

# Benefiting from biomass waste in energy production in Libya

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**Abstract-** Libya is one of the world's oil-producing countries and owns the world's eighth oil reserves. This situation has led to rapid growth in the country's electricity demand and municipal solid waste generation (MSW). The project proposes a brilliant plan for the use of renewable energy, including waste-to-energy facilities (WTE). This research assesses the potential contribution of WTE facilities to the peak energy demand in Libya until 2030, based on two scenarios: mass incineration and mass combustion with recycling of the whole nation and for six urban areas in the Libya. The analysis shows the possibility of producing about 197 MW (MW) based on the overall incineration scenario and about 57 MW on a mass burn basis with a recycling scenario. These values amount to about 0.82% and 0.24% of the expected 2030 peak electricity demand of 24.1 Gigawatt. The expected results for each of the scenarios can be used to design future WTE facilities in the major cities of Libya. It is recommended that further investigations be conducted to assess the scenarios based on financial, social, technical and environmental standards.

## I. INTRODUCTION

It is the responsibility of the municipalities to handle the waste issues [1]. However, their financing and technical capabilities are limited [2]. Metropolitan municipalities have a higher budget and better access to funds than smaller municipalities. The interest of the private sector in waste projects is increasing, because of the incentives available to the sector. Collection of waste and operation of landfills by private sector is possible on basis of a concession given by the municipality. Some companies are focusing on the rehabilitation of old dumpsites due to their potential for energy recovery from landfill gas . The amount of electricity generated and sold to the grid is a major source of income and the projects' cash flow [4]. There is also growing interest in establishing new sanitary landfills in an integrated waste management format, where recycling, composting, energy recovery are all possible. Companies active in this field are interested in developing of lower income countries. Globally, solid waste management costs will increase from today's annual \$206 billion to about \$376 billion in 2025. Cost increases will be most severe in low

income countries and lower-middle income countries. The global impacts of solid waste are growing fast . Solid waste is a large source of methane, a powerful GHG that is particularly impactful in the short-term The recycling industry, with more than two million informal waste pickers, is now a global business with international markets and extensive supply and transportation networks. Locally, uncollected solid waste contributes to flooding, air pollution, and public health impacts such as respiratory ailments, diarrhea and dengue municipalities or other local authorities. These wastes are generally in either a solid or a semi-solid form. They can be classified as biodegradable wastes that

## II. THE PROBLEM OF SOLID WASTE IS EXACERBATING IN MOST CITIES IN LIBYA

Solid waste problems have aggravated at the entrances to Libya's cities and their main and subsidiary streets and within residential neighborhoods. These wastes are distributed among urban household, construction and commercial waste and other hazardous industrial, agricultural, medical and radiological waste. Some of the reason is due to the lack of advanced means to dispose of piles of solid garbage resulting from the daily activities of humans. Shows figure 1. Garbage accumulation pollutes the air of the Libyan capital[3].

Data on official estimates of waste quantities are only available in the capital, Tripoli, and the[4] most populous city of Benghazi.



**Figure 1. Garbage accumulation pollutes the air of the Libyan capital.**

### III. WASTE TREATMENT PROJECT

He suggested that special projects for waste treatment and recycling be adopted, which would save the state a lot of money, in addition to making use of raw materials that were processed in various industries, thus reducing the spread of garbage and reducing environmental pollution resulting from burning and the diseases that result from it.

### IV. CHOOSING THE BEST METHOD FOR SOLID WASTE MANAGEMENT

The public cleaning services company uses a number of cars with a load

Different types of solid waste transportation from different parts of the city by a number of

Small compactors with an average tonnage of 3 tons to collect Waste from collection centers and is characterized by ease of movement and transfer between

City streets, and their cargo is unloaded in the interim landfill. exist

In the landfill are trucks with a larger tonnage capacity of 6 tons and the other 8

tons, and through bulldozers, these trucks are filled with solid waste

To be transported and deported m, but as a result of the increase in the quantities of waste

The solid, which is about 450 tons/day for the city, is no longer there

For the factory to absorb these quantities, because the factory was not modernized, and its need for maintenance [5].

In placing weights, the opinion of experts is taken into account academics, and decision-makers to reach homogeneous judgments and logical [6].

### V. WTE PRODUCTION FORECAST

The population and MSW forecast results were used to estimate the WTE production potential in the Libya. The WTE production potentials were calculated for the two scenarios. The Mass Burn with recycling scenario forecasting results are presented in Figure 5. The figure shows a potential to produce about 57 Megawatt (MW) of electricity from MSW by the year 2030. This value forms about 0.14% of the 24.1 GW peak electricity demand in 2030. City potential production results show that Tripoli city has the largest potential of 9MW and the minimum potential is for Sirt City at about 1 MW by the year 2030. The figure shows the potential to produce about 197 Megawatt (MW) of electricity from MSW by the year 2030. This value forms about 1.73% of the 24.1 GW peak electricity demand for that terminal the forecast results for the six cities apropos the two scenarios cities of the Libya. There is substantial difference between the potential energy productions of the two scenarios.. Further investigations are recommended to compare the two scenarios with reference to financial, social, technical, and environmental criteria. The decision to select between the two scenarios is crucial and should be taken at a political level based on the results of intensive research.

### VI. CONCLUSION

Exploitation of solid waste recycling method as a raw material to restore its industrial cycle, it is new in the industry and has several advantages environmental protection, including the preservation of natural resources, including trees and forests, as well as for this method, Joanna.Reduction in the proportion of water. Also, I saw a lot of positivity Experts and specialists and preferring them to others in terms of waste management alternatives.

Solid, when used, does not produce harmful oxides, nor noise.

Therefore, it is environmentally friendly. This is an economical piece of cake that makes it an economical choice

It is preferred, as it is not expensive to use, and it does not need advanced technology .It provides employment opportunities for society, and it has great economic impact on society and the state. The alternative of recycling when using it works on reducing its volume. and quantities of solid waste, and maintain the cleanliness and beauty of the environment.

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