



FINAL PROJECT REPORT  
EXECUTIVE SUMMARY

*The Vermont Biodiesel Project*  
Building Demand in the Biofuels Sector

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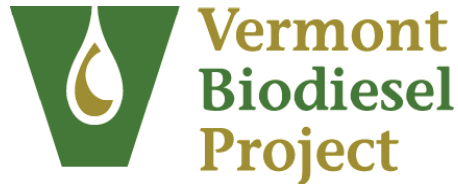
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The Vermont Biodiesel Project is a collaboration between:

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## **Building Demand in the Biofuels Sector**

### ACKNOWLEDGEMENTS

This report represents the collaborative efforts of the Vermont Biofuels Association (VBA), Vermont Fuel Dealers Association (VFDA), Vermont Sustainable Jobs Fund (VSJF), Vermont Department of Public Service (DPS), Vermont Department of Buildings and General Services (BGS), Vermont Department of Environmental Conservation (DEC) and more than a dozen private companies engaged in building the renewable fuels sector in the state.

The Vermont Biodiesel Project (VBP) was funded by a grant to DPS from the US Department of Energy State Energy Program with additional funding from the Vermont Sustainable Jobs Fund via the State of Vermont. The VBP is the first phase of the Vermont Biofuels Initiative, a public/private partnership intended to grow the biofuels sector in Vermont. We would like to thank Chuck Ross, state director from the Office of Senator Leahy, whose insights and advice helped bring this initiative and its many follow up activities to fruition. We would also like to recognize the leadership of Lt. Governor Brian Dubie for his on-going interest in biodiesel as an alternative fuel for Vermont. Special thanks to Richard Smith, Deputy Commissioner from DPS for his assistance with inter-agency coordination.

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We recognize the pioneering efforts of the biodiesel businesses with whom we engaged over the past two years: Dave Bonta (BioQuantum), John Hurley (Dog River Alternative Fuels Company), Greg Liebert (Vermont's Alternative Energy Corporation), Dan Wiley (Global-E Industries), and Scott Gordon (Green Technologies, LLC). Their efforts are making it possible for Vermonters to obtain biodiesel and other renewable fuels.

Finally, we'd like to thank the many individuals and leaders that stepped forward to help build the emerging biofuels sector in Vermont including Middlebury College, the University of Vermont, the Vermont State Colleges, the Vermont Law School, the Vermont Agency of Transportation, and the 10% Challenge.

## **EXECUTIVE SUMMARY**

The future and security of Vermont's energy supply, coupled with concerns about economic development and environmental protection, led a group of leaders to form the Vermont Biodiesel Project (VBP). This two-year venture, funded by the US Department of Energy State Energy Program and the Vermont Sustainable Jobs Fund, set out to develop a market for biodiesel in the state through an integrated set of pilot programs and market building activities.

The VBP was a collaboration between the Vermont Biofuels Association (VBA), Vermont Fuel Dealers Association (VFDA), Vermont Sustainable Jobs Fund (VSJF), Vermont Department of Public Service (DPS), Vermont Department of Buildings and General Services (BGS), Vermont Department of Environmental Conservation (DEC) and more than a dozen private companies engaged in building the renewable fuels sector in the state. This project is the first phase of the Vermont Biofuels Initiative (VBI), a public/private partnership intended to grow the biofuels sector in Vermont that received major support from the Office of Senator Leahy.

According to the Energy Information Administration, Vermonters used more than 678 million gallons of petroleum in 2004 including 63 million gallons of diesel for transportation and over 183 million gallons for home heating, all purchased from outside the state. The premise of the VBP was that by stimulating in-state demand for biodiesel, a market would form that fuel dealers, entrepreneurs and farmers could supply with locally manufactured products.

The goal of the VBP was to create a two-year, commercial-scale program involving large buyers that would initiate local use of biodiesel for heating and fleet transportation. The project was designed to test the feasibility of using renewable fuel in institutional and commercial settings, help peers to educate one another about the fuel, and demonstrate the economic viability of biodiesel in the state's energy market.

***Objective One: Build Demand*** – Increase demand for Vermont-provided biodiesel by organizing the commercial-scale purchase of five million gallons of domestically produced biodiesel by 2006

***Objective Two: Increase Supply*** – Increase the supply of domestic biodiesel available from Vermont-based businesses to five million gallons over two years from a 2004 base line of 27,000 gallons, and increase in-state biodiesel production capacity to 450,000 gallons over two years from the 2004 baseline of 2,500 gallons.

The VBP work plan consisted primarily of pilot projects and educational activities designed to inform parties interested in the use or production of biodiesel.

### ***PILOT PROJECTS***

The VBP focused on generating new knowledge in two large scale pilot projects: use of biodiesel for heating when blended with No. 6 heating oil conducted by the Vermont Department of Buildings and General Services (BGS) at their Waterbury facility; and biodiesel in snowmaking operations conducted by Smugglers' Notch Resort. Subsequently, the partners leveraged their

resources to develop an additional set of pilot projects for residential heating called the Vermont Bioheat Program. During the project duration, VSJF used its own funds to sponsor a set of small biodiesel pilot tests at the Vermont Law School for institutional heating and Sugarbush Resort for snow grooming machines.

All together, these VBP related pilot projects used more than 78,500 gallons of blended biodiesel for heating, snow making, and off-road vehicles reducing greenhouse emissions by an estimated 179 tons. All the projects used biodiesel successfully in real world conditions, thus contributing to the knowledge of how to introduce biodiesel in Vermont settings. As intended, the commercial scale demand for the product sent a market signal to suppliers who responded with biodiesel deliveries.

The BGS pilot developed detailed data that helped the state gain insights into the emissions profile of biodiesel when blended with heavy heating oil. The Smugglers' Notch project yielded specific information about how to use biodiesel in cold weather conditions for snow making. Both organizations expressed continued interest in using biodiesel in the future. The bioheat pilots generated concrete experience with fuel dealers who are beginning to sell biofuels in the residential market. The projects at Vermont Law School and Sugarbush similarly yielded information that contributed to the overall development of the market signal and distribution system.

## ***WORKSHOPS AND EDUCATIONAL ACTIVITIES***

During the project, the Vermont Biofuels Association and Vermont Fuel Dealers Association collaborated on a range of workshops that helped fuel dealers, fuel users, agricultural producers and state leaders to learn more about biodiesel. Attendance at these events totaled more than 1,000 individuals including the Governor of Vermont, fuel dealers, farmers, institutional purchasers, investors, regulators, advocacy organizations, students and citizens.

The VBP also included development of detailed case studies posted on the Vermont Biodiesel Project website ([www.vtbiodieselproject.org](http://www.vtbiodieselproject.org)), surveys that helped document interest in biodiesel, and the formation of purchase/distribution networks to deliver product to customers.

## ***PROJECT OUTCOMES***

### **Demand for Biodiesel Established**

The partners and participants of the VBP helped stimulate the consumption of 275,000 gallons of biodiesel in 2005, up from 9,000 gallons in 2003. Current projections show that more than one million gallons will be consumed in the state by the end of 2006, which is 20 percent of the project goal of five million gallons by 2006. The partners anticipate that the in-state consumption of biodiesel will rise to five million gallons by the end of 2007. Of the volume used in the state, VBP partners and participants in VBP-related pilots consumed more than 78,500 gallons of blended biodiesel.

### **In-State Production on the Rise**

At the beginning of the VBP in 2004, in-state biodiesel production stood at 2,500 gallons and

rose to 10,000 gallons in 2005. Current projections show that volume heading toward more than 50,000 gallons by the end of 2006. This volume is less than the project goal of 450,000 gallons. However, a recent announcement by a newly formed biodiesel production company shows that this volume will rise considerably in 2007.

In August 2006, Biocardel Vermont—a new joint venture between two Canadian firms—announced plans to site a biodiesel production facility in Swanton using soy oil as a feedstock to meet the emerging local biodiesel demand. The company plans to manufacture four million gallons per year initially, rising to eight million gallons in the future. The 21 anticipated jobs at Biocardel combined with the jobs that emerged in the sector since 2004 will put the VBP over its anticipated outcome of 10 new jobs in the biodiesel sector by the end of 2006. The announcement by Biocardel Vermont to produce biodiesel in the state demonstrates that the innovative Vermont Biodiesel Project market conditioning program accomplished its objectives.

***Biocardel Vermont plans to produce over 4 million gallons of biodiesel in the state with 21 new jobs as a result. This decision demonstrates that the innovative Vermont Biodiesel Project market conditioning program accomplished its objectives.***

### **Fuel Dealers are Selling Biodiesel; Farmers are Producing Oil Seed**

As a result of the increased demand for biodiesel, the number of fuel dealers selling biodiesel rose from two in 2004 to 17 in 2006. In addition, several farm operations are now either producing biodiesel or exploring on-farm production of oil seed from such crops as soy, canola, sunflowers and mustard. The interest among farmers continues to grow as the economics for on-farm production become clear.

### **Air Pollution and Greenhouse Gas Reductions**

Biodiesel yields lower atmospheric emissions of pollutants and greenhouse gases than petroleum fuels. The VBP pilot projects at Smugglers' Notch, the Vermont Department of Buildings and General Services combined with VSJF-funded biodiesel pilot projects at the Vermont Law School and Sugarbush Resort led to the reduction of an estimated 179 tons of greenhouse gas emissions. Based on the overall use of biodiesel in the state since 2004, more than 564 tons of greenhouse gas reductions have helped the state respond to concerns about global warming.

The project participants formed what turned out to be a highly effective collaboration that fulfilled the purpose of the project. The public/private cooperation exemplified during the VBP provides a model for sustainable development for others to emulate.

## ***FINDINGS***

The Vermont Biodiesel Project generated several key findings.

### **Finding #1: Biodiesel Works in Vermont**

The foremost finding is that biodiesel blends work in a wide variety of institutional and commercial applications in Vermont's cold climate. In the three years since project leaders began introducing biodiesel into the state, many people have experimented with the fuel to learn its properties. Biodiesel has been vetted in a wide array of uses such as snow making compressors, snow groomers, farm equipment, commercial and institutional boilers, residential heating systems, trucks and diesel cars. With the exception of the rare case where the operators did not anticipate the cleansing properties of biodiesel that moves diesel sludge from storage tanks into engines, biodiesel users report few issues with the fuel.

### **Finding #2: Institutional and Commercial Demand for Biodiesel Now Exists**

A second key finding is that the demand for fuel from institutions and large commercial users is attracting larger volume fuel producers such as Biocardel Vermont. The market signal established by the Vermont Biodiesel Project shows that local consumers are aware of the fuel and willing to use it to meet their heating or transportation needs given that the product meets their standards for quality, reliability and affordability.

### **Finding #3: Biodiesel is Available in Vermont, but Not Widely**

The growth of the biodiesel market is a sign of real progress. However, many parts of the state are not currently served by companies that offer biodiesel either for transportation or heating purposes.

### **Finding #4: The VSJF Market-Building Model Works**

The VSJF market building model formed the foundation under the Vermont Biodiesel Project. This method shows that modest public investments using a strategic approach that connects purchasers with suppliers in an emerging market works. Many other aspects of the state's transitioning economy would benefit from this innovative, efficient and cooperative market-driven approach to sustainable economic development.

### **Finding #5: The Market is Poised for Traditional Economic Players to Enter**

After three years of establishing the utility and economics of biodiesel in Vermont, it is now possible for traditional financial entities to confidently work with prospective biodiesel producers. They now know that there is a highly networked, integrated system in place for answering their questions on biodiesel production scaled to Vermont's size.

### **Finding #6: Attention on Biodiesel is Growing**

When the VBP began in 2003, there was little discussion about biodiesel on the state or national scene. Now, many people from the U.S. President and state legislatures down to individual users are aware of the fuel and are trying it in many applications. The increased attention is building pressure to develop effective policies that will support the sector, remove market barriers, and generate necessary investments in production and distribution infrastructure.

**Finding #7: Develop Policies to Support Biofuel Production in the State**

As demand for biodiesel grows, the state will need more biodiesel, both from within and outside its borders. The state needs coherent policies for biofuels production and programs designed to bring greater volumes of high quality fuel to the market place, as well as a mechanism to continually implement and evaluate the policies as conditions change. This will be a key requirement for the next level of commercial production to emerge in Vermont.

**Finding #8: Focus on Biodiesel Blends that Work for the State**

The Vermont Agency of Natural Resources stated that blends up to B100 can be used in direct-fired industrial or commercial boilers, and that the agency would have no objection to a small percentage of biodiesel being used in home heating oil (up to B5) until more information becomes available that supports a larger percentage. ANR also stated that for use in transportation, biodiesel blends at or below B20 present no problem from an air quality standpoint. However, the agency has questions about emissions from higher blends of biodiesel in transportation that will require further attention.

**Finding #9: Further Progress Will Require Strong Leadership**

The collaborative process developed by the VBP partners accelerated the advancement of a market for biodiesel in Vermont. To capitalize on these advancements and to further develop this emerging market opportunity, the state needs continued strong leadership and coordination among state agencies and between public and private partners.

**Finding #10: Continued Need for the Vermont Biodiesel Project**

The success of the first two years have led to many new questions and demonstrated the need for continued efforts to sharpen the economic picture for biodiesel development at the farm scale, with cooperatives, and for larger commercial-scale ventures in the state. The VBP team retains both capacity and desire to further extend the group's work into currently unexplored parts of the emerging biofuels terrain.

The full VBP report concludes with a set of recommendations for follow-up activities.

Visit <http://www.vtbiodieselproject.org/> to read the full report.