

Feasibility study to use waste as fuel for cement factories

Executive summary of conclusions and recommendations on utilization of MSW for RDF production for the cement industry in Mozambique

Reference number: 2015-036/MOZ-01

Technical feasibility:

It is technically feasible to produce a medium - quality refused derived fuel (RDF) from the unsorted MSW generated in Maputo (Cidade de Cimento). Although, the final RDF will not be able to meet the calorific requirements needed to be used in the processes by the cement industry in Mozambique.

If the calorific requirements for RDF from the cement producer Cimentos De Mocambique (CdM) were to change to accept medium quality RDF with a calorific value of 15,574 KJ/Kg, the process of Mechanical-biological stabilisation (MBS) or biological drying could be used to produce RDF from unsorted municipal solid waste (MSW). The emission reductions from fossil fuel replacement could range from 4.69 tCO₂e/year by the start of the use of RDF, to 4.99 tCO₂e/year by 2040. Emissions avoided from landfilling would give higher greenhouse gas (GHG) mitigation results, achieving 22,974 tCO₂e/year by 2040. The total avoided emissions would therefore be in the range of only 5 tCO₂e/year the first year, and achieve 22,979 tCO₂e/year by 2040.

The establishment of the planned landfill in the area of Matola, including a recycling centre could provide future possibilities for the utilization of separated waste streams. Especially the plastic fraction might become a suitable fuel substitution in the cement production, given the high calorific value requirements set by CdM. Although, current uncertainties regarding the future of the recycling centre and expected amounts of the recycled plastic fraction doesn't make it possible to establish the appropriateness of future utilization of the plastic fraction for RDF.

Financial feasibility:

The use of MSW for RDF production would not be economically feasible, even if the cement industry would lower their calorific requirements for RDF to 15,574 KJ/Kg. The sale of RDF produced would not be able to provide enough revenues, as RDF would have to compete

with natural gas prices, currently the main fuel utilized by CdM. The NPV (after taxes and debt services) of an RDF facility for unsorted MSW is estimated at -8,590,795 USD.

The economy of a RDF plant could be improved if the Mozambican authorities started introducing a gate fee/waste handling tariff for waste disposal, thus providing a potential additional revenue stream for the production of RDF. Another important aspect is that the current expected debt finance provider (the Bank of Mozambique) offers very high interest rates. Partnering up with alternative financing institutions like development banks or climate finance providers (e.g. the Green Climate Fund) could provide more favourable interest rates, thus improving the economic performance of an RDF production facility.

Redirecting the focus of the project to another MSW treatment options and/or their combination with RDF would allow the project to have different sources of revenues, probably with better prices than the RDF price (or natural gas price) and more developed markets. For instance: recyclable materials (plastic, metal, glass, etc.), compost, electricity, heat recovery, etc. For instance the cost of electricity for large consumers in Mozambique is around 0.04 USD/kWh (0.011 USD/MJ), higher than the highest price achievable for RDF (0.002944 USD/MJ).

Legal and regulatory feasibility:

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 existing legislation addresses waste to energy only superficially, but the existing principles on waste management are compatible with processing MSW in RDF to be used by the cement industry.

Specific goals targeting GHG 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.

Mozambique's Policy on the Development of New and Renewable Energy (Resolution 62/2009, 14 October) promotes greater access to clean energy services. However, energy from waste is not classified in the current legislation as an energy source. Renewable energy policies in Mozambique should consider including waste as a suitable energy resource, this would allow waste to energy projects to access financial instruments considered in the law for renewable energy projects, such as investment incentives (grants or loans), possible release of taxes, access to the electricity grid, and access to competitive electricity tariffs.

Waste to energy 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 first 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 further stimulate 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 frameworks in Mozambique should aim at including mechanisms that can improve the economic performance of RDF projects and discourage unsustainable waste practices. This could be done through the establishment of more appropriate waste fees, higher landfilling taxes and an efficient enforcement mechanism, aimed to lead industrial and commercial waste generators to choose alternative waste treatments, such as RDF plants. Further measures that may be considered are subsidies or loan programs for RDF projects with special loan conditions, support of Public-Private-Partnerships, facilitating tender procedures, legal instruments to ensure waste availability (goals of waste collection and improvement of waste collection rates).

There is a strong need to including concrete measures to support and strengthen social sustainability and inclusion, particularly with regard to the incorporation of informal sector waste workers into formal waste activities. This would increase the acceptance and support of these stakeholders to RDF projects, instead of considering them as a competition for waste resources.