Revelstoke is a scenic and compact mountain city with a fast-growing ski area and a large cedar sawmill in the forested Columbia River Valley of British Columbia. When volunteers here decided to create a biomass district heating system, to be fueled with ample wood waste from the sawmill, they had a working model to follow—their own.

In the early 1990s, nearly all of its region’s timber products were being shipped away for processing. So residents created a community forest company that runs a city-owned tree farm and harvests 100,000 cubic meters of wood per year. Today, virtually all of the region’s timber is processed in Revelstoke.

Following that model, in 2001 local volunteers began working on a biomass energy project. Again they created a wholly owned subsidiary of the city, the Revelstoke Community Energy Corporation (RCEC), to be managed by a volunteer board on which city staff and council members form the majority.

At the time, the sawdust and other wood waste created by the Downie cedar mill was going up in smoke, in an antiquated “beehive burner” whose air emissions required that it be retired under provincial edict.

“People in Revelstoke always had an interest in seeing that energy put to good use,” recalls Geoff Battersby, a retired physician and former local mayor who served as the energy project coordinator and lead champion.

Organizers initially proposed a combined heat and power (CHP) dual project: a biomass energy plant would supply heat to the city and the sawmill, and would also generate power. But rates for buying power at the time were so low that planners developed just the district heating system: a 1.5 thermal MW (5.1 MMBtu/hour) biomass boiler with two kilometers of piping to major buildings in the city core.

Total investment was $6.6 million Canadian ($6 million US). That included $3 million for the central plant and equipment, $2 million for design, engineering, and other early phases, $1.1 million for energy transfer stations, and the rest for financing and other costs.

The Downie mill donated an acre of land for the heating plant, and continues to supply sawmill and other wood waste without charge on a 20-year contract. The mill buys about half of the heat produced by the plant for use in its drying kiln, and it provides staffing for the heating plant.

“Our mill cuts only cedar—that’s where all the green fuel for the district heating plant comes from,” says Aubrey Salon, the Downie employee who runs the plant, spending about half of his time there. “I like the cedar sawdust a lot as fuel, but the hog fuel is too irregular and gives me lots of problems.”

The plant’s struggles with mixed-quality fuel are not the only learning experience—local folks sometimes use stronger terms—that Revelstoke has had. Although project leaders today say they would “absolutely” do the project again, and are working on expanding it, they have had their share of bugs to work out.

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Challenging Oil-Water Heat Exchange

Much of the trouble developed because of a provincial staffing requirement that Revelstoke calls antiquated, and is lobbying to change. British Columbia mandates that boilers above a certain size be manned 24/7. Had it built a 1.5 MW (5.1 MMBtu/hour) hot-water boiler, Revelstoke would have fallen under that edict. (Local advocates note that in Scandinavia, biomass systems up to 20 MW (68 MMBtu/hour) in size are routinely remote-operated.)

So Revelstoke installed a boiler that heats “thermal oil,” which can carry much more heat than water. The hot oil is sent through heat-exchanging steam generators, to produce hot water for the district heating system and steam for the mill’s drying kilns.

“The initial problem we had was that we were getting water contamination into the oil,” Dr. Battersby says. That water would expand as it heated and cause oil to blow out through an expansion tank. Once that problem was fixed, there was another—tubes in a steam generator were failing because of corrosion due to oxygen in the water.

Frustrating?

“I’ll say,” Dr. Battersby agrees. “And not only did it set us back in getting more customers on-line to meet our projections, but it cost us a lot of money to repair all these things. However, we’re still afloat, still showing black ink.”

Meeting Goals, Planning Expansion

Revelstoke did this project to improve its air quality, reduce greenhouse gases, displace the need for trucked-in propane (the 8,000-population community’s nearest neighbors are 100 and 150 kilometers, or 60 and 90 miles, away), create alternate sources of energy and city revenue, and add value to a resource that could be processed locally.

Those goals are being met—and customers are happy.

“The system has served our B&B, Minto Manor, very well and reliably,” says David Johnson, who is the volunteer RCEC president. “Based on that kind of positive experience of customers, we want to expand to serve more buildings in Revelstoke.”

The system currently serves the city aquatic center and winter sports arena, high school, and a local hotel along with Minto Manor. RCEC is working to add 10 more—the municipal and federal buildings, Catholic church, and others.

“Our rate structure is based on a capacity charge and an energy charge,” Johnson says. The capacity charge reflects the cost of connecting a customer, plus financing. The energy charge is set linked to the competitive costs of energy.

“Overall, we aim to be about five percent below Terasen Gas,” Johnson says. “The costs are indexed to the Energy Consumer Price Index in B.C. each year.”

Dr. Battersby says the RCEC’s biggest long-term concern “is that the mill might go down, for whatever reason. It’s a risk.” But Downie is highly competitive in the North American cedar market—and the demand for its wood waste has developed strongly.

“Within six months of our signing the contract, their waste stuff came to have a value,” Dr. Battersby says. “They can sell the rest as far off as Florida.”

And Revelstoke still owns its community forest. So its fuel resource remain its own.