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Engineers Believe Water-Powered Electrical Plant Worth Reviving

by David W. Smith, staff

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High above the surface of the Dog River in Northfield, Vt., three students scrambled across banks of melting snow, trying to measure the dimensions of an old wood mill.

While Caleb Heller and Stuart Schutta ventured out onto a narrow bank, occasionally crashing through the icy surface of the deep snow, Surasak Maneesri of Sisaket, Thailand, held back.



photo by David W. Smith, staff

"I did that the last time, but I don't want to today," he said, lifting and pointing to the sole of his military-style combat boot. "Slippery."

It's kind of a juggling act. How much can we spend before we stop making money and start losing money?

~ **Stuart Schutta, electrical engineering student**

Heller and Schutta, civilian students from nearby Norwich University, which offers both traditional and military student lifestyles, survived the task and moved into the interior of the building. The factory, which houses Black Bear Wood Products as its sole occupant, was nearly empty. They passed through room after room of old lathes, sawdust and crates of unfinished baseball bats and drumsticks, and mounted a ladder down into the dark guts of the building. There, a stream of water used to course beneath the structure into a 42-inch

pipe that fed an electrical generator before being directed back to the river.

The group, with fourth student Hugh Corbett, knows the building well. For weeks they've been measuring the facility, surveying the land and learning about its history. At this location, the river drops 17 feet over Northfield Falls, making it ideal for a small hydropower plant. Their plan, and the subject of their senior engineering project, is to study the possibility of reviving the old plant as a source of renewable energy for Northfield.

"The Dog River is an untapped source [of energy]," said Heller, a civil engineer and the Vermont Society of Engineers' student of the year. "There have been dams in the past."

Their idea, according to Heller, of Morrisville, Vt., is to create a proposal for a 12-foot concrete dam at the top of the waterfall, which would direct water into rebuilt channel under the building to another small structure housing the generators. They're also studying the feasibility of an 8½-foot inflatable dam, which could be raised and lowered more easily.

Schutta and Corbet, both electrical engineers, are determining the type and appropriate number of generators to give the town the most bang for its buck.

"How do we do it to make it feasible?" said Schutta, of Syracuse, N.Y. "It's kind of a juggling act. How much can we spend before we stop making money and start losing money?"

The project was partially funded under a new entrepreneurship program at Norwich, the country's oldest private military college. It was designed to familiarize students with the realities of project management—from marketing to public presentation—and help them understand there is more to engineering than simply making something that works. The dam is one of the program's premiere projects. Schutta added this was the first time a senior project called for the specialized skills of both civil and electrical engineers.

"For this kind of project, it's exactly what we need," he said.

Two weeks after that March factory visit, Heller had more information. They'd decided two generators would work best, and believe a plant could generate between 150 and 200 kilowatt hours of energy per year—enough to power a residential block. He added the town might have a better chance for approval of the inflatable dam, which would bring in an estimated \$153,000 annually, minus an operating budget of \$30,000 to \$40,000.

"The traditional dam would generate a lot more money, just because it's higher," said Heller.

The reason they decided to recommend a smaller project had more to do with environmental laws than energy needs or economics. The state of Vermont has strict regulations that seem to discourage dams, particularly if there's a chance of restricting trout movement along rivers, Heller said. He believes the inflatable dam would have a smaller impact, and the regulations shouldn't apply in Northfield Falls.

"There's no trout passage over the 17-foot drop," said Heller. "You can do it in an environmentally responsible way."

Engineering Professor Stephen Fitzhugh, who first brought the idea to students, agreed. "Right now, every indication is that this is a viable project," said Fitzhugh, who is chairman of Northfield's Planning Commission and thought the town should explore small-scale hydro generation as part of a larger plan to understand alternative energy options. Tasking Norwich students with the investigation, he said, was a perfect match.

As their senior year comes to a close, students will present their plan to organizations that include the town and the Vermont Society of Engineers. While it's unlikely the hydro project will move forward soon, Fitzhugh said the possibility is there.

"If the town or owner of the [wood mill] want to pursue this, they could take it to a consulting engineering firm," he said.

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