

HACKATHON
MSME IDEA HACKATHON 4.0

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Reference No. :- INC24DWB052148

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1. HI/BI State	WEST BENGAL
1. HI/BI Name	Haldia Institute of Technology
1. Problem Statements	Sustainable Development
1. Idea Sector	Miscellaneous Sector (Environment, Forests, Water & Sanitation; Foods, Beverages, FMCG, Consumer Goods; Infrastructure, Construction, Housing; IT, ITES, Electronics, White Goods, Telecommunication; Metals, Engineering, Machinery, Automation and Transportation, Automotive, E Vehicles, Railways, Aviation, UAV and any other sub-sector)
1. Title of proposed idea/innovation	Floating dome bio-digester for production of biogas and bio-fertilizer with wind powered agitator
9. Briefly explain newness/uniqueness of the innovation	A biogas digester is essentially one of the most attractive substitutes for managing kitchen waste and producing bioenergy for use as a source of energy in a variety of applications. A methane-rich biogas which is utilized as a cooking energy source, produced by anaerobic digestion of biodegradable household garbage using small-scale biogas device called domestic portable biogas digester. Moreover, it also becomes less necessary to use LPG gas for cooking when kitchen garbage is valued as fuel resource. Water jacket floating dome model with wind-powered agitator will be adapted for design of bio-digester in this proposal. Stirring of substrate inside digester could enhance the production rate of biogas, thus in this proposal, attempt will be made to introduce stirring arrangement. In the proposed model, wind powered stirring arrangement will be fixed to make the system completely eco-friendly. For the design of proposed model, small vertical axis wind turbine will be attached in agitator system for stirring purpose, so that the digestion of biodegradable waste can be enhanced to produce large amount of biogas. A level indicator will also be introduced to check maximum allowable level of substrate as well as to examine dilution level visually. There will be a drainage line to discharge the digested manure for use as bio-fertilizer. The proposal examined methods for purifying digester raw biogas using an extra gas purification unit.

10. Concept & Objective	The increasing need for energy, rising costs associated with fossil fuels, and greenhouse gas emissions contributing to global warming have focused our attention on finding innovative ways to meet our needs for energy supply, including preparing food. Domestic kitchen wastes can be converted into fuel instead of disposal in other waste management practices resulting reduction of load in MSW. By using biogas to meet energy needs for cooking, costs associated with using LPG cylinders can be decreased. Thus, the nations economy can benefit from this technology. Moreover, the digestate can be used as good fertilizer. This system is designed to meet the need for bio-fertilizer as well as provide electricity. In the proposed system, there are additional unit for storage of digestate manure to open up provisions for blending of additives for making balanced bio-fertilizer. The produced biogas is treated through gas purification unit to remove carbon dioxide, moisture and other impurities to achieve higher calorific value of methane rich biogas. A financially viable portable biodigester with applications in both domestic and commercial settings is a viable business venture. This sustainable business plan by new start-ups can address the problems with fossil fuel-related environmental damage and waste management practices.
11. Specify the potential areas of application in industry/market in brief	The proposed biodigester has a wide range of applications in the home, business, and industrial sectors. There will be a closed chamber type system for the biodigester. The water jacket floating dome biodigester model is a completely leak-proof, safe, and high-performing appliance that may be used in rural homes for cooking and in communal kitchens in urban areas. Large amounts of food waste and kitchen garbage are produced in cities by hotels, restaurants, hospitals and other commercial buildings. Therefore, these communities can install biodigester at their premises to obtain biogas-based energy mainly for cooking food. The utilization of biodegradable wastes as feedstock for generation of bioenergy has captured the great potential in market.
12. Briefly provide the market potential of idea/innovation	The rise of biogas plants installed in India is roughly from 26 to 37 between 2002 and 2012. In India, there are 4.957 million installed biogas plants as of 2018. About 56 plants, primarily situated in the states of Kerala, Karnataka, and Maharashtra, generate electricity from biogas. Compared to potential of biogas in India at about 30–50 billion m³/year, current production lies just over 2 billion m³/year which is relatively very less. In India alone, 9.1 billion m³/year of biogas potential is estimated by the year 2030 from organic household wastes. Upon the usage of 8 kg kitchen waste in 0.018 m³ volume, the biogas plant generated 0.25 m³ of biogas during the retention period of 15 days. The produced amount of biogas was equivalent to 0.13 kg of diesel, kerosene, and 0.18 kg of coal. A study performed on usage of kitchen waste in reducing the application of LPG cylinders and reported that 200 kg of food waste in college premises can replace 329 LPG cylinders for 250 working days in a year. In the proposed biogas plant, there are considerable amount of digestate collected which will provide the vast market demand for bio-fertilizer in home gardening.
13. Uploaded Proposal	View/Download