

A material for vehicle fuels and town gas derived from sewage sludge

# Kobe Biogas

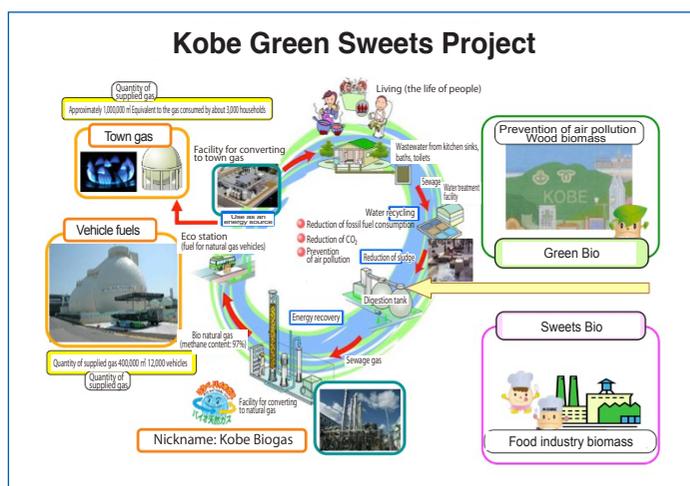
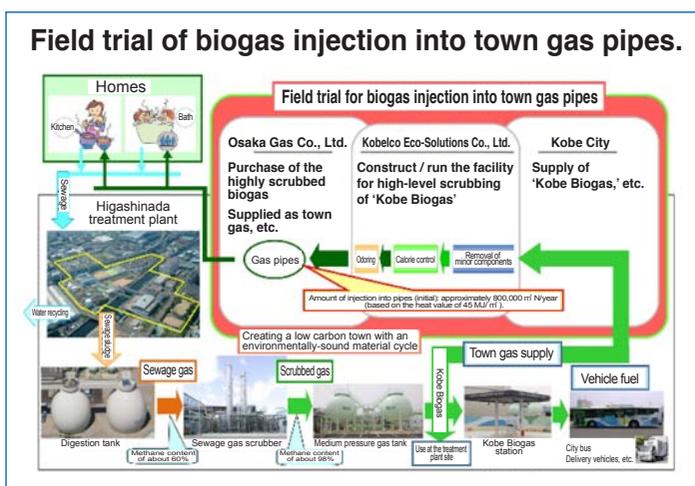
## Features

- Sewage gas with a methane content of 60% is scrubbed by pressurized water scrubbing into Kobe Biogas with a methane content of approximately 98%.
- Commercialized as a fuel for natural gas vehicles, further scrubbed for injection into town gas pipes in a field trial.
- The biomass (food industry, wood) unused in the region is added to sewage sludge in a field trial for increasing the production of Kobe Biogas.

## Overview

(Technical principles, actions, etc.)

Sewage gas is produced in the anaerobic methane fermentation process of sewage sludge in a digestion tank. The gas consists of about 60 percent methane, about 40 percent carbon dioxide (CO<sub>2</sub>), and other impurities including hydrogen sulfide. 'Kobe Biogas' is scrubbed by pressurizing the sewage gas to a pressure of about 0.9 MPa, and bringing the gas into contact with highly pressurized water to remove unnecessary CO<sub>2</sub> and other components. In 2008, Kobe City started to supply Kobe Biogas to public natural gas vehicles at the Kobe Biogas station in the Higashinada Treatment Plant. Presently, the station supplies about 12,000 vehicles with the gas (about 400,000 cubic meters of gas) per year. In 2010, the city launched a field trial of gas injection into town gas pipes. Before being injected into the town gas pipes, Kobe Biogas is further scrubbed to achieve the oxygen, CO<sub>2</sub>, and odor levels and caloric value required for town gas. Presently, the amount of injected gas is 1,000,000 cubic meters per year, the amount equivalent to that consumed by about 3,000 ordinary households. The city is also attempting to increase the production of Kobe Biogas by mixing the biomass of the region suitable for sewerage with sludge since 2012 ("the Kobe Green Sweets Project," the Breakthrough by Dynamic Approach in Sewage High Technology (B-DASH) Project administered by the Ministry of Land, Infrastructure, Transport and Tourism).



## Effects

- ◎ 'Kobe Biogas' is scrubbed by 'pressurized water scrubbing' that increases the methane content in the sewage gas and removes impurities at the same time. The 'pressurized water scrubbing' increases the methane content in the sewage gas by pressurizing the sewage gas to about 0.9 MPa and bringing the gas into contact with highly pressurized water, taking advantage of the fact that CO<sub>2</sub> and hydrogen sulfide are very soluble in water while methane is not. The method achieves a high yield and high efficiency by increasing the methane content to 97% or higher and removing impurities such as siloxane at the same time.

The method dramatically expanded the use of sewage gas, which had been scarcely used because of the low equipment availability and low maintainability due to the impurities. Using 'Kobe Biogas' as an alternative to natural gas and other fossil fuels will also reduce greenhouse gas emissions. In 2014, the CO<sub>2</sub> reduced by using the biogas as vehicle fuels and injecting it into the town gas pipes was approximately 2,800 tons.

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