

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 Yoro, Kainann-shi, 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 a recycled fuel plant for waste vegetable oil at our Eco-Center in 2003 to 2004. We made use of it, and carried out 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. Research activities and result:

1) Unused energy: Situation of unused vegetable oil;

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

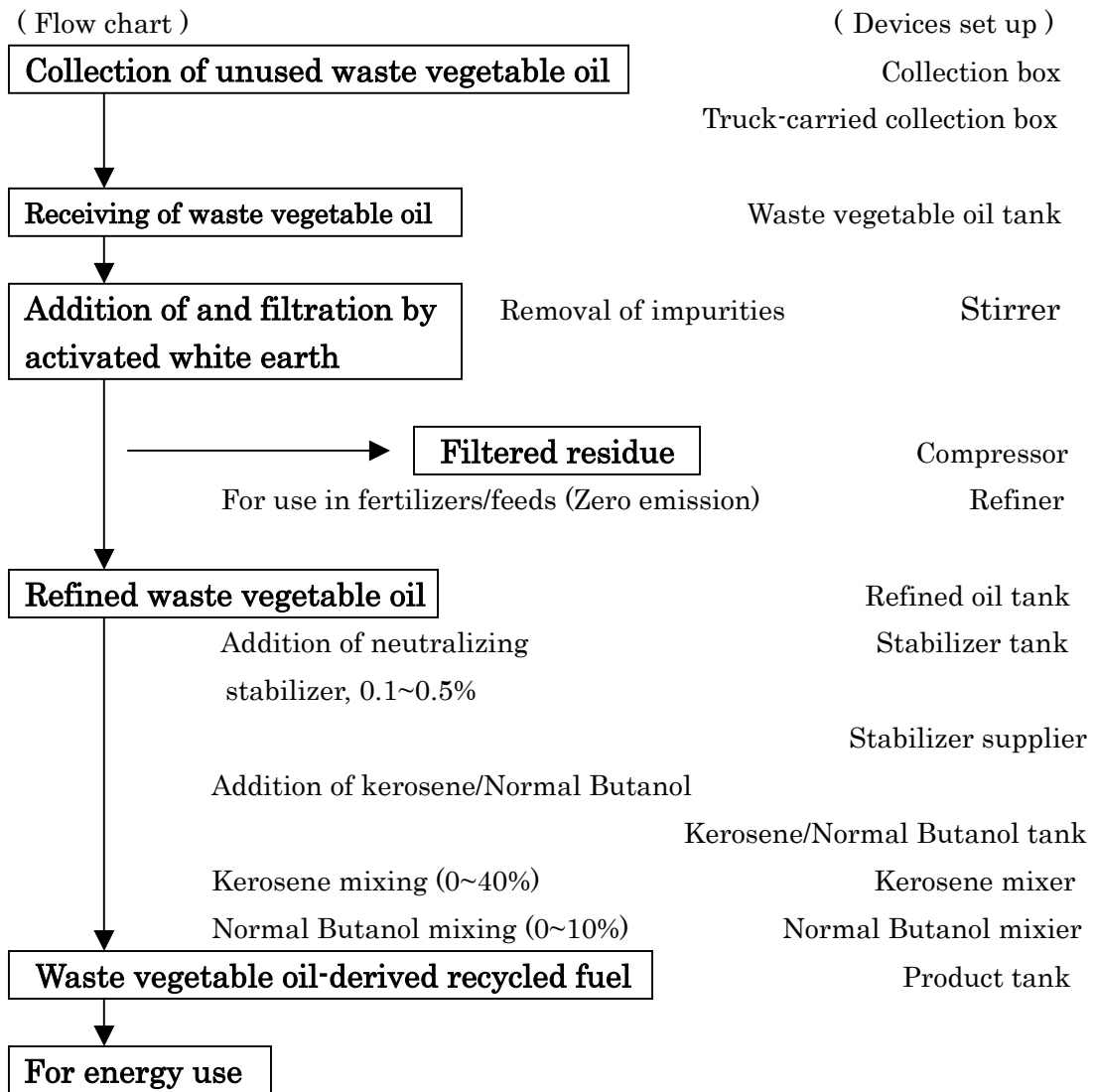
Population in the area: Approximately 1,300,000 people

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. Collection of unused waste vegetable oil

We collected unused waste vegetable oil of about 43 tons by use Collection box and Truck-carried collection box. But the collection of ordinary households, what adjusted a collection cycle and collection time zone reached a difficulty more than we expected it.

2. Research of the ratio of the waste vegetable oil 100 percent

We researched the improvement of the waste vegetable oil ratio, stabilizer of the waste vegetable oil-derived recycled fuel and so on. At the same time, we researched running test and examination of exhaust gas by using a experimentally diesel engine. As a result, it was proved that the fuel which made 90 percent of the waste vegetable oil

and 10% of the natural origin alcohol.

3. The operating examination of the waste vegetable oil-derived recycled fuel system

The plant was made to work, and we got operation data such as terms of waste vegetable oil loss rate and condition of plant operation. In this year, the total amount of produced waste vegetable oil-derived recycled fuel is 92.8 tons by the operating examination.

At first, loss rate of waste vegetable oil-derived recycled fuel intend to be 2 percent. But it depends on having adjusted the quantity of activated white earth by the condition of the collected waste vegetable oil for it to be within 1.3 percent.

The quality of the test fuel of the plant had a problem that is the minute particle extant of White earth that is a filter made a problem arise in the energy use fuel injection pump. A microfiltration device, minute particle measurement device was added as that reform measure behind the waste vegetable oil refinement device was installed, and it worked for the quality improvement.

4. Management of filtered residue caused by the waste vegetable oil-derived recycled fuel

In the process that it gets rid of impurities in the collected waste vegetable oil, this carried out the research reused as manure, feed though activated white earth whom about 60% contained vegetable oil and impurities thing went to 1990Kg. This carried out the research reused as manure, feed. As for the manure utilization of filtered residue, the most suitable mixing rate isn't clear though it is proved that it can use fully by being mixed in the general compost. As for the feed of poultry farming use, activated white earth of filtered residue material doesn't have a problem. Because activated white earth is being handled for food processing as well. But a long time of a breeding examination should be necessary. It found that an influence on the mixing foreign substance, especially, mineral oil, of the waste vegetable oil and a prevention plan were necessary for the manure and feed using.

For energy use ;Out of projects

On test we supply the Diesel generator with the waste vegetable oil-derived recycled fuel. And we verified the cogeneration which electricity of generator and which supplies electricity and heat. There was energy use of the electric 287.8Kw ,28.9% of the energy collection rates · heat 76Gj ,2.1% of the heat collection rates ,by using 87.2 tons by the waste vegetable oil-derived recycled fuel of 92.8 tons. The efficient use of the thermal

energy is a future subject.

5. Holding the business evaluation committee;

We held the following four committees:

The first business evaluation committee: July. 21, 2004

The second business evaluation committee: Mar. 2. 2005

6. Final evaluation;

We made the final evaluation at the second business evaluation committee held on Mar. 2, 2005.

4) Start of the operation

April 1, 2005.