

Striving for Carbon Neutrality in Wastewater Treatment Plants



Background

In response to the national government's '2050 Carbon Neutral' declaration to bring greenhouse gas emissions to net zero by 2050, Miyazaki City made the 'Zero Carbon City Miyazaki' declaration in August 2021. As the first step towards achieving this, we have set an ambitious goal of reducing greenhouse gas emissions from public facilities and municipal operations by 50% (compared to FY2013 levels) by FY2030.

One major obstacle in achieving this goal is the significant power consumption of our sewerage facilities, which operate 24 hours a day. These facilities account for about 30% of municipal power consumption and emit approximately 11,000 tonnes of greenhouse gases annually.

To achieve our goal, it is essential to reduce this significant power consumption and greenhouse gas emission. To this end, a pressing task is to promote green transformation (GX) based on the two pillars of 'energy saving' (e.g. upgrading ageing equipment to high-efficiency ones) and 'energy creation' (e.g. solar power generation and converting wastewater sludge into resources).

Objectives

The Oyodo Treatment Plant in Miyazaki City was registered under the Carbon Neutral Regional Model Treatment Plant Plan by the national government in 2024. This system aims to roll out treatment plants that adopt effective decarbonisation technologies

nationwide as 'showcases', thereby driving decarbonisation across sewerage systems in general. The plan reflects the national government's goal. Therefore, we aim to transform the Oyodo Treatment Plant into an advanced decarbonisation base towards achieving a sustainable society.

Specifically, we will promote energy saving by upgrading ageing equipment, as well as promote energy creation through biomass and solar power generation. Furthermore, by converting all generated wastewater sludge, which has previously been incinerated, into resources, we will achieve a significant reduction in greenhouse gas emissions while also contributing to the formation of a resource-circulating society.

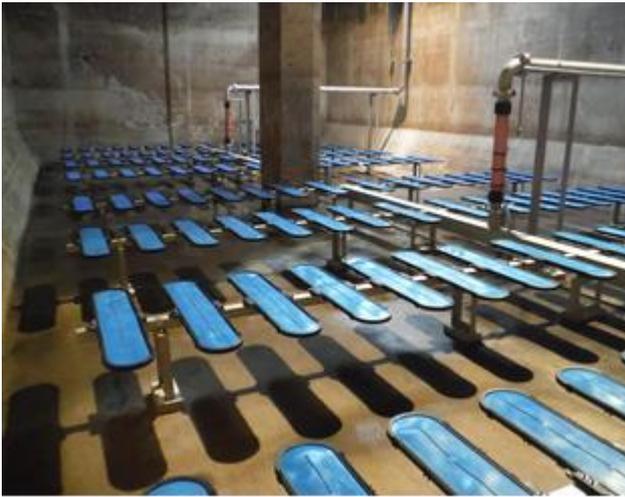
Project Outline

To achieve the aforementioned goal, we are implementing the following four initiatives from FY2024 through FY2029 under this project:

- 1. Introduction of energy-saving technology:** We will upgrade ageing pumps and other facilities to high-efficiency equipment to maximise energy conservation.
- 2. Receiving and utilising local biomass:** We will increase biogas generation by receiving human waste and septic tank sludge, thereby enhancing our energy creating capability. In addition, we will consolidate existing sludge treatment facilities to reduce power consumption.
- 3. Conversion of wastewater sludge into fertiliser**

and fuel: By replacing ageing sludge incineration facilities with sludge drying equipment, we will effectively convert wastewater sludge, which was previously disposed of, into fertiliser and fuel.

4. Adoption of renewable energy: We will introduce solar power generation equipment and EVs to promote the utilisation of renewable energy. In times of disaster, these will serve as mobile power supplies, thereby contributing to the enhancement of local disaster resilience.



Introduction of energy saving equipment (photo: diffuser (low pressure drop membrane panel type))

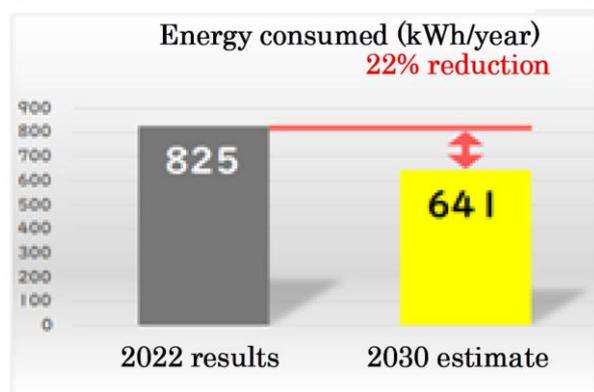
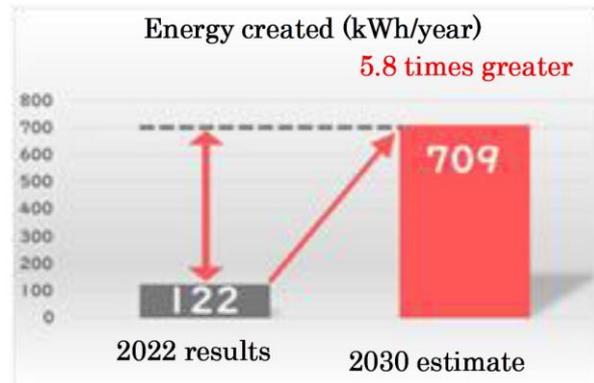


Establishment of facilities to convert wastewater sludge into fertiliser and fuel (photo: dry fertiliser)

Features and Innovations, Results of the Project

Feature 1: Become energy-positive

The greatest feature is becoming energy-positive, meaning the treatment plant creates more energy than it consumes. This will ensure the facility meets the requirements of the national government's Carbon Neutral Regional Model Treatment Plant Plan.



Feature 2: Transition to full biomass recycling

By completely discontinuing sludge incineration and converting all sludge into fertiliser and solid fuel, we will increase our biomass recycling rate from the current 42% to 100%.

Utilisation method	Present (FY2022 figures)	Target after plan completion
Fertiliser	42%	69%
Solid fuel	0%	31%
Incineration	58%	0%
Total recycling rate	42%	100%

Feature 3: Combining decarbonisation and disaster prevention

Investments in solar power generation, EVs, and other decarbonisation equipment not only contribute to reducing CO₂ emissions during normal times, but also help secure emergency power in times of disaster, thereby contributing to the

enhancement of local disaster resilience.

Issues, Problems and Responses

The primary challenge is securing funding. In order to ensure stable financial resources, we will leverage our registration under the Carbon Neutral Regional Model Treatment Plant Plan to obtain priority financial support from the national government.

Another important challenge is expanding the market for fertiliser and fuel generated from wastewater sludge. In addition to existing vendors, we will work on building ties early with related local businesses to ensure stable demand.

Future Developments (expected effects and project vision and issues)

The project's success will significantly contribute to the achievement of Miyazaki City's carbon neutrality goal. Furthermore, the project will serve as a national 'showcase' that disseminates insights and data nationwide and plays a leading role in decarbonising sewerage operations in general.

We are committed to steadily promoting these advanced initiatives towards creating a sustainable future, as well as to present a next-generation standard for sewerage operations nationwide.

Websites for Reference

https://www.mlit.go.jp/mizukokudo/sewerage/mizukokudo_sewerage_tk_000786.html

(Ministry of Land, Infrastructure, Transport and Tourism: Carbon Neutral Regional Model Treatment Plant Plan)

[Miyazaki City Waterworks and Sewerage Bureau](#)
(website for project announcements in the future)

Contact

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Meaning of Technical Terms and Coined Terms Used

- **Ingestion gas**
Flammable gas generated during the decomposition of organic matter such as wastewater sludge. Also known as biogas, it is a renewable energy source that can be used for power generation or as a heat source.
- **Low pressure drop membrane panel diffuser**
A type of air diffuser for supplying oxygen to microbes inside a wastewater treatment reaction tank. This diffuser can supply air at a lower pressure (with a lower pressure loss) than conventional equipment, which significantly reduces fan power consumption and saves energy.
- **Biomass recycling rate**
The percentage of sludge (biomass) generated in the wastewater treatment process that is utilised as fertiliser or fuel rather than being disposed of through incineration or landfilling. Our plan aims to achieve a 100% recycling rate.