

Waste to Energy Market Assessment, By Waste Type [Municipal Waste, Agriculture Waste, Others], By Technology [Direct Combustion, Mechanical and Thermal, Thermo-Chemical, Biomechanical], By Region, Opportunities and Forecast, 2018-2032F

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Report description:

Global Waste to energy market is projected to witness a CAGR of 7.70% during the forecast period 2025-2032, growing from USD 40.04 billion in 2024 to USD 72.48 billion in 2032. The market has experienced significant growth in recent years and is expected to maintain a strong pace of expansion in the coming years.

With the increased generation of waste and rising environmental concerns, there is a significant demand for waste to energy (WTE) facilities, driving the growth of the waste energy market. WTE technologies primarily ensure renewable energy generation from municipal solid wastes, reduce reliance on landfill sites, and decrease greenhouse gas emissions. Additionally, government incentives and regulations drive investments in WTE infrastructure, supporting the implementation of a circular economy and amplifying market growth.

Asia-Pacific is considered one of the prominent markets as China, Japan, and India heavily invest in technological advancements for waste-to-energy (WTE) facilities, which contribute to sustainable growth and meet energy requirements.

For instance, in January 2023, ABB Ltd. announced that it is aiding the technological advancement in waste to energy conversion by supplying high-efficiency variable-speed drives to a new waste to energy treatment facility of Beijing Enterprises Environment Group Limited (BEEGL) in Zhangjiagang, Jiangsu province, China. The installation will mitigate over 300,000 tons of carbon dioxide emissions for the facility annually. The plant's machinery, including draft fans, blowers, and circulating water pumps, relies on electric motors. These motors significantly improve energy efficiency coupled with variable speed drives, thus facilitating the growth of clean energy sources.

Rise in the Number of Waste to Energy Projects is Fueling the Market Expedition

The waste to energy projects are in high demand as waste generation has been increasing continuously, leading to a rise in the

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need for clean energy sources. The WTE facilities transform non-recyclable wastes into electricity, which diminishes the emission of greenhouse gases to a large extent. Moreover, the facilities reduce the environmental issues related to conventional waste disposal methods, including methane emissions from the landfills. WTE projects are very important to promoting the circular economy and can cater to both developed and underdeveloped countries to provide solutions that support waste-to-energy conversion in growing markets.

For instance, in January 2022, Doosan Lentjes, which is a subsidiary of Doosan Heavy Industries & Construction, reported that it had received the Notice to Proceed (NTP) on the construction of the USD 113.74 million Wiesbaden Waste-to-Energy plant. The plant will treat about 600 tons of municipal waste per day to generate electricity of 22 MW together with 40 MW of district heating. This will play a massive role in increasing social awareness of waste-to-energy conversion. In addition, the project is based on sustainable waste management combined with energy recovery. Therefore, the WTE project will enhance the sustainability targets by reducing fossil fuel reliance and reducing harmful CO2 emissions to a great extent.

Rise in Need for the Conversion of Food Waste into Renewable Energy Spearheads Market Growth

WTE plants play a pivotal role in converting organic waste (food waste) into renewable energy by anaerobic digestion. Anaerobic digestion is a process in which microorganisms decompose organic matter in an oxygen-free environment to produce renewable gases. By harnessing this renewable gas, electricity can be suitably generated by minimizing landfill waste. Hence, it can be delineated that WTE plants recover valuable resources, generate renewable energy, and are conducive to the sustainable management of waste. This, in turn, supports recycling management principles that meet energy needs and help to address environmental concerns, thereby driving the market prosperity.

For instance, in December 2023, Captona, RNG Energy Solutions, and South Jersey Industries (SJI) formed an alliance for the construction of one of the biggest food waste-to-renewable natural gas (RNG) facilities in the United States. The project, situated at Linden, New Jersey, will convert up to 1,475 tons of organic waste into 3,783 MMBtu/day of RNG by using anaerobic digestion technology. The RNG facility will reduce the high emission rates of greenhouse gases and offer sustainable means of managing organic waste and replacing fossil fuels, which in turn will fuel market growth.

Pyrolysis Technology is Playing a Vital Role in Market Expedition

Pyrolysis is the process of converting waste to energy through thermal decomposition in the absence of oxygen. The demand for pyrolysis is increasing because the process converts waste, such as plastics, into syngas, biochar, and bio-oil. The technology enables the production of renewable fuels and chemicals for sustainable waste management practices. Moreover, pyrolysis is one of the most innovative energy security and environmental protection solutions. This, in turn, plays a huge role in overcoming the various challenges related to waste recycling, thereby augmenting the market growth. Furthermore, organizations across the globe are focusing on establishing pyrolysis plants for the economic benefits of waste recycling.

For instance, in September 2022, Henan Doing Company signed an agreement with a major environmental protection technology company in Shanxi Province for a turnkey project focused on the pyrolysis of waste tires, with an annual waste processing capacity of 20,000 tons. The project is situated at Linfen, Shanxi, China. Henan Doing took the responsibility of constructing the entire project and also provided a complete set of equipment for a 50 tons/day continuous pyrolysis production line. This marked a pivotal move in the recycling of solid waste in China's Shanxi Province.

Government Initiatives Acting as a Catalyst

Government policies drive the growth of WTE plants worldwide through numerous programs and financial incentives. Government policies are the backbone of waste management services and support a stable economic infrastructure. Subsidies include grants, tax credits, and low interest rates for the project developers while saving the high initial cost associated with WTE technologies. The policies also allow funding to establish more WTE facilities that turn waste into renewable energy, effectively managing waste and controlling greenhouse gas emissions. Moreover, the initiatives are essential to advance sustainable energy solutions and achieve environmental objectives globally, hence driving market growth.

For instance, in June 2022, the Regional Centre for Urban & Environmental Studies (RCUES) at Lucknow prepared and submitted a Techno-Economic Feasibility Report to the Municipal Corporation of Delhi (MCD) for advising on the feasibility of establishing a Waste to Energy Facility at Narela-Bawana. This integrated report presents guidelines for solid waste management, principles for processing, an assessment of the current solid waste management practices in MCD, a proposed project plan, cost estimates, project structuring, and financial feasibility analysis to be aimed at achieving an enhancement of efficiency and sustainability in

managing waste in the region.

Asia-Pacific is the Fastest Growing Region in All Aspects

Asia-Pacific has significantly led market growth and is expected to continue its dominance in the coming years. China plays the most vital role in this leadership, as the country has the largest installed capacity for waste to energy generation. Moreover, China is currently focusing on processing municipal solid wastes into clean energy via WTE plants, propelling the market growth. For instance, in October 2024, to support effective municipal solid waste management and waste-to-energy facilities in the People's Republic of China (PRC), and the Asian Development Bank (ADB) signed a USD 50 million loan with Canvest Environmental Protection Group Company Limited. Under the ADB loan, Canvest will develop, construct, and operate a WTE plant at Huizhou City in Guangdong province of China and expand its municipal solid waste management services in Quyang County in Hebei province, China. Moreover, PRC is one of the world's biggest generators of municipal solid waste, with an overall volume of 244 million tons of MSW in 2022, projected to reach 332.4 million tons annually by 2025. The project's WTE plant can convert nearly 300,000 tons of municipal solid waste into clean energy yearly, thereby generating at least 93 gigawatt-hours of energy/year, which in turn aids the market growth extensively.

Future Market Scenario (2025 – 2032F)

Waste to energy facilities have emerged as a necessary tool in the transformation of municipal solid wastes into usable energies and therefore a reduction in fossil fuel usage. This synergy in solving waste management problems and renewable energy generation makes waste-to-energy an inevitable part of the future energy landscape.

The three technologies regarding pyrolysis, gasification, and incineration hold great importance towards the future of waste-to-energy conversion and offer efficient ways to handle wastes while producing renewable energy.

The rise in investments by worldwide governments in the development of new WTE facilities is accelerating market growth, which in turn will create ample opportunities for market expansion in the future.

Key Players Landscape and Outlook

Market players in the waste to energy sector are engaged in intense competition to gain a significant advantage. Companies heavily invest in technological upgrades and forming strategic alliances to optimize networks and implement cost-cutting measures. The competitive landscape fosters continuous improvement and innovation, enabling firms to effectively meet the rising demand for sustainable energy solutions while maximizing the efficiency of waste-to-energy facilities. As a result, businesses worldwide are better positioned to adapt to evolving market needs and enhance their operational capabilities in the renewable energy sector.

For instance, in June 2024, ABB Ltd. announced that it had upgraded the distributed control system (DCS) of ARN BV Nijmegen's waste-to-energy plant in the Netherlands with ABB Ability System 800xA version 6.1.1. to increase the plant's productivity. The WTE plant processes wastes of around 300,000 tons per year and produces about 150,000 MWh of electricity fed into the grid. Production plants play an important role in the circular economy of the Netherlands and Europe, thereby converting residual waste into energy, fertilizers, and reusable materials, facilitating market growth.

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