One of North America’s biomass energy innovators has been the district energy system in Charlottetown, the capital of Prince Edward Island, which uses woodchips and municipal solid waste plus some fuel oil to heat the city’s commercial center and large buildings. Initially developed in 1986 to serve the city’s complex of provincial office buildings, the Charlottetown system was Canada’s first biomass district heating initiative—and more than two decades later, the expanded facility continues to operate virtually trouble-free.

“In terms of the operation, it’s actually pretty smooth,” says Dave Godkin, general manager of the Charlottetown District Energy System, which provides hot water for heat to about 125 downtown buildings, and generates 1,200 kW of electricity, most of which is used internally with the balance sold to the power grid.

“The municipal solid waste provides the base load for the entire system,” Godkin explains. “Wood is next; then, once the wood is fully loaded, we go to No. 4 oil. For backup and ultimate peaking, we use No. 2 oil. This is really nothing new for district heating systems, to use multiple fuels.”

What is most notable about the Charlottetown system may be its very absence of drama. Through a major system consolidation and expansion in the mid-1990s, a series of ownership changes, and the recent decline of the region’s forest-products industry, the plant has simply, quietly continued to do its job.

The present-day system evolved out of three earlier projects. A local waste-to-energy plant was built in 1983, to turn municipal solid waste into electricity and steam heat. In 1986, the original woodchip district heating plant was separately constructed to serve the provincial office buildings, using public funds and operated by the public PEI Energy Corporation. Over the next decade, the PEI energy system expanded to serve a number of the downtown commercial buildings as well. In the same time period the University of Prince Edward Island, also in Charlottetown, built its own wood-fired district heating plant to serve its campus.

In 1995, the privately owned firm Trigen Energy Canada, Inc., bought all three plants, then consolidated the boilers into one facility at the site of the waste-to-energy plant. In 1997, Trigen installed a new, high-efficiency wood boiler (manufactured by KMW Energy), cogeneration equipment, and state-of-the-art emissions controls on the waste-to-energy plant. The original city woodchip plants were shut down.

Trigen was then bought by a US firm, US Energy Systems, and several years later PEI Energy was spun off and acquired by a Canadian income trust called Countryside. It was subsequently bought by PEI Energy’s current owner, Fort Chicago Energy Partners of Calgary.
Fuel Supply Appears Secure

Under Fort Chicago’s ownership, the system continues to provide heat via hot water to most of downtown Charlottetown: the provincial government offices, the University of Prince Edward Island, the Atlantic Veterinary College, the Queen Elizabeth Hospital, two shopping malls, and a number of other commercial and apartment buildings.

No new expansions are in the works, says Godkin. “We’ve got most of the larger buildings connected—and the smaller the buildings get, the less economical they are to try and connect, because of the costs of installing piping, heat exchangers, and other equipment.”

Each year, on average, the district system uses 36,000 tonnes (40,000 US tons) of wood and about 26,000 tonnes of solid waste, providing 85 percent of the plant’s fuel supply with those materials, the rest with oil. For years, the entire wood supply was sawmill waste from a large local mill owned by JD Irving Ltd.—but that mill “shut down here a couple of years ago,” Godkin says.

“We had to switch to chips from whatever land clearing and forest clearing we have here,” he explains. “We’ve got two contractors. They do some forestry work, some land clearing work, and we rely on them to source out the material.”

The province is not heavily forested, but Godkin isn’t worried about wood fuel supply.

“PEI has a relatively small forest industry, and the amount of material we take is really a drop in the bucket,” he says. “Whole tree chips certainly may be an option or a possibility in our future; it depends on what happens with the forestry industry. I’m confident that the wood is there.”

The Charlottetown boilers produce high-pressure steam that is converted to high-temperature hot water for the district heating system, and is also provided as steam to the hospital. The system’s demand is approximately 40 thermal MW (140 MMBtu/hour).

Asked if there are any major operational issues, Godkin says, not really.

“We do have from time to time some issues on fuel quality, but certainly we’re not nearly as susceptible to fuel-quality issues as some of the smaller systems are. Things actually work fairly well, other than the kind of normal maintenance that systems like this requires.”

Not too long ago, PEI Energy estimated how much oil it would be using, if it had to heat its customers entirely with fuel oil. The estimate, for petroleum oil avoided each year: 16,000,000 liters (4,160,000 gallons).