

Powering progress with a can-do mindset

BWXT's roots in Canada's nuclear sector trace back to the industry's inception



BWXT has been a key player in the design and fabrication of steam generators, boilers, and pressure vessels, particularly for power utilities and industrial customers. (From left) Andrew Vickers, lead hand, fitters; and Micheal Bowers, QC inspector, stand inside a mid-fabrication steam generator at the company's Cambridge, Ont., facility. Images: BWXT

By Lindsay Luminoso

BWXT Canada has quietly powered some of the world's most transformative energy systems for nearly two centuries, starting with steam engines in the 1800s and evolving into a global leader in nuclear manufacturing and services today.

Rooted in Ontario's industrial heartland, the company has become a cornerstone of Canada's nuclear sector, supplying critical components for CANDU reactors, pioneering reactor-based medical isotope systems, and helping shape the future of clean energy with small modular reactors (SMRs).

As the global energy landscape shifts toward net-zero goals, BWXT's deep capabilities in precision engineering, nuclear-grade manufacturing, and workforce development position it at the forefront of a new industrial era—one that is Canadian-made and export-ready.

Early Beginnings

BWXT's Canadian roots go back to 1844, with the founding of Dumfries Foundry in Galt (now a part

of Cambridge, Ont.), which then became Goldie & McCulloch in 1859. At the time, the small foundry focused on industrial power applications using steam and grew with the Industrial Revolution.

It also has ties to Stephen Wilcox and George Babcock, inventors of the water tube boiler used in steam power plants and founders of Babcock, Wilcox & Co. (B&W) in 1867.

However, it wasn't until 1923 that B&W acquired Goldie & McCulloch, setting the stage for the company's eventual establishment of Babcock & Wilcox Canada Ltd., located in Cambridge, Ont.

Over the decades, B&W Canada became a key player in the design and fabrication of steam generators, boilers, and pressure vessels, particularly for power utilities and industrial customers.

Eventually, nuclear power became of great interest in modern society, and the company followed suit, helping to design and build nuclear plants in Canada and the United States.

The Foray Into Nuclear

B&W Canada became deeply involved in the nuclear energy sector with the development of the Canada Deuterium Uranium (CANDU) reactor technology in the 1950s.

"We've been involved from the beginning of the Canadian Nuclear Program, designing, manufacturing, commissioning, and servicing of CANDU nuclear power plants," said John R. MacQuarrie, president of commercial operations for BWXT. "We have about 60 years of activity focused on Canada's nuclear program."

This includes CANDU and pressurized water reactor steam generators, nuclear fuel and fuel components, critical plant components, and parts and related plant services across Canada and internationally.

Babcock & Wilcox spun off its thermal power division, which still uses the name Babcock & Wilcox. The nuclear division became BWX Technologies on Canada Day 2015.

While the company has a head office in Virginia, the Canadian division is a large and long-operating division that comprises most of the commercial businesses and serves two markets: nuclear power and nuclear medicine.



BWXT has been involved in CANDU reactor refurbishments, such as the manufacture of steam generators, for Bruce Power.

The company has focused on developing these two segments through a combination of organic growth and acquisitions. It acquired GE Hitachi Nuclear Energy Canada in 2016, which provided BWXT with nuclear fuel manufacturing and fuel handling capabilities, and Nordion's medical isotope facility in Ottawa in 2018, which became BWXT Medical and expanded the company's role in isotope production and radiopharmaceutical manufacturing for healthcare.

BWXT Canada also has expanded into other areas, including the manufacture of precision components for reactors.

For the last 10 years, the company has been laser focused on nuclear power. While it makes a range of products for the CANDU reactors, BWXT also makes fuel handling systems.

"CANDU reactors are uniquely refuelled while they operate," said MacQuarrie. "We make the systems for that design. We also have isotope systems that we put on reactors. Recently, we partnered with Ontario Power Generation to put a system on a Darlington reactor that can make isotopes, which we designed, supplied, and installed together with OPG."

Services like engineering and fieldwork are a substantial part of the business.

The company is always strengthening its service offerings. For example, it recently announced the

acquisition of Kinectrics, which got its start as Ontario Hydro's research division in Etobicoke, Ont. This large engineering and technology company has interesting testing and analysis capabilities as well as a laboratory environment in its primary facility.

"Kinectrics has expertise in transmission and distribution equipment, high-voltage cables, and all of the electrical equipment that you need for transmission of power," said MacQuarrie. "They also focus on substations at local distribution outside of the power plant and enable distribution into businesses and homes. That was new to us and something we wanted to add to our capabilities."

Canada's Nuclear Landscape

BWXT continues to play a key role in CANDU reactor refurbishments, SMR development, and national and international nuclear supply chains.

"We are seeing a positive business climate in Ontario and Canada for the power generation part of our business," said MacQuarrie. "We've seen long-term demand for quite some time because of life extension work with Ontario Power Generation at Darlington and Bruce Power for a combined total of 10 reactors they are working to extend the life of. For quite a while now, that has created considerable demand for almost everything we do."

Additionally, OPG and the province of Ontario have recently announced plans to extend the life of the Pickering Nuclear Generating Station. OPG also announced its SMR project at Darlington. BWXT, in partnership with GE Vernova Hitachi, has been involved from the beginning.

"It's been pretty positive in the Canadian context, but we're also an exporter," said MacQuarrie. "We are uniquely capable of doing certain things, especially designing and manufacturing large, complex components and equipment for nuclear plants. We've been working with a number of SMR developers because we're not affiliated with any reactor developer, so we can support any one of them."

For example, the company has announced work with U.S.-based TerraPower's Sodium reactor and potential work in Poland with a customer.

"We've got contracts with SMR developers and we're designing components," said MacQuarrie. "Hopefully, they will move to a manufacturing stage. We see good likelihood of export demand, and we're

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Feeder machining in the nuclear industry involves specialized techniques and equipment to fabricate and maintain the feeder pipes that carry coolant within nuclear reactors.

feeling positive about what we're seeing in terms of demand signals from the market."

BWXT Manufacturing in Canada

With such strong demand, the company has focused on ensuring that it has the right capacity to meet the moment. It recently announced plans to expand its primary manufacturing facility in Cambridge, adding about 55,000 sq. ft. and new equipment. BWXT also has made acquisitions that have increased its capacity, allowing it to better serve customers in the nuclear power industry.

"Everything we make is made to a technical specification, meaning it's all pretty unique," said MacQuarrie. "Those specifications have requirements built into them that are either coming from a nuclear code or standard or from a customer where they're adding their requirements."

That means that BWXT needs to work with materials that meet stringent quality standards and are tested in certain ways, either by suppliers or by the company during the manufacturing process. Those quality standards limit BWXT's choice of suppliers.

"While we can buy commercial grade at times, we would then have to upgrade it to meet those requirements," said MacQuarrie. "There's a cost to that. But with nuclear customers, we need to make sure that it meets all those requirements. That's a unique factor. Typically, you'll see that companies like ours that



BWXT has developed an extremely talented workforce but continues to look for welders qualified to perform pressure boundary welding.

specialize in nuclear tend to really specialize because it's quite different than other types of pressure vessel manufacturing for non-nuclear applications."

By volume, the company primarily works with steel. For large pressure-containing components, like a reactor vessel or a steam generator, the material is usually carbon steel forgings. However, a corrosion coating, like a stainless steel, can be applied to certain parts.

"Some of our components have areas that need to be corrosion resistant, so we need to work with really high-content nickel and unique alloys," said MacQuarrie. "Some of the advanced reactors get into very high temperatures, which means that we need to work with unique materials that are specified in coatings and standards to meet these extreme operating conditions."

Building a Nuclear Talent Pipeline

With the ongoing expansion, BWXT is hiring steelworkers, engineers, and other professional staff.

Currently, the Canadian division has approximately 3,000 employees, which includes its most recent acquisition of Kinectrics. Most are located in Ontario and across Canada; however, the company has a footprint in five other countries.

"We're hiring, and that's challenging," said MacQuarrie. "Like many companies, we are struggling with finding skilled tradespeople. But we're managing. We've got more hiring to do. That's the biggest activity that we've been focused on is making sure we have enough capacity, and because the market looks good, we've been making acquisitions."

The company has been able to acquire an extremely talented workforce already, but it continues to look for welders qualified to a certain level for pressure boundary welding.

BWXT has its own internal training program specifically for new welders and those with existing experience not necessarily in the nuclear space to help them meet industry requirements and earn nuclear qualifications.

"We do all testing in-house to make sure that our welders maintain their qualifications," said MacQuarrie. "We essentially have a welding school in-house where we'll bring them up to the level that we need to."

Non-destructive testing (NDT) also is a large part of what the company does. When a weld is made to form a component, it's important that the component gets tested. In nuclear, there are specific standards required to qualify to perform NDT, and the company is always looking out for workers with these skills.

"We've got fitting operations and other quality control operations, all of which require some pretty unique skills," said MacQuarrie. "But for the most part, we have the most difficulty finding highly qualified welders and non-destructive testing personnel."

The company also is looking for multidisciplinary engineers, whether mechanical, electrical, civil, or others. It has had good luck recruiting recent graduates and provides training to those who are unfamiliar with nuclear to get them up to speed on industry norms.

BWXT prides itself on being a member of various nuclear-specific organizations, including the Canadian Nuclear Association and the Organization of Canadian Nuclear Industries.

"We work with them to collaborate with workforce development programs or where we need to lobby collectively as a whole industry," said MacQuarrie. "We are members of chambers of commerce. We work with local businesses through those memberships or on our own. We work directly with colleges and governments to lobby and make sure that we have the right environment to attract labour and skilled professionals into our workforce collectively."

Nuclear Manufacturing Opportunities

In recent years, the governments of Canada and Ontario have announced considerable funding for nuclear energy projects, including life-extension and new-build reactors, which means significant opportunities for the company.

"The budget for the four SMRs at Darlington has been announced, and it is fairly significant," said MacQuarrie. "And to Ontario Power Generation's credit, they're driving local supply by focusing on Ontario or Canadian supply whenever they can get it. For Ontario manufacturers and fabricators, there's a tremendous opportunity there."

Nuclear is not subject to the cycles of the economy in the same way that other industries tend to be. It operates independently from the demand of normal commercial cycles.

Projects are often large and long term in nature.

"We're seeing all levels of government sending good signals about their interests in developing these projects and trying to work on regulatory timelines and the approval timelines," said MacQuarrie. "At the same time, we are seeing better engagement with First Nations, which is a critical part of what we do. It's a very encouraging landscape right now."

Ontario recently announced its integrated energy plan, with a significant focus on nuclear. It has some really interesting possibilities for large reactors at Bruce Power and OPG's Wesleyville site.

CANDU's plants in Romania, South Korea, and China are likely to require life extension work, which signals long-term visibility and good demand.

"I'm excited by the investments that we're seeing being made here," said MacQuarrie. "These are long-term projects. The announcement of the life extension of four reactors at the Pickering power plant, even though it's not in the construction phase, it's driving demand. Then we've got four SMRs at Darlington, highlighting the long-cycle, long-term demand. We are watching our export markets in the United States and Europe and seeing similar things there as well. And we're well positioned to be able to serve all markets." **FW**

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