

Empirical Experiment: The Cogeneration System Using the Recycled Fuel of Waste Vegetable Oil

Summary of the Report

1. Place of experiment:

Eco-Center, Ishibashi Oil, Co., Ltd., 140-2 Shimotsu-cho Cho, Kaiso-gun,
Wakayama Prefecture

2. Types of biomass/ice and snow:

Waste vegetable oil discharged from food processing centers, restaurants, ordinary households and other buildings.

3. Outline of the business:

In order to take full advantage of unused energy, we set up, in this fiscal year, a recycled fuel plant for waste vegetable oil at our Eco-Center at the aforementioned address to investigate an efficient collection of unused waste vegetable oil and as well as to perform the empirical experiment of making fuel from unused waste vegetable oil and the disposal testing of the residue and other dregs accompanied by such fuel-making. At the same time, we embarked on the development of an additional recycle fuel originating from waste vegetable oil in order to render the ratio of the waste vegetable oil 100 percent and then conducted a preliminary research on the utilization of electric-heat energy by the use of this waste vegetable oil-derived recycled fuel.

4. Details of the business and its outcome ;

1) Unused energy: Situation of unused vegetable oil;

Area covered by the collection of unused vegetable oil: Wakayama prefecture and the Sennan region

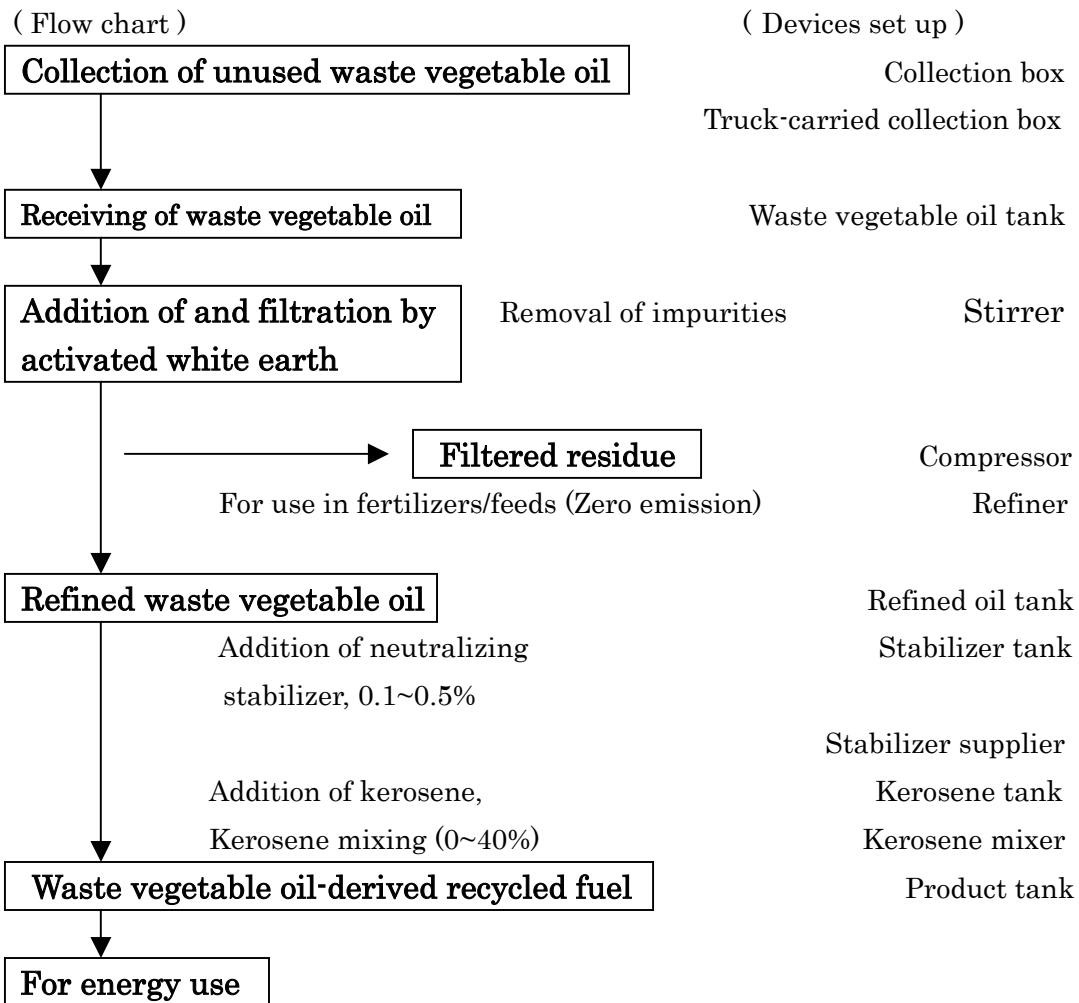
Population in the area: Approximately 1,300,000 people

Estimated quantity of waste vegetable oil: 6,000 tons/yr

Estimated quantity of unused waste vegetable oil: 3,000 tons/yr

Estimated consumption of unused waste vegetable oil: 1,050 tons/yr (daily consumption of 4 tons)

2) Empirical experiment flow chart and the devices set up;



3) Results

1. Setup of the fuel-recycling system for waste vegetable oil;

Completed the setting up of a series of the equipment/devices of the fuel-recycling system for waste vegetable oil.

2. Setup of the waste vegetable oil energy utilization system

Because there was no plan for constructing the cogeneration system using 100% waste vegetable oil-derived recycled fuel by early in January 2004, this equipment has been out of the range of the present joint-research projects although we already set up another system using waste vegetable oil energy.

3. Understanding of the user demand for waste vegetable oil-derived recycled fuel;

We understood the demand by users for waste vegetable oil-derived recycled fuel that is manufactured by the fuel-making system and provided to these users free of charge. The users are able to perform the field testing of energy usage, also

free of charge.

4. Systematic collection of waste vegetable oil;

We conducted a collection experiment by constructing a collection and accumulation system using truck-carried collectors and designating the collection sites of boxes.

5. Disposal of residue and dregs accompanied by making waste vegetable oil-derived recycled fuel;

We studied the recycling of waste activated white earth (1% yield of waste vegetable oil-derived recycled fuel) as a fertilizer for use by orange growers in our neighborhood. We decided to carry out a two-step treatment of liquid waste resulting from the cleaning of the fuel-making plant. That is to say, the oil content was collected through the oil/water separating layer, subjected to this two-step treatment after being passed through the nearby purifying tank of the service station, and released into a sewer.

6. Designing of the plant/cogeneration system for the fuel-making of waste vegetable oil;

We finished designing the plant/cogeneration system by obtaining permission from the fire station and authorities concerned.

7. Analysis of waste vegetable oil-derived recycled fuel;

We implemented in-house analysis of fuel properties in order to increase the ratio of waste vegetable oil and improve the qualities of additive and filtering materials. At the same time, we also tested prototype diesel engine running and exhausting, etc.

8. Holding the business evaluation committee;

We held the following four committees:

The first business evaluation committee: Sept. 25, 2003

The second business evaluation committee: Nov. 25, 2003

The third business evaluation committee: Jan. 29, 2004

The fourth business evaluation committee: Mar. 9, 2004

9. Final evaluation;

We made the final evaluation at the fourth business evaluation committee held on Mar. 9, 2004.

4) Start of the operation

April 1, 2004.