

Japan

Japan's Bioventures Today —

Sun Care Fuels Corporation

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Sun Care Fuels' Background

Sun Care Fuels Corporation ("Sun Care Fuels") is a bioventure company that focuses on the research and development of plant-based biodiesel as an alternative to conventional petroleum-based diesel in order to reduce the greenhouse gas emission, which is responsible for global warming. Sun Care Fuels was established in June 2006 in Tsukuba city, Japan. There, the municipal government has been promoting sunflower-based biodiesel and pursuing various research projects with Professor Matsumura from University of Tsukuba by using the subsidies received from Kanto Bureau of Economy, Trade and Industry. Sun Care Fuels has already established the fundamental technology to produce biodiesel from sunflowers. It is currently laying out the framework towards mass-production. In order to secure the steady supply of the sunflowers, the company has established a subsidiary company in Thailand in March 2005 to cultivate sunflowers in an over 100 hectare field.

Sun Care Fuels' Business

Sun Care Fuels' business is largely divided into five areas; biodiesel, fuel additives, emission credits, research and development of byproducts and consulting.

Biodiesel

As the threat of global warming intensifies, the reduction in the emission of greenhouse gases (carbon dioxide, chlorofluorocarbon, methane and carbon monoxide etc.) is imminent. Sun Care Fuels aims to provide steady supply of high quality eco-friendly biodiesel, which produces approximately 60% less net carbon dioxide emissions than conventional diesel.

The followings are the characteristics of the biodiesel:

1. Carbon neutral — reduction of net greenhouse gas emission
2. Unlimited supply from plants
3. Wide range of application — diesel engines for vehicles, ships and even aircrafts
4. Easier to handle than conventional diesel due to its high ignition point

The company produces biodiesel mainly from the virgin oil extracted from sunflower seeds. The best plant for production of biodiesel is the rapeseeds due to its high quality oil. However, the rapeseeds are not suitable for mass-production as they only grow in relatively low temperature area. Palms are also suitable for producing biodiesel due to its low cost. However, they can only grow under tropical climate, and the quality of the fuels produced cannot meet the standard to be used solely. Therefore, Sun Care Fuels chose sunflowers for the fuel source as they can be cultivated in a wide area, from the cold to hot regions.

	Rapeseed Diesel	Sunflower Diesel	Soybean Diesel	Palm Diesel
Density (g/ml)	0.871	0.873	0.870	0.842
Kinetic Viscosity (cSt)	4.43	4.30	4.12	5.15
Ignition Point (Celsius)	178	182	186	179
Pour Point (Celsius)	-13	-5	-2	12

Table1. Comparison of Biodiesel Produced from Various Plants

Fuel Additives

The biodiesel produced from various plants have relatively high pour point as compared to the conventional diesel. The pour point of the sunflower diesel is only -5 C°, and that of the rapeseed diesel is only -13 C°, making such biodiesel unsuitable to be used in cold region as they are. In order to improve the functionality of biodiesel, Sun Care Fuels has developed proprietary additives. By mixing these additives to biodiesel, the pour point can be significantly lowered (Table 2).

	Rapeseed Diesel		Sunflower Diesel		Soybean Diesel		Palm Diesel	
	No additive	with 1% additive	No additive	with 1% additive	No additive	with 1% additive	No additive	with 1% additive
Density (g/ml)	0.871	0.866	0.873	0.878	0.870	0.874	0.842	0.870
Kinetic Viscosity (cSt)	4.43	4.68	4.30	4.45	4.12	4.37	5.15	5.15
Ignition Point (Celsius)	178	155	182	162	186	159	179	154
Pour Point (Celsius)	-13	-30	-5	-24	-2	-9	12	11

Table 2. Comparison of Biodiesel with Additives

In addition, when biodiesel is used, the torque and horsepower at low to medium engine rotation tend to lag behind those when conventional diesel is used. However, the engine performance tests using conventional diesel, 100% sunflower diesel and sunflower diesel with 1% additive demonstrated that the sunflower diesel with 1% additive was able to produce equivalent performance to the conventional diesel.

Emission Credits

Based on the Kyoto Protocol, an international agreement was made under the United Nations Framework Convention on Climate Change (UNFCCC) to assign greenhouse gas emission limitation. 169 developed countries signed an agreement, as of December 2006, to reduce their emissions 5.2% on average below the 1990 baseline over the period of 2008 to 2012. In order to achieve cost effective emission reduction in the world as a whole, the Joint Implementation (JI), an arrangement for a signatory country to transfer emission credits from another signatory country for its collaborative emission reduction projects, and the Clean Development Mechanism (CDM), an arrangement for a signatory country to obtain credits through emission reduction projects in a non-signatory country, were established. Sun Care Fuels is currently applying its biodiesel production project in Thailand for CDM to obtain emission credits.

Research and Development of Byproducts

During the process of sunflower diesel production, several byproducts are also produced. In order to fully utilize such byproducts, Sun Care Fuels continuously puts its effort in research and development on the application methods. As a result, the company has successfully produced paper using the fiber from the sunflower stems, animal fodders from the seeds and honey from the flowers. As only virgin oil is used for biodiesel, superior quality glycerin is also produced as a byproduct. The company is also developing a method to utilize the glycerin for industry use as refined glycerin and raw material for novel synthetic fabric. In addition, the high quality glycerin is also suitable to use in making perfume and preservative-free soaps and cosmetics.

Consulting

With an aim to secure steady supply of plant-based high quality biodiesel at reasonable cost, Sun Care Fuels has been working closely with Tsuchiura city municipal office for commercialization and prevalence of the biodiesel. With the expertise and experiences obtained through these efforts, the company provides consulting services to those interested in using biodiesel.

Market Overview for Biodiesel

In recent years, the demand for eco-friendly biodiesel is increasing drastically on a global scale in order to combat global warming issues. In the European Union, the total biodiesel production was approximately 2 million ton in 2004 and 3.2 million ton in 2005, a 65% increase from the previous year. Germany has the largest biodiesel market in the world, with the biodiesel exceeding 1% of the total domestic diesel consumption in 2005. In 2004, more than 1,700 fuel stands were set up throughout the country, and the production has also increased to approximately 1.7 million ton in 2005 with a growth of more than 50% compare to the previous year. In the U.S., the Energy Policy Act of 2005 came into effect to promote an increase in biomass energy consumption to approximately 28 billion liter by 2012 with various tax incentives.

Currently, the majority of the biodiesel in Japan is produced from used food oils as a way to recycle them in order to reduce the water contamination. Sun Care Fuels is the only company which produces biodiesel from virgin oil from plants with a concept of biorefinery in Japan. The total biodiesel production in Japan is still very minimal compared to the U.S. and European countries. However, the government and municipal offices are taking more proactive approaches in promoting the biodiesel. In addition, there is a move towards promoting the biodiesel engine vehicles, which potentially contributing to the increase in biodiesel demand.

Sun Care Fuels' Future

In August 2006, Sun Care Fuels' biodiesel project was adopted by the New Energy and Industrial Technology Development Organization (NEDO), the Japan's largest public R&D management organization for promoting the development of advanced industrial, environmental, new energy and energy conservation technologies. As a result, the company will receive 200 million yen worth of subsidy over the next two years for further development of the project.

In order to minimize the risk of price fluctuation due to the climate changes, the company is exploring the cultivation of sunflowers in the Philippines and Tanzania in addition to Thailand. In the Philippines, the company has already started a collaborative research with the Central State University and also has contracted with a local company for feasibility study. In Tanzania, the testing cultivation has already completed and the harvested sunflower seeds will be sent to Japan for processing.

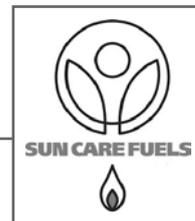


Test Cultivation in Philippines



Test Cultivation in Tanzania

With the implementation of Kyoto Protocol as a background, Sun Care Fuels has the new business models of linking environment, agriculture and energy. The company has been widely acclaimed by companies in bioethanol business. With its new pilot manufacturing plant under construction and negotiations with several companies for potential tie-ups underway, Sun Care Fuels is set to play a critical role in creating a society where mankind and nature can coexist peacefully. 🌱



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