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POLICY BRIEF ON SOLID WASTE MANAGEMENT TO ACHIEVE ENVIRONMENTAL SUSTAINABILITY IN PAKISTAN

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Abstract

This policy brief identifies opportunities in recycling urban, agrarian, and manufacturing wastes into energy, fertilizers, manures, compost, food, diet and construction building material in Pakistan. According to an estimate, country making almost 49.6 million tons of solid waste per annum, hence demanding augmented exertions for effective waste management. This brief sum up the key outcomes associated to monetary feasibility concerning waste-to-energy machined riven technologies, linked with environmentally friendly benefits ensuing from recycling options. This has enormous suggestions for policymakers related to increasing good practices in management of waste in tandem with United Nations (UN) Sustainable Development Goals (SDGs).

I. INTRODUCTION

The argue of management of waste efficiently is one of the terrific that Pakistan is at present realizing owing to fast urbanization and population proliferation. Pakistan generates around 87,000 tons of solid waste every day, and cities like Karachi generate over 16,500 tons (International Trade Administration, 2024). The present method of waste disposal, which involves burning and the use of landfills, has presented serious health and environmental problems. However, due to the adoption of sustainable trends by the global community, recycling of waste into useful resources offers a viable opportunity for generating economic and sustainable growth (Peng et al., 2023).

II. KEY FINDINGS

1. **Waste Generation and Composition:** Organic waste contributes to 30% of the total MSW in Pakistan, while yard trimmings account for a further 14%, and plastics account for 9% (International Trade Administration, 2024). This ports a large opportunity in recycling and energy recovery due to a large percentage of organic waste.

2. **Economic Feasibility:** It was observed recently that the levelized cost of waste to energy technology is competitive, having a cost of around 0.04 USD/kWh for gas from landfills and 0.07 USD/kWh for anaerobic digestion (Ighalo et al., 2022). The energy generated from these technologies can fulfill demands of a number of million people.

3. **Environment Impact:** Recycling of wastes means the production of fewer greenhouse gases, hence smaller environmental footprints from the waste management sector. An excellent example is from recycling agri-wastes to fertilizers, which helps improve soil quality and may decrease the use of chemical fertilizers (Murtaza et al., 2019).

4. **Technological Innovations:** If there is progress in waste technology, such as through anaerobic digestion and pyrolysis methods, and so forth, there would be more utilization of waste to produce energy and other useful materials (Ighalo et al., 2022).

III. The MAIN BODY

1. **Current Waste Management Scenario:** The current waste management system of Pakistan faces issues of low waste collection efficiency of 60-70% and outdated waste management technologies (Asian Development Bank, 2023). A lack of public awareness and government red tape makes it further complicated as a task of garbage management of the country.

2. **Potential for Energy Recovery:** Recycling waste to produce energy can also be a means of bridging the gap between energy demand and supply in Pakistan. For example, methane gas from landfill sites can be used to produce enough electricity to light millions of houses if properly utilized (Kaza et al., 2018).

3. **Fertilizer Production:** Organic fertilizers of higher grades can be produced using agricultural and food waste. Such productions not only reduce the amount of waste in landfills, they also encourage sustainable agriculture practices due to enhanced fertility of the soils (Murtaza et al., 2019).

4. **Construction Materials:** Recycling the waste generated from the construction and demolition industry provides the construction sector with alternative material, hence reducing the dependence on natural material, hence sustainable construction practices (Iqbal and Baig, 2016).

IV. POLICY IMPLICATIONS

This shows that there is a need for more robust policies and regulations to support and improve recycling of wastes. These policies and regulations are inadequate in encouraging innovation and investments in waste infrastructure (Kaza et al. 2018).

Recycling Schemes for Waste in Pakistan – Recognition Drive

In order to increase public awareness, it would be necessary to promote a recycling culture. Implementation of the following strategies might be beneficial in this regard.

1. **Educational Campaigns:** There could also be extensive educational campaigns conducted at community centers and college levels that could bring awareness about the management of waste. There could also be educational campaigns conducted within schools that could bring a sense of responsibility among the students, and thus the advantage would also be brought forward for the individuals (Bano et al., 2024).

2. **Community Engagement Programs**
Community engagement programs such as workshops, waste sorting, and cleaning activities can be implemented to engage the community in order to take the community along on how they can actively involve themselves in awareness campaigns for proper waste management. In this way, reducing waste can also be addressed, along with the importance of the community gathering for awareness (Pakistan Today, 2024).

3. **Utilization of Media and Technology**
The usage of social networks, TV, and radio communications could greatly help in spreading awareness regarding the significance of recycling and waste management. Such thoughtful efforts can help in creating awareness about the benefits associated with recycling, and how some successful initiatives related to these aspects can become a source of motivation for people in this regard (Ahmad et al., 2025).

4. **Public-Private Cooperations:** The collaboration of public institutions, NGOs, and the private sectors is likely to bring efficiency and effectiveness to the dissemination of public awareness campaigns. The campaigns together enable the pooling of funds,

hence educating people effectively (SWITCH-Asia, 2024).

5. **Motivators of Participation:** The provision of rewards to people participating in recycling initiatives can be a big motivator for people to take part. For example, provision of incentives such as discounts on utility bills or rewards to business people who embrace a green program can serve as a motivating factor (Meraj et al., 2024).

6. **Segmented Messaging:** Awareness messages could be tailored to demographics such as age, income level, or educational attainment. Since the target population for these campaigns can be known, designing the message has the ability to appeal to them (Jevric and Cipranic, 2023).

7. **Success Stories Featuring:** Featuring success stories on recycling – that is, waste recycling and management – could be a way of motivating others to practice the same. Mentioning the individuals or communities that have succeeded in recycling could be a very effective motivating factor (Pakistan Today, 2024).

8. **Government Initiatives and Regulation:** The Government authorities should test their ingenuity in encouraging waste management through strict legislation and effective policies. To devise a configuration for public engagement in the process, they might enforce the necessary legislation and regulations related to the separation and recycling of waste (SWITCH-Asia, 2024).

9. **Continuous Feedback and Improvement:** The incorporation of avenues for the engagement of public participation in the management of waste steps and initiatives may help in identifying areas, as well as the need for improvement and adjustment of strategies based on local needs. The engagement of people in the communities in the negotiation process of waste disposal may help in enhancing commitment and inducing the feeling of responsibility and duty (Ahmad et al., 2025).

10. **Inference:** To create awareness regarding the recycling of waste among communities of peoples, there is a need for an inclusive strategy and approach that requires assistance from the government, print and social media, as well as educational programs in Pakistan.

The use of these strategies could pave the way for the system at Pakistan to encourage a recycling culture that fits the sustainable development goals of the United Nations and speaks of confronting demands for waste management.



Fig. 1: Recycling Metropolitan, Farming, and Industrial Waste Materials into Energy Source, Fertilizers Manures, Feed, and Building Supplies to UN SDGs in Pakistan

V. POLICY RECOMMENDATIONS

1. **Frame Comprehensive Waste Management Policies:** Recycling and waste to energy initiatives complement the attainment of the UN SDGs by a great proportion. All of the above measures should be incorporated within the macro-economic initiatives to ensure a holistic management approach for the sustainability of resources.

2. **Public-Private Corporations:** In order for both preparatory work in the management of waste and technological development to be further enhanced, it is necessary that the corporations between the public and private sectors are established and promoted as well.

3. **Public Awareness Creation:** Carrying out educational programming is an awareness stage for the quantity of benefits that are available through recycling, along with promotion of proper methods of waste disposal is critical to raising effective practice (International Trade Administration, 2024).

4. **Funding R&D:** Encourage the development of research-based projects focusing on feasible practices and creative waste management technology.

5. **Align with UN Sustainable Development Goals:** The waste management strategies ought to take a vital role in pursuing the goals of the UN-SDGs, particularly the challenges facing the climate change, promoting the use of renewable energies, and enhancing the consumption level.

VI. CONCLUSION

In light of the aspects and challenges in managing waste in Pakistan, recycling of such waste in sectors such as industry and agriculture, as well as in municipal areas, to produce valuable energy resources, appropriate fertilizer, productive food, and building materials, is an extremely feasible way to proceed. With the help of proper legislation and technology, Pakistan has all it takes to improve and optimize processes in handling and managing their waste. Public and corporate collaboration is required to collectively find appropriate solutions.

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