



Bruce Ander, CEO of Markham District Energy Inc., shows off a small, four-megawatt gas-powered system at Markham-Stouffville Hospital in Ontario.

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Meet the new generation of power plants: small, gas powered, and local

BERNARD SIMON

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Seen from the outside, the two power plants being built by Markham District Energy Inc. northeast of Toronto and Capital Power Corp. in east Calgary could not be more different.

The Markham project is so compact that it looks like an extension of an adjoining parking garage. With a capacity of just four megawatts, its output – normally delivered to the local distribution grid – will be used during outages mainly to power one customer, the neighbouring Markham-Stouffville regional hospital.

By contrast, Capital Power's Shepard Energy Centre is taking shape on a 60-acre site in an industrial park. At 800 megawatts, it will produce enough power to light and heat more than half of Calgary.

Yet the two projects have one important similarity. They will both be fuelled by natural gas, making them harbingers of a new era in power generation.

“Natural gas will provide the backbone of security of supply in North America over the next decade or two,” says Brian Vaasjo, Capital Power's chief executive officer. “It will be what we rely on to make sure the lights stay on.”

Bruce Ander, Markham District Energy's CEO, adds: “I've been in this business long enough that I've stopped predicting the future. But I certainly wouldn't have predicted stable gas pricing this

low five or 10 years ago. Right now, gas is clearly the fuel of choice for high-efficiency combined heat and power.”

The National Energy Board expects the natural gas share of Canada’s power-generation mix to grow to 15 per cent in 2035 from 9 per cent in 2010.

In the United States, where gas already makes up a quarter of total generating capacity, the Energy Information Administration forecasts that demand will jump by 22 per cent between 2011 and 2040, more than any other fuel source, including renewables. (Gas has a smaller share of Canada’s energy pie because of abundant supplies of hydro-electric power.)

The rising star of natural gas is partly explained by the fading attraction of rival fuel types. Coal, which currently makes up 14 per cent of generating capacity in Canada and almost 40 per cent in the United States, is in decline as controls on greenhouse gas emissions tighten. Natural gas produces only half as much carbon dioxide when it is burned compared with an equivalent amount of coal.

Among other fuels, a question mark has hung over the future of nuclear power since the 2011 Fukushima disaster in Japan. Wind farms are increasingly dogged by controversy, while solar and biomass can contribute only a tiny portion of future energy needs.

Gas has gained a further competitive edge with the unlocking of vast deposits by the technology known as hydraulic fracturing, or fracking. The process involves injecting water, chemicals and sand into shale rock under high pressure to break up the rock and extract the gas.

Environmental activists decry fracking because of the greenhouse gas emissions produced by the extraction process, including diesel fuel used to drill wells and escaping methane that may pollute nearby aquifers. “In principle, we would like to support natural gas as a transition fuel,” says Nigel Protter, head of the BC Sustainable Energy Association in Vancouver. But, he adds, “We do have concerns about where the natural gas comes from. Natural gas is not a clean fuel.”

For power utilities however, fracking has raised the prospect that natural gas prices – once so volatile that they were the biggest deterrent to building new gas-fuelled power stations – will remain stable for years, if not decades, to come.

Even so, gas-fuelled plants are better suited to some parts of the country than others. “Where you have really good hydro developed – in British Columbia, Manitoba, Quebec, and Newfoundland and Labrador – it makes sense to continue developing those hydro resources,” says Jim Burpee, president of the Canadian Electricity Association.

Investment in gas-fuelled power plants is likely be confined to Alberta, Ontario and, to a lesser extent, Saskatchewan and .

“There’s a lot of gas in Alberta and the economics make sense,” Mr. Burpee says. “In Ontario, if demand picked up in a hurry and there’s a need to build capacity, there’s no question that gas is the quickest to build.”

B.C.’s carbon tax, introduced in 2008, has spawned plans for dozens of small-district energy projects similar to the Markham one. Most are likely to be fuelled by biomass and natural gas.

Until recently Ontario’s push for renewable energy, coupled with lower-than-expected electricity consumption, dampened growth in large-scale natural-gas generation. The province lost one big gas project in October of 2010 when former premier Dalton McGuinty bowed to political pressure to cancel TransCanada Corp.’s proposed 900 MW plant in Oakville, west of Toronto. The decision, mired in political intrigue, has become a heavy millstone around the ruling Liberals’ neck.

Ontario's long-term energy plan – now under review – concludes that “natural gas will continue to play a strategic role in Ontario's supply mix as it helps to support the intermittent supply from renewables like wind and solar; meet local and system reliability requirements; (and) ensure adequate capacity is available as nuclear plants are being modernized.”

Nonetheless, Mr. Ander expresses frustration that the authorities have not shown more enthusiasm for small “district-energy” systems, such as the one at Markham-Stouffville hospital. These plants produce steam, hot water or chilled water that is piped into buildings for heating and air conditioning.

“The notion of small distributed-power generation is rising up to the top of many mayors' agendas,” Mr. Ander says, citing not only the economic and environmental benefits of small systems but also their resilience during storms and other events that disrupt the mainline power network.

“We're trying to get policy makers and politicians at the provincial level to understand the value of these assets,” he adds.

Markham District Energy, wholly owned by the local municipality, operates three units with two more under construction. Guelph and Vaughan are among several other Ontario cities pursuing district energy projects.

The view from Alberta is more upbeat. Besides the Shepard project, Capital Power expects to commission another large gas-fuelled power station within the next seven years on the site of the existing Genesee coal-fired plant in central Alberta.

In contrast to many other parts of the country, “we have increasing demand, so that needs to be met,” Mr. Vaasjo says. “We also have coal units that need to be retired before the end of this decade. There is a significant need for net new additional generation.”

Mr. Vaasjo foresees natural gas providing more base-load capacity, in other words, the heavy-lifting, around-the-clock generation so far met largely by coal and nuclear plants.

“Natural gas is such a popular fuel because every region and every zone has what makes sense for them from a power generation standpoint – coal, nuclear or hydro. You almost always need something like natural gas to complement that. It's extremely flexible, it's relatively clean, it just works extremely well with other fuel types.”

Who's using watts

Provinces using natural gas to generate electricity:

- British Columbia: 1,000 megawatts
- Alberta: 5,000 MW
- Saskatchewan: 1,000 MW
- Ontario: 6,500 MW
- Quebec: 1,000 MW
- New Brunswick: 350 MW
- Nova Scotia: 450 MW

Source: Canadian Electricity Association

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