



PERÚ

Ministerio
del Ambiente

Peru Solid Waste NAMA

Program for supporting up-scaled mitigation action in

Peru's solid waste sector

Concept Note

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Nordic Council of Ministers

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Executive Summary

The Peru solid waste NAMA aims to generate a transformational change in the waste sector by minimizing GHG generation from waste management and addressing related environmental, health and social issues including formalizing the role waste pickers. In addition, the NAMA is designed to complement and accelerate the existing modernization policy for solid waste management in Peru by creating incentives that increase the economic value of waste that currently goes to landfills and dumps.

This NAMA support proposal includes: **Regulatory and policy changes** to the waste sector that will ensure the long term sustainability of the expected impacts, coupled with the establishment of financial mechanisms designed to catalyze both private sector and additional public sector investment. These financial mechanisms will result in **project implementation** to prove alternative waste management and mitigation technologies. In addition, **technical assistance** will be provided to ensure that project implementers possess the necessary capacity to minimize the risks of unsuccessful implementation.

Peru is in an excellent position to pursue a NAMA for its solid waste management sector, as is currently close to enacting a modification to its General Waste Law and the relevant agencies are developing a new National Waste Management Plan. Once passed, the legislation and the Plan will be implemented via regulations mainly issued by MINAM and potentially DIGESA. Under current law, Peru has a non-binding 2017 goal of recycling 60% of recoverable waste and insuring proper treatment and disposal of 70% of non-recoverable waste.

The proposed modification to the General Waste Law establishes integrated solid waste management (ISWM) and waste minimization principles as key policy elements, and mandates that municipalities develop comprehensive plans based on the waste management hierarchy prioritizing waste prevention and reduction. In addition, the Law allows and encourages local governments to establish partnerships with the private sector to optimize the implementation of waste management activities based on these principles.

In this context, this supported NAMA proposal builds on the legislation to clearly commit the country and its municipalities to implementing policies to minimize waste disposal and increase waste recovery. Under the proposed Law, once a municipal plan is approved, the city must implement it. By strengthening the capacities of local government officials, this NAMA will accelerate the incorporation of the principles and aims of the modified Law and result in concrete improvements in the short term. Creating binding guidelines for cities to set specific goals for their waste management initiatives in their plans and offering incentive financing on a competitive basis will accelerate the adoption of new practices and technologies.. In 2014, the national government allocated budget support to municipalities of more than USD 380 million but most went to basic solid waste management. The NAMA proposes that a portion of the budget be allocated for waste recovery which will spur innovation. The NAMA also proposes that municipalities be required to provide equal or greater per ton payments than paid for traditional landfilling to private sector players who implement composting or any other alternative treatment facilities. This will improve the core economics of these technologies and increase private sector interest. Also, through the implementation of the NAMA, reporting of annual GHG emissions will be required from municipalities and solid waste sector participants. This measure will

also be an important step toward mainstreaming awareness of GHG emissions in the solid waste sector. The NAMA also puts forward the idea of requiring all new landfills to be designed to capture methane emissions and phasing in similar requirements for existing landfills. While stakeholder discussions have begun around such initiatives, this is excellent timing for Peru to intensify its efforts to meet its new domestic SWM policy goals and attract international support and interest.

Peru Context

Notably, Peru has in the last few years dramatically ramped up its commitment to transform the waste sector. Peru's Government has proposed a modification to the General Waste Law which would establish ISWM as key policy element, and mandate that municipalities develop comprehensive plans based on the waste management hierarchy prioritizing waste prevention and reduction. The proposed modification to the law would also allow and encourage local governments to establish partnerships with the private sector to optimize the implementation of waste management activities based on these principles. In addition, for 2014, 380 million USD has been budgeted to the waste sector in the Peru Integrated Solid Waste Management program, a 1,250% increase from two years ago. These actions can provide a strong basis for developing a NAMA for the waste sector.

As of 2012, 85% of municipal solid waste was being collected in Peru. There are currently 10 landfills operating in Peru, and the disposal rate in landfills is approximately 42% for non-recoverable waste. Peru is actively seeking to create additional landfill capacity to meet basic disposal requirements and has set a goal of achieving 100% adequate treatment of waste via the 3R's (Reduce, Recycling, Reuse) and sanitary landfills by 2021. The government's goals for developing new sanitary landfills is intended to eliminate the practice of waste disposal in dumps with little active operation or environmental control. While many of the open dumps may have limited GHG emissions due to aerobic conditions resulting from their configuration and manner of waste placement in shallow cells, GHG emissions will likely increase if a conventional landfill design is utilized. While, these new landfills will help to reduce other environmental/health problems, the increased GHG emissions is one of the reasons for developing this waste NAMA. . Emissions from the solid waste sector are projected to increase 37% from 2.6 million tons of CO₂e in 2012 to 3.6 million ton CO₂e in 2030.

In terms of existing alternative treatment across the country, it is believed that approximately 14% of recyclable waste is indeed recycled (via both formal and informal methods) Therefore, only 14% of waste capable of being recycled (ie, plastic, glass, paper, etc) is recovered, equivalent to 2.5% of total solid waste.¹ Also, 53% of the nation's Municipal Solid Waste (MSW) is organic, but less than 1% of total MSW is treated with composting operations, most of which are associated with municipal nursery operations.

¹ NIRAS, Perspectives, PUCP, ECI and Miranda&Amado, Diagnóstico de los Residuos Sólidos en el Perú, 2013.

Barriers to Implementation

Below is a summary of the key barriers to implementing solid waste management technologies in Peru and how the Waste NAMA proposes to address them.

Figure 1 Key Barriers to implementing SWM technologies

Regulatory/Institutional/Political Barriers	Proposed NAMA Solution
Core effective solid waste management services and facilities not yet in place (i.e., collection, transport, treatment)	NAMA addresses ISWM principles and fosters the implementation of projects that incorporate best management practices
Peru is still in the process of consolidating its waste management infrastructure. Currently, single metropolitan areas send their waste to multiple disposal sites which limits the economies of scale that treatment infrastructure can have.	Provide incentives nationally or via regional governments for municipalities to form associations to create combined SWM service areas for collection, transport and treatment of waste
Lack of institutional technical capacity particularly at municipality level <ul style="list-style-type: none"> - municipalities are overburdened with the elements of basic sanitation such as collection and disposal of waste. - local technical level government officials are not familiar with alternative treatment technologies and processes. This reinforces traditional methods of land disposal. - Municipalities also struggle to take full advantage of current national incentives (Separation at source incentives), especially smaller municipalities 	Develop a Technical Assistance Program to build capacities at the municipal level (both district and provincial level)
Municipally run recycling plants are not allowed to sell materials directly to industry	Proposed modification to the waste law will allow municipalities to sell materials direct to industry
Economic/Market Barriers	Proposed NAMA Solution
Capital-intensive alternatives to landfills are not being promoted due to low revenue foundation from tipping fees. Tipping fees are controlled by municipalities and any changes are politically delicate.	<ul style="list-style-type: none"> - Mandate approach - Ministry of Health (DIGESA) sets quality standard of landfills, necessitating a rise in tipping fees to match standard - Incentive approach - Peru creates incentive program to reward alternative treatment technologies with a higher tipping fee
High rate of payment delinquency results in poorer service and the need for subsidies	The technical assistance will support research to reduce payment delinquency ²

² Successful international models and examples of reductions in payment delinquency will be studied.

<p>Large private sector waste management companies are present primarily only in Lima. Lack of adequate tipping fees outside Lima discourages private sector participation and make it difficult to find private sector actors to implement alternatives to landfills. Current low level of SWM cost recovery (payment delinquency) impacts sustainability and private sector participation incentive.</p>	<p>All solutions listed will promote private sector involvement</p>
<p>Alternative treatment technologies are more expensive than sanitary landfills</p>	<p>Consider incentives to promote alternatives to landfills and include co-benefits within selection criteria</p>
<p>Past investments in landfill infrastructure – solid waste operators have invested in landfills and controlled dumps based on the current regulatory framework. Any changes to the framework could threaten the current business model and investments of many large solid waste companies (both public and private) and could result in resistance to change.</p>	<p>Create opportunities for the private sector by incentivizing alternative treatment technologies</p>
<p>Lack of market for waste based commodities</p> <ul style="list-style-type: none"> - Dry recyclables – The market for recyclables is volatile and exposed to international market fluctuations. - Compost - Markets for both high and low quality compost are fragmented and need to be developed if composting is to be adopted as an option for treating organic solid waste. - Refuse Derived Fuel Market opportunities for RDF in Peru have not been developed 	<ul style="list-style-type: none"> - Support and create markets for waste based commodities - The Ministry of Agriculture (MINAGRI) could create a certification program for high quality compost - Continue plans to install source separated organic composting plants next to 31 landfills built in the National Program - Support compost sales price (ie, the compost merchant can charge an “adder” to the consumer and be reimbursed by the government) - Promote source separated organic collection from large generators
<p>Financial barriers:</p> <ul style="list-style-type: none"> - Perceived credit quality of borrower (either private sector or municipality) - High transaction costs of smaller-scale projects - Lack of familiarity with technology - High interest rate environments and/or lack of project revenues to cover market- terms of financing - Lack of capacity in local banks - Undercapitalized project sponsor 	<ul style="list-style-type: none"> - NAMA Fund managed by an entity such as COFIDE to provide incentives such as concessional loans and equity financing. - Direct funding to municipalities in the case of smaller projects

Social Barriers	Proposed NAMA Solution
<p>Informal waste pickers are still present in many dumpsites and are active collecting dry recyclables. This presents political barriers to close dumpsites. Waste pickers work in adverse conditions and need to be formalized, ensuring them of a decent wage and better working conditions.</p>	<ul style="list-style-type: none"> - Promote waste picker formalization programs in coordination with current efforts around Minam's source separation policy - Capacity building for informal waste pickers on the benefits involved with being formalized.
<p>Lack of public awareness about benefits of recycling and source separation – Without citizen education campaigns, source separation policies are not effective. This can prevent the proper collection of non-contaminated recyclables and high quality compost.</p>	<p>NAMA education programs</p>
<p>Resistance of population to site treatment facilities near their residences</p>	<p>NAMA outreach programs</p>

Source: CCAP

Proposed NAMA elements

With the proposed modification to the General Waste Law soon to be enacted, Peru has a great opportunity to implement transformational waste policies that support alternative treatment technologies that both minimize waste and reduce GHGs, before the next generation of sanitary landfills are built. Peru needs to build more sanitary landfills to reach its goal of 100% adequate disposal by 2021. A supported NAMA can capitalize on this opportunity and transform the waste sector from a static landfill-oriented sector to one that optimizes economic value of waste, creates jobs, and provides various co-benefits. Alternative treatment technologies can employ 6 to 10 times as many workers compared to landfills. Hence, the NAMA could contribute to formalizing Peru’s tens of thousands of informal waste pickers and provide them with more sustainable lives.

The NAMA includes three core elements:

1. Regulatory and policy changes
2. Project implementation
3. Technical assistance

Regulatory and policy changes

Proposed regulatory and policy changes include the following:

- Develop regulations and policy instruments to implement proposed modifications of the waste law including:
 - Guidelines for municipalities to set specific quantitative goals for each element of waste policy (recycling, composting, separation of organics, capture of landfill methane, etc.)

- Require periodic monitoring and reporting of GHG emissions associated with waste facilities and activities by municipalities and private sector operators³
- Require collection of methane gas from all new landfills
- Require municipalities to provide equal or greater tipping fees to alternative waste reduction technologies as are provided to landfill disposal
- Raise technical standards for disposal sites and ensure an adequate tipping fee is provided to maintain the facility quality standards.
- Allow the municipalities to sell materials directly to industry

In addition, the following incentive based measures and enabling conditions elements are included in the NAMA:

- Create a technical support program for municipalities including training and capacity building
- Expand formalization program for waste pickers
- Provide incentive financing for investment in alternative technology (reducing both GHGs and waste impacts)
- Support and create markets for waste-based commodities, e.g., Creating certification program for high quality compost
- Create incentive financing for municipalities who pursue regional aggregation of waste and regional waste reduction facilities including LFGE, flaring and composting

Project implementation

In addition to pursuing the policy actions presented above, the NAMA will seek to finance investments in the follow waste treatment and mitigation technologies based on a number of factors including their mitigation effectiveness, cost effectiveness, and consistency with Peru’s sustainable development goals for the waste management:

1. Landfill gas capture with electricity generation (LFGE)
2. Landfill gas capture with flaring (Flaring)
3. Source separated organic composting⁴ (Composting)

The economic and technical feasibility of the different technologies will be impacted by the amount of the waste collected in a given municipality. For example, landfill gas capture with electricity generation

³ This monitoring function could also be done at a centralized national level if preferred. For example, facilities would send relevant waste management reports (tons of waste collected, disposed, etc) to Minam to be entered in the “SIGERSOL” waste management database system. Simultaneously, this information could be passed for review and validation to INFOCARBONO, a proposed information system specialized in GHG related calculations. If done in a centralized fashion, a set of agreed upon emissions factors could be used to accurately quantify emission reductions.

⁴ Based mainly on large generators of organic waste such as markets, supermarkets, public green waste, etc. Cities applying for support from the NAMA can consider the viability of other sources of organic waste from households or from agribusiness.

appears to be cost-effective only in areas with a population of over 400,000 (assuming all waste goes to one regional landfill) since this technology needs a sufficient amount of waste to produce enough methane for capture. In addition, flaring should be considered only in areas with a population between 200,000 and 400,000, in order to ensure sufficient waste and methane generation to make the technology viable.⁵ Using this framework, municipalities were analyzed based on their population and waste generation data. The different waste management and mitigation technologies were evaluated for the different size municipalities, for their cost-effectiveness and mitigation potential.

NAMA support funding would be available to municipalities on a competitive basis to support projects achieving the requisite scale for each technology. Different “windows” of funding could be created to ensure cities of a certain size compete with comparably sized cities. Criteria for selecting projects would be established and could include a city’s experience with publically funded projects, proof of availability of land for a facility, human resource capacity and private sector involvement.

Figure 2 summarizes a preliminary analysis of what technologies could be considered under a project implementation program in different municipalities. A net present value (NPV) analysis found that all technologies have a negative economic value, taking into account projected revenues (e.g., from tipping fees, the sale of electricity, compost, recyclables, etc.) and estimating the capital and operating costs for the different technologies. Because of this, all technologies will need financial support in order for them to be implemented under current market and regulatory conditions. Figure 2 lists the estimated financial contribution needed to implement the technology, and shows as an example what those amounts would be for domestic and international sources, assuming a 50-50 split.

Over time, as discussed above in the barrier analysis, the proposed regulatory and policy changes for the NAMA are intended to address the economic barriers to implementation.

⁵ NIRAS, Perspectives, PUCP, ECI and Miranda&Amado, Opciones de mitigación de GEI en el sector de residuos sólidos municipal, June 2014.

Figure 2 - Project implementation analysis

Technology	City	Mitigation Potential (tCO ₂ e)*	Contribution (USD)			Abatement Cost (USD/tCO ₂ e)
			50% National	50% Inter.	Total	
LFGE	Lima - Modelo del Callao	3,239,578	2,004,603	2,004,603	4,009,206	0.92
LFGE	Lima - Portillo Grande	2,041,716	6,191,496	6,191,496	12,382,991	5.06
LFGE	Lima - Zapallal	510,430	1,981,775	1,981,775	3,963,549	6.50
LFGE	Lambayeque	397,307	2,025,948	2,025,948	4,051,895	7.73
LFGE	Arequipa	397,307	2,025,948	2,025,948	4,051,895	7.73
Flaring	Mid-sized cities (6 cities)	1,482,335	7,150,364	7,150,364	14,300,728	7.70
Compost	Mid-sized cities (2 cities)	58,122	456,023	456,023	912,046	13.48
Compost	Small cities (23 cities)	135,579	1,063,746	1,063,746	2,127,492	13.48
Compost	1 Large city	79,276	884,952	884,952	1,769,905	18.92
Total		8,341,649	23,784,854	23,784,854	47,569,707	4.59
Technical Assistance			2,000,000	2,000,000	4,000,000	
GRAND TOTAL NAMA Supported Project			25,784,854	25,784,854	51,569,707	

* cumulative between 2015-2030

Financial Mechanism

According to CCAP's initial analysis, a contribution of approximately 47.5M USD is required to ensure the feasibility of the portfolio of projects shown in Figure 2. Stated another way, the project's aggregated cash flow profiles need an incremental revenue equal to 47.5M USD (in present value terms) in order to obtain a minimum return on the investment of 12% and be financially attractive for implementation.

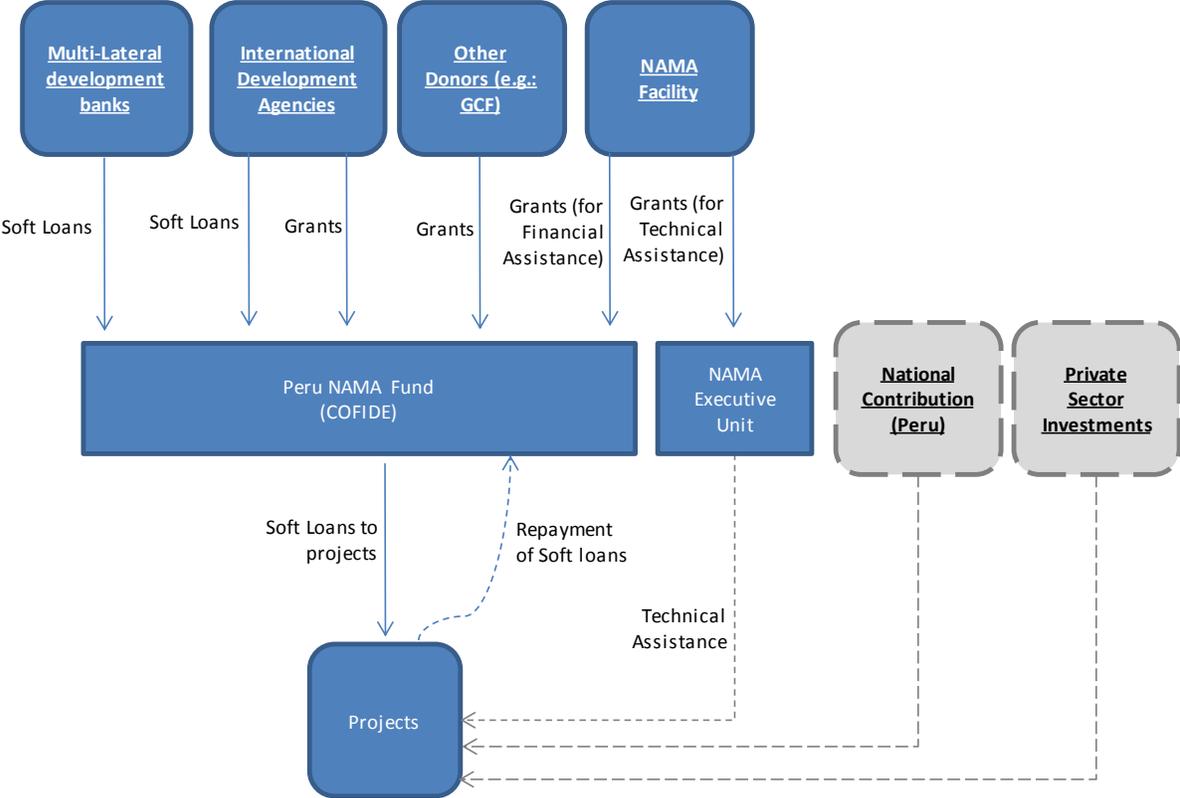
To provide this contribution, CCAP recommends:

1. **Cost sharing between the government of Peru and International Donors:** Figure 2 illustrates, as a matter of example, one cost sharing scenario in which the government of Peru and international donors contribute equally the amount of funds needed to make the projects feasible.
 - a. The government of Peru may provide its 50% contribution by means of, for instance, tax incentives and/or a tariff increase, or simply as a grant. In discussions held with officials, the option of providing grants seems more feasible. Ultimately, the government of Peru needs to determine the best way to make its contribution.
 - b. International donors may provide their 50% share of contribution through the Peru NAMA Fund described in point 2 below.
2. **Creation of a Peru NAMA Fund:** this financial instrument will be of a revolving nature where the returns of one project provides funding for future projects and would provide favourable terms debt financing to projects.

The creation of a Peru NAMA fund includes several financial elements that when implemented together constitute the financial mechanism of the NAMA. While further analysis is required to formulate a detailed custom-made financial mechanism, the fund's main elements are outlined below.

The majority of the contribution to the fund would come from sources such as multilateral development banks or international agencies in the form of soft loans with favourable terms such as below-market interest rates and grace periods. Other international agencies or existing facilities (such as the Germany-UK NAMA Facility or the Green Climate Fund) could also provide additional contributions in the form of grants. The Peru NAMA Fund, in turn, could provide debt financing in favourable terms to projects and using an interest rate that is essentially the weighted average of the rates demanded by the sources that contribute to the Fund. In addition, the Peru NAMA Fund could also provide small grants to projects in support of technical studies to ensure that the candidate projects are well positioned to receive soft loans. The following figure illustrates how the Peru NAMA Fund could channel funds from international donors to the projects.

Figure 3 Illustration of the Financial Mechanism



To illustrate the impacts of the above financial mechanism on improving the project’s feasibility, CCAP conducted a scenario analysis modelling the previously described elements. The analysis looked specifically at how the implementation of the Peru NAMA Fund, as described above, could impact the feasibility of the first project on figure 2, a LFGE project at Lima Modelo del Callao.

Under the scenario analysis, CCAP assumes that international institutions such as multilateral development banks or other development agencies provide funds in the form of soft loans totalling 80% of the NAMA Fund's capitalization. The remaining 20% capitalization would be in the form of grants, for example from the Germany-UK NAMA Facility or the Green Climate Fund. The scenario analysis modelled the impacts of the "soft" loan as the debt finance component of the project. Specifically, CCAP assumed the project receives a loan with an annual interest rate of 6% and a grace period of two years in comparison to the 10% annual interest rate assumed in the base case analysis. In addition, CCAP assumed the soft loan would finance 90% of the capital investments instead of 70% as assumed in the base case.

These more favourable terms modified the cash flow profiles of the project by lowering interest expenses and delaying the repayment of capital. Consequently, the net present value of the project improved significantly, translating into a lower contribution required to achieve feasibility of the Lima Modelo del Callao LFGE project. The base case analysis shown in table 2 indicated that the Lima Modelo del Callao LFGE project would require a USD \$4M contribution to achieve feasibility. If the project were to receive soft loans via the Peru NAMA Fund as opposed to standard commercial loans, the contribution required would be reduced by half. In addition, if the soft loans were to finance 90% of the project's capital investments, the contribution required would be reduced even further, to approximately USD\$ 0.5M. This smaller amount could be contributed by international donors in the form of grants or even by the government of Peru.

The scenario analysis serves to demonstrate how establishing a Peru NAMA Fund could significantly reduce the amount of grant contribution from international donors to achieve project feasibility. To further define the economics of the Peru NAMA Fund and the resulting project financing, it will be necessary to have specific terms of the soft loans that multilateral banks or development agencies would contribute. Also, the economics of the Peru NAMA Fund will vary based on the proportion of soft loans to grants contributed by donors (e.g., the economics would differ if say 60% of the NAMA funds were contributed as soft loans as opposed to 80%). In addition, each project has a unique cash flow profile, thus the feasibility of each project will be impacted differently by the Peru NAMA fund. Based on the assumptions of this analysis, CCAP estimates that the USD \$47.5M contribution indicated in table 2 for all projects could be replaced by the combination of soft loans in the range between \$30M to \$40M and by grants in the range of \$10M to \$15M, all managed through the Peru NAMA Fund (note that the soft loans herein proposed would replace the 70% of debt financing from commercial banks).

It is worth re-stating that, as explained before, CCAP proposes that Peru and international donors share equally the financial contribution required by projects to achieve feasibility. Therefore, in addition to the funds channelled through the Peru NAMA Fund, the projects would also demand a contribution by the government of Peru in the amount of \$10M to \$15M approximately.

With the proposed financial mechanism, the investments required by the private sector are reduced from 30% to 10% of the capital investment required for each project. The resulting investments would be in the order of \$5M to \$10M. This reduction may incentivize private sector companies to invest in alternative waste technologies.

Further to the above financial contributions to implement projects, additional funds would be required for technical assistance, as explained in the next sections of this document.

Operational elements of the NAMA Fund

COFIDE is positioned as the financial institution to create and operate the Peru NAMA Fund (as the NAMA Fund administrator) in coordination with the Environmental Quality Directorate of MINAM which could provide the technical guidance for evaluation of proposals from cities and/or private sector operators.

This financial mechanism could be divided into sub-windows for each one of the technologies (e.g., LFGE or flaring). The fund would operate based on an open application process. In order to ensure an adequate stream of projects, a technical support program would be established to assist potential applicants (described below in the Technical Component section) and ensure the quality of projects. Peru's *Program for Source Segregation, Selective Collection and Safe Final Disposal*⁶, as well as the *Executive Unit for the Program of Solid Waste Management Systems in Prioritized Areas*⁷ could be involved in providing the technical assistance to projects since they already support and implement advanced waste management practices with a group of pre-selected municipalities in Peru.

Proposals should be evaluated on technical and economic criteria as well as on mitigation potential, health and environmental benefits, and transformational potential. Also, applications must prove that they have guaranteed access to the waste streams that are necessary for the successful and sustainable implementation of the projects. This can be in the form of pre-agreements or contracts.

Technical Assistance

Technical assistance will help ensure that all different stakeholders involved in the NAMA possess the necessary capacity for the successful implementation of each of the elements. It will be critical that the projects funded by the NAMA are successfully implemented in order to provide examples of good practices for subsequent projects and ensure their replicability. While the alternative technologies for ISWM to be demonstrated are internationally known and mature, Peru and most of Latin America have very limited experience with them. The following elements are proposed to be included within the NAMA technical component:

- a. **Technical support program:** This program aims to provide permanent technical support to the different stakeholders that will be implementing the different activities within the NAMA. This technical support program should operate under the coordination of the Environmental Quality Direction of MINAM and will include the following activities:
 - i. **Technical support** for public entities for analyzing the evolving regulatory and institutional framework ensuring that the best available information, international guidelines and practices are incorporated into the design and implementation process. In addition, technical assistance will be provided to Municipalities to ensure they are

⁶ Translation of "Programa de Segregación en la Fuente y Recolección Selectiva de Residuos Sólidos"

⁷ Translation of "Programa de desarrollo de sistemas de gestión de residuos sólidos en zonas prioritarias"

able to evaluate, analyze and structure projects to be presented for implementation support and later to be able to effectively operate and maintain the facilities. Finally, technical assistance will be also available for private entities interested in developing alternative technology projects. Such assistance will cover regulatory aspects, financial support alternatives and best available technologies.

- ii. **Pre-investment grants** for private project developers to carry pre-feasibility studies that will allow them to make decisions on investing in alternative waste management projects. This will provide private sector developers an incentive to consider submitting bids for municipal waste related projects. Given the scarcity of private sector entities active in solid waste management outside Lima, this will be an important element.
 - iii. **Capacity building** activities for municipalities and related project developers in order to provide them with the adequate tools to successfully plan and implement the projects. The main areas to strengthen are related to regulatory environment, funding opportunities, project development and implementation and best available technologies according to local conditions.
 - iv. **Knowledge exchange** activities such as bringing to Peru technology and policy experts to provide real world experience and advice for adapting successful implementation models to the Peruvian context. Also, international technical missions for Peruvian public officials and private developers and other related stakeholders to visit facilities and institutions abroad to learn about the different policies, technologies and successful commercial models for ISWM.
- b. **MRV system:** An MRV system must be developed and operated in order to manage all relevant data to measure performance. The design, development and operation of the system will require expert technical support to ensure successful quality control and assurance.
 - c. **Outreach and awareness:** Increasing the community and key stakeholders' understanding and awareness of the benefits of improved waste management, and specifically ISWM, will contribute to the sustainability of the program before and after the first stage of project implementation. Success stories and lessons learned will be systematically communicated in order to promote the development of additional ISWM projects in Peru.

The implementation of the technical component should produce the following outcomes:

- Favourable regulation: Support the Ministry of Environment and other relevant national entities to design adequate regulation or standards related to ISWM that are necessary to successfully implement the NAMA.
- Effective training: enable Municipalities and project developers to design, build, operate, and regulate new alternative treatment technologies.
- Verified feasibility for projects.
- Finance for a variety of technical studies such as:

- Technology feasibility studies (in some cases this is already done for composting facilities in those cities where the Program of Solid Waste Management Systems in Prioritized Areas is active).
- Waste picker formalization program design
- Market studies and market development for recyclables and compost.
- Facility engineering design studies
- Cultural shift in consumer behaviour to support waste reduction programs, source separation, etc. (Public awareness).

Figure 4 Technical Assistance Indicative Budget*

	% of budget	Budget (USD)
1. Local technical experts	54%	2,160,000
2. International technical experts	20%	800,000
3. Local support staff (accountant, office management, lawyer)	4%	160,000
4. Travel costs	4%	160,000
5. Training costs	1%	40,000
7. Other costs	7%	280,000
8. Support costs	10%	400,000
Grand Total		4,000,000

* This budget is indicative. A detailed budget would need developed specifically for the Peru NAMA and in coordination with the corresponding Peru government entities according to their needs and inputs.

NAMA Benefits

Mitigation Impact

It should be noted that the Waste NAMA will select the cities and technologies to be supported via a competitive process. These full-scale technology demonstrations in LFGE and composting in particular are expected to reduce the perceived risk of such investments and over time to drive down the costs of implementing these technologies which are relatively new to the Peruvian market. As a result, the NAMA is projected to spur the replication of these technologies at many other cities in Peru and therefore the mitigation impact will also be increased over time.

It is estimated that this comprehensive NAMA will achieve the implementation of the 3 technologies shown above in Table 2, which could reduce the country's emissions by at least 8.3 MtCO₂e cumulative over a period of 15 years between 2015 and 2030, with a reduction of about 17% compared to the BAU levels.

Sustainable development benefits

A well implemented, comprehensive NAMA for the waste sector will have an impact in improving waste management in Peru in the short, medium and long term, and also provide the following sustainable development co-benefits:

Economic - These benefits will ensure private sector involvement and will save municipalities millions of dollars in relation the actual cost schemes as a result of the following:

- Using compost and recyclables in productive processes will result in savings for industrial and municipal actors.
- Reduction in transport costs of waste to distant landfills.
- Extend life of costly landfills.
- Cost savings of leachate treatment.
- Add value to recovered materials by creating new products
- Private sector and local funds leveraged with NAMA funds

Social - These match the country's development goals:

- Jobs created – alternative treatment technologies can produce 6 to 10 times as many jobs as landfill disposal⁸
- Decreased health effects to population living near landfills or dump sites through air, groundwater, soil contamination (different types of cancer, low birth weight, birth defects, etc.)
- Create sustainable livelihoods and better quality of life for vulnerable informal waste pickers (increased prices, pension, healthcare, employment, etc.)

Environmental - These match the country's environmental goals:

- Reduced leachate production that will prevent contamination of aquifers.
- Increased recycling that will reduce the use of virgin raw materials (metals, paper, fossil fuels, etc).
- Use of compost could displace partially chemical fertilizers depending on market conditions.

Institutional Arrangements

NAMAs require clear descriptions of institutional arrangements to be effective, to avoid conflicts between institutions, and to ensure all important aspects are addressed. The below outline of this NAMA's institutional arrangement is indicative only, and would be finalized during the appraisal process after the NAMA has been awarded financing since it requires considerable input from local law firms, donors, and stakeholders.

⁸ Friends of the Earth Report, "More jobs, less waste", page 15, September 2010

Executive Committee

In order to implement the program of activities included in the NAMA, an Executive Committee will be established to provide the lead role of governance and oversight. The members of the Executive Committee will reflect the main stakeholders involved in the NAMA. Potential members are suggested in the below “Actors Involved” section below.

The executive committee’s bylaws, committee member selection process, objectives, etc., will be finalized by stakeholders at a later stage, although its main duties are outlined below.

- Approve the final project selection criteria
- Approve the annual budget of the NAMA EU
- Select the Coordinator of the NAMA EU and other executive level staff; Set salaries and compensation for employees of the NAMA EU
- Approval of reports created by the NAMA EU to be sent to donors and other stakeholders
- Approve applications to receive technical assistance prior to NAMA project tenders
- Final review and approval of NAMA project winners. (the NAMA Fund Administrator and the NAMA Executive Unit (EU) will present to the committee a list of projects recommended for selection.
- Delegate to the NAMA Executive Unit all remaining duties not carried out by the Executive Committee.

Unless otherwise specified, the permanent chairman of the executive committee will be the Director of the GDEQ or a proxy selected by him/her.

NAMA executive unit (EU)

In order to execute the program of activities efficiently and provide coordination among the various actors, it is planned the creation of an operational unit similar to Minam’s “Executive Unit 003”, created to implement the construction of 31 landfills across the country (financed by JICA, IDB, Minam, and specific municipalities). In the same fashion as Executive Unit 003, the NAMA EU would be created within Minam, under the control of the GDEQ department. The EU would be charged with carrying out the operational, administrative, accounting, and monitoring duties to execute the projects within the NAMA program of activities.

Coordination of activities

While the Executive Committee provides the lead roles of governance and oversight of the program of activities, the NAMA EU carries out the day-to-day operational and administrative activities. In this way the NAMA EU can be viewed as the operational arm of the executive committee, providing the Executive Committee with the research support to allow the committee to efficiently evaluate and approve of

project proposals selected by both the NAMA fund administrator and the EU itself. The EU will also lead the coordination with entities not involved in the executive committee, most notably the private sector. Its duties would include:

- Disbursal of technical assistance funds after approval from the Executive Committee, including administrative support and the competitive selection of consultants for feasibility studies.
- From within the EU itself, provide technical assistance directly to municipalities, including assisting them with the process for applying to the NAMA Fund.
- Coordination of all administrative activities associated with the operation of the NAMA Fund
- Creation of timely reports for presentation to the executive committee and donors on NAMA Fund performance and investments.
- Coordination after the project award process to initiate investments; providing any contracting support needed.
- In collaboration with the NAMA fund administrator, presentation to the executive committee the list of NAMA projects recommended and ranked to receive implementation funding.
- Serves as point of contact for all NAMA fund applicants
- Promotion of the NAMA fund among key stakeholders, including the public
- Monitoring of projects awarded with NAMA funding, including providing for an external audit (audit company selected by the executive committee).

Actors involved⁹

Ministry of Environment (MINAM), General Directorate of Environmental Quality (GDEQ) -

The GDEQ is the public entity responsible for the development and implementation of the waste policy in Peru and therefore will play a leading role. The main responsibilities of the GDEQ in implementing the NAMA will be to create and oversee the executive unit that will execute the program of activities, coordinate with other local and international entities involved in the NAMA and ensure that all activities are developed according to the established objectives. It will also be the permanent chair of the NAMA Executive Committee.

Members of the Executive Committee

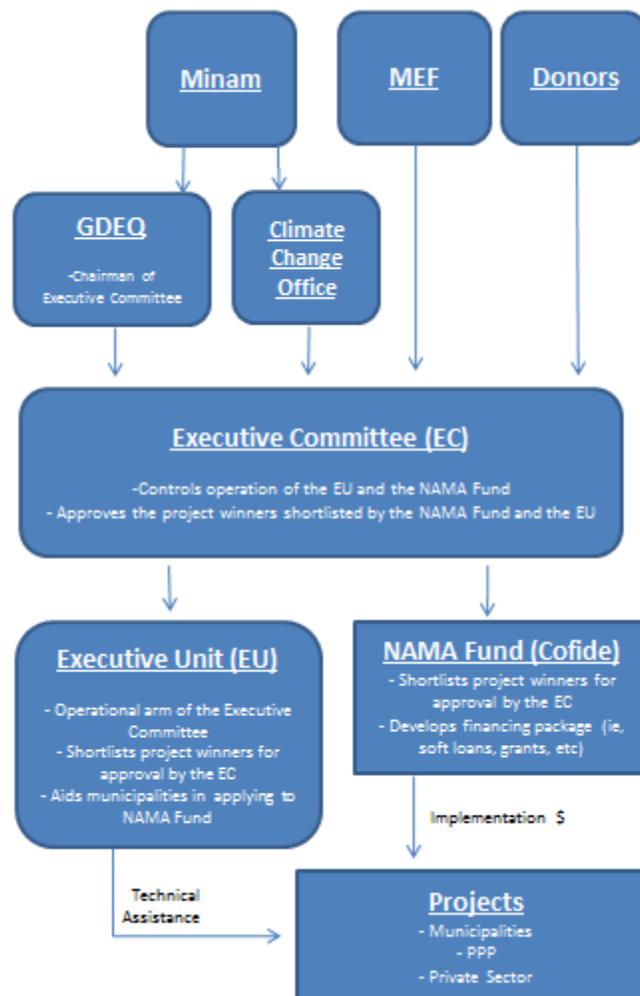
- Ministry of Environment (MINAM) - the General Directorate of Climate Change, Desertification and Hydric Resources – This will ensure an appropriate flow of information on climate change policy towards the NAMA process.
- Ministry of Economy and Finance (MEF) – The MEF manages various public funding mechanisms relevant to the NAMA and assesses the yearly governmental budget.
- NAMA fund donors – It is possible that representatives from multilateral or bilateral donors will want to be a part of the executive committee and take part in the approval of projects.

⁹ For more information about stakeholder roles in the NAMA refer to “NAMA Options Report”, CCAP, 2014.

Fund Administrator – COFIDE - For the implementation of the financial mechanism COFIDE will be responsible for creating and managing the NAMA fund. It is also foreseen that COFIDE together with the EU would select winning projects based on the selection criteria established. The selection of winning projects would thereafter be confirmed by the Executive Committee.

Delivery Organizations (DO)– Based on the experience of the German/UK NAMA Facility, two delivery organizations need to be chosen at the time of application for international support, one for the technical component and one for the financial component. The technical DO is in charge of administrating the technical assistance component of the NAMA. Meanwhile, the financial DO is in charge of overseeing the NAMA funds management. The delivery organizations will ensure that all activities are carried on according to the guidelines and expectations of International Donors, the GDEQ, and the members of the Executive Committee. According to the institutional arrangements outlined in this report, the NAMA Executive Unit would fulfill the role of technical DO, while Cofide would play the role of the financial DO.

Figure 5– Institutional Arrangements



Implementation Plan

Given the actual state of development of the NAMA it is envisioned that the implementation could begin by late 2015 or early 2016. If the NAMA proposal is finalized by the first quarter of 2015, international funding could be pursued immediately. Figure 6 outlines an implementation plan over 6 years for the NAMA, with most of the activities occurring over 5 years, leaving year 6 for reporting and project completion activities.

Figure 6 Implementation timeline

Peru Solid Waste NAMA: Implementation Plan and Timeline

	2015	2016	2017	2018	2019	2020
Activities						
NAMA Application						
Selection of NAMA delivery organization(s)						
Send proposal to NAMA finance donors						
Appraisal Process						
Definition of the detailed final proposal						
Creation of NAMA Executive Unit within GDEQ						
Creation of NAMA Executive Committee						
NAMA Executive Committee sign Memorandum of Understanding						
Regulatory and policy changes						
Develop regulations to implement proposed modification under the new waste law						
<i>Create technical support program</i>						
<i>Creating certification program for high quality compost</i>						
Approval of regulation to support the compliance of the NAMA objectives						

Establishment of a financial mechanism						
Identify the NAMA Fund Administrator						
Creation of the NAMA fund						
Technical assistance						
Design of technical support program						

<i>Knowledge exchange activities</i>						
<i>Support research to reduce payment default</i>						
<i>Initial country-wide scoping study to develop project pipeline</i>						
<i>Send municipalities tender documents, selection criteria, application templates</i>						
<i>Award pre-investment grants to private sector developers outside of Lima</i>						
<i>Capacity building for selected projects</i>						
Finalize design of MRV system (during appraisal stage)						
<i>Improvement to SIGERSOL system</i>						
<i>Coordination with INFOCARBONO system</i>						
Outreach and awareness						
<i>Initial public outreach</i>						
<i>Outreach after first round of projects</i>						
Project implementation phase						
Prepare tender process and develop criteria for selection of municipalities						
Open tender, evaluation of proposals by NAMA Fund Manager, NAMA EU, and later by the Executive Committee						
Feasibility studies in selected municipalities (Round 1)						
Technical support provided to municipalities (Round 1)						
Project implementation (Round 1)						
Round 2 tender process						
Round 3 tender process						

NAMA Application

The Peru Waste NAMA Concept Note, NAMA Options Report, as well as the previous technical evaluations performed by the Consortium¹⁰ will be the building blocks for an application for international NAMA financing. As mentioned before, the two most prominent sources for support are the German/UK NAMA Facility and the future Green Climate Fund. In the case of the German/UK Facility, a technical and a financial “delivery organization” will need to be selected by Minam at the time of creating the initial NAMA application.

¹⁰ NIRAS, Perspectives, PUCP, ECI and Miranda&Amado, 2014

The technical delivery organization is the entity best positioned to develop the application for funding, in coordination with Minam. If the NAMA is preliminarily approved for funding, the delivery organization(s) will be responsible for preparing the full funding application and monitoring implementation of the NAMA. For more information about financing sources and the application process, please refer to the NAMA Options Report.

Appraisal Process

Again using the German/UK NAMA Facility as a precedent, if the NAMA is selected for funding it will need to pass through an appraisal process for final approval. This process can take from 6 to 12 months depending on the complexity of the activities involved, such as the creation of any new entities. During this process a final detailed proposal will be created and submitted, which must be approved before the funds are finally committed. Funds are provided by the NAMA Facility during the appraisal process for travel, involvement of external experts, workshops, presentation of results of the appraisal and submission of the final NAMA proposal.

Further, all details or coordination activities not carried out during the NAMA design and application process will need to be established during the appraisal stage. In many ways, it is to be expected that many activities and details will only at this stage be finalized, because until the NAMA receives preliminary approval for financing it is difficult to attract the necessary high level political support and coordination essential for implementation (e.g., the formation and regular meeting of the NAMA Executive Committee).

In reference to the future Green Climate Fund (GCF), inferences can be made by looking at the draft board documents about whether the GCF will have a similar appraisal process. According to the draft documents, what the GCF calls “appraisal” takes place before the project is submitted formally to the Secretariat for funding. Therefore, the appraisal is conducted by the project proponent as part of the later stages of the proposal process in the case of the GCF.

Regulatory and policy changes

Changes to the regulatory and policy framework will be supported in this stage by the creation of a technical support program within the EU that will coordinate all research activities (either in-house or through external consultants) and develop the proposals for the implementation of the regulatory and policy changes that are needed. For example, support can be allocated to policy studies of specific potential regulation and/or to the creation of a compost certification program, including the provision of funds for coordination with the Ministry of Agriculture, private stakeholders, and technical studies.

This process will be led by the EU and directed by both the GDEQ and the Executive Committee. The Executive Committee will also have the responsibility of obtaining political support to implement the measures proposed, within the Minam and other relevant entities. The researching of regulatory and policy changes will be performed in the first year of the program, while in year two proposals for new

regulations under the current proposed modification of the waste law can be submitted for approval. These new regulations will be key elements of the NAMA to ensure compliance of the NAMA objectives.

Establishment of a financial mechanism

In order to effectively channel NAMA finance to projects on a competitive basis, the Executive Committee will have to set up all necessary administrative and legal procedures and operational structures for managing the funds. The process to establish the financial mechanism will finalize the details of the NAMA fund, its relationship to the Executive Committee as to how projects are selected, and identification of a qualified NAMA Fund administrator, such as COFIDE.

The fund administrator in conjunction with the EU is expected to rank and present projects based on competitive tenders to the Executive Committee, who will make the final selection of project winners. The fund administrator will also create a financing package tailored to the needs of the project winners. To ensure that the best projects are selected, the fund administrator will be expected to invest a portion of its own financial resources into the NAMA projects.

Technical Assistance

Technical Assistance will be continuous and focuses not only on creating the right conditions for developing solid projects for financing, but also on how the projects will be selected, monitored, and communication with the public. This activity will be led by the EU, under the direction of the NAMA Executive Committee. The following types of technical assistance will be provided in the NAMA (in approximate chronological order):

- Knowledge exchange activity - Peruvian NAMA representatives will travel to countries that have proven best practices relevant to the NAMA activities. For example, travel could be funded to meet with experts on the process to reduce payment default in Peru.
- Technical studies at a structural level throughout Peru such as a study to reduce waste tariff payment default.
- Education of municipalities and the private sector about the NAMA Fund and assistance with how to apply.
- Pre-investment technical studies for specific projects to determine feasibility and to build project proposals.
- Capacity building for selected projects.

Project implementation phase

In this stage, competitive tenders will be opened to participating municipalities and evaluated according to agreed-upon criteria. The NAMA Fund Administrator and EU will recommend and rank projects, which will then undergo review and approval from the Executive Committee. As part of the overall technical support package mentioned above, detailed feasibility studies and other technical support will be provided to select projects before the tender round begins, allowing municipalities to prepare strong

proposals. It is possible that final feasibility of individual projects will only be ascertained from the results of feasibility studies. Therefore, final implementation funding for individual projects could be conditional on the results of these studies. The number of tender rounds and the number of projects selected within each round will depend on the scale of international and domestic contributions.

Appendix 1 - Comparison of the NAMA with and without the option of Mechanical-Biological Treatment (MBT)

Memo to accompany the Concept Note

The following memo shows a comparison between two options for the NAMA. Option I shows the scenario we have currently included in the concept note. Option II shows the CCAP recommendation based on its NAMA Options Report delivered on November 26th, 2014.

Option I - 3 Technologies

Technologies

1. Landfill gas capture with electricity generation (LFGE)
2. Landfill gas capture with flaring (Flaring)
3. Source separated organic composting¹¹ (Composting)

This combination could reduce the country's emissions by at least **8.3MtCO₂e** during a 15 years period between 2015 and 2030, with a reduction of about **17%** compared to BAU levels. The abatement cost is **US\$4.59/ton** of CO₂e reduced.

Figure 7- Three Technologies

Technology	City	Mitigation Potential (tCO ₂ e)*	Contribution (USD)			Abatement Cost (USD/tCO ₂ e)
			50% National	50% Inter.	Total	
LFGE	Lima - Modelo del Callao	3,239,578	2,004,603	2,004,603	4,009,206	0.92
LFGE	Lima - Portillo Grande	2,041,716	6,191,496	6,191,496	12,382,991	5.06
LFGE	Lima - Zapallal	510,430	1,981,775	1,981,775	3,963,549	6.50
LFGE	Lambayeque	397,307	2,025,948	2,025,948	4,051,895	7.73
LFGE	Arequipa	397,307	2,025,948	2,025,948	4,051,895	7.73
Flaring	Mid-sized cities (6 cities)	1,482,335	7,150,364	7,150,364	14,300,728	7.70
Compost	Mid-sized cities (2 cities)	58,122	456,023	456,023	912,046	13.48
Compost	Small cities (23 cities)	135,579	1,063,746	1,063,746	2,127,492	13.48
Compost	1 Large city	79,276	884,952	884,952	1,769,905	18.92
Total		8,341,649	23,784,854	23,784,854	47,569,707	4.59
Technical Assistance			2,000,000	2,000,000	4,000,000	
GRAND TOTAL NAMA Supported Project			25,784,854	25,784,854	51,569,707	
* cumulative between 2015-2030						

Option II - 4 Technologies

Technologies

¹¹ Based mainly on large generators of organic waste such as markets, supermarkets, public green waste, etc.

1. Landfill gas capture with electricity generation (LFGE)
2. Mechanical-Biological Treatment (MBT)¹²
3. Landfill gas capture with flaring (Flaring)
4. Source separated organic composting (Composting)¹³

This combination could reduce the country's emissions by at least 10 MtCO₂e accumulated over a 15 year period between 2015 and 2030, with a reduction of about 20% compared to BAU levels. The abatement cost is US\$3.90/ton of CO₂e.

Figure 8 – Four Technologies

Technology	City	Mitigation Potential (tCO ₂ e)*	Contribution (USD)			Abatement Cost (USD/tCO ₂ e)
			50% National	50% Inter.	Total	
LFGE	Lima - Modelo del Callao	3,239,578	2,004,603	2,004,603	4,009,206	0.92
MBT	Lima - Portillo Grande	1,953,258	3,556,035	3,556,035	7,112,069	2.87
MBT	Lambayeque	1,604,427	4,147,249	4,147,249	8,294,497	4.15
MBT	Arequipa	1,604,427	4,147,249	4,147,249	8,294,497	4.15
LFGE	Lima - Zapallal	510,430	1,981,775	1,981,775	3,963,549	6.50
Flaring	Mid-sized cities (3 cities)	741,167	3,575,182	3,575,182	7,150,364	7.70
Compost	Mid-sized cities (5 cities)	145,305	1,140,057	1,140,057	2,280,114	13.48
Compost	Small cities (23 cities)	135,579	1,063,746	1,063,746	2,127,492	13.48
Compost	1 Large city	79,276	884,952	884,952	1,769,905	18.92
Total		10,013,446	22,500,846	22,500,846	45,001,693	3.90
Technical Assistance			2,000,000	2,000,000	4,000,000	
GRAN TOTAL NAMA Supported Project			24,500,846	24,500,846	49,001,693	
* cumulative between 2015-2030						

¹² MBT plants could be built in large cities and potentially can produce recyclables, compost, and derived fuel depending on local markets for such commodities.

¹³ Based mainly on large generators of organic waste such as markets, supermarkets, public green waste, etc.