Earth, wind, fire, water.

Building the power business
Starting out. Growing up. Going strong.

Like many energy companies in the 1990s, TransCanada’s first steps in the power business were on the marketing and trading front. But around 1998, the company decided to shift its focus to owning and managing power generation assets.

The early years were defined by initial forays into greenfield development. In Alberta, TransCanada was one of the most successful new entrants into the newly deregulated power market, building five cogeneration plants in the space of as many years, and ultimately winning the rights to three Alberta Power Purchase Arrangements. In Ontario the company built four plants and purchased a fifth—all of which were ultimately rolled into the TransCanada Power LP and later sold. However, development in Eastern Canada continued, with greenfield projects of increasing scale, including TransCanada’s first wind farm.

The U.S. Northeast was another area the company knew well due to the pipelines already in TransCanada’s portfolio. Beginning with a single New England power plant in 1996, TransCanada grew in the region by acquiring hydro assets, developing a major wind power project, and establishing a successful retail power business.

Other major milestones included a significant investment in Bruce Power, the second-largest nuclear power facility in the world, and the acquisition of Ravenswood, which is capable of supplying more than 20% of the power to New York City.

Today, TransCanada is Canada’s largest independent power producer and stepping into new regions of the U.S. “If there’s anything that surprised me, it’s probably how quickly we did it,” says Karl Johannson, Senior Vice-President, Canadian Power. “When I look around at the industry in Canada I see some companies that have been around for over 100 years and we were able to exceed both their capacity installed and their profitability in less than 12 years. That speaks highly of our ability to plan and execute strategies.”
The way TransCanada built the power business fits the recipe book for organic growth, starting with building $40 million projects, then $100 million projects, then $500 million projects, and then a $2 billion project. The power portfolio has expanded to include natural gas, nuclear, coal, hydro and wind generation.
It’s 1999. TransCanada is refocusing in the wake of its merger with NOVA the year before. Though the prevailing mood is to sell rather than buy assets, a not-to-be-missed opportunity presents itself.

Based on an investment thesis that power demand and prices would increase following deregulation and restructuring in Alberta, Alex Pourbaix, then-Senior Vice-President, Power Ventures (at left), convinces the TransCanada Board that the company should enter an auction to purchase up to two leases on the output of coal-fired power plants (the Alberta Power Purchase Arrangements, or PPAs).

“[The bidding] was actually done on the Internet, which was very novel for the time. There were progressive rounds where you would bid on a PPA, then other people could top your bid, then you would have a chance to top it again in successive rounds. At the start, we saw about one bid a day; by day seven, there was a bid every hour. They had consulted experts on game and auction theory to drive the highest price, so you could actually watch what your competitors were bidding. It was fascinating. The Board had authorized us to bid on two PPAs, and we could go up to something like $300 million total, but as we started bidding, the price went up over $200 million on just one of the PPAs; the Board gave us a little more money if I recall, to keep bidding, but in the end, we just acquired one, Sundance A, for $215 million.”

Ironically, just over a year later, Enron Canada began to unravel, and was looking to offload assets, including the second PPA TransCanada had bid on, Sundance B.

Terry Bennett, Vice-President, Power Development, recalls the purchase: “I think it was December 14th when the opportunity became real, and we had to get it done by the end of the year because of a complex court and bankruptcy process with Enron Canada and its parent. So we were literally here every day, and closed it on December 30th. It was very cool to see a big company like TransCanada react and mobilize that quickly. I’ll admit, it was sort of a fun time.”

Four years after that came a third PPA purchase. “Sheerness was notable in that, at the time, it was our largest single power acquisition outside of Bruce,” says Karl Johannson, Senior Vice-President, Canadian Power. “Most other potential buyers could not accept the size of the transaction and tried to buy only parts of it. This acquisition gave us a unique opportunity to achieve large scale quickly in a growing market. We had the confidence that we could take this large block of power and effectively market it.”
Still under construction and due online in late 2010, Halton Hills Generating Station in Ontario will operate during peak demand and generate enough power for about 600,000 homes.
“Every time you win a bid, it’s a team effort and there’s always a feeling of great satisfaction. That certainly is one of the highlights of the job. If you lose, there’s the other side of that. But at the end of the day, we learn something from it, and there’s always a lesson to be had that you use as you move forward to the next project.”

—FINN GREFLUND, VICE-PRESIDENT, POWER GENERATION AND DEVELOPMENT

GREENFIELD DEVELOPMENT

TransCanada’s greenfield power development business goes back to the late 1990s, when the company began building projects in Alberta and Ontario, starting with plants of less than 100 MW each. “TransCanada had money to invest and it was a big competitive advantage in those days, because the typical independent power producer was a very small company that had all sorts of difficulty trying to arrange financing,” recalls Karl Johannson, Senior Vice-President, Canadian Power. By June 2010, the company had 15 greenfield power projects under its belt (some of them sold as part of the Power LP in 2005). Most of these have been natural gas-fired plants. Today, TransCanada is capable of building some of the largest gas-fired power projects in North America.

Some of the latest projects use high-efficiency, low-emissions technology to minimize their environmental impact.

Combined-cycle natural gas generating stations, such as Halton Hills Generating Station (HHGS), use 30 to 40% less fuel energy than traditional generation alternatives. In addition to being amongst the most energy-efficient generators, HHGS also uses low-emissions technology to further minimize air pollution.

How it works:

- Natural gas is used to fuel twin gas turbine generators, which generate electricity and hot exhaust gas
- The hot exhaust gas from the turbines is used to make steam which generates additional electricity via a steam turbine
- After passing through the turbine, the steam is condensed to water, and the water is reused in the steam generator

Finn Greflund led a number of our very successful greenfield power development projects. Pictured here are Finn and some of his team at Portlands Energy Centre, in Toronto.

Left to right: John Mikkelsen, Finn Greflund, Terry Bennett, Nick Di Domenico, and Christine Cinnamon.
BY THE NUMBERS

Date of initial TransCanada investment: February 2003
Year investment first proposed to TransCanada Board (declined): 2001
TransCanada ownership: 48.8% of Bruce A, 31.6% of Bruce B
Bruce A: 4 CANDU reactors (2 online, 2 in refurbishment)
Bruce B: 4 reactors (all online)
Power output: 4,700 MW (6,200 MW after restarts)
Turbine hall length: 1,460 metres (4,790 feet)
(more than 14 CFL football fields)

Rank among world’s nuclear power plants: 2nd, behind the Kashiwazaki-Kariwa plant in Japan
Land area: 932 hectares (2,303 acres)
Roads on site: 56 km (35 mi.)
Wildlife living on site: 200+ species
TransCanada employees onsite: 5
Bruce Power employees who operate the plant: About 3,700 (2)

LAT 51°N, LONG 85°W

Bruce restart project team (left to right) Brett Schoneck, John Soini, Gary Juenke, Larry Bonazzo, all of TransCanada’s Operations and Engineering project management group.
How it works

The Bruce Nuclear Generating Station, the second-largest nuclear power facility in the world, uses CANDU (CANada Deuterium Uranium) reactors to generate electricity. Here’s how they work:

In the primary loop, pressurized heavy water is passed through the reactor core.

Here, the fission of uranium or other nuclear fuels heats the water. Because it is under high pressure, it can be superheated without boiling.

The pipes of the primary loop are passed through a steam generator filled with low pressure light water in the secondary loop. Because the water in the secondary loop is at low pressure, it boils.

The steam produced is forced through a steam turbine, which in turn powers the generators that produce electricity.

After passing through the turbine, the steam is piped across a tertiary loop containing cold water, which is returned to the steam generator.

TransCanada’s Corey Goulet, Vice-President, Technical Development (3, left), recently transferred to the Bruce Power nuclear facility near Kincardine, Ontario, on the shore of Lake Huron (4). He talks about how working at a nuclear power plant is different from working at a conventional plant.

“The first thing you notice is a lot more security. The whole process of getting into the facility as a visitor or as a new employee takes a lot longer,” describes Corey.

“The second thing that struck me was the enormity of the facility. Bruce produces more than 6,000 MW, the equivalent to about ten of our Portlands facility. It takes 25 people to operate Portlands, so for 10 Portlands, we have 250 people, right? This facility has almost 4,000.”

One reason for the large staff is self-sufficiency; in a rural environment, Bruce must supply almost all of its own services, including electricity, heavy equipment operations, food services, medical care, fire services and security.

“Because of the nature of the work, you have to control everything from a radiological safety perspective. You have to control what comes in and out much more carefully than you do at a different type of power plant; you really need a more self-contained site.”
HydRo

Vernon Station, a hydroelectric facility on the Connecticut River between Vermont and New Hampshire, was built in 1909, and was designed to produce 16 MW of power from eight turbine generator units. It was the first plant in the Northeastern U.S. to transmit electricity across state lines.

In April 2005, TransCanada acquired Vernon and 12 other hydroelectric plants from USGen New England. By then, Vernon was showing its age. Two units had been decommissioned because of mechanical failures, while two units were on “emergency run only” status because of equipment problems.

TransCanada opted to refurbish Vernon Station by installing four modern turbines to replace the obsolete units and making other improvements to the powerhouse. After the $55 million upgrade was completed in May 2008, Vernon Station returned to full power, with a capacity of 32 MW.

At Vernon’s 100th birthday party last year, hundreds of New Englanders celebrated the facility’s past and present.
“In the case of the hydro facilities, there were some really excellent, dedicated staff who joined us with the assets. They had continued to operate the hydro facilities through some very rough years and so when they saw us come on board they were relieved, I think a little bit, that we were financially sound and we were committed to the assets and staff for the long run. Vernon is an example where the employees were really thrilled that the company was very committed to taking what was a 100-year-old facility and giving it a new lease on life.”

—BILL TAYLOR, SENIOR VICE-PRESIDENT AND GENERAL MANAGER, U.S. NORTHEAST REGION
Ravenswood Generating Station, a 2,480 MW gas- and oil-fired plant, is capable of supplying more than 20% of New York City’s power. TransCanada acquired it on August 26, 2008.

Just three days later, technicians discovered a vibrational anomaly in “Big Allis,” a 1,000 MW turbine that is the plant’s biggest, and that was the biggest in the world when it was commissioned in 1965. Technicians investigated, and found a fracture in the unit’s high-pressure generator rotor.

This was bad news. The obvious solution—forging a new rotor—would take up to five years. But New York summers can be brutally hot, making the demand for electricity surge. Going offline for four summers was not an option.

The Ravenswood team found an innovative solution. The entire rotor was shipped to a foundry in North Carolina, where the damaged part was replaced and welded on to a 9,000 kg “stub shaft.” Shipped back in early 2009, the rotor was reinstalled in time for the 2009 summer peak.

Big Allis was back in play.

David Callender (above, left) and Gordon Bristol, prepping a boiler feed pump volute for shipment so it can be overhauled.

(1) Aleksandr Kazakov of the Ravenswood Maintenance Department.

(2) A view of Ravenswood from across the East River in Queens, New York.

(3) Clement Amanor (left) and Ekow Oppon of the Operations Department.

(4) Gregory Heinen, Operations Department, in the control room.
“It filters down, I mean, TransCanada always tries to settle things fairly by its stakeholders. We’ve always dealt with people properly, and you know, in Maine, at Kibby, we told them we’d be good corporate citizens, we did that, and they appreciate it. There were doubters initially, and now they’re no longer doubters. They’re thrilled to have a company of this quality as a neighbour.”

—NICK DI DOMENICO, PROJECT MANAGER
CARTIER

In 2004, Cartier Wind Energy, then a partnership of TransCanada, Innergex and RES Canada, bid on six Québec wind projects. The bids were TransCanada’s first forays into wind power generation. “TransCanada ended up winning 740 of the 1,000 MW that were awarded, which shocked everybody! We thought maybe one project, two projects, we got ultimately six projects out of it, and realized how big wind could be for us,” says Terry Bennett, Vice-President, Power Development.

KIBBY

The Kibby Wind Power Project in Maine, built on the experience gained through Cartier, added to TransCanada’s growing presence in the northeast U.S. In building Kibby (shown at left, and 1 and 3, above), TransCanada helped make a difference for ten local young people by co-sponsoring “Kibby Boot Camp” with the State of Maine and TransCanada’s partners and contractors on the Kibby project.

Kibby Boot Camp (2) was part of Maine’s WorkReady program, aimed at preparing young people for the job market.

During the six-week program, the participants received occupational safety and health training, courses in first aid and CPR, and job-seeking guidance. They also spent much of their time on the Kibby project site, learning about environmental research, surveying, road construction, wind turbine assembly and management, and renewable energy. TransCanada managers Wolfgang Neuhoff and Matthew Nazarko acted as mentors, as did managers and technicians from TransCanada’s partners and vendors at Kibby. All ten participants earned Maine’s WorkReady Certificate.

HOW TO BUILD A WIND FARM

“I’ve always said that wind projects are actually more like pipeline projects than gas-fired power plant projects, because of the repetitive construction activities,” says Corey Goulet, who was responsible for the construction of both Cartier and Kibby. “When you build a pipeline, you have a group that clears the land, another group that puts a trench in, another one that lays the pipe, another that welds it together, and so forth. Building a wind farm is no different. When you have 73 turbines, you have the crew that goes in and clears the land, another crew behind it builds the roads, another installs the turbines, et cetera, et cetera. So, experience-wise, we were well equipped to build a wind farm.”
CHAPTER 7  WHERE WE’VE BEEN

Building the power business

AUGUST 2000
Sundance A—PPA
First power purchase arrangement (PPA) acquired through Alberta government online auction.

JUNE 2000
Ocean State Power—full ownership
Positioned TransCanada to compete in the New England power market.

FALL 2001
Carseland and Redwater
Construction completed on two gas-fired cogeneration plants in Alberta.

DECEMBER 2001
Sundance B—PPA
Second PPA acquired in Alberta.

FEBRUARY 2003
Bruce Power deal closes
31.6% interest acquired in the world’s second-largest nuclear power facility.

OCTOBER 2004
Cartier Wind
Six wind energy projects awarded by Hydro-Québec.

APRIL 2005
Hydro acquisition closes
13 hydroelectric facilities acquired on Connecticut and Deerfield Rivers in New England.

SEPTEMBER 2005
TransCanada Power, LP sold
Originally formed in 1997, by the time it was sold, the Power LP encompassed 11 power plants in Canada and the U.S., totalling 744 MW. The Power LP included both natural gas/waste heat and hydro assets.

OCTOBER 2005
Bruce Power restart
TransCanada invested in multi-billion dollar restart and refurbishment program of the Bruce A nuclear facilities at Bruce Power.

NOVEMBER 2005
Sheerness—PPA
Third PPA acquired in Alberta.

SEPTEMBER 2006
Béacencour
Construction completed on gas-fired cogeneration plant in Québec.

MAY 2008
Portlands Energy Centre
Phase 1 construction completed in Toronto; in April 2009 phase 2 was completed and plant began full high-efficiency, combined-cycle operations.

AUGUST 2008
Ravenswood
Power generating station acquired in New York.

AUGUST 2009
Coolidge
Construction began on gas-fired peaking power plant in Arizona.

SEPTEMBER 2009
Kibby Wind
Phase 1 construction completed on wind farm in Maine.

SEPTEMBER 2009
Oakville
Contract awarded by Ontario Power Authority to build gas-fired combined cycle plant.

OCTOBER 2009
Zephyr and Chinook
Proposals announced for two high-voltage direct current (HVDC) power transmission projects originating in Wyoming and Montana.

JUNE 2010
Halton Hills
Construction continued on gas-fired plant in Ontario.

“The big question is, are people willing to pay for green power, because it’s going to cost a lot more. So at the end of the day, it’s about the consumer.”

—RUSS HANTHO, POWER GROWTH

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