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Conquering the Cold

For the past two ski seasons, Rymes Propane & Oil has supplied Cranmore Mountain Resort, a popular New Hampshire ski destination, with B20 for its snow-grooming fleet. Despite sometimes grueling winter conditions, the blend performed flawlessly, according to an independent report.

By Lindsey Irwin

Some people just prefer to hear a story firsthand—look a person in the eye, shake hands and ask a few questions—before accepting it as truth. So, despite the fact that Jim Mersereau had read about ski lodges in western resort towns like Aspen, Colo., using biodiesel blends to power snowcats and other grooming vehicles, he wasn't convinced that the renewable fuel was a viable option for Cranmore Mountain Resort, the popular ski destination he manages in North Conway, N.H.



Mersereau stands on the tracks of a Bombardier snowcat

Three years ago, Mersereau's attitude shifted when, in person, he listened to Keene, N.H., Fleet Superintendent Steve Russell speak about his experiences with biodiesel. Intrigued and hungry for more information, Mersereau spoke with Russell after his presentation during a forum put on by the Granite State Clean Cities Coalition (GSCCC). The GSCCC is a group of 65 private and public organizations in New Hampshire dedicated to improving air quality through the use of cleaner-burning alternative fuels; the group has ties to the federally-funded Clean Cities Program. Through his conversation with Russell, Mersereau learned about a grant program funded by the GSCCC. That, and Russell's presentation, was enough to convince him that using biodiesel could work at Cranmore—and that going green was "the right thing to do."

When Mersereau returned to Cranmore, he shared his newfound enthusiasm for biodiesel with the resort's decision-makers. Subsequently, the company pursued, and was able to land, grant funds from the GSCCC that covered the incremental costs of the biodiesel that would be used at the resort over the course of one ski season. The funds would also help with expenses for the rental and installation of a 4,000-gallon above-ground storage tank for the renewable fuel. That winter, Cranmore became the first ski area in the East to use biodiesel in its snow-grooming fleet. Ultimately, that distinction would make the resort the subject of a case study carried out by a non-profit environmental organization.

Through in-depth interviews with Mersereau and other Cranmore personnel, Jennifer Schroeder, a case study writer for Clean Air-Cool Planet (CA-CP), an organization dedicated to finding and promoting solutions to global warming, compiled a comprehensive look at the performance of the biodiesel used in the icy North Conway climate. The results of the CA-CP report were released in September.

Recipe for Success

Mount Cranmore is situated alongside Mount Washington in North Conway, surrounded by national forest and state park acreage. With the border between Maine and New Hampshire just off to the east, North Conway is a year-round resort village that's a big draw for snow sport enthusiasts. The resort is on the southern edge of Mount Cranmore, above Mount Washington Valley.

Cranmore's 40 trails have 1,200 feet of vertical reach. Winter temperatures in North Conway average just above the single digits, but are known to dip as low as minus 29 degrees Fahrenheit, making the ski area an ideal place for a case study on the performance of biodiesel blends in frigid temperatures.

Interestingly, the study found that Cranmore Mountain experienced no difficulties with biodiesel blends—specifically B20—in three ski seasons from 2003-'06. “We used B20 that first winter and had nothing negative—no cold weather problems,” Mersereau says. “Everything ran well.”

The resort's snow-grooming fleet is comprised of four Bombardier snowcats, three of which are powered by six-cylinder, 270-horsepower Cummins Inc. engines, and one with an 8.81-liter, 350-horsepower Caterpillar Inc. engine with a turbocharger and an air-to-air cooler. Cranmore's two John Deere diesel engine auxiliary generators were also switched over to B20; the generators are used to power the resort's ski lifts in the event of an electricity outage. Other diesel-powered equipment and vehicles, including a loader/backhoe, also became part of the resort's B20 fleet.

While it is still too soon for the resort's mechanics to bear out any long-term maintenance differences—good or bad—that may be attributable to the use of B20, the CA-CP report did note that oil filters were cleaner during oil changes and there were less fuel filter failures. Short-term, Cranmore reported no additional wear and tear, and no needed mechanical alterations or changes to any equipment in order to accommodate B20. After burning more than 60,000 gallons of the blend, it was found to be just as efficient as using straight diesel—and it proved to be just as reliable in winter conditions.

According to the National Biodiesel Board, B100 gels at a slightly higher temperature than No. 1 or No. 2 diesel, but John Rymes of Rymes Propane and Oil constantly reminds committees and state representatives that conventional diesel gels in cold temperatures, as well. The proper blending of a biodiesel product plays a large part in avoiding engine failure due to gelling and clogging, and Rymes says his company's unique way of approaching biodiesel blending has contributed to the success of Cranmore's fleet.

“We look at the equation backwards,” Rymes says. “We take our worst-case scenario temperatures, and we blend the product based on [that]. Most people look out and say, ‘It's going to be cold. We better put this type of additive in and add extra kerosene to our product.’”

He continues, “We'll do a lab analysis on all products, including regular diesel with and without additives to come up with a product to [meet] the specifications and needs of the client. It wouldn't be crazy to hear of negative 40 [degrees Fahrenheit] on top of that ski area.”

With the help of the GSCCC, Cranmore rented a non-heated, above-ground fuel storage tank. At that time, it was thought that B20 or any other blend of biodiesel not stored indoors or in underground tanks would become more viscous. With no problems experienced storing the fuel in the above-ground tank, the project helped to demonstrate that if the appropriate specifications were set by the consumer, there is no harm in storing the fuel just as petroleum is stored, according to the CA-CP study.

Schroeder found in her study that not only did Cranmore's snow-grooming fleet operate as effectively with B20 as it had with diesel, but B20 use also led to noticeable air-quality improvements, according to Cranmore employees. Schroeder calculated that by reducing the amount of petroleum used by 12,000 gallons, the resort achieved a 10 percent reduction in lung-clogging particulate emissions, a 20 percent reduction in sulfur dioxide emissions and a reduction in carbon dioxide emissions of more than 100 tons. “[While] burning diesel, your eyes can water, it stinks and it's awful,” Mersereau says. “When running biodiesel, that goes away. You can tell the engines are running cleaner. People used to get headaches just working on them and starting them up in the garage. It doesn't smell like diesel fuel anymore.”

The Cost of Transition

According to Mersereau, one reason for the resort's initial reluctance to substitute conventional diesel with a biodiesel blend was the increased cost of the renewable fuel. When the Cranmore project began, the cost differential was roughly 44 cents per gallon. At that time, there were no commercial blenders in New Hampshire, so a significant portion of the GSCCC grant money was eaten up on shipping biodiesel

from out of state.

Renting and positioning an above-ground biodiesel storage tank at the resort cost approximately \$7,000. According to the study, Cranmore had made significant commitments in that first year, but after all the preparation, only half a ski season remained to actually run the snowcats on B20—not nearly enough time to properly measure the fuel’s performance. The following season, Cranmore approached the GSCCC with a second proposal that requested grant money for a second season—enough to cover the cost of purchasing the storage tank—on the condition that Cranmore would cover incremental costs and continue to use B20 on its own for a subsequent two years. The GSCCC agreed.

Today, with the U.S. renewable fuels boom in full stride, several fuel distributors in the region—mainstay petroleum distributors and biodiesel newcomers alike—have begun offering biodiesel in New England. There are six suppliers in New Hampshire alone, including Rymes Propane & Oil, according to Rebecca Ohler, director of GSCCC. For the past two ski seasons, Rymes Propane & Oil has supplied Cranmore with its biodiesel, bringing it in via railcar. The cost differential has also decreased significantly from the original 44 cents per gallon to less than 20 cents per gallon (as of January 2006), Mersereau says. “It’s not that much of a difference in cost (over diesel), and if we can make the environment better and don’t have to make any adjustments to our machines, then why not?” he says. “I just can’t say enough good things about it.”

Carving a New Path

Mersereau was so pleased with the performance of B20 that Cranmore is now looking at other ways to utilize biodiesel. “I can’t ever see us not using [biodiesel],” he says, explaining that the resort is currently looking at the possibility of using bioheat.

Ohler sees the Cranmore project as a true success story, and she is proud of the role the GSCCC has played in making biodiesel a little more mainstream in New Hampshire. In fact, there are multiple ski areas in New England that have followed Cranmore’s lead and switched to biodiesel blends, Ohler says, citing examples like Vermont’s Sugarbush and Smuggler’s Notch resorts.

Now, the work carries on. While it’s rewarding to see biodiesel use begin to proliferate in New Hampshire, Ohler and her GSCCC colleagues continue to give and facilitate presentations similar to the one that caught Mersereau’s ear three years ago. “There are more reasons for people to consider [biodiesel], and so much research has been done in the past few years,” Ohler says. “We don’t think everyone knows all they need to know about it.”

CA-CP is currently working on four additional case studies detailing other entities in New Hampshire that are using, or have used, biodiesel. The new case studies include the city of Keene Oyster River Biofuel Initiative; the New Hampshire Department of Transportation; and Rymes Propane & Oil. According to CA-CP Communications Manager Bill Burtis, the organization plans to release the majority of its study findings within a year.

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