative project. None of these programs, however, fully address the financing barriers for renewable energy projects. This NAMA is intended to address the financing barriers in order to spur solar and wind power generation in Chile, and achieve significant GHG benefits, strong local health impacts, and significant leveraging of private investment at low cost to donors.

PSF Model

The objective of the PSF is to catalyze commercial bank financing for renewable energy projects, exclusive of hydropower projects. Chile's energy sector is deregulated in such a manner that renewable power producers are not able to effectively obtain long-term power purchase agreements (PPAs) from customers. The deregulated Chilean power market is subject to wide fluctuations in its spot market...
price, ranging from as low as $30/MWH to nearly 10 times that price. Intermittent renewable projects that cannot obtain PPAs thus face particular risks given this wide variation in price, making banks reluctant to invest.

A PSF would address this barrier to investments in renewable energy by executing long-term (10-15 year), fixed priced payment contracts with renewable project developers to overcome the price fluctuations. It would provide certainty to investors by guaranteeing a price for renewable energy prices and assuming the spot market price risk.

**NAMA Description**

The PSF would execute contracts with developers, committing the PSF to pay a set price to a developer for delivery of electricity into the spot market. The developer would then pledge the PSF contract as collateral for bank financing and would assign all payments from the spot market to the PSF.

Based on modeling studies under development, a ceiling will be established for PSF payments to developers to ensure that the PSF remains financially viable and solvent throughout the life of the PSF program. The number of projects and the quantity of MWs supported by the PSF will be determined based on the funds available and the market projections.

Private investors have expressed interest in developing PSFs, and at least one initiative is ready to fund a PSF. The NAMA funds will be used in conjunction with private funds to expand the scope and impact of the PSF model, increasing the number of renewable projects that can get financing under this mechanism.

**GHGs Reductions**

It is estimated that, on average, 555 tons CO2e can be avoided each year for each GWh generated with renewables. This means that, for example, for every 100 MWs of wind installed capacity supported by a PSF, it can reduce 200,000 tCO2e each year, or 4 million tCO2e over a 20 years period.

**Private Funds Leverage**

For every 100 MW a PSF can support, at least a $10 millions fund for its operation will be required, and the projects supported would require an investment of at least $200 million, adding up to $210 millions of investment for a every 100 MWs supported by a PSF.

**Support Requested**

The Chilean Government is requesting $10 - $20 million in order to support the development of PSFs, expanding the delivery of PSF benefits to a larger pool of projects.
Introduction

The Renewable Energy Centre (CER) Chile, as part of the Chilean Government’s Economic Development Agency (CORFO) and implementing agency of the Energy Ministry, has developed a proposal for a NAMA “Self-supply energy systems based on renewable energy” (SSRE).

The overall objective of the NAMA is to promote the incorporation of renewable energy systems for self-supply in private and public enterprises and to drive the development of a prosperous market for renewable energy technologies in Chile. Self-supply renewable energy is defined as renewable energy systems that generate electric and/or thermal energy for own consumption at the point of installation. In Chile and for the purpose of this NAMA, self-supply is defined as installations that consume more than 50% of the energy generated on-site.

The NAMA aims to increase the uptake of renewable energy systems across industry and the public sector through a comprehensive programme of measures to remove identified barriers such as higher incremental costs of renewable energies (RE) technologies vs. Business as Usual (BAU)/ other capital investments in the sector., difficulties to access to loans by commercial banks and lack of understanding of the technologies among company/resource owners. The NAMA aims at incentivize SSRE investments under three components: a financial component, a technical support component and an outreach component.

Financial component

The financial component will provide financial support at two stages in the investment cycle. At the feasibility stage, the programme will provide pre-investment grants to undertake economic and engineering studies.
that are part of the feasibility assessment of a project. At the investment stage, the fund will provide financial incentives in the form of co-investment grants and subsidised loans, with partial credit guarantees to the lending programme in order to reduce default risk.

Subsidized long term loans will be made available to finance up to 80% of the total cost of a renewable energy installation so the applicant must provide at least 20% own equity. Investment grants will be made available for up to 20% of the total installed cost, subject to certain conditions, during the early stage of the implementation of the NAMA. Two metrics are proposed which capture the objectives of the programme: leverage ratio and mitigation factor. Leverage ratio shows the relation between incentives granted to a project and the total amount of private investment generated. Mitigation factor shows the amount of emission reductions expected per unit of renewable energy produced. Minimum performance required for the leverage ratio is 4 and for the mitigation factor is 500 gCO2e/kWh.

It is foreseen that the type of instrument and levels of support given will change over time. Due to the low maturity of the Chilean SSRE market, the first years will require higher levels of support so both grants and loans together may be required in initial funding packages. The objective over time will be to promote a higher share of loans, as these are more cost-efficient for the programme, until eventually support is phased out as RE technologies reach grid parity.

Technical Component

Three core activities are proposed for technical support; training & capacity building; a help desk and knowledge exchange. The objective of the activities will be to build up knowledge on financing and operation of RE systems for self-supply to generate demand for these technologies and ultimately achieve the objectives of the NAMA.

Outreach Component

Outreach and awareness raising activities are an important component of the NAMA. Experiences shows that constant marketing and outreach is necessary in order to make benefits of SSRE technologies widely known and understood to generate demand for the support instruments. Activities under this component will include seminars, conferences and roundtables, with the aim to disseminate the benefits of SSRE systems to a large number of stakeholders.

The NAMA is proposed to be undertaken with support from both domestic and international sources. The Government of Chile, through the Center for Renewable Energy (CER) will partly support activities with domestic resources. The CER has already put together a US$10 million programme to co-finance capital costs of self-supply renewable energy projects.

The NAMA will need to raise $17.5 million in grants to pay for partial credit guarantees for the loan programme, to provide pre-feasibility and investment grants and to cover for the technical and outreach components. The programme will also need to raise $50 million in concessional loans from domestic or international development banks and $30 million from financial institutions to capitalize the loan programme. Loans would be fully repayable with interest.

For the NAMA to achieve 1.5 – 2 MtCO2e of emission reductions in a 33-year timeframe, approximately $100
million in private investment in SSRE projects would be needed. Based on the leverage ratios calculated for the financial incentives and the estimated administration and MRV costs, the incremental cost is $16.5 million. The incremental cost per tonne of CO₂ reduced is between $9-12. The incremental cost per watt peak installed was estimated at $0.48 per watt peak.

The Renewable Energy Center has been implementing tools to measure the GHG emission reductions achievements with the support of the UK Government, that assisted with a Prosperity Fund with the aim to “strengthen the capacities of Chile’s Renewable Energy Centre to evaluate GHG emission reductions and other benefits generated by renewable energy projects, in order to improve policy planning and promote renewable energies”. This MRV system is currently being implemented in the Center and will be available shortly.
Introduction

The objective of this NAMA is to catalyze the development of waste management projects focused primarily on the industrial organic waste in Chile. Organic waste is the main source of greenhouse gases (GHGs) in the sector, thus its diversion is aligned with the national policies on climate change and waste management.

There are many financial, economic, cultural, and social barriers for the development of facilities for the management of organic waste projects. Probably the most important barrier is the existence of open dumps, where disposal costs are substantially lower than costs for waste management facilities, which makes such projects unprofitable.

While the law mandates the closure of open dumps, the sector is trapped in a dilemma - the authorities do not close dumps because there are no alternatives available. Additionally no one wants to install a sanitary landfill or other waste management facility as there is uncertainty regarding the closure of dumps. That is why; in many cases companies willing to pay for the proper disposal of their waste have difficulties to do it.

NAMA Description
The project will solve the organic waste management issues mainly in the industrial sector, which is expected to represent more than 90% of total organic waste diverted. The main beneficiaries will be the agro industry (wine, fruits, crops), fishing (salmon), and livestock (poultry, pigs). Municipal organic waste expected to be diverted are mainly from pruning, street markets and, hotels and restaurants.

This NAMA aims to address this problem by facilitating the installation of a series of facilities that use dry fermentation (indoor treatment, power generation and compost as products obtained from the process). It aims to create a new market and show the technology, which will, in the future, allow private companies to develop the projects independently. In particular, the NAMA has 4 lines of support:

1. **Regulatory Improvement**: It aims to facilitate the development of diversion and the sale of the products produced ($100,000 - national contribution)
2. **Co-financing feasibility studies**: Through the Chilean development agency will co-finance up to 50% for feasibility studies of projects ($900,000 - national contribution)
3. **Funding Support**: It is intended to cover part of the initial investment, to allow gradually increasing tipping fees. The co-financing will diminish over time, because of the greater economies of scale and technological development expected, and because of the predictable increase in the cost of alternative disposing over time ($10,000,000 - international contribution)
4. **Partial Performance Guarantee Facility**: Due to the use of new technologies, local banks are reluctant to finance waste management projects. As a result, a $10 million USD partial performance guarantee facility will be created to cover a portion of new technology performance risk of all the projects supported by this NAMA. ($10,000,000 - international contribution)

The NAMA will operate through tenders in which winners will be those requesting less support per ton of CO2e avoided. Developers will be required to demonstrate the project’s economic sustainability (cash flows, contracts for waste supply, product sales, etc.)

Also, projects will be required to have the formal support of the municipality where it is installed, in return for which the project will create a fund to support community projects and give preferential tipping fees for municipal waste, thus promoting its diversion and eventual selective collection. It is planned to have four biennial contests. Financial support would be deployed based on an affordability assessment analysis, while the partial performance guarantee will be provided for the whole life of a local bank loan.

**Expected Results**

In total, the NAMA is expected support the development of between 10 – 15 dry fermentation projects, to divert up to 11 million tons of organic waste and avoid 12 million tCO2e over the life of the projects. In addition to these benefits, the NAMA will promote sustainable development by reducing or closing dumps, creating jobs, and increasing economic activity.
Colombia - Transit-Oriented Development

TOD NAMA

Executive Summary

May 2013

Sponsoring Country:  Colombia

Main Contacts:

Nicolás Estupiñan Alvarado
Vice Minister
Ministry of Transportation
nestupinan@mintransporte.gov.co

Adriana Soto Carreño
Vice Minister
Ministry of Environment and Sustainable Development
asoto@minambiente.gov.co

Luis Fernando Arboleda Gonzalez
President
FINDETER
lfarboleda@findeter.gov.co

Sponsoring Agency:  Center for Clean Air Policy

Steve Winkelman
Director, Transportation Program
swinkelman@ccap.org

Felipe Targa
Consultant
felipetarga@gmail.com
Transit-Oriented Development in Colombia

TOD NAMA

Executive Summary

Traffic congestion and air pollution in Colombian cities is projected to get a lot worse under current trends – a new University of the Andes study indicates that driving in Colombia is expected to quadruple over the next 30 years. Already a leader in implementing bus rapid transit (BRT), Colombia is now ready to take the next step and address land use and urban design to tackle traffic and greenhouse gas (GHG) emissions over the long term.

This NAMA would transform Colombian cities by focusing urban development around transit stations, blending low-income and market-rate housing with commercial uses to create neighborhoods where people can safely walk, live, work, shop and play. Such “transit-oriented development” (TOD) will enhance the benefits of major national investments in public transit – increasing ridership and financial sustainability – and leverage substantial funding for low-income housing. It will bring Findeter’s Sustainable and Competitive Cities program to a new level and create a 21st century model of urban development for the region and the world to address social equity, climate change and prosperity.

The Ministries of Transportation, Environment & Sustainable Development, (national development bank) and CCAP developed this proposal to implement and finance catalytic transit neighborhoods with the support of the Office of the President, the Ministry of Housing, National Planning Department and input from local governments, real estate developers, NGOs and university researchers.

The TOD NAMA will capitalize on Colombia’s new public-private partnership legislation and provide incentives to develop vibrant transit neighborhoods that will grow the economy, save Colombians time and money on travel, reduce government infrastructure costs, increase returns for real estate and retail. By changing long-term land use patterns, the TOD NAMA is expected to cut growth in driving by 25%, ensuring GHG emission reductions for decades to come. GHG reductions in 2040 are expected to range from 1.9 to 3.8 MMTCO2 per year, depending upon penetration and performance levels.
The Center for the Promotion of Transit-Oriented Development

The core of the NAMA is an independent Center for the Promotion of Transit-Oriented Development, housed within Findeter, which would provide technical and financial assistance on TOD implementation, based on locally-articulated needs. The Center would also serve a policy advisory role to integrate national policies to promote TOD and advance national policy goals on urban transportation, housing, environment, economic development and social equity.

The Center for the Promotion of Transit-Oriented Development would be staffed by experts in TOD design, evaluation, finance and public-private agreements, who would be supported by technical consultants and guided by an independent technical secretariat. The Center would have two functions:

1. **Technical Assistance for Implementing Catalytic Transit Neighborhoods.** Initially focusing on approximately five transit districts in Colombia’s largest cities, sample assistance areas include:
   
   ✓ **Project development.** High-quality design, market analysis, project preparation, pre-construction planning;
   
   ✓ **Private-sector partnership.** Public-private partnership RFP development and evaluation, collaboration agreements on TOD implementation;
   
   ✓ **Finance.** Developing and packaging funding proposals for domestic and international investors or donors;
   
   ✓ **Value capture mechanisms.** Design and structure advance land-based mechanisms for the investment, operation and maintenance of TOD transit districts, such as Tax Increment Financing, CEPAC-style instruments, Business Improvement District fees, etc.;
   
   ✓ **Replication of policies and plans.** Continue implementing TOD “pipeline” of sites, districts and corridors;
   
   ✓ **Evaluation (measuring benefits: GHG emissions, social and economic).** Calculation, measurement and data improvement.

2. **Policy analysis** and guidance to provide the cohesive “glue” to connect national and local policies on transportation, land use and housing with private sector efforts on TOD. For example, providing guidance on TOD public-private partnerships, developing a CONPES document and/or Decree on TOD, integrating national policies and plans with local instruments, and developing a financial sustainability plan.

Support Requested

The Colombian government is requesting US$20 million for the NAMA. Over three years, this funding would support Center staff, consultants, embedded agency staff and data improvements for evaluation. The Center would develop and execute a financial sustainability plan to identify funding sources beyond NAMA support.
Solid Waste NAMA in Colombia
Transforming the Solid Waste sector while reducing GHG emissions

Sponsoring Country: Colombia
Sponsoring Agency: Center for Clean Air Policy

Main Contacts:

Javier Moreno
Director de Desarrollo Sectorial
Ministerio de Vivienda, Ciudad y Territorio
(57 1) 332 3434
Carrera 6 No. 8-77
imoreno@minvivienda.gov.co

Rodrigo Suárez.
Director de Cambio Climático.
Ministerio de Ambiente y Desarrollo Sostenible
(57 1) 332 3400 / 332 3820 Ext: 2484/2411
Calle 37 No. 8-40
rsuarez@minambiente.gov.co
Executive Summary

1.1. Introduction

The waste sector in Colombia contributes 5.7% of total greenhouse gas (GHG) emissions, totaling 10 MnTCO2e. As one of the fastest growing countries in the Latin American region, these emissions are expected to grow rapidly under the business-as-usual scenario. Most of the current emissions are generated through methane emissions from landfills in which Colombia disposes most of its solid waste. While this is good practice from a basic waste management perspective, Colombia is not optimizing the economic value that is present in solid waste streams through processes such as recycling, composting and conversion to fuel. Hence, Colombia is actively considering a Solid Waste Sector NAMA in order to maximize generation of economic value from waste streams and also achieve reduction of methane emissions by diverting solid waste away from landfills. The NAMA would transform the waste sector resulting in carbon neutrality shortly after implementation. Additionally, this NAMA is also expected to have several other social, economic and environmental benefits thereby making it consistent with Colombia’s sustainable development objectives.

1.2. NAMA Description

The NAMA will support the Colombian government in transforming the solid waste sector by overcoming various existing policy, financial, market and social barriers. The cornerstones of the NAMA are regulatory changes, the promotion of alternative waste treatment technologies, creation of appropriate financial mechanisms, and the integration of informal recyclers into the formal sector.

The Colombian government (through the Ministry of Housing, City and Territory and the Ministry of Environment and Sustainable Development) is in the process of reforming solid waste management regulation that currently favors landfill disposal over alternative treatment technologies.

The most important of these changes concerns how the solid waste tariff is calculated. The tariff sets the price that solid waste operators can charge to collect, transport, and dispose of waste in landfills. Under the current tariff structure, it is much more profitable for waste operators to dispose of waste in landfills instead of diverting waste to recycling, composting, or waste-to-energy (WTE) plants. The NAMA feasibility studies have included assistance to the national regulatory agency to help them determine the true economic cost of alternative waste treatment methods in order to devise a new tariff structure. Apart from the above crucial steps, the government is also working on other regulatory changes such as removing unfair barriers to use non-hazardous waste as fuel in cement kilns and development of policies such as Extended Producer Responsibility (EPR).

As part of the NAMA, Colombia is proposing the promotion of new technologies such as mechanical-biological treatment (MBT) facilities that can process waste diverted away from landfills to produce commodities such as recyclables, compost, and refuse derived fuel (RDF). Compost made from mixed waste can be used in public parks or for land reclamation. From a mitigation perspective, composting of organic waste is paramount to achieving meaningful GHG reductions, since organic waste placed in landfills will create methane emissions once it begins decomposition. RDF can be sold to cement kilns or other industrial consumers to replace fossil fuels which have a dual GHG benefit of reducing landfill emissions and those resulting from combustion of fossil fuels. Under the solid waste NAMA plan, such MBT facilities will be constructed in cities throughout Colombia and will be executed in three phases. The first phase will include construction of such a facility in Cali, the second phase will include the cities of Barranquilla, Medellin, and Bucaramanga and the third phase would be open to any other Colombian city interested in participating in the NAMA.
The above projects will assume that 50% of waste from all cities in Colombia will be diverted away from landfills to MBT facilities, which will lead to a significant reduction of GHG emissions from the sector. Diverting 50% of the waste would mean that over time, only half of the landfill emissions would be generated. If in addition to this we consider the environmental benefits of recycling (avoiding the production of virgin materials), composting (displacing chemical fertilizers) and use of RDF (displacing coal in cement kilns and other industrial boilers), the waste sector could be a carbon sink, with negative net emissions, as shown in Figure 1. This NAMA scenario is significantly better than a scenario where 50% of all nationally produced landfill gas is flared, as this would reduce the sector emissions by 78%, compared to a 115% reduction after implementing the NAMA.

**Figure 1. Comparison of current and proposed scenarios**

The conditions for financing MBT facilities in Colombia, while encouraging in an overall sense, present a significant barrier in terms of availability and affordability of private sector equity capital due to the lack of experience with such technologies. Hence, another important element of the solid waste NAMA is the creation of a NAMA Equity Fund, henceforth known as the “Fund”, financed through public resources of Colombia and climate finance contributions from donor countries up to $40 Mn. The Fund will contribute equity capital to the MBT facilities that will be constructed in various cities as explained above. The contribution of the Fund to the total equity capital of each of these projects will reduce over time as the private sector becomes more comfortable with the MBT technology and the operational and financial risks associated with it (Figure 2).
The Fund will be revolving in nature which is to say that the returns accruing to the Fund from its investments in various MBT facilities will remain within the Fund and will be available for deployment to other projects in the pipeline in future (Figure 3).

In order to further increase the returns and reduce the risk associated with these projects, cities will be encouraged to implement MBT facilities using the Public-Private Partnership (PPP) framework established under Colombian law in which private sector investors can receive up to 20% of the total construction and operation costs from the Colombian government as revenue support during the operating phase of the project.

Another crucial aspect of the solid waste NAMA is that policies and business models are being designed in order to include informal workers in the modernization of the sector, allowing them opportunities to work in the...
formal economy and increase the standard of their working and living conditions. Several international studies suggest that integrated solid waste management processes like the ones contemplated in the NAMA can create up to 6 - 10 times the number of jobs than those focused on disposal. Thus, additional jobs created through the Solid Waste NAMA could be used to employ a large number of existing informal workers, including many indirect jobs that will be created through increased recycling (transformation into new products) and the creation and sale of compost and RDF.

The Colombian government is also contributing to the success of the Solid Waste NAMA by proactively designing next generation waste management processes such as source separation and selective routes for waste collection that will enhance the efficiency of MBT facilities and also increase the quality of their outputs. Forward-looking policies such as these could be integrated with the larger NAMA whenever possible at a municipal level.

In addition to contributing to the Fund, NAMA Finance could include funding for capacity-building at the national and sub-national governments and for project pipeline development support for Phase I and Phase II projects.

**Capacity-building at the national and sub-national governments could include:**

1. Creation of NAMA specific posts in Colombian Government for three years
2. Consultants to support national government in policy & regulatory design, technical standards for alternative technologies and processes and MRV Systems
3. Consultants to support municipalities through studies on plans for source separation & selective routes, markets for recyclables, compost and RDF and integration of informal workers.

**Project pipeline development support could include funding for activities for each project such as:**

1. Detailed Engineering studies for MBT facilities
2. Detailed estimation of waste composition, GHG baseline and mitigation scenarios
3. Conducting RFP process for selection and contracting with private sector operator/owner
4. Financial closure expenses
5. Negotiating with existing contractors agreeing on service standards and incentives aligned with NAMA objectives

### 1.3. Support Requested

The Colombian government is highly committed to the success of the Solid Waste NAMA because it considers it to be:

- **Transformational** as it propels the solid waste sector into the next generation of technologies and revitalizes recyclable markets, thereby reducing GHG emissions from the sector significantly.
- **Catalytic** as 1 $ of climate finance can mobilize up to 10$ from Colombian public and private sources through innovative financial structuring.
- **Comprehensive** as it meets regulatory, economic, social and environmental objectives.
- **Integrated** as it is consistent with Colombia’s sustainable development plans and will receive high-level support from relevant institutions and contributions through public resources.
- **Replicable** throughout Colombia
Colombia shall be contributing valuable institutional capacity and public resources to:

- Undertake regulatory overhaul and legislative reform
- Contribute to NAMA equity fund (up to 50%)
- Facilitate PPP process for MBT facilities in various cities
- Conduct national and sub-national awareness and education programs
- Undertake comprehensive legislative reform for Solid Waste Management sector

In order to ensure success of the Solid Waste NAMA, the Colombian government requests the following climate finance assistance:

1. Contribution to NAMA equity fund (at least $20 Mn)
2. Capacity-building Support ($2.5 Mn)
3. Project Pipeline Development Support ($2.5 Mn)

The Colombian government is confident that the combination of unilateral contributions and actions along with climate finance support will create the ideal enabling environment for the success of the ambitious Solid Waste NAMA.
Introduction

Costa Rica is the first country in the world to take on the challenge of becoming carbon neutral, which it intends to do by the year 2021. This goal will be achieved, in part, through the implementation of proposed nationally appropriate mitigation actions (NAMAs) in different subsectors. Costa Rica’s agricultural sector accounts for nearly 40% of national GHG emissions (4.6 M Ton CO₂e/year), of which 10% comes from coffee production,² representing an enormous opportunity to contribute to the country’s mitigation goals. Costa Rica’s Coffee NAMA will also contribute to maintaining the relevance of coffee cultivation in the country, which has been at the heart of the country’s identity since 1830 but is now being threatened by climate change and other factors. The subsector affects the livelihoods of 50,000 farming families (400,000 direct and indirect beneficiaries), and involves an area of approximately 93,000 hectares.

The coffee subsector stands out because of its solid institutional setting, high degree of organization, functional collaboration of stakeholders (private, public and social society), strong relationship between implementing agencies (e.g., Instituto de Café de Costa Rica, ICAFE) and growers’ families, and recent successes in carbon market integration (e.g., launching of the world’s first “carbon neutral coffee,” a NAMA in progress, and a local carbon-neutral coffee roaster/exporter). The political-institutional framework is provided by a National Development Plan, a National Strategy on Climate Change, a Carbon-Neutral Country Program, and a specific framework of State Policy for Climate Change in Agriculture and Food. A Coffee NAMA Steering Committee, “Mesa NAMA – Café,”³ established in 2012 under the umbrella of the Agriculture and Livestock Ministry of Costa Rica, plays a key role in championing the NAMA’s readiness, by facilitating coordination and strengthening collaboration of relevant actors.

Given these strengths, the vision of the subsector serving as a “NAMA laboratory” for other sectors in the country, and the potential for scaling up the effort to other Latin American coffee-growing countries, the Costa Rican Coffee NAMA, the first around the World and one of the few NAMA’s in Agriculture, is being proposed for international support for implementation.

NAMA Description

The objective of the Coffee NAMA is to deliver a smart combination of public and market incentives for adoption of measures aimed at increasing carbon dioxide (CO₂) sinks and reducing emissions of nitrous oxide (N₂O) and methane (CH₄) for the entire Costa Rican coffee sector. Combined with climate adaptation practices, the NAMA would also yield important benefits such as increased eco-competitiveness of Costa Rica’s coffee and improved resilience of farming systems.

The NAMA will address the production of coffee at two levels: at coffee farms and at coffee mills. Changes at the farm level will aim primarily to improve adoption rates of innovative mitigation practices and proven adaptation techniques that reduce N₂O emissions (increasing efficiency in nitrogenated fertilizer use and increasing sinks through coffee shading and augmented farm-tree growing). The main changes at the mill level will aim to introduce technologies and techniques that reduce methane emissions from wastewater treatment and pulp management (using coffee byproduct (biomass) as a fuel source in mills) and improve mill efficiency.

---

² Coffee plantation side, GHG National Inventory, 2005.
³ Representing: Agriculture and Livestock Ministry of Costa Rica (MAG), Climate Change Department of the Environment and Energy Ministry (MINAE), Fundecooperación para el Desarrollo Sostenible and the Institute of the Costa Rican Coffee (ICAFE).
The main barriers to adoption of these mitigation actions are: a) policy barriers: low incentives to capital investment and process innovation; b) technology and capacity barriers: weak access to GHG-efficient fertilizing technology, weak or costly equipment for GHG-monitoring, risk adversity of growers and millers, knowledge gaps of extension professionals; c) financial barriers: low and late return of investment of GHG-efficient fertilizing and milling technologies, weak cash-flow problems of coffee growers and millers; and d) market barriers: insufficient access to market incentives for adopting climate adaptation measures (like shade growing), weak market incentives for GHG-efficient fertilizers, high and uncertain transaction and MRV costs.

The total reduction potential in growing and milling alone is approx. 30,000 Ton CO2e/year, meanwhile carbon sink potential is approximately 90,000 Ton CO2e/year (120,000 Ton CO2e/year\(^4\), near 25% of the emissions total national GHG emissions of coffee growing section in the GHG Inventory until 2024 at full implementation). The expected aggregate GHG emission reductions over 20 years will be 1,850,000 Ton CO2e. Significant environmental and socio-economic co-benefits are expected, including: improved wastewater management, decreased energy demand of external sources at mills (using coffee biomass), increased soil and biodiversity conservation, cost savings, income diversification, and investment in technology, production capacity and others.

Proposed policy changes will focus on an intelligent mix of regulations and incentives that concede preferential advice and microfinance for innovative farmers and mills. Some of them are: a) technical level: Best products from the agrochemical industry, stimulate to build local capacity for design preferred technologies, increase coverage of the extension services to support the whole coffee sector in transformational process and construction of innovative transformational technologies, facilitate a self-sustained MRV-system, build programs to create professionals for special technical advice and technology transfer support b) financial level: adequate loans and guarantee valuation, available funds for cash-flow bottlenecks (finance extra cost for new techniques and coffee mill transformation), financial readiness for specific transformations in the National Bank System, c) Market level: contribute development of “NAMA coffee” market and improve access to relevant market information.

The financial mechanism envisaged is a national NAMA Coffee Fund embedded into the multi-purpose *Fondo Nacional NAMA de Carbono*, which collects from a proposed national carbon tax (*Canon de Carbono*) and other public budgets\(^5\) and attracts multilateral, bilateral and national money from sources like carbon markets. The objective of the fund is to attract, capture, collect and capitalize all possible revenues (actual and future, local and international) attachable to mitigation actions, in order to stimulate evolution of the coffee sector into a carbon efficient value chain. This includes even small revenues from coffee growers and millers, in order to improve ownership for the process and award them endowment for representation in the governing body of the fund. The fund would in turn emit carbon reductions and other environmental services, which shall be tradable, once the market reaches maturity. The fund would have a governance structure comprised of an intergovernmental panel (ministries have still to be nominated), a multi-stakeholder committee (evolved from the “Mesa NAMA Café”) and a technical advisory board with national and international partners. These bodies will propose and implement new and innovative policies and financial mechanisms required for the transformational process. After a transitional budget financing through the contributions to the fund, the operational costs of the governing body should be granted by retransmissions. An Executing Agency will provide technical services and follow up to the financial resources demanded for the farmers and coffee mills.

The “Mesa NAMA – Café” will serve on the advisory board of this NAMA Fund. Private investments of growers

\(^4\) Near 25% of the emissions total national GHG emissions of coffee growing section in the GHG Inventory.

\(^5\) Agriculture and Livestock Ministry is expecting set up National Budget in 2014, amounts which are still to be defined.
and millers are partly granted by the National Development Banking System and other financial actors. The national and international coffee industry, worried about future supply of premium coffee, should be a powerful contributing partner to the fund. The aim of the fund is to capitalize all mitigation and adaptation potential, offering it on the “carbon futures market” of Costa Rican coffee and refinancing part of the transformation costs.

The NAMA Fund will support: a) institution building: financial mechanism and mobilization, building a coordination architecture; b) capacity building: research and innovation, extension services, technology adoption, promotion of management models, niche market access (for “Coffee Types NAMA”); c) evidence building: establishing a smart MRV- system; d) capital building: investments in (NAMA-type) fertilizing technology, renovation of mills, increasing of MRV- equipment.

Support requested

Costa Rica is seeking international support in the amount of USD 20,000,000 from 2014 to 2023 (equivalent to 40USD/family/year) for this NAMA. It is proposed that funds be received in installments based on achievement of performance milestones distributed along 3 phases. Total expected funding support provided by the host country will be USD 3,000,000 over 10 years. Coffee farmers and coffee mills will contribute with their labor and take the risks of adopting innovations. The National Development Banking System, other financial actors, and further financial incentives to be established by ICAFE will partly grant and support these private contributions. Estimated additional private sector and/or development bank financing mobilized by the NAMA will be around USD 8,500,000 over 10 years.

The public extension system makes available logistics and qualified personnel for the adoption process on farms and mills, including part of the MRV activities. FONAFIFO 6 will be contributing towards coffee-shading and reforestation with seedlings, looking for funding and advising on payment for environmental services. MAG will be issuing awards for environmental services delivered by the “best practices and performance”. Presently the German Gesellschaft für Internationale Zusammenarbeit, GIZ funded by BMU/ICI – International Climate Fund by means of advising development of NAMA- proposals and as potential donor the Multilateral Investment Fund of the Interamerican Development Bank, FOMIN/BID 7 will continue to support the evolution of the NAMA in the Costa Rican coffee sector through a pilot with 6 coffee cooperatives with around 3,000 farmers.

Contact Information
Ing. Agr. Luis Zamora Quirós
National Coffee Manager, NAMA Manager
Ministry of Agriculture and Livestock
Apartado 10094-1000 San José
Sabana Sur, antiguo Colegio La Salle
San José, Costa Rica
Tel: (506) 2231-2344 ex.t. 168
Mobile: (506) 8391-6773
Email: lazamora@mag.go.cr

6 Forest Finance National Fund
7 By means of funding the mitigation pilot project of “Promoting low carbon growth in the coffee growing sector of Costa Rica"
Costa Rica - Low Carbon Urban and Housing NAMA

Acronyms

BANHVI: Bank for Housing (A second floor public bank that allocates State subsidies).
CCC: Construction Chamber.
CFIA: Architects and Engineers Professional Association.
GAM: Great Metropolitan Area (31 Municipalities, 4% of the total territory)
MIVAH: Ministry of Housing and Human Settlements.
MINAE: Ministry of Environment and Energy.
RESET: Requirements for Sustainable Building in the Tropic (voluntary regulation, like LEED).
SPV: Special Purpose Vehicle (In this case a Trust Fund).

Introduction

The building sector has a huge potential for change by taking advantage of new technologies and new processes in design, construction and deconstruction. This sector has the ability to become more efficient in terms of resource use along being less environmentally intensive, low carbon emitter and more profitable. In Costa Rica, buildings are responsible for 60-75% of total electricity use and 40-60% of the waste volume.

During the last ten years, the historic figure of building amounts to 30.4 million m². This figure is projected to be 38.6 million m² in 2012-2021. The housing sector represents almost 70% of the total construction and is characterized by a slow pace of technological improvement. The lack of vertical development and insufficient infrastructure is stressing the sources of fresh water and threats areas of wild life conservation in a Country which custody nearly 5% of the world biodiversity.

The construction sector is highly fragmented, with many, often poorly integrated actors involved in the value chain. One of the key actions that need to be addressed in the sector is to encourage standardization, industrialization, and promotion for pre-fabricated modules. These actions are affected by regulations that MIVAH should encourage and by standards that are boosted through adoption by the private sector. The same is true for promoting sustainable operations through buildings with low water consumption and efficient energy usage.

The impact sought for urban development will be over the long term, but it implies pushing for reforms to the domestic and municipal urban planning standards in relation to the urban regulatory plans. Currently, the GAM urban regulatory plan is being analyzed by the MIVAH. Since it is the ministry that pushes these mitigation measures, conditions will be created that are conducive to the climate change perspective with actions to promote green urban development into the new urban regulations.

Estimated Greenhouse emissions reductions

In the construction sector it is been estimated 3.9 millions of tons of CO2 emissions by 2011, and the outlook for 2012-2021 predicts that the sector will release 40.9 millions of tons of CO2 accrued in the period, based on the mass balance including wastewater, operation energy and commuting. The total CO2 mitigation is expected to
reach 763,000 metric ton per year in 2021, add up 3.2 million tons during the period 2013-2021.

The benefits of the NAMA in the construction sector embraces key drivers for CO2 mitigation: reduce consumption and waste; substitution of high emission factor materials for CO2 by sequestering materials (wood); reduce the emission factor and carbon embodied in material by promoting environmentally preferable materials; reduce energy consumption in building operation by bioclimatic building design, improve wastewater treatment and compact multifunctional cities with urban planning and green infrastructure. The high performance building in the long term will increase the competitiveness of the Country and contributes to attract foreign investment, mainly in eco-tourism, global services, medical supplies and services, computers’ software and hardware, biotechnology and new materials development. In general, the CO2 low emission strategy for the housing sector will benefit the environment at local, regional and global level, as well as, social and economic value creation. No doubt the strategy will foster the economic development and social mobility. Costa Rica Urban Planning aims to have well-designed and compact habitats, as well as interconnected cities holding a wide range of uses in a sustainable environment highly integrated with public transport and public services, design to adaptable to climate change and other natural events.

**NAMA Description**

The path for sustainable construction comprises a coordinated set of measures that comes from market mechanisms, voluntary adoption of green standards, extensive communications integrated with the academy and mandatory regulations. The Government wants to focus its resources in to create a key mechanism which will leverage actions from the private sector to mobilize all stakeholders: Final Users, Investors, Architects and Engineers, Developers, Distributors, Manufactures, Financial Institutions, Municipalities, as well as, integrating key organizations of the sector (CFIA, CCC, Green Building Council etc) with clear and detailed roles around a Road Map for Low Carbon Urban and Housing Development. Public and Private Sector will be working together under a common vision.

The NAMA is described through three key strategies:

**I. Market readiness.**

1. Market instruments (CO2 trade, MVR, Urban flexibility etc)
2. Voluntary agreements and regulations (RESET and EPD, industry subsector agreements)
3. Mandatory regulations (Government directives and legal frame modifications)
4. Information and knowledge transfer (Universities, web based knowledge, etc)

**II. Financial mechanisms.**

1. Create financials mechanism -Special Purpose Vehicle- to foster green urban development with green buildings. (Trust Fund for short term credit, with BANHVI support)
2. Develop a strategy with commercial banks to improve credit conditions for final users, provided fulfill green code specifications. (Promote competence among commercial banks)

**III. Practice and Results**

1. Identify and prioritized specific urban sites for new project developments according to polifunctional cities aimed to reduce commuting. (Five key areas in the GAM)
2. Develop a pilot project of 1000 affordable houses ($50,000 to $80,000) to show a practical application of sustainability concepts. (First step for leading project)

The Government pursues to mainstreaming best practices and innovation movement around a set or strategic axis:
• Promotion of long term planning for dynamic improvement.
• Promotion & adoption of best practices, including potential for the use of voluntary agreements.
• Creating the Enabling Environment for sustainable-housing through Strategic Partnerships.
• Creating a Viable Market for Green Materials, Green Buildings and Green Cities.
• Create condition for financial viability and sustainability of nonprofit organization (private-public) that has sustainable construction as core business.

Reviewing the legal framework, on first sight, it is revealed requirements for:
• Modify MIVAH Directive 27, technical specifications for social housing
• Modify Decree 36550 for MVR system.
• To create a High Performance Building Code for voluntary adoption (could be issue a Government Decree for its application in public buildings).
• Enhance Act 7447 for Rational Use of Energy.
• Engineers and Architects College regulatory frame.
• Decree 28099 Material and equipment tax exoneration
• Create a Model for Local Governments to foster sustainable construction through the regulatory urban frame.

The SPV, in the form of a green housing trust fund will create a new platform for the receipt and allocation of state subsidies for medium income households, GHG donor mitigation funds, the long term development banks financing and private funding intended to expand affordable green housing opportunities in Costa Rica, which reduce CO2 footprint below a baseline. The intention is that the trust fund will not require exclusively Government money to become operational but will instead seek funding sources outside with sustainability purposes according to a National Policy of CO2 mitigation issued by the MIVAH and MINAE.

**Support Requested**

Nowadays, Costa Rica is President pro tempore, of the organism that coordinates efforts at inter-Governmental level for Central America Region regarding housing and human settlement issues. So, its leadership and experience can be replicated with much wider impact in a vulnerable region.
### Local counterpart International cooperation

#### Capacity development

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>MVR system</td>
<td>$60,000</td>
<td>$250,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certification &amp; Accreditation</td>
<td>$130,000</td>
<td>$375,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional training</td>
<td>$250,000</td>
<td>$300,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Performance Code</td>
<td>$20,000</td>
<td>$100,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legal framework strengthen</td>
<td>$100,000</td>
<td>$75,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical training</td>
<td>$500,000</td>
<td>$100,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$1,060,000</td>
<td>$1,200,000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Special Purpose Vehicle (Trust Fund)

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legal creation</td>
<td>$35,000</td>
<td>$250,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stock Market trade off</td>
<td>$50,000</td>
<td>$175,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrative constitution</td>
<td>$15,000</td>
<td>$125,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$100,000</td>
<td>$550,000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Multifunctional cities

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prioritization assessment</td>
<td>$150,000</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Five polifunction urban analisys</td>
<td>$45,000</td>
<td>$5,000,000</td>
<td>$2,000,000</td>
<td>$2,000,000</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>Pilot project 1000 green houses</td>
<td>$6,500,000</td>
<td>$65,000,000</td>
<td>$1,500,000</td>
<td>$4,500,000</td>
<td>$18,000,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$7,855,000</td>
<td>$72,750,000</td>
<td>$5,420,000</td>
<td>$7,200,000</td>
<td>$19,130,000</td>
</tr>
</tbody>
</table>

### Contact Information

Mr. Roy Barboza  
Vice Minister  
Ministry of Housing and Human Settlement  
Apartado 1753 - 2050 San Pedro de Montes de Oca.  
Sétimo piso OfiMall San Pedro, Costa Rica  
Tel: (506) 2202-7900  
broy@mivah.go.cr
Executive Summary

NAMA Ordinary Solid Waste Costa Rica (NAMA OSW) seeks support for its preparation phase. This proposal was prepared by the Ministry of Health (MinSalud) with support from the Department of Climate Change (DCC) of the Ministry of Environment and Energy (MINAE) and the Costa Rica Agency of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, and agreed with major stakeholders.

Introduction

The country generates about 1.3 million tons of ordinary solid waste (OSW) per year (3,600 t/d or 0.78 kg per person per day), with the majority placed in four large landfills operated by private companies in the Great Metropolitan Area (GMA). Another significant part of the OSW is deposited in landfills without proper environmental controls, mainly outside the GMA. The dry material recycling is growing.

MinSalud as the governing body of the solid waste sector has improved the conceptual, legal and regulatory framework significantly in recent years, in order to establish a modern and adequate Integrated Solid Waste Management (ISWM) in the country. This framework is generally a favorable context for the definition of a mitigation program; however it is still in development, partially incomplete and in different implementation stages. The main documents are:

- 2010-2021 National Policy for Integrated Waste Management,
- Law for Integrated Waste Management No. 8839 and its General Regulation,
- Costa Rica Solid Waste Plan (PRESOL),
- Municipal Solid Waste Management Plans in 43 of 81 cantons of the country.

The OSW subsector (not including industrial solid waste, organic industrial waste, and wastewater) causes a net emission of about 0.94 million tCO₂eq for 2012. The main factors are methane gas emissions at landfills and dumps (about 1.08 million tCO₂eq.) and recycling activities. The latter generate greenhouse gases (GHG) however; due to energy savings in processing recycled material (compared to raw material processing) they are a GHG sink in production processes, with estimated net emissions of -0, 14 million tCO₂eq. A projection of future emissions in the OSW subsector, under a "business-as-usual" (or baseline) scenario, would result in 1.07 million tCO₂eq in 2021.

A NAMA proposal would be a target of 480,000 tCO₂eq mitigation, per year on average, i.e. about 50% of current emissions. The NAMA is justified by its contribution to the country's mitigation goal and sustainable development of the waste sector, and for its social, economic and environmental co-benefits.

**NAMA Description**

1. **Methane gas capture and destruction in the three major landfills:** Since this issue is caused by the OSW organic fraction decomposition, deposited in the past and currently, it remains as the subsector’s main source of emissions. A high efficiency methane gas capture and destruction in major landfills is the more important mitigation strategy for the short and medium term. It will be complemented by the use of gas for the generation of electricity or heat in feasible cases.

2. **Valorization (recycling) of dry materials such as plastics, paper / cardboard, metals and glass:** Recycling can increase GHG sink function. The most important stakeholders are private recycling companies and production companies, the "Alliance for the Use of Recoverable Waste in Costa Rica", the "Costa Rican Network of Recovery Centers of Recoverable Waste" and collection centers, supported by the public sector in order to increase recycling rates.

3. **Composting and organic waste biodigestion:** Currently a large portion of organic waste streams within the OSW (waste from agricultural fairs, parks, gardens and establishments such as restaurants, shopping centers and hospitals) are deposited in landfills and contribute to the formation of methane gas. These organic wastes can be collected separately in a relatively easy way, and be properly treated through composting and / or bi-digestion with the co-benefit of generating compost and / or electrical energy.

4. **Evaluation and implementation of advanced technologies for solid waste management and energy use:** In the medium to long term the OSW subsector will need a transition toward advanced technologies to enable energy use from the organic fraction of waste with high calorific value, reduction of local environmental impacts, a high efficient GHG mitigation and a significant reduction in the volume of waste deposited in landfills. The latter can prolong the life of disposal sites and is of high strategic importance because it has been shown almost impossible to establish new landfills in the GMA. These technologies will be subject to feasibility analysis and to technology transfer and adaptation. An example of promising technologies is the biological stabilization (also called "mechanical-biological treatment").

The proposed funding mechanism is divided into three parts. The fund for integrated waste management based on the General Regulation to the Integrated Waste Management Law (No. 8839), which can receive donations from foreign donors (Articles 24°, 25°). The second component is the private investment in this sector, for example by the cement industry. This may work as a joint venture between the cement company and the waste management unit, in which the first invests in advanced technologies to prepare ordinary waste for co-processing and the second one is responsible for the operating expenses. The third component is the income of the municipalities for the fees charged. It is also noted that there is an increasing initiative from the Costa Rican bank in green credit lines and financial support to SMEs.

There must be changes in policies at the municipal level: Better waste management, in many cases lead to a
higher cost. Currently, many recycling activities are subsidized by municipalities. Revenues from real and personal property taxes do not always cover the costs. There must be a political will at local governments to adjust rates, as well as increased awareness and willingness in the population.

To sensitize the population, companies and municipalities will carry out workshops, trainings and meetings. There is also an inter-agency consultative platform with regular meetings, involving the Ministry of Health, MINAE, representatives of municipalities and NGOs. With the Integrated Solid Waste Management policy, the government is committed to supporting each activity in search of an improvement in this sector.

**Support Requested**

NAMA preparation requires external support. We propose 1-1.5 years for preparedness measures such as institutional strengthening and coordination, alignment of strategies and legal framework, improved database and MRV design, training and exchange at international level, awareness of sectors, definition of economic incentives, technology transfer and implementation on a pilot basis, and overall implementation planning including costs, responsibilities and schedule. It is estimated that the government will support the preparation phase (18 months) through health and environmental officers from the following institutions: MinSalud, MINAE (DCC; Directorate of Environmental Quality Management) and the 17 municipalities of the GMA, in the amount of $150,000. During the preparation phase it is estimated that private investments will be made in at least eight municipalities for methane gas recovery and burning, waste sorting and recovery, energy use, each with an approximate cost of $500,000, this is to say a private investment of $4 million. Therefore, the total local contribution (government and privates) is estimated in $4,150,000.

Costs estimates for support during the preparation phase are around $625,000 to $730,000, depending on the phase duration. The current OSW NAMA proposal was developed in workshops with key industry stakeholders. However, both the GHG reduction potential and implementation costs are estimates. It is necessary to carry out a technical and economic feasibility study, measure the impact, and evaluate the commitment of major actors, especially landfill operators.

NAMA’s first phase is to establish a pilot program with up to 10 GMA municipalities. Due to the gradual implementation character of the mitigation program, it is expected to begin with the implementation of some of its elements during this preparation phase, so that the corresponding measures can become a continuous accompaniment of implementation.
Dominican Republic - Tourism and Waste NAMA Executive Summary

For the CCAP Global NAMA Financing Summit in May 2013

May, 2013

1. Title page

Name of the proposed action: Tourism Sector in the Dominican Republic

Sponsoring country: Dominican Republic

Sponsoring agency or agencies: National Council for Climate Change and Clean Development Mechanism (NCCCCDM)

Main contact(s) for the NAMA:

Name: Omar Ramirez-Tejada
Title: Executive Vice-President
Phone: 809 472-0537
E-mail: o.ramirez@cambioclimatico.gob.do
Address: Av. Winston Churchill No. 77, Edificio Grucomsa 5to Piso, DN, Dominican Republic
Fax: 809 565-2889

Name: Moises Alvarez
Title: Technical Director
Phone: 809 472-0537
E-mail: m.alvarez@cambioclimatico.gob.do
Address: Av. Winston Churchill No. 77, Edificio Grucomsa 5to Piso, DN, Dominican Republic
Fax: 809 565-2889
Executive Summary

Introduction
As the country's leading foreign exchange earner and an important contributor to the national economy, the tourism industry in the Dominican Republic directly contributed just over $2.5 billion USD (4.7 percent) to the GDP in 2011, and including indirect impacts, the tourism sector's contribution was over $8.1 billion USD, (15.1 percent). Responsible directly or indirectly for over a half a million jobs, the sector also contributes to the nation's employment. Despite generous government tax incentives for renewable energy in the last two years, to date, the tourism sector's growth has been powered almost entirely by imported fossil fuels—diesel, natural gas and LPG, as well as electricity produced with fuel oil. Total GHG emissions in 2011 are estimated at 0.825 MtCO2e for the Tourism Sector and 2.1 MtCO2e for the Waste Sector.

In most tourist areas of the Dominican Republic, electricity is provided by private electricity suppliers on isolated grids under territorial concessions from the government; hotels are not permitted to purchase electricity from other outside sources. Electricity is reliable but prices range from 26 to 43 cents per KWh. In most cases, this power is generated in inefficient and small (1 to 6 MW) diesel engines, and fueled by imported fuel oil, and to a lesser extent, imported natural gas. In all but the smallest hotels, roughly half of electricity consumption is used for air conditioning. Private power suppliers serving the tourism industry have little incentive to change their energy mix or lower generation costs.

To improve competitiveness and further economic development in the sector, a top priority for the tourism industry is lower energy costs. At the same time, often under foreign ownership, hotels are reluctant to have clean energy investments on their books, preferring to invest in visible hotel amenities. Certain promising solutions, including municipal solid waste-fired and biomass-fired boilers serving groups of hotels, may be difficult to finance by the hotels directly as investors will offer credit based on the least credit-worthy partner. Clean energy solutions (e.g., solar hot water and biomass projects) also face reputational and informational barriers, respectively, due to negative past experience within the country and lack of data on the quality, quantity and location of biomass resources.

A second priority for the tourism industry in the Dominican Republic is reducing open dumping of solid waste in their communities through better waste management. Clean energy projects that burn organic municipal solid waste and biomass that displace on-site energy and/or purchased electricity have the potential to both lower energy costs and reduce dumping of waste while lowering greenhouse gas emissions by an estimated 0.85 MtCO2e. Other types of clean energy have the potential to displace additional on-site and/or electric sector emissions.

Reduced consumption of imported fuels will lower the overall cost of energy, improve the energy security of the country and reduce expenses in foreign currency. To the extent that the NAMA reduces dumping of waste or biomass, the NAMA will also result in a more attractive and healthful environment conducive to tourism.

NAMA Description
The Tourism Sector NAMA aims to replace fossil fuel combustion with alternative energy sources, particularly municipal solid waste- and biomass-fired boilers or combined heat and power (CHP) facilities while also encouraging investment in other alternative energy sources such as solar hot water, central station solar and wind power, and energy efficiency. Given high electric prices currently paid by the tourism sector, initial assessments suggest that all of these measures have the potential to lower energy costs.

A preliminary feasibility study shows that MSW and biomass facilities serving a cluster of five hotels with 2,700 guest rooms and sized at about 610 HP can lower energy costs by between $7 and $22 M USD per year, reducing GHG emissions between 20 and 69 ktCO2e per year, depending on the design (boiler or CHP unit). The proposed facility would displace current heat, steam, hot water and/or electricity. We estimate that these types of facilities can be implemented at about 15 sites around the country serving the tourism sector. The total investment cost for one of these facilities would be between $12.0 and $22.5 M USD, depending on the design, and the total emission reductions, considering scaling-up to 15 sites, would be between 300,000 and 1.0 Million tCO2e / year.

Additional analysis is needed to understand the technical and economic potential in the Dominican Republic of other alternative energy sources that displace emissions from the tourism sector, as well as the associated emissions reductions. For example, it is estimated that EE measures can reduce energy use between 30 and 50% in this sector,
by applying measures that are economically feasible. To avoid picking winners, the NAMA design will seek to
encourage wide-spread adoption of a variety of clean energy technologies.

These actions would be encouraged through a financial mechanism—a lease financing program—that reduces or
eliminates the need for an up-front equity investment and structures the financial deal such that the hotel or other
beneficiary sees net benefits starting in the first year. The financial mechanism would be complemented by policies
and measures overcoming specific barriers: an in-depth study of biomass cost, quality and location to facilitate use of
this resource; measures to reduce the cost and time of permitting for alternative energy projects; and outreach to
local technology and resource providers (e.g., fuel suppliers) and consulting firms for technical, legal and financial
aspects which can participate, increasing the socioeconomic co-benefits of the project and reducing costs.

The NAMA would be extended to all the tourist regions in the Dominican Republic and the financial mechanism will
be open to bidders from all over the country. Up to now specific opportunities have been identified to encompass
waste-to-energy in the Bavaro-Punta Cana region—the largest tourist district in the country. This region contains
more than 45 percent of the hotel rooms in the Dominican Republic (over 30,000 last year) and another 24,000 rooms
are under development or construction. An additional 14,000 rooms projected in near-by Miches, Hato Mayor
Province could also be included in the initial scope of the NAMA. Additionally, many of these hotels are large and well-
positioned to pay for clean energy (almost all of them are owned by the largest hotels chains in the world). Further,
there are strong actors in the region who are actively exploring alternative energy solutions. A scoping study has
already been conducted that confirms the economics of waste-to-energy technologies, and it is expected that other
tourism regions will present similar projects to ask for resources from the financial mechanism.

Support Requested

While ultimately the NAMA will require significant financial support to establish the financial mechanism, at this
stage, additional support is needed to design the financial mechanism, fully characterize the technical and economic
potential for energy efficiency and renewable energy technologies in the tourism sector, and assess the characteristics
of the biomass resource available to the tourism sector. In addition, capacity support is needed to develop feasibility
studies for Renewable Energy projects already identified by several local actors, including utilities and the National
Energy Commission.

The Dominican Republic requests 21 million USD for the further design and implementation of the NAMA. $20 M USD
will go to the initial capitalization of the lease financing mechanism. $1 M USD will go to a variety of capacity building
elements, including the elaboration of pre-feasibility studies in energy efficiency and renewable energy to help
demonstrate the economics and mitigate technology risk concerns.

Once the NAMA is implemented, existing tax credits offered by the Dominican Republic are expected to represent an
important domestic contribution to renewable energy investments facilitated by the Tourism and Waste NAMA. While
use of the tax credits have been limited up until now—in 2011 they accounted for expenditures of approximately $1.2
million—this will change with efforts to overcome barriers to investment. For example, if the NAMA is successful in
achieving 12 biomass projects similar to the one we evaluated, the Dominican Republic Treasury will forgo between
41 and 86 million USD in revenues depending on the technology chosen.
Title: Pakistan - Energy Efficient Lighting in Residential, Commercial, Industrial and Outdoors Sectors

Sponsoring Country: Pakistan

Sponsoring Agencies: Ministry of Climate Change

Main Contacts: Syed Mujtaba Hussain
Deputy Secretary, Climate Change, Ministry of Climate Change
hussainmujtaba@hotmail.com; mujtaba.gov@gmail.com; +92519245529

Executive Summary

Pakistan is presently facing multiple challenges to its economic growth that are also compounded by the worsening energy crisis. The country has a deficit of 5000 MW in the system during peak summer season that results in load shedding of up to 12 hours a day in urban areas and 18-20 hours in the rural areas. The total power generation capacity of the country as of June 2012 was 23,538 MW of which 16,035 MW (68.12%) was thermal, 6,716 MW (28.53%) was hydroelectric and 787 MW (3.34%) was nuclear. Pakistan’s growing population of 180 million is forecast to increase demand for power to 306,797 GWh by 2020, and 889,583 GWh by 2035, most of which is likely to be sourced from the country’s vast coal reserves. Pakistan also has one of the highest rates of transmission and distribution losses in the world while the non-productive residential sector is responsible for the largest share of electricity consumption (42.15%) as compared to the industrial (23.92%) and agricultural (14.03%) sectors.

In 2008, Pakistan’s total GHG emissions were 310 MtCO₂e. In terms of sectoral distribution, the energy sector is the most significant contributor to GHG emissions in Pakistan, totaling 157 MtCO₂e in 2007-08, or over 51% of the country’s total emissions (0.45 % of world’s total). By 2050, energy related emissions are expected to increase to 2,730 MtCO₂e, equal to 64% of total emissions that year – evidence that the energy sector in Pakistan will become increasingly carbon-intensive without intervention.

Reducing emissions through energy efficient lighting

To some degree, the energy crisis in Pakistan can be managed by implementing cost-effective, energy efficiency measures to technologies such as lighting in the residential, commercial, industrial sectors and outdoor/street lighting. Accordingly, the following activities are proposed for implementation under the NAMA:

(ii) Development of a Measurable, Reportable and Verifiable (MRV) system for GHG emission reductions resulting from deployment of Energy Efficient (EE) lighting projects/programmes.

(iii) Design and deployment of an integrated waste management system for destruction of Incandescent Lamps (ICLs) and recycling of Compact Fluorescent Lamps (CFLs) bulbs.

(iv) Establishment of a Revolving Loan Fund (RLF) and its linkage with the active Energy Conservation Fund of the National Energy Conservation Centre (ENERCON) to develop EE lighting projects/programmes.

(v) National launch of a public awareness campaign on transitioning to EE lighting to educate people from all walks of life regarding the benefits of adopting timely actions relating to energy conservation and efficiency.

The proposed measures are in conformity with the National Climate Change Policy 2012, National Energy Conservation Policy 2007 and Renewable Energy Policy 2006. Implementation of this NAMA will be led by ENERCON of the Ministry of Water and Power and will be technically back stopped by the Clean Development Mechanism (CDM) Cell of the Ministry of Climate Change, Energy Conservation Fund (ECF); Pakistan Standards and Quality Control Authority (PSQCA); Pakistan Council for Scientific and Industrial Research (PCSIR); Engineering Development Board of the Ministry of Industries and UNEP/GEF en.lighten initiative.

By implementing the above-mentioned actions, this NAMA will reduce 1.97 MtCO$_2$e, and produce energy savings equal to 5.5% of total national electricity consumption or 35.1% of electricity consumption from the lighting sector per year. This in turn will create annual savings of approximately US$ 408 million. Over 10 years, this equals approximately US$ 4 billion, corresponding to 3% of GDP. Increasing access to EE lighting will promote sustainable development by transforming the lighting sector and helping to shift Pakistan onto a low-carbon trajectory. The expected two-fold increase in the use of CFLs by low-income and lifeline consumers (consumers having consumption up to 100 kwh per month) will lower monthly electricity bills over the 10-year lamp lifetime, reduce peak demand for electricity and create jobs. Finally, the NAMA will help Pakistan meet its international obligations under the UNFCCC.

**Revolving Loan Fund**

Since 2002, Pakistan has demonstrated the technical capacity and experience to effectively manage ECF that received 3 million USD in seed funding, which has grown over time as a result of good fund management by ENERCON. The ECF is an active revolving fund governed by a board of public and private sector entities. However, as per memorandum and articles of association of ECF, the company can create a separate funding window for other sectors as well. The existing staff of ECF can effectively handle the RLF for transition towards Efficient Lighting in Pakistan. The frequent requests for EE lighting financing through the ECF (currently outside the scope of the fund) indicates growing trend for financing of EE lighting projects/programmes that is not met by private lenders so far.

The proposed RLF will be a separate funding window under the existing ECF specifically for the financing of EE lighting. The loan structure under this fund will be similar to the ECF, providing below market rates for lease finance facilities for EE lighting projects. The rates have been proposed at 3-10% per annum but would be finalized after stakeholder consultations. Obtaining additional collateral may cover the proposed exposure/credit risk against the prospective client. If the same mechanism is adopted
for financing of EE lighting projects/programmes, then the leasing company will determine the quantum of equity participation by the customer/client/lessee as it deemed fit. The customer/client/lessee shall bear all pertinent costs including inter alia installation and insurance of energy efficient equipment. Per part financing limit (restrictions on the size of the entity) would be US$ 30,000 to 50,000.

The RLF will be implemented in two phases. The first phase will allow the public, industrial and commercial sectors to access financing through this window. These sectors are prioritized because they will have the greatest reach and immediate impact. The second phase will provide access to the residential sector. In addition to capitalizing the fund, NAMA support will be used to develop guidelines for implementation, especially for disbursing funds to households.

An estimated amount of US$ 7 Million as financial support is required for realizing various activities in the proposed NAMA. Out of the total requested amount, US$ 3 million will be allocated specifically for RLF scheme whereas remaining US$ 4 million will be required for technology and capacity support needed for the implementation of other actions mentioned above. The host country will only facilitate the implementation of NAMA activities and will not be able to contribute financially. However, the Government of Pakistan has taken various policy and strategic initiatives in the form of duty exemptions on renewable/energy efficiency equipment.

The objective of RLF will be to provide access to financing for the private sector to retrofit or purchase EE lighting that is otherwise not available. Demonstration projects and the RLF will help build confidence in Energy Service Company (ESCO) models - an idea of self-revenue generation to encourage private sector and household participation. The RLF will also help in addressing the high cost of transitioning to EE lighting. MEPS and other policies are intended to increase demand for EE lighting. Few energy efficient lighting pilot projects under ESCOs principle were developed which recovered their investment cost through the savings. This arrangement can also be replicated through support to energy efficient lighting sector.

It is envisaged that with the successful implementation of the proposed NAMA, the country will benefit from replicating energy efficient measures in other major electricity consuming devices such as electric fans, water pumps, motors, refrigerators and air-conditioners.
Pakistan - Waste Sector NAMA

Title:  Pakistan - Waste Sector NAMA
Country:  Pakistan
Contact:  Engr. Dr. Basharat Hasan Bashir
Director General (H&W) AEDB
basharathasan@gmail.com, bashara15@yahoo.com.au, +92-51-926-2954

Executive Summary

Introduction

Municipal Solid Waste Sector:
Worldwide methane (CH4) from the landfilling of municipal solid waste (MSW) accounted for over 788 million metric tons of carbon dioxide (MtCO2eq) equivalent in 2012 and represented over 12 percent of total global CH4 emissions. Global CH4 emissions from landfills are expected to grow to 816 MtCO2eq by 2020. CH4 Emissions from landfilling of Municipal Solid Waste in Pakistan accounted for 3.6 MtCO2eq in 2012 and is expected to grow to 3.82 MtCO2eq by 2020.

Pakistan has regulations that will constrain and potentially reduce future growth in CH4 emissions from landfills. Waste to Energy projects are being encouraged in Public and Private Sectors.

Wastewater Sector:

Worldwide CH4 from wastewater accounted for more than 629 MtCO2eq in 2012. Wastewater is the fifth largest source of anthropogenic CH4 emissions, contributing approximately 9 percent of total global CH4 emissions. Global CH4 emissions from wastewater are expected to grow to 665 MtCO2eq by 2020. In Pakistan, CH4 from wastewater accounted for more than 23 MtCO2eq in 2012. CH4 emissions from wastewater are expected to grow to 27 MtCO2eq by 2020 in Pakistan.

Cattle and Buffalo Waste:

Pakistan being an agricultural country has large numbers of livestock. According to the Economic Survey (2009 – 10), Pakistan has 34.3 million cattle and 30.8 million buffalo heads respectively. This amounts to a daily generation of waste amounting to over 600 million kg of manure daily. In the context of the prevailing energy crisis in the country, the livestock waste presents an opportunity for Pakistan to promote both small-scale and utility-scale biogas that would greatly reduce the GHG emissions resulting from livestock waste produced in the country as well as provide alternate sources of energy both at the individual farm and utility level. The prevalent renewable energy policy in Pakistan (Short-term RE Policy, 2006) provides the government the mandate to promote biogas in the country that can potentially reduce GHG emissions resulting from the anaerobic decomposition of manure.
Estimated GHG emissions reductions are expected to be 30.8 MtCO\textsubscript{2}eq from Municipal Solid Waste and Wastewater Sectors in Pakistan as a result of the NAMA by 2020. Country will have enormous benefits in terms of environment and health as by controlling pollution from the waste sector, huge amounts of funds being spent on health sector will be saved and by products of sanitary landfills and wastewater treatment plants (Methane, Carbon dioxide and organic fertilizer) will be sources of income hence will bring economic uplift.

**NAMA Description**

1. Integrated Municipal Solid Waste collection, and conversion of Waste to Energy NAMA for Pakistan’s cities (includes organic waste separation, recycling, establishment of Waste to Energy Plants and Feed-in-tariff study, electricity generation).
2. Wastewater treatment and Wastewater to Energy NAMA (includes anaerobic treatment, gas separation, organic fertilizer production, electricity generation)
3. Nationwide promotion of both domestic and utility-scale biogas as a NAMA targeting the reduction of GHG emissions resulting from the waste generated from over 60 million cattle and buffalo heads in the country.

Environmental Pollution control, energy generation, organic fertilizer production, reduction in GHGs.

Recently, Waste to Energy and Bio-Energy have been added to Pakistan’s Renewable Energy Policy which has been approved by the Economic Committee of the Cabinet. Waste Sector NAMA will help transform the Renewable Energy Policy in this sector.

The overall objective is the reduction of emissions from solid and liquid wastes from the urban cities. With this NAMA, Pakistan wants to develop a programme to promote alternative use of waste, specifically for energy production. The scope of the programme will include different forms of energy and technologies. Emissions reductions will result from the avoidance of emissions from waste and additionally the replacement of conventional fuels with bioenergy.

**Incentives**

Government of Pakistan has resolved to extend all existing benefits under ARE Policy 2006 to Waste to Energy and Bio-Energy Projects. Specific proposed incentives are given below:

**Fiscal Incentives**

- No customs duty or sale tax for plant, machinery, equipment and spares (including construction machinery, equipment, and specialized vehicles imported on temporary basis) meant for the initial installation or for balancing, modernization, maintenance, replacement, or expansion after commissioning of ARE projects subject to fulfillment of conditions under the relevant SROs. All imported plant, machinery, equipment and specific items used in the production of Alternative Fuels shall also be exempted from Customs Duty and Sales Tax
- Parties may raise local and foreign finance in accordance with regulations applicable to industry in general. GoP approval may be required in accordance with such regulations.
• Non-Muslims and non-residents shall be exempted from payment of Zakat on dividends paid by the company.

Financial Incentives

• Non-residents allowed purchase of securities issued by Pakistani companies without State Bank of Pakistan’s permission, subject to prescribed rules and regulations.

Risk Cover

GOP has developed a security package consistent with international best practices which offers protection against “political” risk in a manner consistent with GOP policies in other infrastructure and related projects;

Incentives Exclusive for ARE–IPPs,

Fiscal Incentives

• Exemption from income tax, including turnover rate tax and withholding tax on imports.
• Repatriation of equity along with dividends freely allowed, subject to rules and regulations prescribed by the State Bank of Pakistan.

Financial Incentives

• Permission for power generation companies to issue corporate registered bonds.
• Permission to issue shares at discounted prices to enable venture capitalists to be provided higher rates of return proportionate to the risk.
• Permission for foreign banks to underwrite the issue of shares and bonds by ARE-IPPs to the extent allowed under the laws of Pakistan.
• Independent rating agencies in Pakistan to facilitate informed decision-making by investors about the risk and profitability of project company’s bonds/TFCs.

Risk Cover

Significant risks covered are:
• GOP guarantees payment obligations under the EPA in respect of projects to whom AEDB issues LOI and/or LOS;
• Safeguards in the event of privatization of any power purchaser or other constituent public sector entity;
• Protections against change in law, including tax and duty impositions;
• Foreign Exchange approvals and facilities commensurate with those in place for conventional power projects;
• Ensure convertibility of Pakistani Rupees into US Dollars at the prevailing exchange rate and the remittance of foreign exchange to cover necessary payments related to the project, including debt servicing, payment of dividends, and repatriation of equity.
• Indexation of tariff to cover exchange rate and inflation etc. consistent with that available to conventional power projects.

On the recommendation of Alternative Energy Development Board, the State Bank of Pakistan has enhanced capacity limit of all renewable power projects from 10MW to 20MW for financing under Scheme for Financing Power Plants Using Renewable Energy.

Banks, Development Finance Institutions DFIs can consider financing requests of sponsors, who intend to set up power projects up-to a maximum capacity of 20MW, using all types of renewable energy sources eligible under Scheme. Maximum financing limit to a single renewable power project under Scheme has also been fixed at Rs 3 billion to accommodate larger number of borrowers. However, banks, DFIs may continue to provide financing facilities as per their credit policies over and above maximum limit from their own sources subject to adherence to Prudential Regulations. SBP took these steps to promote Power Plants using Renewable Energy in the country after receipt of feedback from Alternative Energy Development Board AEDB.

Moreover US OPIC, IFC, ADB, US EXIM Bank etc. have shown interest and are financing Renewable Energy projects in Pakistan on 25% equity basis.

**Support Requested**

The support could be in the form of grant assistance from donor agencies. Host country will provide experts from Alternative Energy Development Board to supervise the development of NAMA in the waste sector.

Proper estimation is required to give an amount. Considering the scope of work US$ 5.0 million seems to be a conservative estimate.
This document summarizes a NAMA concept to scale up waste-to-energy activities in the Peruvian agricultural sector. The NAMA development work was initiated by the Ministry of Environment (MINAM) and will be led by the Multisectoral Bioenergy Commission that consists of the MINAM, the Ministry of Agriculture (MINAG), the Ministry of Energy and Mines (MINEM), and the Ministry of Production (PRODUCE). The work receives support from the International Climate Initiative (ICI) of the German Government.

**Objective**

The objective of the NAMA is to promote the scaling up of self-supply waste-to-energy technologies in the Peruvian agricultural sector to contribute to rural sustainable development and to global climate change mitigation. In particular, the NAMA aims to:

- Facilitate farmers’ and agro-industries’ access to capital to cover (up-front) investment costs of self-supply technologies and infrastructure for bioenergy generation from agricultural waste.
- Build the capacity of beneficiaries of the NAMA programme to establish, operate and maintain technologies and infrastructure to ensure their efficient and long-term use.
- Promote the establishment of an waste-to-energy services and technology market in Peru.

**Background**

2.1 Energy production in the context of climate change – Peru’s NAMA submission

Biomass waste from agricultural production has a great potential to be converted to energy. This potential is often untapped. In Peru, the agricultural sector generates about 13.5 million tons of biomass waste annually (MINAG, 2010) of which most is burned or left to rot on the fields.

Converting agricultural biomass waste into energy can provide a decentralized energy source in rural areas while simultaneously achieving a cost-effective solution to waste disposal, and a reduction in greenhouse gas (GHG) emissions.

Agricultural waste-to energy activities would fit well into Peru’s plan to cover part of the increasing demand for energy with renewable energy and to reduce national GHG emissions.

The energy demand is projected to grow by 9 percent per year. Meeting this demand is equivalent to a new 500 MW generation plant that would have to be taken into operation every year (IFC, 2011). Beside its potential, agricultural waste-to-energy activities currently contribute less than 4 percent to the national energy matrix.

By 2020, the country plans to have at least 33 percent of renewable energy in their energy matrix. This
goal, set by the Ministry of Energy and Mines (MINEM), was also communicated in Peru’s submission to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) on Nationally Appropriate Mitigation Actions (NAMAs).

In this submission, the government further stated its “firm willingness to strengthen the collective action to mitigate climate change through the development of a sustainable and low-carbon economy (UNFCCC, 2011)”.

The energy sector (including transport) contributes about 27 percent of the national GHG emissions which increased by almost one-third compared to GHG emissions in 2000 (Figure 2) (PlanCC, 2012). This increase is the result of an overall increase in energy consumption and the incorporation of natural gas into the national energy matrix.

Scope of the NAMA based on waste-to-energy generation potentials

The NAMA targets agro-industries, farmer cooperatives and individual farmers throughout the country. Biomass waste from the following crops will be considered: Sugar cane, Cotton, African palm, Rice, Coffee, Cacao, Aspara y Olive.

Other crops produce a significant amount of biomass waste, but further research is needed to determine the energy generation potential and/or assess the sustainability of its use. Crops under this category include: Potato, Cassava y Corn

About 85 percent of the potential is in sugar cane waste.

All self-supply technologies will be considered that are relevant for transforming agricultural waste biomass into energy. Figure 4 presents an overview on waste biomass sources, the available transformation technologies and the application or final use.

Estimated NAMA impacts

4.1. GHG emissions

Agricultural waste-to-energy activities have an estimated annual GHG emission reduction potential of 9.3 million ton CO₂eq. [included percentage of total GHG emissions]

NAMA components

The proposed NAMA comprises a range of activities to address the barriers presented in chapter 4 of this document. An overview of the different components and activities under each component is shown in Figure 1, followed by a summary description of each component.

NAMA Fund to support investments in and capacity building for agricultural waste-to-energy activities

A NAMA Fund (Figure 2) will be the core element of the proposed NAMA to help overcome financial barriers to investments in self supply waste-to-energy technologies, to finance capacity building for waste-to energy activities, and to support the awareness raising and coordination activities that are necessary to build a renewable energy market in Peru.

Since Peru has three geographical regions which differ in terms of their socio-economic characteristics, energy needs and the agricultural waste-to-energy generation potential, support programs will be designed that consider the different barriers, potentials and needs of the regions.
Capacity building support

The objective of the technical support programme is to develop and foster the technical capacities of national experts to design and implement self-supply waste-to-energy energy projects. The programme will be targeted at different stakeholders including project developers, energy service professionals, the financial service industry as well as relevant government officials (e.g. regulators). Activities will be designed to the specific needs and knowledge gaps of different stakeholder groups.

Outreach to promote the establishment of a renewable energy market

Outreach and awareness raising activities are planned to be an important component of the proposed NAMA to generate knowledge about the potential of renewable energies in Peru and to help build a national renewable energy market.

Figure 1: Proposed NAMA framework. Source: Own elaboration
Peru - Sustainable Housing and Construction Sector NAMA

Low Emission Capacity Building Project (LECB Peru)
Ministry of Environment – UN Development Program

Contact:

INTRODUCTION
According to the National Energy Balance 2010, residential, public and commercial buildings consume 45% of the total electricity consumption with a growing trend in the next years. That means almost a half of the total GHG emissions in electricity subsector. So, there is a huge electricity savings and GHG mitigation potential if substantial changes in current housing and construction market are promoted towards sustainability.

Peru has one of the greater annual growth rates (+5%) of Latin America, but this growth has not been done into an organized planning framework. These NAMA proposals will contribute to the implementation of initiatives of the Peruvian Government.

Peruvian housing and construction sector experienced a sustained growth in the last 10 years, considering that 16% of the GDP belongs to this sector. An important share of GHG emissions come from cement, steel and brick production, as well as their use in buildings. NAMA proposals for each of the three industries will have an approach that comprises all the activities that participate in the housing and construction value chain, including public entities, such as the Ministry of Housing, Construction and Sanitation, Ministry of Production, National Training Service for Building Industry (SENCICO), Peruvian Building Chamber (CAPECO), among others.

Sectorial initiatives are implemented: Roadmap of Low Emission Buildings and Inter-institutional coordination committee, Construction Standard EM.110: Thermal and lighting comfort with energy efficiency (in elaboration).

Barriers screening: Real GHG mitigation potential in this sector is unknown; current housing and construction market is unsustainable; local professional capacities are limited; inter-institutional synergies are weak, climate change and GHG mitigation are not a priority in this sector.

ESTIMATED GHG REDUCTIONS AND CO-BENEFITS

GHG emissions mitigation: Not available at this phase.

Co-benefits:
1. Increase of industry competitiveness.
2. Economic savings from the perspectives of the energy efficiency in thermal processes, lighting and electricity consumption.
3. Development of appropriated regulation to “greening” the market.
4. Opportunities to access Climate Green Fund.
5. MRV systems development and implementation.
6. Green building materials access in the market.

NAMA DESCRIPTION

Proposed NAMA actions will address identified barriers. The aim is to transform the housing and construction market towards sustainability, taking into account the following solutions:

Hereafter, a summarized description of each proposed NAMA action is shown:

1. **Action 1**: Baseline studies and value chain mapping of the three industries (cement, steel, brick).
   
   The objective of these studies is to provide concrete information regarding the factors that influence the current conditions of these industries, as well as the housing and construction value chain.

2. **Action 2**: Fostering the production of green construction materials (cement, steel, brick) towards sustainability by means of appropriated policy, regulation and incentives.
   
   A green construction materials industry is desirable for market transformation. This transformation has to be accompanied by appropriated regulation and incentives. The objective of this action is to enhance and support this initiative.

3. **Action 3**: Capacity building support for public and private market actors.
   
   The objective of this action is to foster technical capacities of national public and private experts, and to increase knowledge in green construction materials, to develop relevant regulation to allow availability of technology, and to implement MRV systems.

4. **Action 4**: Enhancing institutional control & supervision bodies for a better MRV design and implementation.
   
   Together with Action 1, relevant public control & supervision bodies will be enhanced financially and technically, by means of hiring experienced human resources, increase dedicated budgets, technology exchange, and inter-institutional synergies.
5. **Action 5**: Technical and financial support in NAMAs design and implementation.

As already said, MHCS’ medium-term aim is to develop a green housing and construction code that will transform the market in Peru. The objective of the action is to provide support to this initiative.

**PROPOSED POLICY CHANGES**

The green housing and construction code will be the umbrella policy under which the proposed 3 NAMAs will be designed and implemented.

**PROPOSED FINANCIAL MECHANISMS**

There is not a specific financial mechanism. The Development Financial Corporation (COFIDE), a public second-floor financial entity, through its Bio-business Program (Bionegocios) could develop and implement financial mechanisms to support greening construction materials industries. Likewise, public housing programs, such Mi Vivienda and Techo Propio, could design and implement incentive tools (green mortgage, energy efficiency labeling, renewable energy use in buildings, etc.) to promote the use of green construction materials.

**NAMA SELF-FINANCING AND REQUESTED SUPPORT**

Not available at this phase.
Peru - Programme for the Support of Up-scaled Mitigation Actions within the Solid Waste Management Sector

NORDIC ENVIRONMENT FINANCE CORPORATION

Contact:
Eduardo Durand López-Hurtado, General Director of Department of Climate Change, Desertification and Water Resources - Ministry of Environment. Telephone: 611-6000 Annex 1354. Email: edurand@minam.gob.pe

1. BACKGROUND

Daily waste production is estimated to come to about 22,400 tonnes, of which just over two thirds are collected and treated. Treatment usually amounts to little more than discharging waste at illegal dumps lacking any safety provision to avoid contaminating local areas, including rivers and coastline with toxic chemicals and harmful substances.

Open incineration is also common, resulting in further environmental degradation. Additionally, only about 30% of the collected waste, or 20% of the total waste produced, is disposed of in controlled (or sanitary) landfills. The country has no more than eight of these sanitary landfills, five of which are in Lima. A single separate landfill for hazardous waste is also present near Lima.

The laws and regulations governing the management of waste in Peru are:

- Ley Nº 27314, Ley General de Residuos Sólidos.
- D.S. Nº 057-2004-PCM, Reglamento de la Ley General de Residuos Sólidos.
- Decreto Legislativo N° 1065, modifica la Ley General de Residuos Sólidos.
- Ley Nº 28256, Ley que regula el Transporte Terrestre de Materiales y Residuos Peligrosos.
- D.S. Nº 021-2008-MTC, Reglamento Nacional de Transporte Terrestre de Materiales y Residuos Peligrosos.
- Ordenanza Municipal Nº 295/MML, Decreto de Alcaldía N° 147.

Responsibilities of municipal and non-municipal sectors in waste management in Peru are explained in the follow graphic:
MINAM is developing the “Solid Waste Management Programme in Priority Areas of Peru” with the financial support of Japan International Cooperation Agency (JICA) and Inter-American Development Bank (IDB), which aims to achieve the objectives of the National Environmental Action Plan - 2011-2021 (PLANAA), specifically referred to Solid Waste (100% of municipal solid waste are handled, recycled and disposed of properly in 2021). This Solid Waste Management Programme in Priority Areas of Peru will benefit to 2,925,213 habitants from 31 cities in Peru, improving the management of 1,348,376 tons per year of solid waste generated that will have adequate treatment and final disposal.

On the other hand, according to Peru's Second National Communication, Peru's waste sector is responsible for a rising 7% (estimation 7,334 Gg CO₂eq) of the country's total greenhouse gas (GHG) emissions. As a result of future growth projections and a recognition of the potential for making significant GHG emissions savings, Peru is investigating the potential for improving its waste management strategy to not only provide a much-needed better service to citizens and the country, but also to mitigate climate change.

2. PROGRAMME DESCRIPTION

2.1. Objective

The overarching aim of the Programme is to improve Peru’s readiness to benefit from international climate finance and/or the carbon market for supporting up-scaled mitigation action in the waste sector.

2.2. NAMA Components

The readiness activities shall address gaps in data availability and quality and technical and institutional capacity, as well as relevant technical, financial and other barriers to up-scaled mitigation and private sector engagement, including:

- Collection of updated data on emissions and emission reduction potential;
- Capacity to oversee and manage waste streams;
• Capacity to generate and implement waste strategy across different levels of Government and addressing the private sector;
• Identification of barriers to mitigation action, and proposals for addressing them;
• MRV system of international standard;
• Identification of appropriate support instruments for mitigation action, including potential sources of finance and funding, requirements and criteria for support;
• Relevant institutional arrangements, capacity building and training.

The Programme will consist of a preparation and follow-up stage and entail three phases: 1) Developing a solid waste inventory and identifying options to achieve significant emission reductions in this sector as a readiness activity; 2) Facilitating the development of a comprehensive national waste management strategy with the purpose of assisting the Government of Peru to facilitate the development of targeted policies and measures; and 3) elaborating one NAMA option identifying a measure resulting in substantial emission reductions, detailed list of tasks, institutional procedures including public-private partnerships, allocation of responsibilities and efforts, and funding options. The Programme will give special emphasis to exploring opportunities to utilise market-based (crediting) mechanisms in Peru’s solid waste sector, implying a results-based approach for provision of future support. However, the Programme itself is not expected to generate verified carbon credits.

Furthermore, the Programme aims to explore and share valuable lessons on practical issues relating to new climate finance and new carbon market mechanisms under negotiation. The Programme offers a unique opportunity for Nordic countries and Peru to pioneer into new support mechanisms for up-scaled mitigation action, act as a model for similar initiatives and share their valuable insights with the global community.

3. FUNDING

For the purposes of the Programme the Grant in an amount of up to EUR 2,000,000 and Peru is committed to providing the in-kind contribution of 10% of the total budget of the Programme.
Introduction

Despite vast, untapped renewable energy resources, roughly 10 percent of the Filipino population does not have access to energy, and the country remains heavily reliant on imports – primarily from fossil fuels - to meet its growing energy demand. Currently, half of the country’s power generation is derived from coal alone, and 67% is generated from fossil fuels. The power sector accounts for 22% of the Philippines’ total GHG emissions (energy accounts for 50%), and high rates of population growth and economic development are projected to increase power-related emissions by 400% between 2007 and 2030, from 26 to 140 MMT CO2-eq, in a BAU scenario. To improve energy security, expand access to power, and shift the energy sector onto a low-carbon trajectory, the archipelago is seeking to intensify development of its indigenous, renewable resources through a series of robust regulations and incentives, most notably of which are a set of feed-in-tariffs (FITs) for emerging renewable technologies.

Current Policy Framework

To accelerate renewable energy deployment, the Philippines has set long-term capacity targets as well as approved and implemented a range of fiscal and non-fiscal incentives. The National Renewable Energy Program calls for increasing renewable energy capacity from 5,400 MW in 2011 to 15,400 MW by 2030, and nearly doubling the share of renewable energy in the electricity matrix to 50 percent.

The Renewable Energy Act of 2008 (RA 9513) provides the following incentives for developing wind, solar, ocean, biomass, biogas and run-of-river hydropower resources:

1. Fiscal incentives: Several tax incentives for renewable energy projects including a seven-year income tax holiday and 10 percent corporate tax rate thereafter, duty-free and VAT-free importation, tax rebate for renewable energy components of equipment, and a tax credit on domestic capital equipment and services, among other provisions.

GHG and sustainable development benefits

This NAMA has the potential for significant GHG emission reductions given the scale of emissions from this sector, and the projection for accelerated energy demand that to a great degree will continue to be derived from fossil fuels if renewable energy deployment is not catalyzed. Technical assistance from donor countries will be critical in developing an accurate emission reduction estimate, and for developing the monitoring systems that will track the effectiveness of this NAMA as it is implemented. This NAMA will also contribute to other Philippines priorities including:

- Enhancing sustainable development by improving energy security through reduced fuel imports;
- Expanding access to energy, especially for the poor;
- Improving health conditions by reducing respiratory illnesses and other diseases associated with fossil fuel combustion and indoor air pollution from burning traditional biomass; and
- Increasing economic growth and social well being by providing the energy needed to fuel schools, hospitals and businesses that improve quality of life.

2. NAMA Description

This NAMA aims to increase deployment of grid-connected renewable energy by combining an innovative financial mechanism to overcome local financial barriers with the implementation of the FIT. This would be accomplished by the creation of a revolving construction finance facility.

FIT structure and barrier to private sector participation

The government recently established a feed-in-tariff program for four renewable technologies in July 2012, with a fifth expected to be released at a later date. The FITs are guaranteed for a period of 20-years from the Commercial Operation Date, and are substantially higher than the spot market rate of Php 5.39 ($0.13)/kWh. The implementing guidelines for the FIT are under development. The Department of Energy has also determined technology-specific installation targets for a total of 760 MW in the first phase of activities, conducted over three years (2012-2015) or until the target capacity is achieved. Subsequent phases are expected although not yet planned. To hasten the deployment of renewable energy at the initial stages, and assuming the cost of technologies declines over time, the FIT rates will digress annually. The rate of digression, although not finalized, is currently recommended at 6%. The approved tariffs and capacity targets are shown in Table 1.

The FIT is designed on a “first come, first serve” basis. Independent power projects must be certified by the Department of Energy (DOE) as commercially operational before applying for the FIT. The Filipino FIT model takes a results-based approach to avoid designating support for FIT projects that ultimately may not be constructed or do not begin commercial operation by a specified date. Under this model, however, project sponsors can obtain a FIT contract for the sale of energy after project completion and commissioning.

This results-based approach creates a gap in the financing process for renewable energy projects as local banks are reluctant to provide construction finance for projects without a certified source of long-term payment that would come from the FIT contract. To facilitate access to financing without a guaranteed tariff, the government has asked private lenders to provide construction financing based on a firm’s equity rather than cash flow. Very few project developers have sufficient capital to obtain construction financed based on their balance sheet. Approximately 114 firms are potentially FIT-eligible projects, yet only 56 of these have applied for the

Table 1: Phase I feed-in-tariff and capacity targets

<table>
<thead>
<tr>
<th>Technology</th>
<th>Approved FIT (per kWh)</th>
<th>Capacity Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run-of River Hydro</td>
<td>PHP 5.90 ($0.13)</td>
<td>250 MW</td>
</tr>
<tr>
<td>Biomass &amp; Biogas</td>
<td>PHP 6.63 ($0.16)</td>
<td>250 MW</td>
</tr>
<tr>
<td>Wind</td>
<td>PHP 8.53 ($0.21)</td>
<td>200 MW</td>
</tr>
<tr>
<td>Solar</td>
<td>PHP 9.68 ($0.24)</td>
<td>50 MW</td>
</tr>
<tr>
<td>Ocean</td>
<td>TBD</td>
<td>10 MW</td>
</tr>
</tbody>
</table>
declaration of commerciality under the FIT system. This is in part due to the difficulties of securing construction financing.

Financial Mechanism: Construction Financing Facility
This NAMA proposes to develop a revolving fund that will provide construction financing to qualified developers and projects that cannot access construction financing. The expected construction loan repayment period is estimated at one year, which would enable donor-provided seed funding to revolve over a short period of time and continue support for projects indefinitely. The fund would require project sponsors to provide a 5% bond to create incentives for project completion, commissioning and FIT certification.

1. After a firm receives the necessary approvals and permits to begin construction, it will secure a take-out commitment from a private lender contingent on executing a FIT agreement.

2. With a take-out commitment in hand, the Construction Finance Facility will provide well designed qualified projects with a construction loan. The revolving fund will be managed by experts in construction finance and have personnel on site to ensure construction proceeds as planned, with funding disbursed in progress payments as project activities are completed.

3. When the project has commenced commercial operation, the sponsor will seek to execute a FIT agreement. Once the FIT agreement is approved, local banks will provide take-out financing and the proceeds from this financing will be used to repay the construction loan to the revolving fund.

Through a revolving Construction Financing Facility, NAMA funds fill the FIT financing gap that the private sector has been unable to provide. The short repayment period and revolving nature of the facility will ensure long-term sustainability of the program, as well as replication across the country.

To pilot the facility, the NAMA proposes providing financing to eligible firms that have been approved to develop power plants in “Eco-towns”. Eco-towns are municipalities identified by the Climate Change Commission (CCC) that are located in biologically important areas and have strong political will to implement policies that promote sustainability and alternative livelihood development. The CCC, with support from USAID, has conducted in depth pre-feasibility studies in 10 Eco-towns to assess the potential for various renewable energy options. The CCC has identified the most viable technologies for several of these municipalities, and is hosting an investor’s forum in June 2013 to attract private sector interest in developing the power plants. The Construction Financing Facility would thus support independent power producers investing in select Eco-towns.

3. Support Requested

The Government of the Philippines is requesting $10 million to implement and capitalize the Construction Financing Facility.
Title: Philippines - Revolving Fund for Waste-to-Energy Projects
Sponsoring Country: The Philippines
Sponsoring Agencies: National Solid Waste Management Commission (NSWMC), Department of Environment and Natural Resources; Climate Change Commission (CCC)
Main Contacts: Emelita Agualdo, Executive Director, NSWMC emyaguinaldo@yahoo.com; +632-9202252
Joyceline Goco, Deputy Executive Director, CCC joy.goco@yahoo.com; +632-7353144

1. Introduction

One of the Philippines’ most significant challenges both in terms of sustainable development and GHG emission reductions is waste management. This includes municipal solid waste, wastewater, and agricultural waste. In fact, 38 percent of the country’s emissions in 2005 were produced by the waste (15 Mt CO\textsubscript{2}e) and agriculture (39 Mt CO\textsubscript{2}e) sectors, with emissions expected to rise significantly as growing populations and incomes accelerate waste generation. Additionally, there is a significant pipeline of potential waste-to-energy projects to come on-line in the near-term, driven by a robust policy-framework. Under current law, all secondary cities are required to convert open dumps to controlled landfills. This has led to a significant implementation gap – there are currently 55 operational sanitary landfills serving 75 municipalities, and roughly 61 landfills in various stages of construction nationwide. To provide a sense of scale, the Philippines has 1,610 cities and towns. In addition, large scale waste streams (e.g. 13 million tons of solid waste produced annually, 13.7 million pigs) are available for waste-to-energy development. However, without appropriate incentives and access to financing, landfill facilities will be established without methane capture and agricultural waste streams will be underutilized as a source of renewable energy in the Philippines.

Current Policy Framework and Bilateral Initiatives

The Ecological Solid Waste Management Act of 2000 (Republic Act 9003) mandates the closure of all open dumpsites by 2004 for conversion to controlled disposal facilities. By 2006, these controlled disposal facilities should be converted to sanitary landfills. The law requires the inclusion of a gas control and recovery system for gas ventilation, and encourages operators to consider gas capture and utilization systems if economically feasible. The Clean Water Act of 2004 aims to catalyze the treatment of sewage and wastewater by prohibiting the discharge of pollutants into the nation’s waterways. Both laws prescribe civil and criminal penalties for non-compliance, yet neither law includes a mandate or incentives for methane capture and utilization.

The 2010 Department of Environment and Natural Resources Administrative Order 2010-06 provides guidelines for the use of waste as an alternative fuel and raw material for the cement industry, thereby reducing the need for raw material inputs and reliance of the energy-intensive industry on fossil fuels.

The Renewable Energy Act of 2008 provides a series of incentives for renewable energy generation, including but not limited to: reduced corporate tax rate, VAT-free importation and energy transactions, tax rebates for equipment, accelerated depreciation, operating loss carryover, renewable portfolio standards, net metering and cash incentives for distributed energy. A feed-in-tariff for biomass and biogas is also in place, and implementing
guidelines are underway.

Through several bilateral initiatives, the Philippines government is building a foundation to support implementation of the above framework and the actions proposed under this NAMA. Activities include: creation of a landfill database with waste characterization assessments (US EPA); demonstration of best available technology for methane reduction and utilization, development of MRV systems and sectoral baselines (GIZ); and implementation of an enforcement mechanism for promoting local compliance with RA 9003 (UNDP).

Reducing emissions from the waste sector through the CDM
To address methane emissions from waste activities, the Philippines has registered approximately 100 Clean Development Mechanism (CDM) projects expected to reduce 4.3 MtCO₂e annually. Additionally, the World Bank has agreed to purchase 250,000 tons of certified emission reductions (CERs) through 2013 under two Programs of Activities covering methane recovery and utilization from landfill gas and animal waste. The program is currently under negotiation for a second term.

Despite the CDM’s positive initial uptake, the collapse of the carbon market and subsequent CDM revenues has discouraged many firms from installing gas collection and utilization technology in their facilities, or caused waste-to-energy (WTE) facilities in-progress to close before becoming fully operational. With carbon prices likely remaining low in the near-term, the Philippines needs an alternative to the CDM that will catalyze investment in WTE projects, and offer a model that can be replicated elsewhere. Although the World Bank project is supporting a limited number of CDM projects, this model is not able to meet the needs of the sector (the Payatas landfill alone has nearly 400,000 CERs unsold) and is not sustainable without continued donor support.

2. NAMA Description

This NAMA proposes to design a set of measures that will catalyze private investment in methane capture and utilization technology in the waste sector through increased regulation, incentives, capacity building and innovative financing. The NAMA will not seek to replace the existing emission reduction purchase project with the World Bank, but will instead work with the firms producing emissions outside the eligible 250,000 CERs, or in sectors not eligible under the Program of Activities.

Regulation, Incentives and Capacity Building
WTE technology is unlikely to be mandated due to unique circumstances encountered by each facility that affect the financial viability of such projects. However, there is political support in enacting regulations, and incentives can be put in place to stimulate the expansion of waste treatment facilities so that NAMA financing can be directed for the additional cost of emission reduction through implementation of WTE technology. Funding to explore the viability and effectiveness of such measures is critical to designing a robust NAMA that will catalyze private sector participation in these facilities, and fill the gap left by the CDM.

The government is interested in exploring the following policy initiatives to reinforce the market:

- Develop guidelines for the design, construction and operation of waste-to-energy facilities that are harmonized with the Clean Air Act
- Mandate that utilities purchase all power generated from biogas
- Capacity building for public-private partnerships to build, operate and maintain WTE facilities, building off of a GIZ project to demonstrate the viability of this technology at the local level
RA 9003 and the Clean Water Act provide the following incentives for solid waste and wastewater management technologies: tax and duty exemption on imported capital equipment and vehicles, tax credit on domestic equipment, tax and duty exemption from donations, priority financing by national financial institutions, and fiscal and non-fiscal incentives provided under the Omnibus Investments Code. However, these incentives do not currently extend to WTE technology. An important regulatory measure would thus be revising “Chapter IV, Section 45” of RA 9003 and “Chapter 4, Section 26(1) Financial Incentives (1)” of the Clean Air Act to explicitly include WTE facilities.

Finally, farms and banks are hesitant to pursue WTE projects due to lack of familiarity with this technology and its application in country. In order to drive uptake, there should be a locally tested, proven technology for WTE facilities that is capable of generating the expected volume of electricity. Thus, in addition to growing the sector through regulations and incentives, demonstration of WTE projects will be an important contribution of the NAMA.

**Financial Mechanism: Revolving Fund with low interest rates and extended maturities**

Most facilities use the sale of CERs to supplement revenues for loan repayment. Thus, with the loss of carbon credit revenues, annual debt service payments have become unaffordable for the purchase and use of WTE technology.

In an effort to reestablish the financial viability of many proposed WTE projects that have lost the value of CDM support, this NAMA will establish a concessional loan co-financing program to leverage private investment and lower debt service demands for eligible WTE projects. The NAMA fund would provide zero interest loans for up to 50% of a project’s total financing. The loan program would revolve as repayments of principle will flow back to the fund for lending to additional projects.

Several existing government supported lending programs are being considered as a host for the revolving fund to reduce operational costs and utilize existing data networks for lending.

**GHG and sustainable development benefits**

According to a preliminary assessment, this NAMA is expected to reduce 4 MtCO₂e annually. It will also contribute to the Philippines priorities for sustainable development by reducing vector borne and respiratory disease associated with unmanaged waste; expanding access to energy, especially for the poor in rural areas; and improving the overall quality of life for Filipino citizens.

### 3. Support Requested

The Government of the Philippines is requesting support for technical assistance to further design and elaborate this NAMA, and $15 million to capitalize a revolving waste-to-energy fund.
Uruguay – Solar Thermal NAMA

Executive summary

Country: Uruguay
MVOTMA. Ministry of Housing, Land Planning and Environment.

Main contact:
Dr. Ramón Méndez
Director of Energy
National Directorate of Energy
Ministry of Industry, Energy and Mining
(+598) 2900 9616
ramon.mendez@dne.miem.gub.uy

Introduction

Uruguay has set very ambitious targets for renewable energy. By 2015, it will have 90% of its electricity and more than 50% of its primary energy coming from renewable sources. Electricity production and primary energy from renewable sources already account for 75% and 38%, respectively, and with an estimated 1000MW of wind power either under construction or awarded, the country is on its way to achieving these objectives.

To further promote the substitution of fossil fuels, solar thermal collectors are being proposed as a way to reduce electricity consumption.

Law 18,585 establishes that all new public buildings, health-care institutions, hotels and sports facilities where at least 20% of the total energy consumption is used for water heating, will have to meet 50% of the water heating demand through solar thermal collectors.

The National Directorate of Energy (DNE) estimates that solar collectors can reduce the use of electricity for water heating by up to 60% in the residential sector. Since water heating accounts for 37% of the average household electricity bill, the benefits to consumers is significant. The residential sector consumes 41% of national power production, thus the introduction of solar thermal technology would potentially reduce total national electricity consumption by 9%, yielding a reduction of 440,000 tCO₂e per year.

In an effort to promote the technology among residents, Uruguay’s government-owned power company (UTE) and the Ministry of Industry, Energy and Mining (MIEM) have launched the Solar Plan – an initiative that seeks to provide access to solar thermal collectors for private users by providing an affordable, easily attainable 5 year-loan that includes insurance for the equipment. In addition to this loan, UTE offers a monthly discount of
700 Uruguayan pesos plus VAT (est. US$43) off of electricity bills during the first 2 years for the first 2,000 program beneficiaries. This program, despite its great economic advantages, has had little uptake due to lack of familiarity with solar water heating technology.

**NAMA Description**

The Solar Plan – deployed in 2012 - focuses on the existing private residential sector. In order to promote solar thermal energy in new social housing, the Ministry of Housing, Land Planning and Environment plans to make a mandate where all new housing built with public funding will have to include the necessary infrastructure to install solar collectors. Private housing that benefit from a public contribution will also be included in the mandate. Over 2,000 new social houses are built with government funds per year and 4,000 built by private institutions with public contribution. The incorporation of this mandate is one of the pillars of the NAMA allowing the installation of at least 4,000 solar collectors per year.

As Uruguay has three local manufacturers of solar collectors, this program also boosts the domestic sector and increases the technical expertise of the companies, contributing to the cost decrease by technological learning.

NAMA funds would be used to (help) finance the installation of the collectors, which would then be paid back through the electricity bill using an approximation of the savings achieved due to the use of solar technology. A continuous flow of financing can be generated once funding for the development of the program has been obtained. The proposed fund, which would be operated by UTE, would operate as shown in the following figure:

![Diagram of NAMA funding cycle]

Estimations of the Ministry of Industry, Energy and Mining assure that 37% of the electricity used in a household is used to heat water, and that the use of solar collectors would reduce the use of electricity for this purpose by up to 60%. This would then save each household the equivalent of 900kWh per year, or US$ 240. As the number of installed systems would increase by 4,000 a year, a constant number of 80,000 units would be achieved after
20 years (including the ones at the end of their lifetime). Once this final number is achieved, an annual avoidance of around 75,000 MWh could be attained. Giving the project a lifetime of 30 years (even though if managed correctly the fund could continue indefinitely) the emissions reduction could reach 1 Mt CO₂e over 30 years.

In addition to the GHG emission reductions, the deployment of this NAMA is critical for socializing this technology - creating success stories that highlight the economic and environmental benefits of solar water heater use – in order to accelerate uptake of the technology, as prescribed in the Solar Plan. This will transform the sector by making solar water heaters common practice as new homes are built, leveraging private investment in and uptake of this technology beyond the homes supported under the NAMA. Although Uruguay’s primary energy supply is relatively low-carbon due to a reliance on hydropower, diesel generators are used to complement the baseload when meteorological conditions are not favourable for electricity production. The solar water heaters are thus important for displacing fossil fuel consumption and increasing the share of renewables in both the primary energy supply and electricity production. Finally, demonstration of this technology and financing mechanism is important for replication, especially in countries with a carbon-intensive energy supply.

Support requested

To complement the funding obtained through the NAMA program, Uruguay proposes two channels for financial contributions:

- UTE would provide direct support to the fund.
- The government would provide financial support by means of the Uruguayan Energy-Saving and Efficiency Trust Fund (FUDAEE).

This would allow the creation of a fund with an overall financing need of US$ 21,000,000, which will be used throughout the development of the NAMA.

In this regard, the support requested to finance 4,000 installations per year at a cost of US$ 1,500 each is US$ 14,000,000, and the rest of the total amount would be provided by the Uruguayan Government, in particular US$ 5,000,000 by the state-owned company UTE and the remainder by the Uruguayan Energy-Saving and Efficiency Trust Fund (FUDAEE). The funds would be used over time as shown in the following table:

<table>
<thead>
<tr>
<th>Year 0</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Fund total</th>
</tr>
</thead>
<tbody>
<tr>
<td>FUNDS NEEDED</td>
<td>6,000,000</td>
<td>5,000,000</td>
<td>4,000,000</td>
<td>3,000,000</td>
<td>2,000,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td>RECOVERY THROUGH REPAYMENT</td>
<td>1,000,000</td>
<td>2,000,000</td>
<td>3,000,000</td>
<td>4,000,000</td>
<td>5,000,000</td>
<td></td>
</tr>
</tbody>
</table>

Vietnam - Waste Sector NAMA: Waste to Resources for Cities

Title: NAMA in the Waste Sector: Waste to Resources for Cities in Vietnam

Sponsoring Country: Vietnam, Institute of Meteorology, Hydrology and Environment, Ministry of Natural Resources and Environment

Main Contact: Dr. Tran Thuc, Director General
No. 23 Lane 62 Nguyen Chi Thanh, Hanoi, Vietnam
tranthuc@imh.ac.vn or thuc@netnam.vn

Sponsoring Agency: United Nations Economic and Social for Asia and the Pacific (UN-ESCAP)

Mr. Joao Aleluia
Project Coordinator
Environment and Development Division
United Nations Economic and Social for Asia and the Pacific (UN-ESCAP)
aleluia@un.org
Executive Summary

Introduction

National context
In 2009, the Prime Minister approved the National Strategy for Integrated Management of Solid Waste up to 2025, vision towards 2050 which sets the vision that by 2050 all forms of solid waste will be collected, reused, recycled and treated completely by advanced technologies which are environmentally friendly, customized for different locales and reduces the need for the land filling of waste to a minimal level. Recently, in 2012, the Prime Minister approved the plan "Management of greenhouse gas emissions; management of the activities of trading carbon credits to the international market” which sets the target of reducing GHG emissions by 5% in the waste sector by 2020.

Sector context
According to the Second National Communication of Vietnam to the UNFCCC, the total GHG emissions from waste in 2000 is 7,925.18 thousand tons of CO$_2$e, which constitutes 5.3% of the total GHG emissions of Vietnam. Although the percentage of GHG emissions from waste sector is the smaller compared to other sectors, emissions will increase significantly in future given no appropriate waste management methods are applied.

Currently the collection, transportation, and disposal of waste are managed by the municipal government, contracted through the Urban Environment Company (URENCO) which is under the supervision of the People’s Committee.

Barriers:
- The expenses incurred with solid waste management often constitute a substantial portion of city budgets. Income generated from collection fees may suffice to cover the operational costs of waste management but are not enough to cover investment requirements. Hence, local governments often depend on the Central Government for subsidies or on official development assistance (ODA) funds for investment in new infrastructure. Therefore, in order to apply models such as the IRRC and anaerobic digestion facilities, that are intended to transform waste into resources in cities in Vietnam, additional technical and financial assistance from developed countries is necessary.
- Local banks do not have the capital or technical capacity to finance waste management facilities, including those of source separation, recycling, composting, and biogas/anaerobic digestion.
- There is no mandate to close insanitary landfills, and open dumping through the disposal of waste into lakes, rivers, and open areas is prevalent across the county, in addition to the burning and burying of waste.
- URENCO does not have a budget for capital and investment costs for new technology and capital in the waste sector beyond current business as usual practices.
NAMA Description

The Institute of Meteorology, Hydrology and Environment of Vietnam (IMHEN), in partnership with the United Nations Economic and Social Commission for Asia and the Pacific (UN-ESCAP), proposes developing the following NAMA: “NAMA in the Waste Sector: Waste to Resources for Cities in Vietnam”.

The overall goal of this NAMA program is to reduce GHG emissions from the waste sector and contribute to sustainable development. The proposed NAMA will build upon the results of the NAMA-readiness project titled “Vietnam-Japan Capacity-building Cooperation and Joint Study Project for a NAMA in the waste sector in a MRV manner” implemented by IMHEN in cooperation with Overseas Environmental Cooperation Center (OECC), Japan, as well as the approach and experiences of UN-ESCAP in developing a pro-poor and decentralized solid waste management model for countries in developing Asia.

The specific objectives of this NAMA include: (i) the improvement of waste collection services in cities in Vietnam and the promotion of 3R principles; (ii) the diversion of waste streams from landfill disposal and other end-of-pipe solutions; (iii) sorting out of the organic and inorganic components of waste streams through the separation of waste at source; (iv) promotion of the biological treatment of the organic waste; and (v) the recycling and reuse of inorganic waste.

This NAMA initiative is planned to commence July 2013 to December 2020 and consists of three phases.

Phase 1 (July 2013 – December 2013) will be a preparatory stage, and the key activities to be conducted will be the full definition of the NAMA scope, a detailed plan of activities, milestones and priorities, as well as the identification of stakeholders that could take part on this NAMA.

Additionally, through Phase 1 scoping studies, a financial mechanism will be defined in which to integrate the involvement of the private sector and define how revenues generated from facilities will be used for the repayment of the capital investment funds and to sustain financing for the operation and maintenance of the facilities. The purpose is to create both political and economic incentives to replicate similar projects nationally.

Phase 2 (January 2014 – June 2015) will consist of building capacities among local partners and the implementation of at least two pilot projects in cities across Vietnam: one in a centrally controlled municipality and the other in a secondary city or small town. The pilot projects will take account of the different needs and challenges of municipalities, and will serve as a test-bed for a fully-fledged NAMA program to be deployed under phase 3. The project in the centrally controlled municipality is planned to be a waste-to-energy facility applying anaerobic digestion technology to generate electricity from organic waste and having as feedstock organic waste separated at source, collected from vegetables markets, households, restaurants and small shops. The project in the smaller municipality will consist
of an up-scaled Integrated Resource Recovery Center (IRRC) facility, facilities aimed at recovering waste from resources, with the capacity to process up to 20 ton organic waste per day, which can potentially reduce the emission of 6,600 tons of methane per year.

Three major activities are typically carried out by an IRRC: i) collection of segregated waste; ii) storage and processing of waste; and iii) sale of the resources produced from the waste. IRRCs promote the use of simple, non-mechanical technology, and can be built and operated at low cost. The IRRC model has many elements of a NAMA, and there is a potential to explore a bottom-up vertically integrated approach to fully incorporate these elements into a national climate change mitigation action for the waste management sector (Figure 1). Such “NAMA elements” include the potential for GHG emission reductions, technical and financial support, capacity building and strong co-benefits to local communities.

**Phase 3** (July 2015 – December 2020) will consist of the full implementation of the NAMA throughout cities in Vietnam in order to reach a significant reduction of GHG emissions from waste in cities to achieve the target of reducing GHG emissions by 5% from waste by 2020 set by Decision No.1775/TTg of the Prime Minister.

**Support Requested**

The study conducted during Phase 1 will reflect on the estimated costs and necessary financing requirements, and will estimate the expected contributions to the implementation of this NAMA initiative from domestic entities, private sector stakeholders, and international donors. During Phase 2, both the national and municipal governments are expected to make unilateral contributions towards the project implementation, including financing of the proposed solution, allocation of land, manpower, etc.
As a research institute, IMHEN will provide in-kind contribution in the amount of USD 10,000.

As a partner to the Government of Vietnam and IMHEN, UN-ESCAP is willing to provide support on the following streams:

- Preparation of supporting studies and background documents for Phase 1;
- Identification and mobilization of stakeholders in Phase 1;
- Seed funding to selected pilot projects in Phase 2;
- Capacity building activities and knowledge sharing initiatives.

The required level of international support will be determined during Phase 1 of the NAMA, but it is expected to be in the range of USD 10-20 million. The private sector is also expected to play a key role on the implementation of this NAMA, both on phases 2 and 3, by taking ownership stakes on waste-to-resource projects and, whenever possible, contribute to technology transfer and capacity building. Revenue generated by the facilities is expected to cover the operating and maintenance of the IRRC and AD facilities and to repay the capital investment costs.
Appendix - NAMA Host Country Contacts

Argentina – PROBIOMASA, Biomass NAMA
Sponsoring Agencies
- Ministry of Agriculture, Livestock and Fisheries
- Secretary of Agriculture, Livestock and Fisheries
- Ministry of Federal Planning, Public Investment and Services
- Secretary of Energy with the assistance of the United Nations Organization for Food and Agriculture (FAO)
Contact
- Moira Laura Achinelli
  machinelli@minplan.gob.ar / info@probiomasa.gob.ar
  +54 11 41203121 / +54 11 43497585

Chile - Chilean Renewable Energies Price Stabilization Fund
Sponsoring Agencies
- Chilean Ministry of Energy
- Center for Clean Air Policy
Contact
- Tatiana Molina, Advisor to the Minister of Energy
tmolina@minenergia.cl
  +(56 2) 2365 6800
  Alameda 1449, 13th floor, Santiago, Chile

Chile - Self-supply Renewable Energy in Chile
Sponsoring Agency
- Renewable Energy Center
Contact
- Gerardo Canales, Chief of Project Division
gcanales@cer.gob.cl
  +(56 2) 2496 9600
  Agustinas 640, 16th floor, Santiago, Chile

Chile - Catalyzing Organic Waste Diversion in the Chilean Industries
Sponsoring Agencies
- Chilean Ministry of the Environment
- Environment Canada
- Center for Clean Air Policy
Contact
- Carolina Ascui, Professional of the Solid Waste Section, Ministry of the Environment
cascui@mma.gob.cl
  +(56 2) 2240 5678
  Teatinos 254, Santiago, Chile
**Colombia** - Transit-Oriented Development in Colombia
Sponsoring Agency
• Center for Clean Air Policy
Contacts
• Nicolás Estupiñan Alvarado, Vice Minister, Ministry of Transportation
  nestupinan@mintransporte.gov.co
• Adriana Soto Carreño, Vice Minister, Ministry of Environment and Sustainable Development
  asoto@minambiente.gov.co
• Luis Fernando Arboleda Gonzalez, President, FINDETER
  lfarboleda@findeter.gov.co
• Steve Winkelman, Director, Transportation Program, CCAP
  swinkelman@ccap.org
• Felipe Targa, Consultant for Center for Clean Air Policy
  felipetarga@gmail.com

**Colombia** - Integrated Solid Waste Management NAMA in Colombia
Sponsoring Agency
• Center for Clean Air Policy
Contacts
• Javier Moreno, Director de Desarrollo Sectorial, Ministerio de Vivienda, Ciudad y Territorio
  jmoreno@minvivienda.gov.co
  (57 1) 332 3434
  Carrera 6 No. 8-77
• Rodrigo Suárez, Director de Cambio Climático, Ministerio de Ambiente y Desarrollo Sostenible
  rsuarez@minambiente.gov.co
  (57 1) 332 3400 / 332 3820 Ext: 2484/2411
  Calle 37 No. 8-40

**Costa Rica** - Coffee of Costa Rica - Keeping Coffee Growers and Farming Families in Business
Contact
• Ing. Agr. Luis Zamora Quirós, National Coffee Manager, NAMA Manager, Ministry of Agriculture and Livestock
  lzamora@mag.go.cr
  (506) 2231-2344 ext. 168 | Mobile: (506) 8391-6773
  Apartado 10094-1000 San José, Sabana Sur, antiguo Colegio La Salle, San José, Costa Rica

**Costa Rica** - Low Carbon Housing and Cities
Contact
• Mr. Roy Barboza, Vice Minister, Ministry of Housing and Human Settlement
  broy@mivah.go.cr
  Tel: (506) 2202-7900
  Apartado 1753 - 2050 San Pedro de Montes de Oca., Séptimo piso OfiMall San Pedro, Costa Rica
**Costa Rica** - Ordinary Solid Waste NAMA

**Sponsoring Agency**
- Ministry of Health
- Ministry of Environment and Energy
- GIZ Agency - Costa Rica

**Contact**
- Eugenio Androvetto, Director, Human Environment Protection, Ministry of Health
  eandrovetto@gmail.com
  +506 2257 7821
  Calle 16, Avenidas 6 y 8 - San José, Costa Rica
- William Alpízar, Director, Climate Change, Ministry of Environment and Energy
  walpizar@racsaco.cr
  +506 2222 4290
  Avenida 8 y10, Calle 25 Frente al edificio principal del MINAET San José, Costa Rica
- Verena Arauz, Program of Action for Climate, GIZ Costa Rica
  verena.arauz@giz.de
  +506 2520 1535
  Apartado 8-4190, 1000 San José, Costa Rica

**Dominican Republic** - Tourism and Waste NAMA

**Sponsoring Agency**
- National Council for Climate Change and Clean Development Mechanism (NCCCCDM)

**Contact**
- Omar Ramirez-Tejada, Executive Vice-President
  o.ramirez@cambioclimatico.gob.do
  809 472-0537 Fax: 809 565-2889
  Av. Winston Churchill No. 77, Edificio Grumosa 5to Piso, DN, Dominican Republic
- Moises Alvarez, Technical Director
  m.alvarez@cambioclimatico.gob.do
  809 472-0537 Fax: 809 565-2889
  Av. Winston Churchill No. 77, Edificio Grumosa 5to Piso, DN, Dominican Republic

**Pakistan** - Energy Efficient Lighting in Residential, Commercial, Industrial and Outdoors Sectors

**Sponsoring Agency**
- Ministry of Climate Change

**Contact**
- Syed Mujtaba Hussain, Deputy Secretary, Climate Change, Ministry of Climate Change
  hussainmujtaba@hotmail.com and mujtaba.gov@gmail.com
  +92519245529

**Pakistan** - Waste Sector NAMA

**Sponsoring Agency**
- Alternative Energy Development Board, Ministry of Water & Power

**Contact**
- Engr. Dr. Basharat Hasan Bashir, Director General (H&W) AEDB
  basharathasan@gmail.com or bashara15@yahoo.com.au
  +92-51-926-2954
Peru - Scaling up Waste-to-Energy Activities in the Agricultural Sector
Contact
- Eduardo Durand López-Hurtado, General Director of Department of Climate Change, Desertification and Water Resources - Ministry of Environment
  edurand@minam.gob.pe
  611-6000 Annex 1354
  Av. Javier Prado Oeste 1440, San Isidro – Lima, Perú

Peru - Sustainable Housing and Construction Sector NAMA
Contact:
- Eduardo Durand López-Hurtado, General Director of Department of Climate Change, Desertification and Water Resources - Ministry of Environment
  edurand@minam.gob.pe
  611-6000 Annex 1354
  Av. Javier Prado Oeste 1440, San Isidro – Lima, Perú

Peru - Programme for the Support of Up-scaled Mitigation Actions within the Solid Waste Management Sector
Contact
- Eduardo Durand López-Hurtado, General Director of Department of Climate Change, Desertification and Water Resources - Ministry of Environment
  edurand@minam.gob.pe
  611-6000 Annex 1354
  Av. Javier Prado Oeste 1440, San Isidro – Lima, Perú

Philippines - Philippines Construction Financing Facility to Support Private Sector Participation in Renewable Energy Development
Sponsoring Agency
- Department of Energy, Climate Change Commission
Contacts
- Mario Marasigan; Director, Renewable Energy Management Bureau; Department of Energy
  mcmarasigan@doe.gov.ph
  +632-8402268
- Joyceline Goco, Deputy Executive Director; Climate Change Commission
  joy.goco@yahoo.com
  +632-7353144

Philippines - Philippines Revolving Fund for Waste-to-Energy Projects
Sponsoring Agencies
- National Solid Waste Management Commission (NSWMC)
- Department of Environment and Natural Resources
- Climate Change Commission (CCC)
Contacts
- Emelita Aguinaldo, Executive Director, NSWMC
  emaguinaldo@yahoo.com
  +632-9202252
- Joyceline Goco, Deputy Executive Director, CCC
  joy.goco@yahoo.com
  +632-7353144
**Uruguay** – Solar Thermal NAMA

**Sponsoring Agencies**
- MIEM. Ministry of Industry, Energy and Mining
- National Directorate of Energy
- MVOTMA
- Ministry of Housing, Land Planning and Environment

**Contact**
- Dr. Ramón Méndez, Director of Energy, National Directorate of Energy, Ministry of Industry, Energy and Mining
  - ramon.mendez@dne.miem.gub.uy
  - (+598) 2900 9616

---


**Sponsoring Agency**
- Institute of Meteorology, Hydrology and Environment of Vietnam within the Ministry of Natural Resources and Environment

**Contacts**
- Dr. Tran Thuc, Director General, Vietnam Institute of Meteorology, Hydrology and Environment
  - tranthuc@imh.ac.vn, or thuc@netnam.vn
  - No. 23 Lane 62 Nguyen Chi Thanh, Hanoi, Vietnam
- Joao Aleluia, United Nations Economic and Social for Asia and the Pacific (UN-ESCAP)
  - aleluia@un.org
SUPPORTED BY:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

Environment Canada

Environnement Canada

DANISH MINISTRY OF CLIMATE, ENERGY AND BUILDING