

Case Study

Rymes Propane & Oils, Inc. : **Bringing Biodiesel to New Hampshire**

Introduction

Faced with soaring energy prices two decades ago, large institutions across the Northeast had few options other than cutting back or simply passing the price hikes on to their customers.

In 2006, prices are again fluctuating, and organizations and institutions are under increasing pressure to reduce their environmental footprint. But there is a new alternative, which carries with it the promise of energy independence, a factor that appeals to key decision makers regardless of their political affiliation or opinions on climate change: biodiesel.

Made from vegetable oil, biodiesel has gone from hobbyist's homemade to commercially produced fuel for home heating and transportation in a scant three years. In New Hampshire, one company read the handwriting on the wall, got in early, and laid the groundwork for biodiesel's popularity in the state.

Background: Policy helps create a market

In 2001, The New England Governors and Eastern Canadian Premiers agreed to reduce greenhouse gas emissions in the region at least 10 percent below 1990 emissions by 2020, with a long-term goal to reduce regional GHG emissions sufficiently by 75 to 85 percent. The pact recommends moving away from fossil fuels, a leading source of carbon dioxide emissions, to "less polluting energy resources."

An open question at the time was what "energy resources" – and who would be willing to take the risk of being an "early adopter"? In New Hampshire that marketing role was assumed by Rymes Propane & Oils, Incorporated, a small distributor who recognized a business opportunity in biodiesel.

As a clean-burning, renewable fuel that is derived from vegetable or animal fats, both domestically sourced, biodiesel was on the horizon as early as 2000. Few people except enterprising "distill it yourself" folks were actively using it, however; many fleet managers were concerned about stories of poor quality fuel and voided engine warranties.

Biodiesel is created through specialized processing of vegetable oil in which glycerin is separated from the fats, leaving behind methyl esters. But

quality control can be an issue, and it is only recently that ASTM standards have regularly been applied to the fuel, making it a truly functional alternative to petroleum-based diesel. Testing of the product can still be an issue for all but large commercial operations, since it is expensive and requires specialized laboratory facilities.

The good news about biodiesel is that little or no modification to a diesel engine is necessary¹. It can be used in its pure form (B100) or blended with petroleum; a 20% (B20) biodiesel blend is favored for most commercial applications. Furthermore, while other cleaner, alternative fuels such as propane, compressed natural gas, or ethanol require separate holding tanks or special modifications to burners, biodiesel requires few modifications and preparations or storage precautions prior to service, which allows for an easy transition period.

Biodiesel was also a relatively easy product to market because customers would not have to make any up front financial commitments in order to utilize biodiesel in their cars or furnaces. In fact, *bioheat*, which is the heating-fuel industry's accepted term for any blend of biodiesel used in generating heat, is compatible with all oil burning furnaces and thus far has performed equally to regular oils with few negative effects.² And, there was a market: US census data reports that more than half of all NH households use fuel oil as their primary heating source³. With oil prices soaring and no technical start-up changes required, bioheat is a great alternative.

But introducing the product to a new market, particularly one like New Hampshire with concerns about cold-weather performance, was still a major challenge, requiring a unique public-private partnership to champion its use, based on real-world results.

The Granite State Clean Cities Coalition (GSCCC) played a leadership role in the effort, providing grants to cover the incremental costs in order to "pilot" the fuel in various settings. GSCCC represents more than 65 public and private interests supporting the goals of reducing America's dependence on foreign oil, improving air quality through the use of domestically produced, cleaner-burning alternative fuels, supporting the creation of alternative-fuel infrastructure and use of alternative-fuel vehicles. But the challenge remained for a local fuel dealer to step up and make a commitment to filling storage tanks and delivering biodiesel as a replacement to both home heating oil as well as a fuel for vehicles.

It was price hikes and world events that finally brought Rymes into the bioheat/biodiesel market. Gathering in early 2004 for a management meeting, John, Jim, and Tom Rymes discussed a disturbing trend in the price of traditional energy sources: the costs were soaring with no-end in sight. Compounding that trend was post 9/11 American concern that the nation's security was at risk from a growing dependence on imported oil. The brothers felt that New Hampshire residents, conscious of the economy and national security, would demand a

response to both pressing issues, and in biodiesel, a renewable fuel that is domestically produced and environmentally friendly, they saw a potential solution.

The Project

Not long after that initial meeting, and with the support of the NH Department of Environmental Services and the GSCCC, in April 2004 Rymes Propane and Oils received their first railcar shipment of pure biodiesel (B100) at their bulk storage facility in North Stratford, New Hampshire. This delivery was a significant event, making Rymes the first heating fuel supplier in New Hampshire to offer an alternative energy fuel.

Immediately Rymes distributed a 20% blend (B20) to five of their filling stations throughout New Hampshire, taking a significant risk of losing diesel business by selling only the B20 blend at specially designated pumps at those locations, where diesel drivers pumped B20 into their own vehicles. They also began to sell B100 wholesale from their bulk storage facility in North Stratford; they have plans in the works to offer the higher concentration at a new facility in West Lebanon. The company also took an important step by going beyond just selling biodiesel and ran B20 in their entire diesel truck fleet of more than 60 vehicles, ranging from pick-ups, delivery and lift trucks.

The brothers believed that by demonstrating their commitment to biodiesel they could help convince customers to make the switch as well, in effect building a new market one customer at a time. John Rymes notes that while there has not been a significant shift in buying habits, several factors are attracting new converts, such as increasing energy costs and the potential availability of a wider range of diesel vehicles because of recent changes in federal clean air standards.

Rymes discovered that are drawn to biodiesel for varying reasons: some seek to reduce their environmental footprint out of concern for climate change, while others see this as an investment in renewables supporting American farms, rather than wealthy oil companies or nations in troubled areas of the world.

The Results

The inaugural shipment of biodiesel was the first of several key market development milestones for Rymes. That first year, the company sold approximately 100,000 gallons of pure biodiesel. Their sales have increased by a staggering amount ever since: they sold approximately 500,000 gallons their second year, increasing sales by 400%, and crossed the million-gallon plateau in mid-2006. This totals an estimated 38,400 barrels of biodiesel (the barrel is the standard unit of measuring oil, the price of which has become the focus of daily news⁴.) This unique business endeavor has demonstrated its success already.

Initially prices for B20 were \$0.20 higher per gallon than regular petroleum diesel, and customers paid a premium in support, apparently, of the cause of cleaner air, reducing the threat of global warming, or energy security. Today Rymes has been able to minimize the price differential significantly with rising demand, offering discounts to large volume customers.

Concord Sand and Gravel is one large business taking advantage of this product. The company has begun to use B20 in a half-dozen heavy trucks and in heating the asphalt at their plant in Concord. Company President Bob Cole explains: "The number one reason for the switch is to help the environment...I think it's great and there has been no change in performance." He believes that the company could burn 100,000 gallons of biodiesel in the near future, "because if we can do our two cents for the environment then it's worth the two cents for the fuel."

Biodiesel's environmental benefits are considerable. When B100 is burned, it emits 48% less carbon monoxide, a poisonous gas harmful to humans. In a recent pilot air quality study done in cooperation with Keene State College, it was found that the level of particulate matter smaller than 2.5 micrograms (defined as "fine" by the US EPA, and smaller than human hair, which can be inhaled deep into lung.) dropped significantly when using a B-20 biodiesel.

The findings from the pilot study include that use of a B20 blend of biodiesel resulted in up to 82% reduction in local area levels of PM_{2.5}, up to 61% reduction in formaldehyde area concentrations; and up to 57% reduction in acetaldehyde area concentrations. The data also suggest a three- to five-fold increase in exposure to PM_{2.5} or PM₄ particulate matter in people exposed at work to petroleum diesel operations as compared to biodiesel operations.

A limited study by the federal Department of Energy found that in some engine families B20 can produce up to 2% more nitrogen oxides (NO_x) than petroleum diesel, and B100 can produce up to 10% more. This is a concern because NO_x contributes to the formation of smog, and some are greenhouse gases. It has been found, however, that in real-world applications, the NO_x does not increase as much as in laboratory tests, Russell says, with different engines producing different results, some lowering NO_x emissions by a significant amount. Additives are also available that eliminate the problem, and research is underway to reduce the amount of NO_x produced by biodiesel. .

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Sulfur emissions, a major source of acid rain, are essentially eliminated when using B100⁵. Furthermore, there is a 78 percent reduction in carbon dioxide, a major contributor to global warming, because CO₂ is reabsorbed by plants used to produce vegetable oil in the natural carbon cycle. Only because fossil fuels are used in fertilizers and pesticides used to grow the crops, and in the refining and transportation of biodiesel, is it not a carbon-neutral fuel.

By the end of 2006, when Rymes' total biodiesel sales since 2004 reached approximately 1.6 million gallons, it is estimated the company will have helped prevent the release of approximately 17,907.2 tons of CO₂⁶, the equivalent of taking 2,984.5 average-sized vehicles off the road.⁷

Biodiesel sales show gains on the revenue from Rymes traditional products, demonstrating that the decision to move towards energy independence was a good one. Additionally, though the Rymes brothers continue to rely on Midwest and Canadian suppliers for the fuel, they are optimistic that there will one day be a choice of feedstock for the fuel from within the region.

The Rymes admit the transition to biodiesel has not come without some problems, primarily around finding the right blend to withstand frigid temperatures. Cold weather impacts all crude petroleum oils, but it tends to affect and gel diesel oils sooner⁸. As anyone who refrigerates salad dressing knows, vegetable oil shares this property and, as early adopters, Rymes has on a few occasions had to deal with "clouding" or gelling because they had prepared an inappropriate blend to withstand the colder weather. A variety of additives, including kerosene, that lower the "cloud point," are used to create a "winter blend," but blending is a science in itself and one the company had to learn. With an indoor storage facility in Vermont, another planned for Keene, and real-world experience, Rymes is optimistic that New England's climate should have little impact on the efficiency of the fuel. Their enthusiasm is borne out in the success of the City of Keene Public Works Department, where biodiesel propels heavy and emergency equipment year round, and in snow groomers on the slopes of Cranmore Mountain, where the fuel sees service as tough as it comes.

There are also benefits of using biodiesel that were not anticipated. Research indicates the fuel helps reduce wear on an engine because of its higher lubricity.⁹ It is also much cleaner than using regular diesel, which further contributes to an efficient running engine. John Rymes laughed when explaining the "side effects" the company has run into.

"The guys all love it, the trucks are easier to maintain, and the guys don't go home at the end of the day smelling like exhaust fumes!"

Company Profile

Rymes Propane and Oils was founded by Jim and Carol Rymes in 1969, and has been owned and operated by the Rymes family since. The company is New Hampshire based and conducts business throughout the state and in parts of Vermont, Maine, and Massachusetts. Rymes is one of New Hampshire's major distributors of heating products and sells a variety of energy choices such as propane, heating oil, kerosene, diesel, biodiesel, and gasoline. In 2004 Rymes became the states first distributor of biodiesel. They offer the product at five

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fueling stations throughout the state and sell it wholesale at two bulk storage facilities.

¹ http://www.biodiesel.org/resources/biodiesel_basics/default.shtm

² <http://www.biodiesel.org/markets/hom/faqs.asp>

³ <https://www.nhes.state.nh.us/elmi/pdfzip/econanalys/vitalsigns/vs2006/VitalSigns2006-Energy.pdf>

⁴ <http://www.newton.dep.anl.gov/askasci/eng99/eng99288.htm>

⁵ http://www.biodiesel.org/pdf_files/fuelfactsheets/emissions.pdf

⁶ <http://www.eia.doe.gov/oiaf/1605/coefficients.html>

⁷ <http://www.coolriver.org/>

⁸ http://www.biodiesel.org/pdf_files/fuelfactsheets/Cold%20Flow.PDF

⁹ http://www.biodiesel.org/pdf_files/fuelfactsheets/Lubricity.PDF