

*Welcome to*  
**Darlington Nuclear  
Generating Station**



O n t a r i o P o w e r G e n e r a t i o n

**ONTARIOPOWER**  
GENERATION



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**Darlington Nuclear Generating Station** is Ontario Power Generation's newest CANDU (CANada Deuterium Uranium) nuclear generating station. It is a four unit station with a total output of 3,524 megawatts (MW) and is located in the Municipality of Clarington in Durham Region, 70 km east of Toronto. It provides about 20 per cent of Ontario's electricity needs, enough to serve a city of two million people. Darlington produces electricity with heat created by nuclear fission using natural uranium fuel. The heat produced by this reaction is transferred, via a separate heavy water heat transport system to boilers where ordinary water is boiled and the resulting steam is used to drive a turbine generator that produces electricity. This electricity is fed into transmission lines that carry the power from the site to residential, commercial and industrial users.

## ABOUT THE PLANT



### Reactor Buildings

These four structures are made of heavily reinforced concrete (external walls 1.8 m or six ft. thick) to enclose the reactors and related equipment. Interior concrete walls also shield personnel from radiation during operation. Each building contains one reactor and four steam generators (boilers). The reactor consists of a large, heavily shielded vessel or calandria which contains 480 fuel channels and 6,240 bundles of uranium fuel that are encased in zircalloy sheathing.



### The Turbine Hall

This steel-framed structure is referred to as the conventional side of the station. It contains a turbine generator set and associated equipment for each of the four reactor systems. Steam is brought across from the boilers atop the reactor buildings. The steam is used to drive one high pressure turbine, then three low pressure turbines before being condensed back to water and returned to the boilers to be reheated. Each turbine generator set has a single shaft rotating at 1,800 rpm.



### Vacuum Building

This 71 m (240 ft.) high cylindrical concrete structure is connected to the reactor buildings by a pressure relief duct and is a unique safety

feature of the CANDU system. The vacuum building is maintained at negative atmospheric pressure. Any release of radioactive steam from the pressurized systems would be sucked into the vacuum building, thus preventing its release outside the station.



### Tritium Removal Facility

Tritium is a by-product of the nuclear reaction and it gradually builds up in Ontario Power Generation's (OPG) reactors. To help keep workers safe, and to minimize the amount of tritium going into the environment, a tritium removal facility was opened at the Darlington site in 1990. This plant extracts tritium from heavy water used in OPG's nuclear reactors. The tritium is safely stored in stainless steel containers within a concrete vault.



### Irradiated Fuel Bays

Two water-filled pools inside the station store the irradiated fuel once it is removed from the reactors. The pools keep the used fuel cool and shield station workers from radiation. The used fuel will be moved to dry storage containers after the Used Fuel Dry Storage Plan for Darlington has been approved by the Canadian Nuclear Safety Commission.

## Safety

Public and employee safety is the most important consideration when operating an Ontario Power Generation nuclear facility. Like our other nuclear power generating stations, Darlington has been designed and built with multiple barriers to safeguard against the release of radioactive materials. These barriers are protected by careful plant operation and maintenance, regular testing and inspection by our highly qualified staff.

The Darlington station is licensed by the Canadian Nuclear Safety Commission which regulates the use of nuclear energy and materials to protect health, safety, security and the environment through the Nuclear Safety and Control Act. In addition, the station is subject to other federal and provincial government safety and environmental regulations such as the Environmental Protection Act and the Planning Act. Darlington meets or surpasses all the prescribed regulations.

## Darlington in the Neighbourhood

Darlington is committed to being a leader and keen community supporter. Our positive contributions to the local communities are manifold. Through OPG's Corporate Citizenship Program, we provide financial support and hands-on involvement to registered charities and not-for-profit environmental, educational, and community organizations. We're involved with everything from rain barrel programs

to jazz festivals to tree plantings to backyard festivals and bowl-a-thons. We are particularly proud of our leadership on the Waterfront Trail, our partnership with Durham College, our many partnerships with local schools and environmental groups, and our support for children's sports teams and recreational organizations.

Darlington Nuclear provides employment for thousands of people in the immediate and surrounding communities, and supports the local economy through purchases of goods and services. Our employees live in communities surrounding the plant and many of them are actively involved in maintaining a good quality of life in their communities. They contribute their services as community volunteers and coach amateur sports, participate in local service groups and support charities through fundraising and volunteer work.

## Our Commitment to the Future

Darlington, along with OPG's other generating facilities, plays an important role in Ontario's economy. It also plays a vital role in keeping our air clean, and will continue to produce large quantities of electricity with no smog producing emissions. In fact, Darlington has already made industrial history by becoming the first nuclear station in North America to be certified under the tough ISO 14001 environmental standard and our site has earned international recognition as a Wildlife Habitat.





## Turbine Hall

This steel frame structure, approximately 382 m (1,255 ft.) long, 54 m (179 ft.) wide and 45 m (148 ft.) high, contains the four turbine generators and their associated equipment. Each turbine generator has a single shaft rotating at 1,800 rpm.



Behind Darlington's advanced technology are the men and women who make it work. They are highly skilled and carefully trained. A nuclear operator, for example, must train for a minimum of seven years before being authorized to work in the main control room. And, training does not stop there, ongoing training of approximately 200 hours is required annually.

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### **More Information:**

We have more brochures on our nuclear stations and other facilities. To receive these or arrange for a visit to Darlington Nuclear, please contact us at:

Information Centre, Darlington Nuclear  
Ontario Power Generation  
Box 4000, Bowmanville, Ontario L1C 3Z8

Local Telephone: 905-623-7122

Toll-free Telephone: 1-800-461-0034

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You can also visit us on the internet at: [www.opg.com](http://www.opg.com)

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