



Building Change.

A pocket guide

The Centre for the Built Environment (CBE) includes dozens of environmental features.

This guide gives you a little background on what you will see as you walk through the building.

Described as a living laboratory, the Centre for the Built Environment is designed to balance the natural environment with the built environment – a unique concept for a trades and technology learning space. In this 11,148 square meter (120,000 square foot) building, students will learn how to change the built environments of the future, and to lead the way toward more sustainable building practices in Nova Scotia and beyond.

This building is almost 50 per cent more energy efficient than a conventional building.

By opening or closing the operable walls and doors, students in different disciplines can work collaboratively, just as they will in industry. Built-in interpretive and diagnostic features show how the building's systems function in real time.

NSCC has committed to reducing our environmental impact as a College – across all campuses. We don't have all the answers, but we're learning every step of the way – and we invite you to learn along with us.



Living Building.

Environmental Certifications

LEED

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ encourages and accelerates global adoption of sustainable building and development practices through the creation and implementation of universally understood and accepted tools and performance criteria.

The Harbour Wing of the NSCC Waterfront Campus is certified LEED Silver, and the Woodside Wing has been built to LEED Gold standards.

BOMA BEST

BOMA BEST (Building Owners and Managers Association of Canada – Building Environmental Standards) is a national program which provides standards for energy and environmental performance of existing buildings based on accurate, independently verified information. All NSCC buildings have been certified under BOMA BEST, and the NSCC Waterfront Campus has been certified at Level 4. It is the highest certified building in Canada to date.

Audubon

The NSCC Waterfront Campus has received certification in Environmental Planning from the Audubon Cooperative Sanctuary Program, an international program administered by Audubon International designed to help landowners preserve and enhance the environmental quality of their property.



Building Possibilities.

Environmental features



Exterior living wall X E

The exterior living wall is located on the east end of the building, facing Pleasant Street. Planted in May of 2010, it has 24 plant species that were rigorously tested for Nova Scotia climate conditions. The wall contains more than 7,000 plants including begonias, daylilies, hostas, and seven native species, such as the horsetail, bunchberry, winterberry and ferns. The plants, baskets, irrigation system and location of the wall were all developed and/or researched at NSCC. Rainwater collected from the roof is mixed with nutrients and used to irrigate the living wall.

Bioswale X B

A Bioswale is a gently sloped ditch lined with grass and other plants. It is a natural filter used to clean storm water run-off. As water flows over the sloped soil, the plants filter out contaminants. The excess water settles in retention ponds, where it slowly seeps back into the local water table. As a result, less storm water enters the city storm sewer system and the water entering the ground water table is cleaner.

Green roof 5 B

The CBE's green roof has 743 square meters (8,000 square feet) of plants, including purple coneflowers, brown-eyed Susans, sedums, herbs, common roses and low-bush



blueberries. It is planted in five zones: potted plants, trays, sod, intensive and extensive growth. The intensive zone, with deeper soil, sustains more intensive root systems. The green roof provides insulation for the building, reducing heating costs in the winter; and soaking up the sun's energy during the summer, reducing the need for air conditioning. In addition, the plants and soil reduce the impact of rainwater run-off by absorbing the rain that falls on the roof.

Renewable energy technologies

Renewable energy comes from sources that nature is able to replace. They include sunlight, wind, rain, tides and even heat trapped below the earth's surface. At this campus we have several types of wind turbines, solar photovoltaic panels, solar thermal panels, geothermal wells, and heat recovery units. NSCC students, staff and partners can research, study and practice on the latest technology.

Wind turbines X G X C 5 F 5 D

The site has five types of wind turbines. The hybrid street light located on the Pleasant Street lawn is a vertical wind turbine with a solar photovoltaic panel. A battery in the base stores enough energy from the wind and sun to power the light from dusk to dawn. On top of the man-made hill are two horizontal wind turbines classified as urban residential wind turbines. On the roof are two vertical wind turbines and two Blade Tip Power System turbines that look like bicycle wheels.



Solar thermal (plates/tubes) 5 C X I

Solar thermal technology mounted on the roof includes six evacuated tube panels and an array of 'flat plate' panels. These technologies offset the cost of heating the building's domestic hot water.



Cansolair® X F

The Cansolair thermal unit, designed in Newfoundland, is a single panel made from aluminum cans. The cans are painted black to absorb the sun's energy which heats the air inside. The heated air rises through the cans and is pushed out of the unit by a fan into an otherwise unheated storage shed. One of these units can heat a 93 square meter (1,000 square foot) space.

Solar photovoltaic 5 C X I



The CBE is outfitted with many solar technologies including solar photovoltaic (PV) panels. There are two types of solar panels found on site: standard and bi-facial. Standard panels absorb sunlight on the face closest to the sun while bi-facial solar panels are designed to absorb energy from the sun directly as well

as light that reflects back indirectly from the surrounding environment. The stationary panels are located on the roof. Located between two ground-mounted horizontal wind turbines are two Sun Trackers, one with a standard PV panel and the other with a bi-facial PV panel. Sun Trackers control the movement of the PV panel to orient the panel toward the sun, maximizing the energy captured.

Geothermal X H

Located on the south side of the CBE is a geothermal field with 36 wells. Each of these vertical wells is 152 meters (500 ft deep) and together they provide 100 per cent of the building's cooling and 50 per cent of the building's heating needs. There is also a 76 meter (250 feet) test well in the field for field research.

Interior living walls 3 D

The two Living Walls in the Centre for the Built Environment provide a cooling effect, the soothing sound of trickling water, visual appeal, and



reduced glare – all while helping to clean the air. These walls are hydroponic, which means that there is no soil sustaining the plants. Instead, a mesh-like material is used to hold the plants in place while water and nutrients nurture them. Fans located above the walls draw air through the roots of the plants, filtering out impurities.

Design & Innovation Centre 3 L



The Design & Innovation Centre is a learning space where students, faculty, business partners and industry collaborate to generate solutions to real-world problems using the power of technology, creativity, imagination and innovation.



Mechanical room 5 A



Located on the top floor, the Mechanical Room also serves as a teaching and demonstration lab for students and industry partners. It contains the Heating, Ventilation, and Air Conditioning (HVAC) system. The HVAC system is the heart and lungs of the building: pumping water and air where it is needed, regulating temperatures, filtering out impurities and supplying fresh air.

This system uses a combination of energy sources to heat and cool the building – including steam purchased from the hospital next door, solar and geothermal energy. In addition, an external solar wall supplies warmed fresh air to the heating system, reducing energy needs.

Building Systems Monitoring Research Lab 3 B

This space is a research lab. What you see in this lab is data collected in 'real time' from about 3,400 points in the building. The data helps explain how the building is acting and living at any given moment. The data will be used by students to explore and study the building operation of the Waterfront Campus. This system is also used by our Facilities department to monitor and manage building operations.

Data you can explore:

- Building energy use and savings
- Energy produced by wind turbines, geothermal systems, solar energy
- Operation of heating, ventilation and air conditioning systems
- Stress and strains put on building components such as walls, floors, and roof
- Temperature of inside air, outside air, soil and well water
- Temperature and use of domestic water
- Classroom temperatures and lighting power use
- Security and fire alarm systems

Shadow window 3 M

The word 'BALANCE' appears and disappears with the movement of the sun – a message to be discovered and reflected on as we work to find a more harmonious relationship between the built and natural environments.



Word walls balance the natural environment with the built environment 3 N

Two walls in the main entrance area of the CBE capture the relationship between the natural environment and the built environment. The natural environment word wall features handwritten text and natural elements engraved into the wall as if eroded there, or carved into rock like Mi'kmaq petroglyphs, tracing human impact over time. The words and images of the built environment wall reflect what has been created over time from human action. The elements are constructed in 3D, projecting out from the wall surface, suggesting the impact of mankind's ongoing development.

UNESCO wall 3 O



The CBE was designed with principles and values that embrace stewardship. A cornerstone of this was the UNESCO Learning for Work, Citizenship and Sustainability Bonn Declaration of 2004 which notes the key role of education in leading change.

"... since education is considered the key to effective development strategies, technical and vocational education and training must be the master key that can alleviate poverty, promote peace, conserve the environment, improve quality of life for all and help achieve sustainable development ..."



The Centre for the Built Environment is located at the Nova Scotia Community College Waterfront Campus in Dartmouth, Nova Scotia, Canada

nsc.ca/cbe



Centre for the Built Environment