

TURNING TRASH INTO TREASURE, CHINA'S GREEN CITY GETS GREENER WITH GRUNDFOS SOLUTIONS



Zhengzhou, also known as the 'Green City', is a metropolis in central China that serves as an integrated transportation hub for its neighbouring cities. With a high green coverage rate of more than 35% in the city centre, Zhengzhou is also ranked as one of China's National Forest Cities. In the 'Chinese City Competitiveness Report 2020' released last October by the Chinese Academy of Social Sciences, Zhengzhou was ranked among the top 20 for the first time. With urban development advancing at a rapid pace, as of 2019, the population of Zhengzhou has exceeded 10 million people. It is expected that this number will exceed 18 million by 2030.

With rapid population growth and urbanisation, waste generation and management are increasingly becoming key issues. China started off late in developing its waste management industry. In the past, waste has always been deemed as a 'ticking timebomb' in people's lives and for the overall environment. However, with advances in technology, China's waste management industry has seen substantial growth in recent years, turning waste into one of the most underestimated urban resources of great potential.

WASTE MANAGEMENT: REALITIES ON THE GROUND AND ITS CHALLENGES

In the past, China's waste management system consisted of landfill and composting. This took up limited land resources and was deemed unsustainable. It was reported that China's largest landfill site, which spanned approximately 100 football fields, closed on February 27, 2020. It was originally designed to have a daily capacity of 2,600 tons and was expected to last for 50 years. Yet, urbanisation and population growth meant that the landfill had reached its full capacity in less than 25 years.

In addition to space constraints, landfill sites also have serious environmental implications. The odour from these landfill sites has severely affected local residents, bringing unwanted mosquitos and flies. The large quantities of waste also produce highly corrosive leachate, which can bring severe environmental damage through pollution if not treated properly.

There are currently more than 2,000 licensed landfill sites operating in China, most of which are facing an overcapacity problem. Since the release of the Renewable Energy Law in 2005, the government has been introducing new regulations to encourage the research, development and use of waste incineration technologies in China. It also promotes waste incineration plants in cities with limited land resources. As such, many regions have started building waste incineration power plants.

SAFE AND EFFICIENT WASTE INCINERATION SOLUTIONS

At present, the domestic waste production from Zhengzhou's main city area is at around 8,000 tons per day, meaning that the city's waste treatment facility is constantly running at an overload capacity. As a result, the Zhengzhou municipal government began planning for a waste incineration power plant project.

The Zhengzhou (Eastern) Environmental Protection Project, put into operation in 2019, is now central China's biggest waste incineration power plant project. It also ranks in the top 10 waste incineration power plants in China. Spanning 232 acres of land, the power plant has had a total investment of 2.1 billion yuan, with a designed daily capacity of 4,200 tons to help effectively reduce the volume of waste by at least 85%.

Grundfos provided a comprehensive set of water solutions for the project, including landfill leachate treatment, heat exchange pumps in power generation and heating sections, as well as rainwater collection, firefighting and sewage treatment in the park.



Before incineration, the waste goes through composting for five days to a week, during which time the solid waste will be mixed evenly. The Zhengzhou (Eastern) Waste Incineration Power Plant has a storage space of 32,000 cubic metres, which can supply waste to six furnaces for seven days. The leachate produced during the composting phase is treated with Grundfos' industrial solutions. Cao Donghui, who is in charge of the operations at the Landfill Leachate Unit of Zhengzhou Public Utility Investment Development Group, said, "Tackling landfill leachate is the first step to ensuring safe operations in a waste incineration power plant. Using Grundfos' solutions, we are able to achieve a leachate treatment rate of more than 95%, which is the highest in the industry."

Unlike traditional industrial parks, leachate can easily mix into the wastewater stream during the transportation and loading of waste in the incineration plant. This mixed sewage is corrosive to the cast iron impeller inside normal pumps. To address this, Grundfos provided specially made stainless steel impellers to replace the original impellers. Cao Donghui continued, "We wanted reliable, efficient and energy-saving pump solutions with professional and timely service when we were planning the construction of the plant. Having chosen to work with Grundfos, they were able to identify our needs and provide us with a customised solution to address the issue of corrosion. Grundfos' solutions were able to address the pain points we were facing and ensured the safe and reliable operations of our plant."



TURNING TRASH TO TREASURE, PROVIDING POWER AND HEAT TO LOCAL RESIDENTS

To date, the waste incineration power plant in eastern Zhengzhou has been operating for more than a year. It has become a benchmark for similar projects in central China and beyond. The power plant mainly manages the domestic waste from four major areas in Zhengzhou. Namely, Jinshui, Guancheng, Erqi and the Hangkonggang area. In addition, it manages all domestic waste from the Economic Development Zone, East Zhengzhou New Zone and Zhongmou County, all of which make up around 60% of the total domestic waste in Zhengzhou. Through incineration, the total volume of the garbage is reduced by 85%. This in turn frees up land resources and lowers the environmental impact from leachate.

In addition, power generated through incineration allows the further reuse of waste resources, which can be very substantial. It is estimated that the six furnaces with a capacity of 700 tons of waste every day and three 30MW turbine generators can help generate a total of 400 million kW of power every year, which is equivalent to 250 million yuan in electricity bills. The residual ashes can also be made into construction bricks.

In addition to power generation, the steam from the heating section can be tapped into the local thermal grid, supplying heat to a space of more than 1.6 million square metres, amounting to 750,000 GJ of heat.

The waste incineration power plant has been widely recognised by local residents. One resident living near an old landfill site said, “I couldn’t open my windows during the summer because of the odour, but with the new incineration power plant, the waste can be reused while the harmful emissions are treated. It helps lower the impact to the land and contributes to a greener environment.”

The Zhengzhou (Eastern) Environmental Protection Power Project has become a leading example and educational centre for resource reuse and environmental protection. Cao Donghui said, “The reliable operation of Grundfos’ solutions established a solid foundation for the smooth running of the entire project and plays a key role in sustaining Zhengzhou’s environmental beauty, its crystal clear water and blue skies.”

