

*Feasibility study to use waste as fuel for cement factories*  
*Reference number: 2015-036/MOZ-01*

*Output 3:*

*Report on the analysis of the current legal framework, including  
recommendations that enable the country to implement the production of  
RDF and its use in cement factories*

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## Table of Contents

<b>1. Assessment of the current Mozambican policy and legal framework related to waste management, climate change and Waste to Energy .....</b>	<b>4</b>
<b>1.1 Background and Justification.....</b>	<b>4</b>
<b>1.2 Mozambican Legal Framework .....</b>	<b>5</b>
1.2.1 International and constitutional framework .....	5
1.2.2 National framework.....	6
1.2.3 Local level.....	8
<b>1.2.4 Summary of the main legislation.....</b>	<b>10</b>
<b>1.3 Political framework: national strategies and initiatives .....</b>	<b>12</b>
1.3.1 National waste and poverty reduction strategies .....	12
1.3.2 National, International and technical assistance.....	15
1.3.3 Climate change strategy and climate support .....	16
1.3.4 Climate finance and mitigation actions in the waste sector .....	17
Task Force for the Development of a NAMA in the Waste Sector in Mozambique.....	18
<b>2. Analysis of the current legal/political framework related to cement kilns operations .....</b>	<b>19</b>
<b>2.1 Regulations of types of fuels.....</b>	<b>19</b>
<b>2.2 Regulations on air pollution/emissions.....</b>	<b>19</b>
<b>2.3 Policies or strategies for climate change for cement kilns .....</b>	<b>20</b>
<b>2.4 Current finance or other mechanisms to incentives new policies .....</b>	<b>21</b>
<b>3. Review of current experiences of Waste-to-Energy policy and legal frameworks in other countries.....</b>	<b>21</b>
<b>4. Recommendations to promote and boost Waste-to-Energy projects in the Mozambican cement sector .....</b>	<b>25</b>
<b>References.....</b>	<b>28</b>

## List of acronyms

ANAMM	Association of the Mozambican Municipalities
AMOR	Mozambican Association for Recycling
CdM	Cimentos de Moçambique
CDM	Clean Development Mechanism
CTCN	Climate Techonology Centre & Network
EN1	Estrada Nacional N°1 – National Road N°1
FUNAB	Fundo do Ambiente (Environment Fund)
JICA	Japanese Cooperation
LAL	Lei das Autarquias Locais (Law of local autarchies)
MGW	Megawatt
MICOA	Ministry of environmental action and co-ordination
MITADER	Ministry of Land, Rural Development and Environment
MISAU	Ministry of Health
MSW	Municipal Solid Waste
NAMAs	Nationally Appropriate Mitigation Actions
NDE	National Designated Entity
PARPA	Action Plan for the Reduction of Absolute Poverty
RDF	Residue Derived Fuel
UNEP-DTU	United Nation Environment Program – Denmark Technical University
W2E	Waste to Energy

## **1. Assessment of the current Mozambican policy and legal framework related to waste management, climate change and Waste to Energy**

### **1.1 Background and Justification**

Municipal solid waste management is a growing problem in Mozambique. It can be estimated that Mozambique generates approximately 2.5 million tons of municipal solid waste per year, organic waste constituting approximately 60% of the waste. The final destination of solid waste in Mozambique is mostly open bins and uncontrolled dumpsites, with no or very little waste treatment.

Simultaneously, the cement industry in Mozambique has been developing rapidly in recent years, with clinker and cement sales increasing by 13.7% in 2010 and Cimentos de Moçambique's sales rising by 9.8% in 2013. According to Global Cement, the cement production capacity in Mozambique shall raise from 2.66 million tons / year today to 5.5 million tons / year in the coming years.

Together with growing production, cement plants require extremely high temperatures, consuming about ten times more energy than the average amount required by other manufacturing processes. As such, employing waste as an alternative fuel (RDF = Residues Derived Fuel) has been helping the cement industry to manage its environmental impact, while addressing waste management challenges.

This approach would be also attractive for Mozambique, where both, the production of waste as well as the production of cement are dramatically increasing.

Having this background, the Mozambican government requested, through its National Designated Entity (NDE), technical assistance to the Climate Technology Centre & Network (CTCN), in order to determine the technical, financial and legal feasibility of the production and use of municipal solid waste in cement factories in Mozambique, with focus on two urban cities: Maputo and Matola. After the approval of this request, the CTCN assigned the UNEP DTU Partnership (UDP) to the implementation of this technical assistance, which started in November 2015.

Having into consideration that there is local knowledge in place, UDP decided to identify and subsequently involve Mozambican experts in the development of the technical assistance, in the form of subcontracting for the development of specific tasks included in the project. A consultancy was celebrated with AMOR, the Mozambican Association for Recycling. The goal of this consultancy is the development and delivery of specific tasks related to the technical assistance provided by UDP on behalf of the CTCN.

Specifically, the current report provided by AMOR is an analysis of the legal and political framework of Municipal Solid Waste management in Mozambique. It first presents the legal

framework of the Municipal Solid Waste Management in Mozambique, compiling a number of existing documents and then presents the current political position of Mozambique regarding energy recovery from waste and other environmentally friendly initiatives in the waste sector.

As such, the report includes aspects such as the national strategies for reducing and treating waste, the climate mitigation initiatives from the waste sector as well as the financial or others mechanisms to implement and incentive them, with a special focus on RDF to be used by cement industry.

## **1.2 Mozambican Legal Framework**

In Mozambique, several legal instruments on waste reflect a general framework whose key features are:

- ✓ The definition of responsibilities for the management of different types of waste
- ✓ The definition of the conditions and goals under which municipalities can develop their municipal ordinances and by laws to implement concrete measures of waste management
- ✓ The definition of the rights and responsibilities of municipalities regarding waste management, for example, who is responsible for cleaning the city? What are the sources of revenue for the municipality to finance the SWM?<sup>1</sup>

The legal framework is presented below in different levels, from international and constitutional level to local level, focusing on waste Management by local authorities:

### **1.2.1 International and constitutional framework**

The World Conference on Environment and Sustainable Development held in Rio de Janeiro in 1992, known as the Rio Summit, recognized that the prosperity, peace and economic development of a country depend on its environment. The Summit adopted the so-called Agenda 21, which recognizes the need for cities to become sustainable, independently from their size, particularly looking at the needs of water supply, access to environmental sanitation, wastewater management, and solid waste management systems, among others.

In Mozambique, the Constitution of 2004 and the Law 20/97 of 1<sup>st</sup> October, known as the Environment Act (*Lei do Ambiente*) are the most important texts dealing with environment.

#### **Constitution of 2004, Article 90**

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<sup>1</sup> Plano Director – Gestão de Resíduos Sólidos Urbanos na cidade de Maputo, 2008

*"Every citizen has the right to live in a balanced environment and the duty to defend it. The state and local authorities, with the collaboration of associations for environmental protection, adopt policies to protect the environment and ensure the rational use of all natural resources."*

On the one hand, the constitutional legislation recognizes the right to a safe and healthy environment as a fundamental right of citizens. On the other hand, the constitution explicitly mentions the duty of the state and local authorities to protect this environment.

### **1.2.2 National framework**

At the national level, Mozambique recognizes the interdependence between development and environment

#### **National Environment Policy**

***(Política Nacional do Ambiente - PNA):***

Approved by Resolution no. 5/95 of the 3<sup>rd</sup> August 2008

The National Environmental Policy (*Política Nacional do Ambiente* – known as PNA) was approved by Resolution No. 5/95 of 3 August 2008. This is a legal recognition of the interdependence between development and the environment. Chapter 3.7 of the National Environmental Policy refers to the management of the urban environment: it provides an ever-closer coordination between MICOA and Municipal Councils, which are to be trained in terms of management of solid waste. As such, the waste management is the responsibility of the local authorities (Municipalities and districts). The resolution also provides for the need to introduce systems of waste treatment and recycling, and recommends the introduction of separation mechanism of domestic solid waste for posterior valorization.

#### **Law 20/97 of October 1<sup>st</sup>**

**The Environment Act (*Lei do Ambiente*)**

Approved on the 1<sup>st</sup> of October 1997

The Environmental Law sets the foundation for sustainable management of the environment and its components. The law shows that waste management, though managed by the municipalities, is not governed autonomously: it remains under the coordination of the MICOA – the MICOA being the entity responsible for the coordination of environmental action at the National level. Please note that the MICOA has been merged in February 2015 in the MITADER (Ministry of Land, Rural Development and Environment), which now assumes this coordination role.

Some waste-related decrees have been added to complement the Law 20/97, such as:

#### **The Decree 8/2003, of February 18<sup>th</sup>**

(Approving the Regulation on the Management of Solid Waste Bio-Medical)

The decree says that coordination must be established between the MICOA and the local Authorities, providing a license to manage bio-medical waste. This implies coordination between MICOA, Municipal Councils and other government institutions (especially MISAU – Ministry of Health).

**The Decree 11/2006 of June 15<sup>th</sup>**  
(Approving the Regulation on Environmental Inspection)

The decree allows the MICOA (now, MITADER) to realize environmental inspections, including waste related inspections.

**The Decree 13/2006 of June 15<sup>th</sup>**  
(Approves the Regulation on Solid Waste Management)

This very important decree gives to the Local Authorities (in our case, the municipalities but it can also be Districts), in the area under their jurisdiction, the power to:

- a) Adopt specific rules on waste management
- b) Establish fees for providing services to the public through their own means, in particular within the collection and disposal of solid waste, including hospitals and toxic waste
- c) Approve removal processes, treatment processes and disposal of solid waste, including hospitals and toxic waste
- d) License establishments producing hazardous or toxic waste.

This Decree provides in **Article 7 (Waste Management Plan)**, the obligation of all public or private entities which operate waste management to develop a waste management plan managed by them, to be submitted to MICOA, with a validity of 5 years from the date of its adoption.

**Case study – Maputo waste master plan**

Following the Decree 13/2006, the Municipality of Maputo started in 2007 the elaboration of its Master Plan for Solid Waste Management : the document was prepared with support from the German cooperation and was concluded in February 2008. It is a comprehensive tool for strategic planning of the sector which oversees the Municipal Services of city cleaning, as it sets objectives for the development of the sector on the basis of use and systematization of available information and analysis of the current situation. For each planning sector (institutional and organizational development, removal of MSW final

disposal, other activities such as promotion of recycling activities and awareness and financial sustainability) specific objectives have been defined. This process results in the definition of a coherent and sustainable strategy for the future development of Solid Waste Management in Maputo City. The initial version does mention incineration processes, but consider them as too expensive for the Municipality to implement. There is no reference to RDF. Note that the Waste Master Plan is currently being reformulated with support of the Japanese Cooperation (JICA)

### **The Decree 94/2014 of December 31<sup>th</sup>**

(Revocates the former decree and provides guidelines for waste management)

This Decree revocates the former one but maintains the obligation for private and public entities to develop a Waste Management Plan. Furthermore, it defines 7 principles to be followed: principle of auto-sustainability (operations to happen in the national territory as much as possible), principle of responsibility for the waste management, principle of prevention or reduction, principle of the waste management hierarchy, principle of the responsibility of the citizen, principle of the protection of human health, principle of the polluter pays. The Municipalities shall establish and approve systems for waste valorization processes. These systems shall clearly indicate the processes to use for the treatment (mechanical, physical, thermal, chemical or biological) as well as the forms or reuse, recycling, recovery of material or co-processing for the production of energy.

We can consider that the use of waste as RDF follows the principle of auto-sustainability (local process) as well as waste management hierarchy. Strict control of pollution must ensure protection of human health.

### **1.2.3 Local level**

#### **Law 2/97, of February 18<sup>th</sup>**

Law of Local Government (*Lei das Autarquias Locais* known as LAL)

Approved on the 18<sup>th</sup> of February 1997

At the local level, this is the main important text as it establishes the legal framework for the implementation of waste management by the Local Government (*Autarquias Locais*), i.e. municipalities. It refers to environmental issues in particular, the removal processes, treatment and disposal of solid waste, including hospitals and toxic waste. Among the other duties of local authorities it is important to note the following point relevant to solid waste management:

**Responsibilities** (Article 6. b and 46): Environment, sanitation and quality of life.

**Skills** (Article 45, n. 3): approve regulations and procedures; establish by law municipal rates, strokes and other sources of revenue and fix their quantitative value; fix tariffs for the



provision of services to the public through their own means, in particular within the collection, disposal and treatment of waste;

### **Law 11/97 of May 31**

Finance Act and Municipal Heritage

Approved on the 31<sup>st</sup> of May 1997

In addition, the **Law 11/97 of May 31**, Finance Act and Municipal Heritage is important at the local level because it establishes that the local government enjoys administrative and financial autonomy, and possesses its own finances independently managed by the respective agencies.

The **Article 3 (Exercise of powers of local authorities)** stipulates that for the discharge of tax Local Authorities must "respect the principles of legality, security, equality and ability to pay of the respective populations." Paragraph 2 of the article in question, states that: "the competent government bodies, in determining the amount of fees to be charged, must act fairly, being forbidden to set values that in their size exceeds a balanced relationship between the compensation for the services rendered and the amount received by the local authority. " In other words, the local government cannot raise taxes that would exceed the costs of the services.

The **Article 4 (Collaboration within local government)** says that "Municipalities can associate themselves to the pursuit of works or provision of public interest". An example of this is the project for the construction and management of the future common landfill of Mathlemele between the Municipality of Maputo and the Municipality of Matola.

The **Article 13 (Own Revenues)** stipulates what can constitute the own revenues of local authorities, among others:

- a) The product from fees for licenses granted by the local authorities
- b) The product of a percentage of state taxes, as shall be provided by law
- c) The product of charging fees or tariffs resulting from the provision of services
- d) The product of fines that by law, regulation or procedure, fit the local authority
- h) Any other revenues established by law in favour of local authorities

The **Article 25 (Responsibilities of Local Authorities)** stipulates that the Municipality has the responsibility to invest in the following areas, among others:

- a) Rural and urban equipment: Green spaces including gardens and nurseries of the municipality; roads and pavements, affordable housing, public cemeteries, markets and fairs, etc.

b) Sanitation: systems of municipal water supply, sewer systems, collection and waste management systems, public cleaning etc.

The **Article 35 (Autonomous Services)** stipulates that the Municipalities can create autonomous services or municipal public enterprises to meet the collective needs of their populations, when such needs are of interest and relevance to the community or autonomous management proves to be the most efficient solution. These services are managed in business terms, at the risk of the Municipality, enjoying a financial and administrative autonomy.

The **Article 36 (Concession of public services exploitation)** stipulates that the Municipal Assembly may authorize a private actor to execute public services as long as the public interest is proved to be properly secured and the choice of concessionaire takes place through a public tender to be held in compliance with the legislation in force.

Note that technically, all the waste poured into municipal containers belong to Municipalities, and is the responsibility of the Municipality. However, this article allows for private sector operators to manage municipal waste in certain conditions. This is a relevant article that could enable private sector operators to run an RDF facility.

The **Article 37 (Regulation and supervision of tariffs)** says that services whose exploitation is subject to concession are subject to regulation and supervision of the local government, being also the Municipality executive bodies to approve its tariff policy. The Municipality may terminate contracts of concession if it appears to act in violation of the contractual clauses affecting the public interest, or when the services manifestly work under unsatisfactory conditions to meet the needs of the users.

The **Article 70 (Fees and charges for services)** stipulates that the Municipality can apply tariffs or exchange service under their direct administration of the provision of certain public service, and in particular in the following cases:

- a) Water and electricity
- b) Collection, storage and treatment of waste as well as the connection, conservation and wastewater treatment
- c) Collective urban transport of people and goods
- d) Maintenance of gardens and markets
- e) Maintenance of roads

The **Article 71 (fines and penalties)** defines the fines and penalties in the case of violation of procedures and regulations.

#### 1.2.4 Summary of the main legislation

As seen, the responsibility of solid waste management has been given to the Local Authorities, namely Municipal Councils and Districts. They can create autonomous services or authorize third parties to run waste management services as long as the public interest is proved to be properly secured.

The table below summarises the basic legislation governing the environmental law, with focus on the management of solid waste.

Legal Framework	Organ of authority	Foundation	Important Articles/Observation	Scope
<b>Fundamental Law</b>				
Constitution of the Republic (2004)	Assembly of the Republic	It is the Law of Laws (Constitution). Fundamental Law of Mozambique	Article 90 – enshrines the Right to the Environment	National
<b>Government Policies</b>				
Environmental Policy (Resolution 5/95, 3 August)	Ministers Council	To achieve the goal of ensuring sustainable development and environmental protection	Essential tool for the creation of the current Law of the environment	National
Integrated Management Strategy for Municipal Solid Waste in Mozambique	Ministers Council	Defines clearly roles and responsibilities to achieve sustainable waste management systems	In recognition of the seriousness of the problem, gives orientation to all society to improve waste management	National
<b>Ordinary Laws</b>				
Law 20/97, 1 <sup>st</sup> October- Environment Law	Ministry for Coordination of Environmental Action (MICOA)	Assigns the Government to develop and coordinate programs for sustainable management	Articles 4, 5, 7, 8, 10.	National
Law 2/97 of February 18, Local Government Act	Local Authorities	Assigns Local Authorities the co-responsibility of defending the environment, ensuring sanitation and quality of life	Articles 6, 11, 14.	Local

Law 11/97 of May 31, Finance Act and Local Government Heritage	Local Authorities	Standardize the Finance and Municipal Heritage, and defines the exercise of powers of the Local Authorities	Articles 3,4,13,25,35,36,37, 70.	Local
Decrees	Local Authorities	Provides principles and guidance for the local authorities to implement the laws	Provides 7 principles of Municipal waste Management	Local

### 1.3 Political framework: national strategies and initiatives

#### 1.3.1 National waste and poverty reduction strategies

##### ***Integrated Management Strategy for Municipal Solid Waste in Mozambique***

In recognition of the seriousness of the problem of municipal solid waste management in the country, the Government introduced the Integrated Management Strategy for Municipal Solid Waste in Mozambique, which characterizes the situation and develops the technical, institutional and management of municipal solid waste in the country by 2025. This Strategy for the Integrated Management of Municipal Solid Waste in Mozambique has a time horizon of 12 years of implementation.

The strategy stresses the fact that waste is a problem affecting the whole of Mozambican society: *“Given that solid waste represents a problem that affects not only large cities, but even small towns and that these residues are produced by all members of society, whether in the home, on public roads, hospitals, schools and in the workplace, it is everyone's business and everyone independently of their social class, religion or belief.”*<sup>2</sup>

It guides the different stakeholders on how to design, implement, and manage public cleaning systems involving the wide participation of all sectors from the civil society, with the final goal of contributing to sustainable development with:

- Construction of landfills
- Improved waste collection of urban solid waste
- Eradication and /or improving the conditions of open rubbish dumps
- Promotion of separation of recyclable materials at source

<sup>2</sup> Estratégia de gestão integrada de resíduos sólidos urbanos em Moçambique

- Resource mobilization and partnerships to continue ongoing initiatives
- Organization of waste pickers
- Promotion on the creation of income associated with waste
- Improved inter-sectorial coordination
- Elimination of the burning of solid waste disposal sites<sup>3</sup>

It is within this perspective that the Strategy assigns responsibilities to all stakeholders, described as follows:

a) **Central and local governments (provincial, district and village)** - it is the responsibility of governments to support municipalities in mobilizing financial and material resources, adopting appropriate legislation to ensure the implementation of waste management programs towards a healthy environment of cities and towns in solid urban waste management, providing incentives for this and the sustainable management of municipal solid waste, among others.

• **Municipal Councils** – they play a key role in the management of solid waste. It is up to the Municipal Councils to approve the key legal instruments to implement a system of sustainable management of solid waste, such as regulations, charges or fees and rates, tax code, resource mobilization and organization of the different stakeholders, initiatives for sustainable management of solid waste, etc. They also have to promote studies for the rehabilitation and conversion of the existing open rubbish dumps (to be closed) for other uses.

#### **Closing and rehabilitation of Hulene dumpsite, Maputo**

In Maputo, a tender was launched in 2014 for the closing of the dumpsite of Hulene.<sup>4</sup> The best option estimated the value of the closing to 500 000 000 Mt (approximately 8 400 000 USD).<sup>5</sup>

b) **Private sector (business and trade services)** – they are important actors for they produce large quantities of solid waste, often collected together with household/residential waste. They are also important because they can be part of the solution (for instance, cement industry incinerating waste as RDF). Therefore, members of the Commercial Association shall participate in committees drawing up local plans on solid waste management.

c) **Waste pickers** – they have a responsibility and should be organized into forums or associations and qualified to implement programs of selective collection of solid waste in

<sup>3</sup> Estratégia de gestão integrada de resíduos sólidos urbanos em Moçambique

<sup>4</sup> Closing and operation of Hulene, 2014

<sup>5</sup> João Mucavele-Moçambique\_9ªJTIR-VianaCastelo\_set2015

cities and towns. In other words, they are expected to be treated as priority partners in separate collection.

d) **Local communities and residents** – they have the responsibility to participate actively in the implementation of all stages of the system of solid waste management including:

- **Production** - householders and local communities must assimilate and adopt the principle of the 3Rs (Reduce, Reuse and Recycle)
- **Packaging** – suitable packaging must be adopted to facilitate solid waste removal
- **Collection** – when existing, the schedules for the collection of deposited solid waste in secure containers must be respected
- **Treatment** - householders and local communities should adopt the techniques of low-cost solid waste treatment (composting, small landfills, reuse, recycling and craft development), and create cooperatives/associations to treat solid waste
- **Final deposition** - householders and communities should ensure segregation of solid waste at source

c) **Non-governmental organizations and civil society** – they have a responsibility to actively participate in the educational and informative part, as well as the creation of new job opportunities and income generation. They also have the responsibility to monitor the performance of the public sector.

### ***Poverty Reduction Action Plan - PARPA***

Mozambique is still one of the poorest countries in the world with 7.5 million people living on less than a dollar a day.

The government's main objective is the reduction of absolute poverty through the creation of employment or income generating activities, according to national plans, PARPA I and II (*Plano para Acção A Redução da Pobreza Absoluta*). In order to achieve these objectives, Mozambique is receiving development assistance from a number of different countries. PARPA II (2006-2009) sought to provide a more direct relationship between poverty reduction and environmental management, going beyond what had been articulated under PARPA I (2001- 2005).

In PARPA II, efforts were made to expand inter-institutional coordination through the creation of working groups on Environment, Health, Water and Sanitation with the participation of State agencies, donors and civil society, and to implement policies which

include environmental management on the government's agenda and in the fight against poverty<sup>6</sup>".

In 2012, the struggle against poverty was again elected as priority for the government<sup>7</sup>, with a national agenda of struggle against poverty. As such, income generating initiatives and job creations must be considered as transversal themes in the waste management activities.

### **1.3.2 National, International and technical assistance**

#### ***International Cooperation and Technical Assistance***

Several international development cooperation agencies are to be mentioned for their contribution to the Mozambican waste sector.

Funded by the German GIZ, the programme AGRESU (Support for Management of Municipal Solid Waste) has implemented in the greater Maputo area since 2002 and contributes greatly in modifying the context of waste management by municipal authorities and their development potential. Before 2002, the Spanish cooperation worked together with the Municipality on waste issues.

Amongst others, AGRESU helps the Municipality to raise funds through the implementation of economic instruments, and promotes the concept of partnerships with public and voluntary sectors allowing implementation of various initiatives with noticeable results in terms of improvement of the degree of collection and community participation. The German cooperation agency has also been present in Inhambane, as well as the Finnish cooperation in Xai-Xai.

The PRODEM is the *Programa de Desenvolvimento dos Municípios*: funded by a number of national cooperation entities (Swiss, Danish, Austrian, Irish, etc.), the program aims at supporting all the Central and Northern municipalities on good governance, one of the components being waste management.

International organizations like UN-Habitat have also worked on waste-related issues. NGOs like the WWF or Endangered Trust advocate for better waste management. While they often address waste management in their projects, don't have a specific action program targeting it. Other forms of external assistance can support local waste related projects through funding for instance, as do some international and Mozambican companies through their corporate social responsibility mechanisms.

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<sup>6</sup> Sector Note on environmental Health

<sup>7</sup> <http://pt.rfi.fr/africa/20121009-mocambique-luta-contra-pobreza-e-prioridade-do-novo-primeiro-ministro>  
accessed on 13th of June 2016

However, sustainable waste management practices (recycling, composting, waste to energy...) remain at a very small scale. In terms of waste to energy, small scale programs of anaerobic digestion are being developed in the Municipality of Quelimane

### **1.3.3 Climate change strategy and climate support**

#### ***National strategy for climate change adaptation***

Mozambique, as a signatory to the United Nations Framework Convention on Climate Change (UNFCCC), has taken some actions to develop the mitigation of GHG emissions and adapt its development policies with a view to respond to climate change impacts.

Mozambique is very vulnerable to climate change due to its geographic location in the inter-tropical convergence and downstream of many watersheds, its long coastline and the presence of extensive areas with altitude below sea level (as the city of Beira, for instance). Moreover, the high level of poverty, limited investment in advanced technology, and the fragility of infrastructure and health services contribute to its vulnerability and low adaptive capacity, among other factors<sup>8</sup>.

The National Strategy for Climate Change aims at integrating the different initiatives, to strengthen institutions, and highlights how climate change is a factor that can prevent the social and economic development of the country, and this tendency can be counteracted by increasing the resilience and development of low-carbon initiatives.

Regarding waste management, the National Strategy points to the growth of the urban population which imposes additional challenges that need to take into account the requirements of city dwellers, such as water availability and sanitation, waste management, resilience of fragile ecosystems, which are to be addressed in the process of planning and building new settlements. Without entering into details, the strategy mentions at several points the necessity to have an effective waste management system.

Within this category are presented strategic mitigation actions that are related to the use, production and transportation of energy.

- Management and recovery of waste
- Collection and recycling of waste
- Construction of landfills
- Heat/electricity creation (for industrial use) through waste incineration (relevant for the RDF project)
- Submission of waste to landfills and methane recovery<sup>9</sup>

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<sup>8</sup> Estrategia nacional de adaptação as mudanças climáticas – Versão de 30 de Setembro de 2012

<sup>9</sup> Estrategia nacional de adaptação as mudanças climáticas – Versão de 30 de Setembro de 2012



Note that waste and energy are the two priority sectors currently identified by the MITADER for the TNA – Technology Needs Assessment (TNA), meaning that Mozambique, as a developing country Parties to the UNFCCC determined waste and energy as sectors to receive technology priorities for the mitigation of greenhouse gas emissions and adaptation to climate change. The project is implemented by the United Nations Environment Programme (UNEP) and the UNEP DTU Partnership on behalf of the Global Environment Facility, and Mozambique is participating to the TNA Phase II, launched in November 2014.

### **1.3.4 Climate finance and mitigation actions in the waste sector**

#### **Opportunities and obstacles**

The previously mentioned *Estratégia Nacional de Mudanças Climáticas (2013-2025)* explicitly recognizes the opportunities that are presented by the various climate finance initiatives.

Several tools are introduced as possibilities to support policies and mitigation measures that will be implemented in Mozambique:

- Clean Development Mechanism (CDM)
- CDM Programmes
- Development of standardized baselines
- Sectoral approaches
- Nationally Appropriate Mitigation Actions (NAMAs)
- Other market mechanisms - emissions trading
- Voluntary market
- Reducing Emissions from Deforestation and Forest Degradation (REDD +).

The strategy explicitly asks for training to design and implement a NAMA plan for Mozambique. According to the MICOA, the NAMAs must be designed within the framework of the existence of a national inventory, and within the framework of robust sectorial inventories. One of the activities foreseen by the National Strategy is to explore the possibility of elaborating a sectorial NAMA, giving as examples: Transport, Buildings, and Waste<sup>10</sup>.

However, there is also a general recognition among stakeholders in Mozambique that further discussions and capacity building are required to properly prepare Mozambique for accessing international sources of climate finance at a scale that can make a difference on the ground.

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<sup>10</sup> Estrategia nacional de adaptação as mudanças climáticas – Versão de 30 de Setembro de 2012

This is also the case in the waste sector, where participants in a national climate finance workshop, which was held in February 2014, recognized the need to establish a platform for bringing stakeholders from government, private sector and civil society together to discuss climate finance opportunities on a more regular basis and to identify ways for Mozambican stakeholders in the waste sector to get access to international sources of climate finance.

### **Task Force for the Development of a NAMA in the Waste Sector in Mozambique**

As a follow up to the workshop, an informal Task Force for the Development of a NAMA in the Waste Sector in Mozambique was established in 2014. Members of the Task Force include representatives from the *Ministério da Terra, Ambiente e Desenvolvimento Rural* (MITADER - Ministry of Land, Environment and Rural Development), the *Fundo do Ambiente* (FUNAB - Environment Fund), *Associação Nacional dos Municípios* (ANAMM - National Association of Municipalities), *Associação Moçambicana de Reciclagem* (AMOR - Mozambican Association for Recycling) and Carbon Africa Limited.

The main objectives of the Task Force are to

- (1) formulate sustainable and low-carbon waste management approaches in the context of the *Estratégia Nacional de Mudanças Climáticas* (National Climate Change Strategy) and the Strategy for Integrated Municipal Solid Waste Management in Mozambique and other relevant national policies and regulations;
- (2) identify relevant climate finance opportunities for the waste sector in Mozambique; and
- (3) support the government of Mozambique and other stakeholders in getting access to international climate finance.

Since its establishment in 2014, the Task Force has been meeting on a regular basis. During the various meetings, the Task Force identified the following low-carbon waste management approaches as most appropriate in the context of Mozambique:

1. Implementation of sanitary landfills with methane capture;
2. Waste incineration with heat generation for large industrial clients (e.g. cement factories);
3. Waste recycling, through Waste Transfer and Recycling Center.

The above-mentioned waste management approaches were also included in the *Documento de Base para a Formulação da Proposta de Acções Nacionalmente Adequadas para Mitigação - NAMA de Emissões em Moçambique*, which was prepared by MITADER in early 2015 (draft only).

### **RDF NAMA and political support**

In October 2015, representatives of the Mozambican Government and the waste sector were trained at the NAMA academy on the formulation of NAMA and formulated the 4 following NAMA concepts :

Main NAMA: Implementation of the National Waste Management Strategy  
NAMA component 1: Recycling through Waste Transfer and Recycling Center  
NAMA component 2: RDF to be used by the cement industry  
NAMA component 3: Sustainable management of sanitary landfill

These NAMA components have been presented in a side-event at the COP21 in Paris, where discussion were held with potential financiers (amongst other the NAMA Facility and Green Climate Fund). Discussions are on-going with the MITADER to present these 3 NAMAs as a package to the next round of funding of the NAMA Facility.

At the moment, the Working group is expecting a letter coming from the highest level of the MITADER that states that the MITADER 1) supports mitigation actions in the waste sector, namely recycling, RDF and sanitary landfill and 2) gives a mandate to the working group (Task Force) to work toward the implementation of these actions. Plus, a Unity for the Mobilization of International funding was recently created within the MITADER, which shall play a role in the access to international funding.

As a matter of fact, the latest communication from the Permanent Secretary of the Minister in May 2016 asks the MITADER to decide who shall lead the working group, between the National Direction of the Environment or the recently created Unity for the Mobilization of International Funding.

Public consultations have been made presenting the different NAMAs : there is a great interest of Municipalities and the private sector, but a strong positive signal coming from the highest level of the MITADER is needed.

## **2. Analysis of the current legal/political framework related to cement kilns operations**

### **2.1 Regulations of types of fuels**

There are no specific regulations regarding the types of fuels that can be used for cement production. Cimentos de Mocambique did obtain a special environmental license for co-processing of industrial waste and is currently in the process of obtaining a license for co-processing of municipal solid waste.

### **2.2 Regulations on air pollution/emissions**

Air pollution and emissions are regulated through the Air Quality Regulations on Environmental Quality and Effluent Emission Standards (Decree 18/2004) as amended by Decree no. 67/2010. The regulation contains environmental quality standards and emission levels, aiming at the control and maintenance of the admissible levels of concentration of pollutants in the environment. Decree no. 67/2010 dated December 31, among other items, amends the Air Quality Standards and adds Appendices 1A and 1B which cover Organic and Inorganic Carcinogenic Atmospheric Pollutants and Substances with Odorous Properties, respectively.

Emission levels (mg/Nm<sup>3</sup>):

- Particles: 50
- SO<sub>x</sub>: 400
- NO<sub>x</sub>: 600

Effluents:

- pH: 6-9
- Temperature increase: ≤3°C
- Suspended solids: 50

The Government of Mozambique recently approved the *Regulations for the Production, Commercialization and Quality Control of Cement*. The Regulations establishes a number of technical, environmental and safety standards by referring to the following international standards:

- NMP NP EN 197-1: Cement. Part 1: Composition, specifications and conformity criteria for common cements;
- NM NP EN 197-2: Cement. Part 2: Conformity Assessment;
- NM OHSAS 18001: System safety, management and health requirements;
- NM 66: Symbols and safety signs for fire fighting;
- NM 67: General safety signs;
- NM 15: General requirements for the labeling of packaged products and for the sale of goods subject to the control of legal measurement.

Regarding air pollution, the *Regulations for the Production, Commercialization and Quality Control of Cement* refer to Mozambique's Air Quality Regulations referred to above.

### **2.3 Policies or strategies for climate change for cement kilns**

Mozambique does not have specific climate change policies or strategies that are explicitly targeted towards the cement industry.

The *National Strategy for Climate Change Adaptation and Mitigation*, adopted in 2012, does refer to a number of actions in the waste sector, including:

- Management and recovery of waste
- Collection and recycling of waste
- Construction of landfills
- Heat/electricity generation (for industrial use) through waste incineration
- Waste disposal at landfills and methane recovery

#### **2.4 Current finance or other mechanisms to incentives new policies**

There are currently no specific financial or fiscal mechanisms to incentivize the implementation of waste-to-energy at cement factories in Mozambique.

### **3. Review of current experiences of Waste-to-Energy policy and legal frameworks in other countries**

This chapter presents a general review of other experiences in other countries regarding their current policy and legal frameworks for enhancing waste-to-energy (W2E) projects. The RDF technology for transforming waste materials to fuels has been going through a development and expansion process during the last years, especially in industrialized countries. There are plenty of experiences in developing countries (e.g. EU countries, USA, Japan, etc.) of waste incineration plants as well as RDF plants to provide the cement sector with an alternative source of fuel.

These countries not only have invested in improving the technology, but also have developed and implemented diverse legal frameworks and policy strategies, eliminating barriers to the implementation of such projects, and boosting their implementation in a sustainable way.

The European Waste Framework Directive (2008/98/EC) (WFD) sets the general waste policy in Europe. The WFD establishes basic concepts and definitions, including waste prevention, recovery, recycling, and management. It also stipulates a waste management hierarchy that prioritizes waste prevention, followed by reuse or recycling of wastes, recovery in the form of energy, and, as a last option, disposal by landfilling. Co-processing of

MSW and sewage sludge in the cement industry is regarded as energy recovery and is thus prioritized only over landfilling after re-use, recycling and other recovery strategies (Hasanbeigi et al. 2012).

The next law boosting the incineration of waste in cement plants in Europe was the Landfill directive (1999/31/EC). Thanks to this law, new landfilling categories, acceptance criteria for waste in landfills and the establishment of a landfill reduction targets were created. Especially regarding maximal landfilling rates, countries and industries were pushed to find alternative ways to treat waste reducing volume. In this framework, processes such as incineration and co-incineration in cement plants were especially supported.

The legal framework for RDF in those countries encompasses the waste incineration directive) (2000/76/EC), the Integrated Pollution Prevention and Control Directive (IPPC) (96/61/EC, 1996), and the Large Combustion Plant Directive (LCPD) (2001/80/EC): They regulated all energy recovery operations from waste, establishing the requirements for air emissions control, defining limit values for emissions from waste incineration and cement facilities. For some emissions, the regulations define less stringent limits value for cement plants using RDF as fuel (NO<sub>x</sub>, SO<sub>2</sub>, dust). This can actually encourage the production and use of a standard quality of RDF in cement plants (Hasanbeigi et al. 2012)

In case of the U.S. the use of waste as fuel in cement plants is regulated by the Clean Air Act, which requires the U.S. Environmental Protection Agency (EPA) to set minimum national standards for air quality and assigns to the states primary responsibility for ensuring compliance with these standards. In Japan, the legal framework considers three types of MSW and sewage sludge for co-processing: use of sewage sludge and MSW incinerator ash as an alternative raw material in the production of Portland cement and concrete aggregate; use of incinerator ash as an alternative raw material in specially designated cement products (Eco-cement); and use of MSW as an alternative fuel in cement kilns. These strategies were developed in response to scarce landfill area, relatively high landfill disposal fees, and a policy framework that supports research on waste reuse and gives economic incentives to industrial ecology projects. Japan has developed an integrated waste and material management approach that promotes dematerialization and resource efficiency. Landfill shortage and dependency on imported natural resources have been key drivers of these changes (Hasanbeigi et al. 2012).

In addition to the regulations for air pollution, countries and industries have cooperated for establishing regulations and Standards for co-processing of waste in cement plants. These standards normally cover environmental performance, RDF quality, waste quality, operational practices, and safety and health requirements for employees and local residents (GIZ - HOLCIM, 2006).

In case of developing countries, some countries in Latin America (Argentina, Peru, Brazil, Mexico, Venezuela, and Paraguay) and the Caribbean (Costa Rica) have included in their

legislation concepts like waste valorization, recycling, and 3R. Further, they have developed financial support schemes for waste services. For example, the Brazilian and Peruvian legal frameworks on waste prohibits waste dumping, while compel municipal governments to develop and implement SWM plans that include recycling and sorting-at-the-source programs. Also these countries established the obligation to conduct environmental impact studies and the assignment of responsibility for environmental damages (PAHO-AIDIS-IDB, 2010). Additionally, some countries (as in the case of Mexico) are supporting the Clean Development Mechanism (CDM), energy and material recovery programs (such as biogas and recycling) by including them in their legal frameworks (PAHO-AIDIS-IDB, 2010).

Countries, such as Colombia, have recognized the impact of the waste management sector in their climate change strategies and goals. Knowing this, Colombia decided to implement diverse measures aiming to reduce the GHG emissions and further environmental impacts of the waste sector, improving, at the same time, its social and economic performance. The "Plan de Accion Sectorial de Mitigación - PASm (Mitigation National Action Plan) for the waste sector comprises mitigation policies, programs, and actions, which can be implemented separately or jointly, dependently on implementation plans to be developed. One of these interventions aims at incentivizing the implementation of waste recovery processes for organic and inorganic waste and the development of markets for products generated from waste recovery processes (organic and inorganic waste) , including the use of waste materials as inputs for industries, here can be considered the use of RDF from solid waste (PASm, 2013).

Further, the PASm aims at supporting the Ministry of Energy and Mining in developing schemes for supporting the generation and sale of electricity from biogas, without affecting the waste tariff scheme. The PASm also aims at including feasible W2E projects, including the production of alternative fuel from municipal solid waste, and the support of private sector initiatives for implementing co - processing of waste in the industry, under consideration of environmental standards. With this framework, Colombia has developed its Waste NAMA, which as 4 main objectives:

1. Regulatory changes allowing waste recovery activities with focus on redefinition of waste fees (based on true waste costs) and policies for removing barriers to use non-hazardous waste as fuel in cement kilns, development extended producer responsibility policies, and new standards for alternative technologies (MBT).
2. The promotion of alternative waste treatment technologies; mainly Mechanical Biological Treatment (MBT) plans, for the treatment of mixed waste and the production of compost, recyclable materials, and Refuse derived Fuel (RDF) for cement plans.
3. The creation of appropriate financial mechanisms; removing a barriers to private sector investment. The NAMA proposed the "NAMA Equity fund", financed through

public resources and international climate contributions. Main objective of this fund is to contribute equity capital to the MBT plants, leveraging private investment in this technology (CCAP, 2013).

4. The integration of informal recyclers into the formal sector. Here, informal recyclers should be included in the modernization of the waste sector, formalizing their role in waste recycling and improving their current working conditions (PASm, 2013). Formalized recyclers could access to jobs created through the NAMA, thanks to the organized and improved recycling activities, composting, and RDF production and sale (CCAP, 2013).

Regarding waste policies in Asian countries, most countries have included the 3R waste hierarchy or some aspects of this approach, but the practical implementation of the measures included in the policy and legal frameworks of these countries is still in process. Philippines, Japan, and Thailand have included specific goals in relation to waste amount diverted from landfills, waste prevention and reduction of packaging waste (UNEP-RRCAP, 2010; Pariatamby et al., 2013). Vietnam, Sri Lanka, and Cambodia, however, are still lagging behind in including and implementing sustainable waste practices in their waste policies and regulations (UNEP-RRCAP, 2010; Viet et al., 2009).

In the example of India, W2E projects are in an early development stage and most W2E initiatives are heavily dependent on subsidies being provided by various government agencies. According to these experiences, W2E becomes viable only if sufficient high calorific value components are present in the waste. Based on the waste composition in India, normally W2E is not an option for technical and financial reasons since Indian MSW have low calorific value, high moisture content and high inorganic matter leading to high economic and environmental costs. The costs of W2E plants in India are such that these can be considered as an option for disposal of MSW, only as part of integrated waste management largely in metro cities of India.

In 2007, the ministry of environment in Korea announced the implementation of "Waste Resources and Biomass Energy Utilization Initiatives" as a mean to achieve the national vision of "Low Carbon, Green Growth". IN order to implement waste to energy policies, the Korean Government has defined a yearly goal of utilization of combustible waste, increasing as well the targets for energy collecting rates for residual thermal from middle and large-scale incinerators and for landfill gas from waste landfill sites.

Further, the Korean Government has gradually increased the subsidies for the establishment of W2E plants in local governments. It is expected the ministry will offer more government subsidies to increase the W2E distribution rate, decentralizing W2E projects, also promoting the participation of the private sector at the local level. The strategy of Korean government is focused on establish independent facilities and expand facilities by local and municipal



governments based on regional and facility characteristics, promoting economic efficiency by utilizing RDF produced from local facilities in regional environmental and energy towns.

In Malaysia, the National Renewable Energy Policy in 2010 has recognized waste as a potential source for renewable energy. However, there are still several challenges to overcome in order to make possible the use of waste as a source of energy. Some issues preventing the use of waste in energy generation are the limited incentives, no reliable data about the waste availability and energy potential, limited efforts to enforce biomass programs, high initial investment, limited local technologies, poor financial support, limited coordination among local agencies, and the unwillingness of the industry to change (Pariatamby and Tanaka, 2014).

#### **4. Recommendations to promote and boost Waste-to-Energy projects in the Mozambican cement sector**

As presented in the first section, the Mozambican legal and policy framework on waste management presents various environmental standards and principles on responsibilities of waste management, waste treatment and final destination. The legislation mentions very few times W2E programs, but the principles are definitely compatible with W2E projects, allowing indirectly processing MSW in RDF to be used by the Cement industry. Observing the current development and orientation of climate change national policies of the country, it is expected a strong support towards NAMAs, as it is already happening through the activities of the MITADER as a part of the NAMA Waste Task Force. The task force has identified waste incineration with energy generation for the industry as a priority waste treatment alternative. A NAMA on RDF from MSW to be used in cement plant has been proposed and the MITADER is in a decision making process about how to politically and institutionally support this and other waste NAMAs for facilitating access to international funding.

However, this political process is still ongoing and a strong political signal must come from the top to endorse the RDF concept at the highest political level. This endorsement is now indispensable for Mozambique to access climate finance and climate support, which are much needed for the implementation of the mitigation actions in the waste sector.

The third section of this report presented some highlights of the experiences of other countries regarding the design of appropriate policies and legal frameworks to support and boost W2E initiatives. Even though these policies may not be reproduced in Mozambique in a 100%, there are some aspects and problems common in developing countries, which can apply to the Mozambican context. Therefore, some measures implemented in other countries might be suitable to include in the future development of W2E policies and

strategies in Mozambique. Based on this, the following general recommendations are proposed:

- W2E initiatives should be developed in the framework of an integrated waste management approach at the national and local levels. This means that RDF project should be planned following and complementing national waste strategies based on basic waste principles, such as waste prevention, recycling, and reduction goals of landfilling volumes and elimination of waste dumping. National strategies and goals aiming at reducing the volume of waste in landfills may impulse the development of projects focused on waste treatment, such as RDF.
- Future development of waste policies and legal frameworks should focus on minimize negative environmental impacts on public health, not only at the national but also at the local level. Climate change is an important issue, but frequently health and social problems are considered as more important. Therefore, future policies and legal instruments should consider the inclusion of measures and goals for eliminating environmental and public health problems related to final waste disposal.
- Policies and legal framework in Mozambique should aim at including mechanism that can ensure the economic sustainability of RDF projects and also discourage unsustainable waste practices. This may be done, for example, through the establishment of more appropriate and fair waste fees (according to the real costs of handling waste), encouraging citizens to participate in recycling programs. Higher landfilling taxes (especially for industries and enterprises) and an efficient enforcement mechanism may also lead industrial and commercial waste generators to choose alternative waste treatments, such as RDF plants. Further measures that may be considered are: fair gate fees for receiving and treating the waste at the RDF plants, subsidies or loan programs for RDF projects with special loan conditions (such as in the waste NAMA in Colombia), support of Public-Private-Partnerships, facilitating tender procedures, legal instruments to ensure waste availability (goals of waste collection and improvement of waste collection rates), and allowing that W2E projects can access waste resources in a sustainable way (enabling the transfer of legal property of the waste to the W2E projects).
- There is a strong need of including concrete measures to support and strengthen social sustainability and inclusion, particularly with regard to community participation and to the incorporation of informal sector waste workers into formal activities in W2E projects (as in Colombia). This would increase the acceptance and

support of these stakeholders to RDF projects, instead considering them as a competition for waste resources.

- Specific goals targeting emission reductions, rate of use of alternative energy sources or replacement of fossil fuels, as well as material recovery target should be included in national strategies for the relevant sectors in general, including the cement sector in Mozambique.
- Regarding the renewable energy framework, Mozambique has the Policy on the Development of New and Renewable Energy (Resolution 62/2009, 14 October), which promote greater access to clean energy services through the use of equitable, efficient, sustainable and culturally sensitive sources of new and renewable energies. However, waste is not included in the law as an energy source. An important change can be achieved, if future changes in the renewable energy policies in Mozambique would be expanded to include waste as a suitable energy resource for industrial purposes at least. Its inclusion and recognition as an energy source may open the doors to W2E projects to access the benefits and instruments to be considered in the law for renewable energy projects, such as investment incentives (grants or loans), possible release of taxes, access to the electricity grid (possible sale of electricity from burning RDF in cement plants, as energy recovery measure), access to competitive electricity tariffs, among other benefits. Further, future policies and strategies should define specific goals for a possible energy supply from waste resources.

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- CTCN contact details:

CTCN Secretariat  
UN City, Marmorvej 51,  
DK-2100 Copenhagen, Denmark  
+45 4533 5372  
[www.ctc-n.org](http://www.ctc-n.org)  
[ctcn@unep.org](mailto:ctcn@unep.org)

- CTCN Facebook
- CTCN Twitter
- UNEP, UNFCCC, UNIDO



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