



Syntroleum's Bio-Synfining™ Process

Capitalizing on its extensive synthetic fuels production experience, Syntroleum proudly announces next generation synthetic biofuels made possible by the company's proprietary Bio-Synfining™ process. Proven and successful testing of over 400,000 gallons of Syntroleum synthetic diesel and jet fuel, along with expanding interest in renewable fuels worldwide has opened the door for Syntroleum to utilize its Synfining® product upgrading technology in a new way. Able to use a wide variety of renewable feedstocks such as vegetable oils, fats, and greases, Syntroleum's Bio-Synfining™ process is truly a "flexible feed, flexible synthetic fuel" technology.

The first commercial application for Bio-Synfining™ is Syntroleum's recent announcement of Dynamic Fuels, a 50/50 venture formed with Tyson Foods, the world's largest processor and marketer of chicken, beef, and pork. Utilizing fats and oils feedstock from Tyson, coupled with Syntroleum's Bio-Synfining™ technology, Dynamic Fuels' first plant will be designed to produce 75,000,000 gallons per year of ultra-clean and high performing renewable synthetic fuels, starting in 2010. Additional plants are already in the planning stages. Each plant will create jobs while its output will contribute to our nation's energy supply and security of that supply. The production of synthetic fuels that are low in emissions, environmentally friendly, and derived from renewable feedstock is our focus.

Longer-term, Syntroleum plans to employ its proven Fischer-Tropsch capabilities to produce ultra-clean renewable synthetic fuels from our nation's extensive supply of biomass.

Bio-Synfining™ FAQ's

1) What is the "Bio-Synfining™" process?

Syntroleum's Bio-Synfining™ process converts renewable feedstocks, such as fats and vegetable oils, into ultra-clean and environmentally friendly renewable synthetic diesel fuel, renewable synthetic jet fuel, naphtha and propane.

2) What is meant by "Flexible Feed, Flexible Synthetic Fuels"?

Syntroleum's Bio-Synfining™ process is capable of processing a wide range of renewable feedstocks including vegetable oils, fats and greases into a broad slate of synthetic ultra-clean fuels, including summer to arctic grade diesel fuel and jet fuel. This dual flexibility is unique in the renewable fuels industry, and accurately described by the statement "Flexible Feed, Flexible Synthetic Fuels."

3) Why is a company like Syntroleum, which is heavily involved with Fischer-Tropsch

technology, interested in renewable fuels?

Syntroleum's core technologies involve three key, patented processes: a) Production and cleanup of synthesis gas consisting of carbon monoxide (CO) and hydrogen (H₂) b) the Fischer-Tropsch process where the synthesis gas is converted to wax, and c) Synfining, or product upgrading, which transforms the Fischer-Tropsch wax into diesel and jet fuel. The Bio-Synfining™ process leverages Syntroleum's Synfining® technology and product upgrading experience to produce renewable synthetic fuels from a variety of renewable feedstocks. The renewable synthetic fuels produced via Bio-Synfining™ are ultra-clean and much higher quality than those produced via conventional processes. The Bio-Synfining™ process is therefore a natural extension of our existing technology and business model.

4) What are the company's plans for other renewable fuels projects, such as biomass-to-liquids?

With its roots in Fischer-Tropsch process technology, Bio-Synfining™ provides an economical pathway for the company to migrate into the emerging biomass-to-liquids industry. By incorporating a gasifier and Fischer-Tropsch reactor to an existing Bio-Synfining™ plant, Syntroleum will then be able to produce ultra-clean and renewable synthetic fuels from biomass. This migration strategy is significant because the amount of potential biomass feedstock in the United States (1,300 million annual tons) dwarfs the current supply of vegetable oils and fats (15 million annual tons), and presents the true long-term growth opportunity in the renewable fuels industry.

5) How does the Bio-Synfining™ process work?

Bio-Synfining™ processes triglycerides and/or fatty acids from fats and vegetable oils with heat, hydrogen and proprietary catalysts to make renewable synthetic diesel or jet fuel.

6) How is the Bio-Synfining™ process different from the conventional biodiesel process?

Bio-Synfining™ is capable of processing a wide range of feedstocks including vegetable oils, fats and greases into ultra-clean middle distillate fuels including summer to arctic grade diesel and jet fuel. These products are extremely stable, exceed all the standards of conventional petroleum based fuels, and are usable across a very wide band of operating temperatures as both diesel and jet fuel.

7) What feedstocks can be used in the Bio-Synfining™ process?

A significant advantage of the Bio-Synfining™ process is the flexibility of the feedstock—vegetable oils or fats and greases, of a wide variety of quality levels (both inedible and edible) and in any proportion, can be successfully used by the Bio-Synfining™ process to produce renewable synthetic diesel or renewable synthetic jet fuel—all of the same high quality. Syntroleum plans to use low grade fats and greases in its plants because the cost is typically cheaper than vegetable oils, and because the use of low grade fats does not impact the human food supply.

8) What are the advantages of Syntroleum's renewable synthetic fuels produced by Bio-Synfining™?

Bio-Synfining™ fuels have lower emissions, near zero sulfur, no aromatics, and higher cetane levels

than comparable conventional fuels. Bio-Synfining™ fuels can be used at much lower operating temperatures, and can be fully utilized in engines without having to be blended with other fuels. Bio-Synfining™ fuels are expected to be completely compatible with existing pipelines, storage facilities and other conventional fuel infrastructures. In summary, Bio-Synfining™ fuels are ultra-clean, flexible in their use, produce fewer emissions and are environmentally friendly.

9) Can the Bio-Synfining™ process produce jet fuel and other products besides diesel fuel?

Yes. A significant advantage of the Bio-Synfining™ process is that it can produce a middle distillate fuel that can be used in nearly all climates. Bio-Synfining™ can produce summer, winter, and arctic grade renewable diesel as well as renewable jet fuels.

10) Why are there so many grades of diesel—isn't it all the same stuff?

Like all fuels, diesel fuel's characteristics are affected by temperature changes. Cold weather temperatures can cause wax crystals to form in diesel fuel, and as temperatures continue to drop, diesel fuel begins to gel and eventually freezes. Because of this, special formulations of diesel are made to perform in harsh winter conditions and are labeled "winter" or "arctic". Because the Bio-Synfining™ process works at the molecular level, it is flexible enough to produce these "winter" and "arctic" grades of diesel by simply adjusting the processing parameters.

11) What is so special about the jet fuel made from the Bio-Synfining™ process?

Fuels used in aircraft are subjected to temperature extremes, even exceeding minus 50°F at higher elevations. Because the Bio-Synfining™ process works at the molecular level, it is flexible enough to produce thermally stable jet fuel by simply adjusting the processing parameters.

12) Can the Bio-Synfining™ technology be patented?

Yes, and Syntroleum has already applied for multiple patents surrounding its Bio-Synfining™ technology, relating to both the process and the synthetic fuels produced.

13) How does Syntroleum's renewable fuel help with the climate change problem the world is facing?

The appealing aspect of Syntroleum's fuel produced via the Bio-Synfining™ process is that all of the carbon in the finished fuel originated in the atmosphere as carbon dioxide (CO₂). The CO₂ was absorbed by plants that were converted into oil, or fed to animals and converted to fat.

14) Does Syntroleum's renewable fuel reduce polluting emissions through its use?

Yes. Fuels that are combusted produce some level of emissions, however, Syntroleum's fuels are very low in the three major categories of emissions—nitrogen oxide (NO_x), sulfur (almost zero), and aromatics (zero). As a result, its emissions levels are the lowest of any transportation fuel on the market, petroleum based or renewable.

15) How much will be invested in the first Bio-Synfining™ plant?

The first plant is designed to cost approximately \$150 million and produce 75 million gallons per

year of ultra-clean renewable synthetic fuel.

16) Where will the first plant be built and when?

The venture is evaluating possible sites located in the south central United States. Construction of the first Bio-Synfining™ plant is planned to be completed in 2010.

17) How many jobs will be created by each Bio-Synfining™ plant?

Approximately 260 construction jobs will be created by each Bio-Synfining™ plant. Post-construction, each plant will require approximately 65 permanent highly skilled jobs.

18) Where will the fuels be sold and who will be the customers for Bio-Synfining™ renewable fuels?

Renewable synthetic diesel fuel will be sold in the United States within the existing diesel fuel distribution system. One of the strong benefits of renewable synthetic diesel is that existing infrastructure can be used. At this time, we foresee that its ultra-clean properties will make it a popular choice for conventional diesel producers to use as a blending fuel to help conventional diesel meet minimum government standards. It may particularly appeal to the operators of fleet vehicles and city buses who are seeking ways to reduce emissions in cities subject to large amounts of pollution. Other possible markets include the military and commercial airlines, who have expressed interest in ultra-clean renewable jet fuel.

19) Why is Tyson involved in renewable fuels?

Since the fats and oils produced by the food industry are an excellent feedstock for fuel, it makes sense for Tyson to take a leadership role in this area. Tyson formed a Renewable Energy group in 2006 to explore ways to commercialize the company's vast supply of fat into biofuels, as well as ways to generate energy from poultry litter and other by-products.

20) Does the venture have the support of the agriculture industry?

Yes. Tyson Foods has received letters of support from the following organizations in support of the use of fats in the production of renewable fuels: The American Meat Institute, the National Pork Producers Council, the National Chicken Council, and the National Cattlemen's Beef Association. These organizations, like Syntroleum and Tyson, appreciate the positive impact the production of renewable diesel from waste products has from economic, job creation, environmental friendliness, and energy independence standpoints.