

Nanaimo

CLEAN TECHNOLOGY AND GREEN ENERGY SECTOR



Foreword and Acknowledgments

On behalf of the Nanaimo Economic Development Corporation (NEDC) and our Nanaimo Thrives Partners, we are proud to present the Nanaimo region's first Clean Technology and Green Energy Sector Profile.

The NEDC provides advice on business start-up, growth, and relocation. This supports local business retention and expansion, and assists new businesses to establish in the area. With the goal of business investment and attraction, including international investment, reports such as these are paramount in demonstrating clearly what our region has to offer.

This Clean Technology and Green Energy Sector Profile is a rich and intriguing sector profile of Nanaimo's Sustainable technologies sector that clearly articulates the total value proposition that the region offers for businesses considering investments and growth. This report will be used to actively attract thriving companies to the Nanaimo region, which will ultimately increase our local tax base, introduce new high-paying jobs, and establish Nanaimo as a leader in Clean and Green technology for years to come.

We thank our community partners, shareholders and supporters for allowing us to serve the Nanaimo region, and to continue building a prosperous community through economic opportunity.



John Hankins, CEO
Nanaimo Economic Development Corporation

Nanaimo is located on the east side of Vancouver Island, off the southwest coast of British Columbia. The city is situated within a short 20-minute travel time to downtown Vancouver by seaplane or helicopter, and a 90-minute drive to Victoria, the capital of British Columbia.

Nanaimo is ideally located in the heart of the largest North American island in the Pacific Ocean, Vancouver Island. The city has a beautiful, protected natural waterfront that includes an active harbour, marina, seaport and airport. Against a backdrop of coastal mountains, Nanaimo is home to scenic lakes, mountain trails and parks, and pristine forests of the UNESCO-designated Mount Arrowsmith Biosphere Region. The city boasts nearly 100,000 residents and a highly skilled labour force that is supported by Vancouver Island University, with enrolment of 17,000 students. In addition to its idyllic setting, Nanaimo enjoys a cost of living that is a quarter of that of Metro Vancouver and considerably less than Victoria. Low costs of doing business, outstanding quality of life, and proximity to Canada's largest green tech hub - Vancouver - have meant that a growing number of businesses are choosing Nanaimo as their home.

In recent years the Vancouver+Victoria+Nanaimo region of the West Coast of Canada has blazed a trail as the nation's leader in green technology and sustainability. The green economy in the Nanaimo Region consists of products and services that conserve the use of energy and natural resources, reduce pollution, provide alternatives to carbon-based energy, and repurpose waste. Nanaimo has a strong base of clean tech businesses spanning many industry sectors including land development, water conservation technology, scientific consulting, green building, natural resource management, and waste management.

This report contains a profile of these businesses, the regional assets that support their growth, and opportunities for green energy and clean technology businesses to grow in Nanaimo.

For more information on Nanaimo's Clean Technology and Green Energy Sector, contact:

Nanaimo Economic Development Corporation
104 Front Street
Nanaimo BC V9R 5H7
250-591-1551
info@investnanaimo.com
www.investnanaimo.com
Twitter: @InvestNanaimo





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Nanaimo is a Growing City...

The City of Nanaimo is a vibrant and growing regional centre with a population of approximately 87,000 residents, 5,800 businesses and GDP of approximately \$4 billion. Forming one of two major gateways to Vancouver Island, Nanaimo is an important service centre for a regional population of 374,000 people living throughout Central and Northern Vancouver Island, within a one-hour travel time from Nanaimo. Looking forward over the next thirty years, the City's population is projected to increase by nearly 40,000 residents and 25,000 jobs, for a total of 126,000 residents and 75,000 jobs. Nanaimo is experiencing strong growth in new business formations and incorporations (up 15%, in 2015, far exceeding the 1% growth in the Capital Regional District). In addition to population growth, Nanaimo's passenger travel and cargo shipments by sea and air are all on the rise.

...Backed by British Columbia's High-Tech Strategy

Technology and innovation is a key contributor to Nanaimo's growth and the fastest growth sector in British Columbia. The sector is poised for continued growth, driven by the Province's #BCTECH Strategy. #BCTECH is investing \$100 million in Series A financing for high tech companies in BC. British Columbia also has a \$100 million investment in clean technology commercialization (through Evok Innovations) and ongoing investments in talent and access to markets.





Connected to Vancouver...

Nanaimo is an ideal location for international clean tech firms looking for proximity to Vancouver. Vancouver is North America's largest clean technology hub and home to many of British Columbia's established clean tech businesses. As a nexus of clean technology talent, research, and development, Vancouver offers unparalleled world-class resources. However, for some companies, the high costs of living in Vancouver make the city a less feasible place to operate. Vancouver's cost of living is now the highest in North America (the average single family home price in Summer of 2016 was \$1.4 million according to the Real Estate Board of Greater Vancouver). Business costs are also high, with costs of operation in Vancouver reaching the highest of major cities in Canada.

Located only 61 kilometers from Metro Vancouver, Nanaimo is home to a growing number of green energy and clean technology businesses that enjoy access to Nanaimo's highly-educated high-tech labour force, research and development infrastructure, pristine environment, and outstanding quality of life -- at a fraction of the cost of operating in Metro Vancouver. There are approximately 350 high tech businesses in the Nanaimo Region that generate over \$200 million in revenue and employ about 2,200 workers in the technology sector.ⁱ

Connections to Vancouver include rapid connections via seaplane and helicopter that can get Nanaimo residents to downtown Vancouver in less time than it takes for Vancouver residents to travel through traffic from suburbs like Richmond, Surrey, Coquitlam, or Burnaby. Beginning in 2017, Nanaimo plans to also offer high-speed passenger ferry service that will shuttle residents from downtown Nanaimo to Downtown Vancouver in about an hour. In addition to high speed ferry service, there are currently two ferries offering service from Nanaimo to Vancouver. The Nanaimo airport has approximately 18 inbound and 18 outbound flights a day connecting Nanaimo with Vancouver, Victoria, Calgary and other communities throughout the region.

ⁱ Nanaimo Tech Sector Economic Impact Study (December 2013, Nordicity)

...and the Northwest Clean Technology Corridor

British Columbia's clean technology sector spans power generation, energy efficiency, transportation, and industrial processes that create green benefits. The clean tech sector's revenues are expected to total **\$3 trillion** by 2020, creating great opportunities for investment.

More than 200 BC clean tech firms generated an estimated **\$1.7 billion** in revenue in 2014. Many of these companies are recognized globally for leadership in this industry.

The clean tech industry in the state of Washington employs nearly 90,000 workers and is backed by more than a billion dollars in venture capital. There are more than 100 clean tech companies in Washington, that hold 195 patents in 12 industrial sectors that include energy storage, energy efficiency, green building, clean energy and biofuels, efficient lighting, electric motors, and advanced materials.

Oregon's clean technology sector employs approximately 58,000 workers. The state is a leader in sustainable transportation, ocean energy, fuel efficient vehicles, renewable energy, clean cities, and energy-saving homes, buildings and manufacturing.

Nanaimo's location in the heart of the Northwest Clean Tech Corridor affords the city's clean tech businesses the opportunity to collaborate, expand, and tap new markets in North America and beyond.

The Northwest Clean Technology Corridor is defined as the clean tech businesses, institutions, and resources that are located in the Pacific Northwest, inclusive of British Columbia, Washington and Oregon

Nanaimo
(Pop. 98,000)

Victoria
(Pop. 344,630)

Vancouver Metro
(Pop. 2.46 million)

Seattle Metro
(Pop. 3.73 million)

Portland Metro
(Pop. 2.31 million)

An Attractive Business Climate

Nanaimo's cost of real estate is approximately one quarter that of Vancouver. Average commute time from Nanaimo's outer boundaries to downtown is 20 minutes, compared with over an hour in Vancouver.

In 2014, KPMG ranked Nanaimo as the offering the second-lowest costs of doing business among 20 cities surveyed in the Pacific Northwest. The City has excellent telecommunications infrastructure with access to fibre optics that offer high speed Internet.

Spectacular Setting with Unparalleled Quality of Life

A pristine environment, temperate climate, year-round festivals, and community activities make Nanaimo an incredible place to live for those who enjoy boating, diving, hiking, biking, and exploring the largest island in the Pacific, east of New Zealand.



A Growing Base of Clean Tech and Green Energy Businesses

Nanaimo's base of clean tech start-ups and established businesses is growing as these firms produce cutting edge technologies that are exported globally.

The sector is diverse. It includes companies directly involved in renewable energy development, new technology development for sustainable transportation, water and resource management, leadership in sustainable development and green building, and businesses engaged in environmental resource industries including fisheries, aquaculture, forestry, agriculture, and mining.



Electric Vehicles & Green Transportation

BC is a Leader in Hydrogen and Fuel Cell Technology

Mercedes Benz Fuel Cells, a division of Daimler, has built an automated production facility less than 100 km from Nanaimo in Burnaby BC. The state-of-the-art facility uses world-class technologies to build Membrane Electrode Assemblies (MEA), seals and fuel stacks. The facility is working to ramp up production to produce fuel cells for next generation of Mercedes' fuel cell vehicles

Nanaimo's Clean Tech Industry Clusters Building a Sustainable Transportation Economy

British Columbia is a global leader in sustainable transportation research and is one of the world's leading regions for fuel cell, hydrogen, and electric vehicle technology development and manufacturing. Daimler established its global center of excellence for fuel cell stack manufacturing in British Columbia due to the established fuel cell cluster in the region. The transportation sector has long been among Canada's largest contributors to greenhouse gas production, but businesses and organizations in Nanaimo are changing that through sustainable transportation strategies, electric vehicles, and technology development that is reducing environmental footprint and creating a sustainable transportation economy.

Nanaimo is home to one of Canada's first electric vehicle manufacturers: **Canadian Electric Vehicles Ltd (CEV)**. With over 25 years of electrical vehicle manufacturing experience, CEV, has produced a wide array of industrial vehicles ranging from electric trucks and carts to electric ice rink surfacing vehicles to three-wheeled police vehicles to a converted electric Bobcat.

According to CEV founder Randy Holmquist, the company's success in the Nanaimo area has been linked to the low costs of operating on the island, highly skilled labor force, and a robust local and global market for electric vehicles. Randy notes, "It may cost us a few hundred extra bucks to get a vehicle off the island, but that cost is more than offset by the low overhead costs of operation. Plus our facility is located on five acres in paradise with a thirty second commute to work."

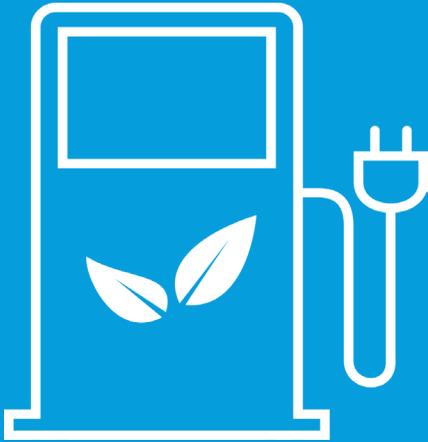
The electric vehicle (EV) market on the island is supported by an expanding electric charging network in Nanaimo and across Vancouver Island. In 2012 Sun Country Highway, showcased its network of level 2 electric vehicle charging stations by using nearly 200 EV charging stations to travel the longest highway in North America from St. John's NL to Victoria, BC at **no cost to the electric vehicle owner**





Canadian Electric Vehicles Ltd.

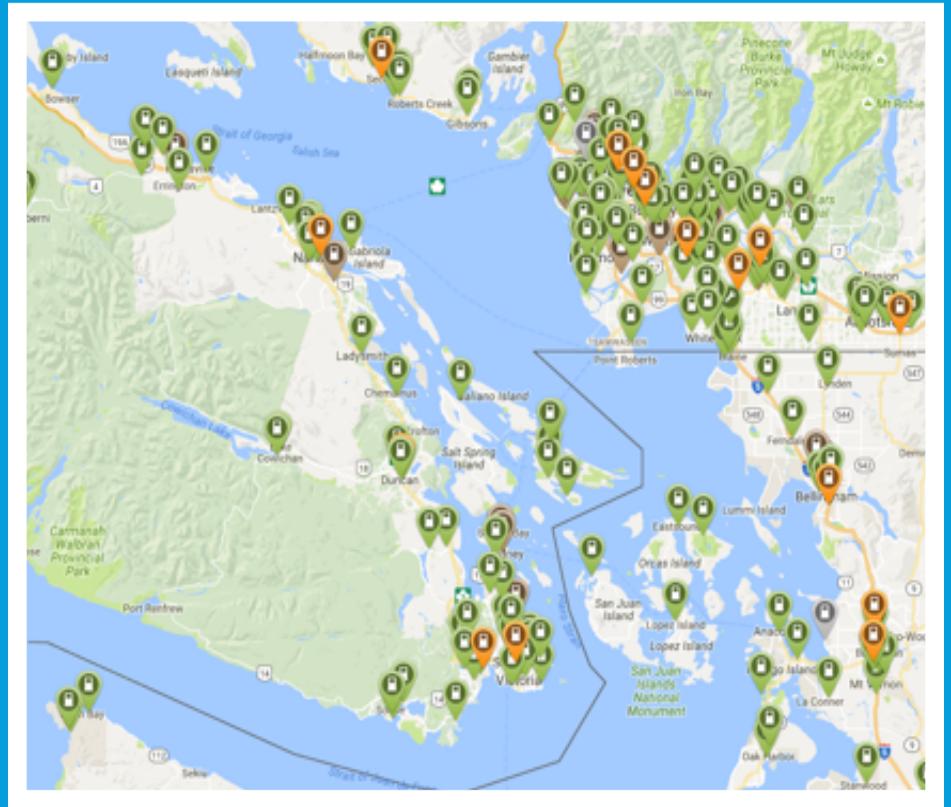
Based minutes north of Nanaimo in Errington, British Columbia, Canadian Electric Vehicles (CEV) has been designing and manufacturing electric vehicles and electric vehicle components for over 25 years. With world-wide sales, CEV is a global business. Vehicles in service range in size from three ton aircraft refueling and LAV trucks to the Might-E Tug, an electric towing unit that tows a variety of carts and equipment weighing up to 10,000 pounds. CEV's primary product is the Might-E Truck, a custom heavy-duty electric utility vehicle. Might-E Trucks are in operation at universities, government sites, businesses, parks, municipalities and other organizations. Canadian Electric Vehicles has a direct positive impact on the environment, not only through a zero emission product line but also through ecologically sensitive operations at CEV's manufacturing facility. The facility makes extensive use of rain water, waste-to-energy systems, and the operation of "off-grid" buildings.



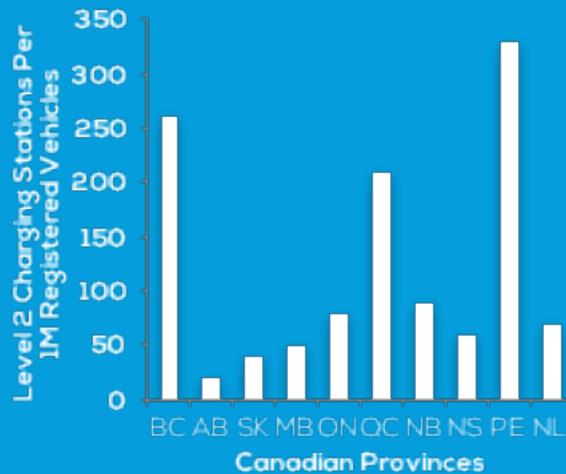
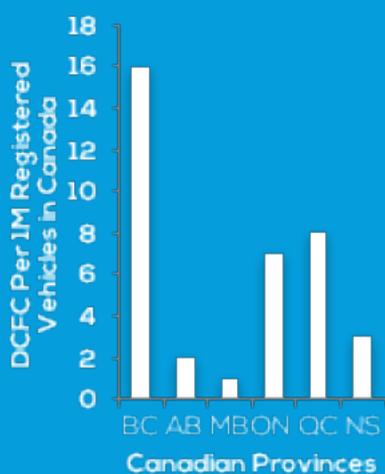
Public Electric Vehicle (EV) Charging Stations

Nanaimo has the infrastructure to support a growing electric vehicle market. Electric vehicle charging stations are available throughout Nanaimo and much of Vancouver Island. British Columbia has the highest number of DC fast chargers (DCFC) in Canada, as well as the second highest number of Level 2 charging stations.

The BC government also supports the EV industry through the Clean Energy Vehicle Program that offers an incentive rebate on the purchase of a new electric vehicle.



Public Electric Vehicle Charging Stations in the Region





BC Hydro EV Charge Park at Powertech Labs – Multi-DC Fast Charger Station for Advanced Operations Testing
Photo Credit: NRCan

Renewable Energy

Harmac Pacific Cogeneration

Construction: 2013
Cost: \$45M
Max Capacity: 55MW
Feedstock: Wood waste
Excess Generation Client: BC Hydro

Harmac Pacific Co-Generation
Credit: Allnorth

Renewable Energy and Resource Conservation

British Columbia enjoyed \$5.2 Billion in clean energy investment between 2010 and 2014, driving a 12% growth in renewables as a percentage of power in the grid. Renewable energy projects in the province support jobs for approximately 14,100 workers in BC, including 7,700 workers in direct renewable energy jobs. This includes about:

- 5,800 workers at large hydro projects,
- 4,400 people at biomass and biogas projects, and
- 1,300 in wind and solar projects.

Policies like B.C.'s carbon tax and clean energy requirement have helped make the business case for investments in clean energy in the province.

Nanaimo businesses, government, and institutions have all played roles in the local renewable energy market. The market is driven by investments in cogeneration, biogas, biosolids, district energy, commercial/residential solar, and other technologies. Nanaimo is home to several green energy design, engineering, and construction firms with deep experience implementing major renewable energy projects. There are also several Nanaimo businesses that provide installation and maintenance services for commercial and residential solar, wind, geothermal, and other renewable energy systems.

Cogeneration

The city's pulp mill, Harmac Pacific received federal funding to upgrade its power boiler to make the mill energy self-sufficient. The new cogeneration system uses biofuels including wood waste and lignin to produce electricity and heat. The project has a 55MW capacity and Harmac Pacific sells excess electricity to BC Hydro.

Biogas

Biogas, a mix of methane and carbon dioxide, is a by-product of wastewater treatment. The Greater Nanaimo Pollution Control Centre (GNPCC) uses biogas as a sustainable energy source to fuel its boilers, heat on-site processes and buildings, and mix the facility's digesters. A cogeneration unit harnesses the facility's excess waste gas (methane) and converts it into electricity that is sold back to BC Hydro. The cogeneration system is

capable of producing 335 kW of electricity daily, enough to power more than 300 homes.



British Columbia has a history of private sector investment driving growth in renewable energy projects. In 2009, Cedar Road Bioenergy Inc. invested in building a Landfill Biogas Utilization facility that cost-effectively produces 1.3 MW of electric power per year. Power generated by Cedar Road Bioenergy is sold through long-term contracts to BC Hydro and the Regional District of Nanaimo. The facility plans to expand in the future by partnering with a leading BC exporter of natural gas fuel compression and storage equipment to demonstrate a pre-commercial modular biogas platform.

Biosolids

Roughly 4,200 bulk tonnes of biosolids are produced by the Regional District of Nanaimo's (RDN) Pollution Control Centres every year. RDN biosolids have been beneficially used in agriculture, landfill closures, mine reclamation and forestry applications, providing an alternative to chemical fertilizers as a means to improve soil fertility where nutrients are limited. RDN biosolids have also been used in Vancouver Island University's (VIU) Forest Fertilization Program. Through this program, 100 per cent of RDN biosolids are diverted from the landfill and applied to forested land to improve tree growth.

Tidal Power

Tidal energy is generated from power found in ocean tidal currents and the use of tidal height differences. Canada is rated third in the world for the number of in-stream tidal and wave energy conversion device developers and is well along the path to the demonstration of grid-connected marine energy converters. BC Hydro estimates the realistic energy potential for tidal energy in British Columbia at 20,000 GWh per year, at an estimated 11 cents/kwh for a large (800 MW) site, and 25 cents/kwh for a small (43 MW) site.

Sites for tidal energy development include those in close proximity to Nanaimo in the Strait of Georgia between Nanaimo and Vancouver. Other sights include the Johnstone Strait near Campbell River (north of Nanaimo) where the proposed Canoe Pass Tidal Energy project is located. Canoe Pass Tidal Energy is expected to generate over 500 kW of renewable energy from the Discovery Passage located near Campbell River, BC.

The West Coast Wave Initiative (WCWI), located nearby at the University of Victoria, is a multi-disciplinary group of academics and industry members committed to quantitatively determining the feasibility, impacts and possible structure of wave energy conversion on the west coast of Canada. The group is developing



Cedar Road Bioenergy

Cedar Road Bioenergy

Constructed: 2009
Developer: Suncurrent
Capital Cost: \$3.8M
Generation: 1.3MW
20-year operating license with the Regional District of Nanaimo

industry leading wave energy resource assessment methods, numerical simulation tools for Wave Energy Converters (WEC) and numerical grid integration toolboxes to create the most accurate possible assessment of the feasibility of wave energy conversion in British Columbia.

WCWI members are continually striving to better understand the environment in which WEC function, the technological and social impacts of WEC development and the policy steps required to ensure wave energy conversion is thoroughly examined as we move towards more renewable and less harmful energy sources for future generations.

District Energy

Vancouver Island University's (VIU's) main campus has a plan to reduce its carbon output for heating and cooling to near zero by tapping into geothermal energy afforded by Nanaimo's coal mining past.

The VIU Nanaimo Campus is located above a flooded coal mine. Water from the mine is a low grade source of energy that will form the basis of a District Geo-exchange Energy System. Engineering studies and well tests have confirmed.

VIU Nanaimo Campus,
Courtesy of Vancouver Island
University





that an effective, efficient geo-exchange system can harness the below-ground temperatures to cool buildings in the summer and heat them in the winter.

The District Geothermal Exchange Energy System is a priority project of the VIU master plan and will serve as a high-visibility model for operation of a state-of-the-art sustainable energy system, encouraging innovation in building systems. The system will eventually displace over 30,000 GJ/year of natural gas energy consumption and will potentially offer benefits to neighbouring Aboriginal populations.

Hydro Energy

Nanaimo is home to several clean energy development businesses that are well-positioned to serve the renewable energy sector.

SRM Projects is a project engineering and project management firm specializing in tidal power, wave power, hydropower and wind power projects on Vancouver Island and southwestern British Columbia. Established in 2007, SRM Projects assists public sector, private sector, and First Nations to successfully bring small to medium size renewable energy and sustainable resource projects to fruition.

With over 20 years of experience, Nanaimo-based Hazelwood Construction Services has played a role in construction of over eight major hydroelectric projects, most of which are developed in partnership with First Nations. The firm also has extensive experience in civil engineering projects, construction of municipal infrastructure, and industrial facilities construction.

Left: Micro-Hydro/Diesel Hybrid, Wuikinuxv Nation; Right Sarita River 5.2MW Hydro Huu-ay-aht First Nations. Credit: Barkley Project Group

Table 1 Selected Clean Energy Hydro Projects, Barkley Project Group Ltd,

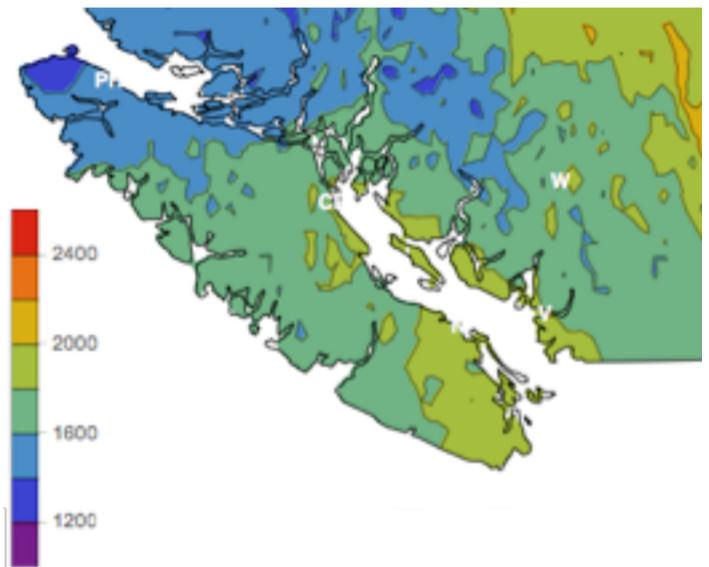
Project	Size	Client	Location
Canoe Creek Hydro	6 MW	Tla-o-qui-aht First Nation	Vancouver Island
Haa-ak-suuk Creek Hydro	6 MW	Tla-o-qui-aht First Nation	Vancouver Island
Winchie Creek	4.1 MW	Tla-o-qui-aht First Nation	Vancouver Island
Sarita River	5.2 MW	Huu-ay-aht First Nations	Vancouver Island
Franklin River	4.8 MW	Tseshahat First Nation	Vancouver Island
Tranquil & Tofino Creek Hydropower Projects	22 MW	Tla-o-qui-aht First Nation	Vancouver Island
Little Nitinat River	4.6 MW	Ditidaht First Nations	Vancouver Island
Wedge Creek	4.6 MW	Lil'wat	Lower Mainland BC
Troutline Creek	200-250 kW	Dease River First Nation	Northern BC
Micro-hydro/diesel hybrid	350 kW	Wuikinuxv Nation	Central Coast BC
Micro-hydro/diesel hybrid	200-250 kW	Hesquiaht First Nation	Vancouver Island

Source: Barkley Project Group

Barkley Project Group Ltd. is another Nanaimo-based project management consulting firm specializing in renewable energy development. Founded in 2003, Barkley Project Group has provided technical and management services to more than fifty renewable energy development projects in British Columbia and Yukon. Barkley works with several First Nation communities to identify, assess and develop commercially viable renewable energy projects. Recent projects are noted in Table 1.

Solar Energy

Solar Energy Yield (kWh/kWp/a)



The cost of a solar power installation has decreased enough that it can be less costly than B.C. Hydro rates. As of 2015, British Columbia had an installed base of 2.8 MW of solar capacity with more investment expected as solar power costs continue to decline.





First Nations Clean Energy Development

First Nations are directly engaged in clean energy development projects throughout British Columbia. The First Nations Clean Energy Business Fund (FNCEBF) promotes increased Aboriginal community participation in the clean energy sector within their asserted traditional territories and treaty areas.

The fund provides agreements between the B.C. Government and successful applicants for Capacity funding and Equity funding. It also provides revenue sharing agreements between the B.C. Government and eligible First Nations. Between 2011 and 2015, the FNCEBF provided \$6.8 million to First Nations communities to build capacity, fund feasibility studies, and inject equity for new developments.

Above: Jimmie Creek Hydro Project,
Hazelwood Construction
Photo Courtesy of Hazelwood
Construction Services



Snuneymuxw First Nation

The Snuneymuxw First Nation is located in Nanaimo and is one of 14 First Nations bands working to provide clean energy, in partnership with the British Columbia government. In 2015, the Snuneymuxw First Nation received a \$30,000 grant to undertake an energy and emissions plan for its community. The plan will create awareness in the community of its energy footprint and provide advice to reduce energy use in homes and other buildings. It will also examine how energy efficiency and clean energy generation could be part of future development of band lands.

The Snuneymuxw are a vibrant First Nation of the Coast Salish People, located in the centre of Coast Salish territory on the eastern coast of Vancouver Island, the Gulf Islands, and the Fraser River. Snuneymuxw territory encompasses one of the most productive and resource rich areas at the heart of the Salish Sea. The area includes 266 hectares of reserve land spread over four small reserves on the shores of Nanaimo Harbour and Nanaimo River and two reserves on Gabriola Island. The Snuneymuxw First Nation is one of the largest Nations in B.C. with a population of over 1,700 people.



Water & Resource Management Technology

Metro Vancouver is home to a cluster of clean water technology companies. Leading companies in the region include:

- Axine Water Technologies (developer of a low-cost, chemical-free solution for treating high concentrations of toxic organics, ammonia, and other pollutants in industrial wastewater),
- Saltworks Technologies (waste water remediation technologies), and
- BioteQ (mine water treatment solutions).

These companies are developing and exporting technologies that transform the ways that water is used and managed.

Clean water technologies are also being developed and deployed in Nanaimo. Nanaimo is home to high-tech developer iDUS Controls, a developer of large-field environmental sensing technology for monitoring and collecting data on conditions of soil and water. iDUS technology is used to increase operational efficiency in precision agriculture, soil sensing for irrigation control, next-generation “smart-mesh” communication technologies, and smart residential water reuse pump stations.

The City of Nanaimo is also investing in advanced clean water projects. In 2016, the city implemented a new ZeeWeed membrane technology to purify water from the Nanaimo River into drinking water. Prior to the opening of the new plant, the city had experienced boil water advisories due to elevated turbidity.

The new facility filters source water to screen out particles, bacteria and pathogenic disease-causing organisms such as cryptosporidium and giardia. The innovative membrane system provides a hard barrier to protect the health of local residents and it is the only plant in Canada that exclusively uses gravity to siphon water through the membranes -- a highly efficient innovation.

Recycling

Nanaimo residents have long been activists for filling gaps in the ability to recycle, reduce waste, and reuse. In 1990, local activists formed what is today the Nanaimo Recycling Exchange (NRE), an organization that provides education, a recycling depot, and a community market which operates as a thrift store that extends the life of products. Nanaimo businesses are also active in the recycling market. Businesses like DBL Disposal Services Ltd protect the environment through a recycling depot for construction materials. In addition to curbside recycling, the City of Nanaimo offers a “Green Bin” food waste collection service for all households in Nanaimo.

Water & Resource Management

iDUS Controls

iDUS Controls Ltd. is a leading-edge intellectual property-based technology company that develops algorithmic controls for environmental sensing for applications including irrigation and precision agriculture.



Photos: Top: iDUS Controls; Bottom: Nanaimo Water Treatment Plant

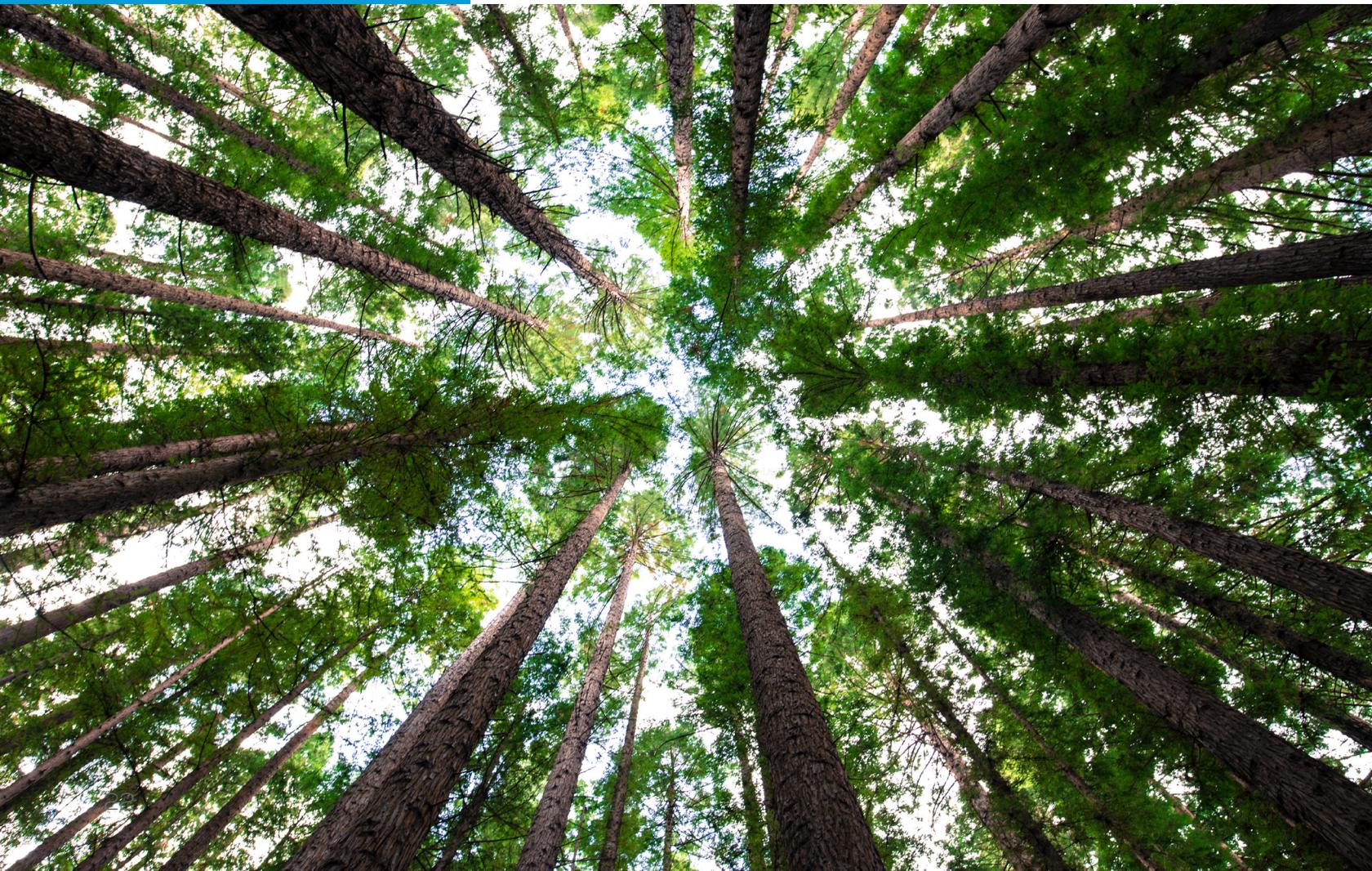


Forest & Land Management

Land and Forest Management Technology

British Columbia is known worldwide as a leader in sustainable forest management. About 95% of B.C.'s forests are publicly owned and priorities for the use of these lands are developed through community-based consultation and strategic planning, coupled with the use of practices that evolve to meet state-of-the-art science and technology. Progressive forest laws, skilled forestry professionals, comprehensive monitoring, compliance and enforcement strengthen the province's leading reputation, and provide a policy environment that supports the growth of new environmental technology serving the forestry sector.

Forestry and forest products remains one of the leading industry sectors in Nanaimo. Nanaimo companies like D.R. Systems (DRS) have flourished in this environment, providing consulting services and land management software that tracks and manages forest resources. The DRS team is made of individuals with extensive experience in forestry, biology, systems analysis and software development. DRS's premier product-- PhoenixPRO -- is one of the most widely used and proven forest activity tracking systems in British Columbia. Foresters throughout BC have contributed their ideas and suggestions to assist in creating this advanced database system to track and manage forests.



The city is also home to several GIS application developers and technology companies including Coastal Resource Mapping and GIS Solutions Inc.



Coastal Resource Mapping Ltd. (CRMLTD) has been a GIS solutions provider since its incorporation in 1998. With over 34 years of combined GIS expertise, CRMLTD has quickly become one of leading GIS companies in British Columbia. CRMLTD has a highly experienced team, recruited from Nanaimo's talented high tech labour force.

Environmental Consulting

There are several environmental consulting companies that have grown their practices by opening offices in Nanaimo.

In 2011, Environmental Dynamics Inc. (EDI) expanded into Nanaimo with a single-employee office that grew to 14 highly-skilled employees in 2016. From the Nanaimo office, EDI provides services in aquatic science, environmental assessment, monitoring, GIS, habitat restoration, geoscience, and other practice areas to the region's resource industries, the diversified energy sector, First Nations communities, and cities and communities throughout the island and the province. In addition to EDI, several other environmental consulting companies have opened offices in Nanaimo, serving the region's industries. Local consulting offices include:

- AMEC,
- Aquaparian Environmental Consulting,
- Castor Consultants,
- Environmental Dynamics Inc. (EDI),
- Golder Associates Ltd.,
- Lewkowich Engineering Associates,
- McElhanney Consulting Services,
- Mesl,
- Romer Consulting,
- SLR Consulting,
- Strategic Natural Resource Consultants,
- Streamline Environmental,
- TeraWest Environmental Consulting, and
- Waterline Resources Inc.



Sustainable Development & Green Building

Green Building and Sustainable Design

Clean tech companies flourish in places that value sustainable design. The City of Nanaimo provides that environment. Municipal leaders have demonstrated a commitment to sustainability and direct involvement in protecting the natural environment through:

- A commitment to maintain carbon neutrality in municipal operations,
- Implementing strategies to protect environmentally sensitive areas,
- Urban forest management practices,
- Management of native and invasive species,
- Watershed management, and
- Sustainable development practices.

The move to sustainability is a process and while the City of Nanaimo has not yet reached its goal, the journey has begun.

- The City has completed a Transportation Master Plan that has strategies for doubling the proportion of trips made by sustainable transportation modes, from 12 to 24%, increasing the number of walking trips (by 2x), cycling trips (by 5x) and transit trips (by 5x) over current conditions, and reducing vehicle travel from just under 14 km to 10 km/day/resident.
- The City is working with many agencies to develop a comprehensive trail system that promotes safe pedestrian circulation, cycling, recreation, tourism and commuting.
- Starting in 2009, the City hired an Energy Manager to pursue initiatives that would allow the corporate City to become more efficient with energy use and to lower greenhouse gas emissions.
- The City of Nanaimo was one of the first municipalities in BC to be 100% water metered. This was completed in 1992, and is one of the most significant water conservation measures that can be done.
- Other policies and programs have been implemented including a Corporate Climate Change Action Plan, a Community Sustainability Plan, policies for rainwater management, pesticide bylaws, a toilet replacement rebate program, and other programs that reduce waste.
- The City requires that all new civic building construction over 900 m² follow the LEED Gold Certification process, with priority given to the following LEED categories: Energy and Atmosphere; Sustainable Sites; and Water Efficiency.



Nanaimo Fire Station Four, Chase River.
City of Nanaimo

Green building is also important in the private sector. Based in Nanaimo, Island West Coast Developments (IWCD) is the largest commercial design-build construction company in the mid-Island. IWCD has been at the forefront of green infrastructure innovation, including the recently-developed and eco-friendly Green Rock Industrial Business Park in Nanaimo. The IWDC headquarters is a LEED Gold office building with sustainability and livability being key elements of the design and construction processes.

LEED Project Examples

Two buildings were constructed for Fisheries and Oceans Canada – one to house Search & Rescue Operations, the other a residence building. Both buildings are of wood-frame construction and include extensive natural wood finishes both inside and out. Located oceanfront in Port Hardy, the two buildings are connected by an overhead aluminum bridge. (Photo above)



Photos courtesy of Island West Coast Developments

A curved wall of windows provides breathtaking views of the Pacific Ocean. The liberal use of Douglas Fir finishes throughout gives the building a true 'west coast' feel. As well as being the home base for the Huu-ay-aht First Nation Band's government and forestry/fishing operations, the building serves the community with medical and dental offices. The building was the winner of an Award of Excellence at the 2011 VIREB Commercial Building Awards. (Photo below)



Fisheries & Oceans

Biological Station

Key Facts

Founded: 1908
Employees: 250
Structures: 22
Wharf: 200 lined foot

Main Function

Principal centre for fisheries research on the West Coast

Location

3190 Hammond Bay Road
Nanaimo, British Columbia

Pacific Biological Station
Courtesy of Department of Fisheries
and Oceans Canada

Fisheries and Oceans

Fisheries and ocean industries have been part of Nanaimo's history for over 100 years. The region is home to several research facilities and centres including the oldest fisheries and oceans research centre in the West Coast. Vancouver Island University offers classes to prepare workers for careers in fisheries and hosts several research centres to support aquaculture and oceans management.

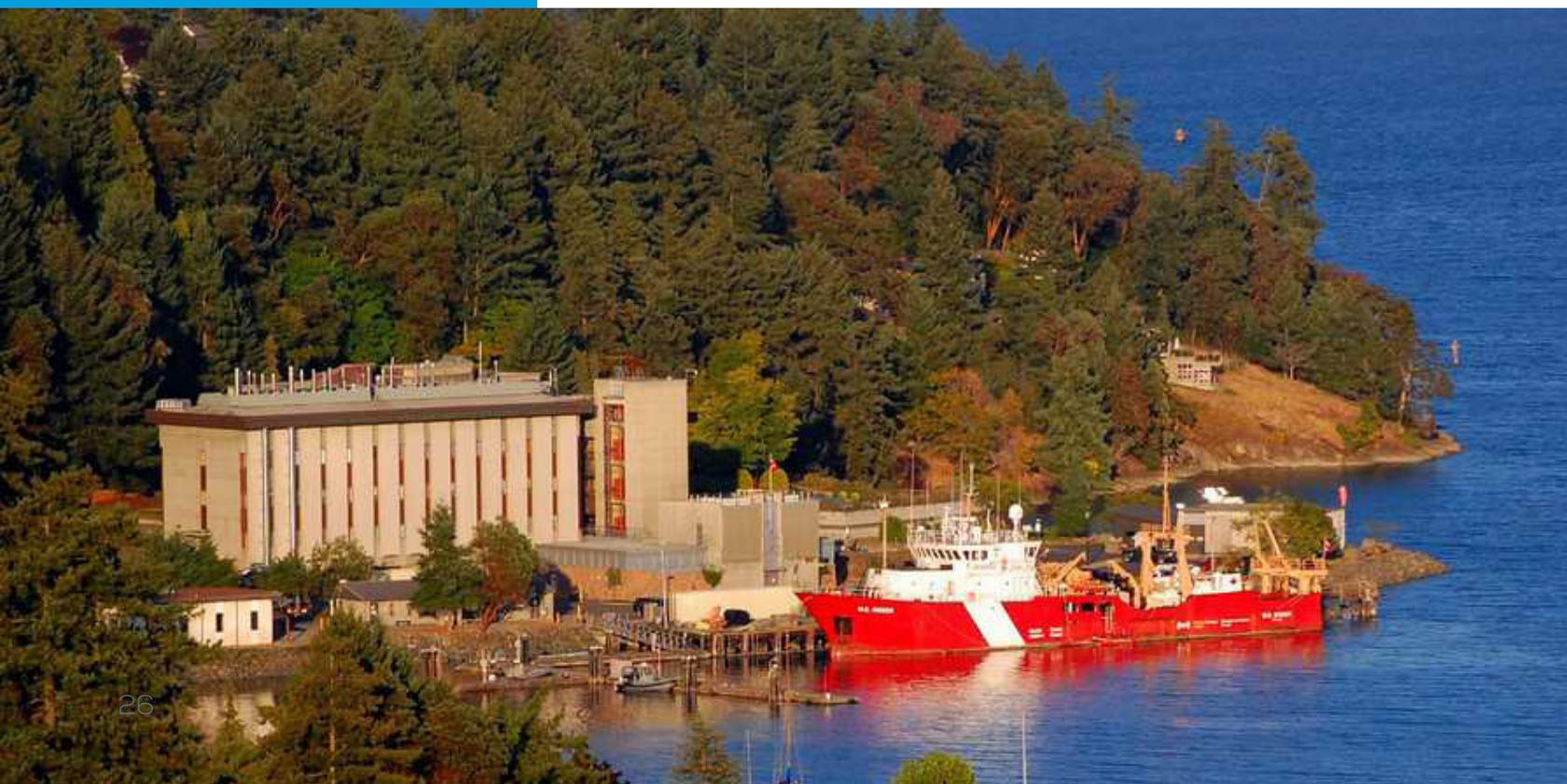
Pacific Biological Station

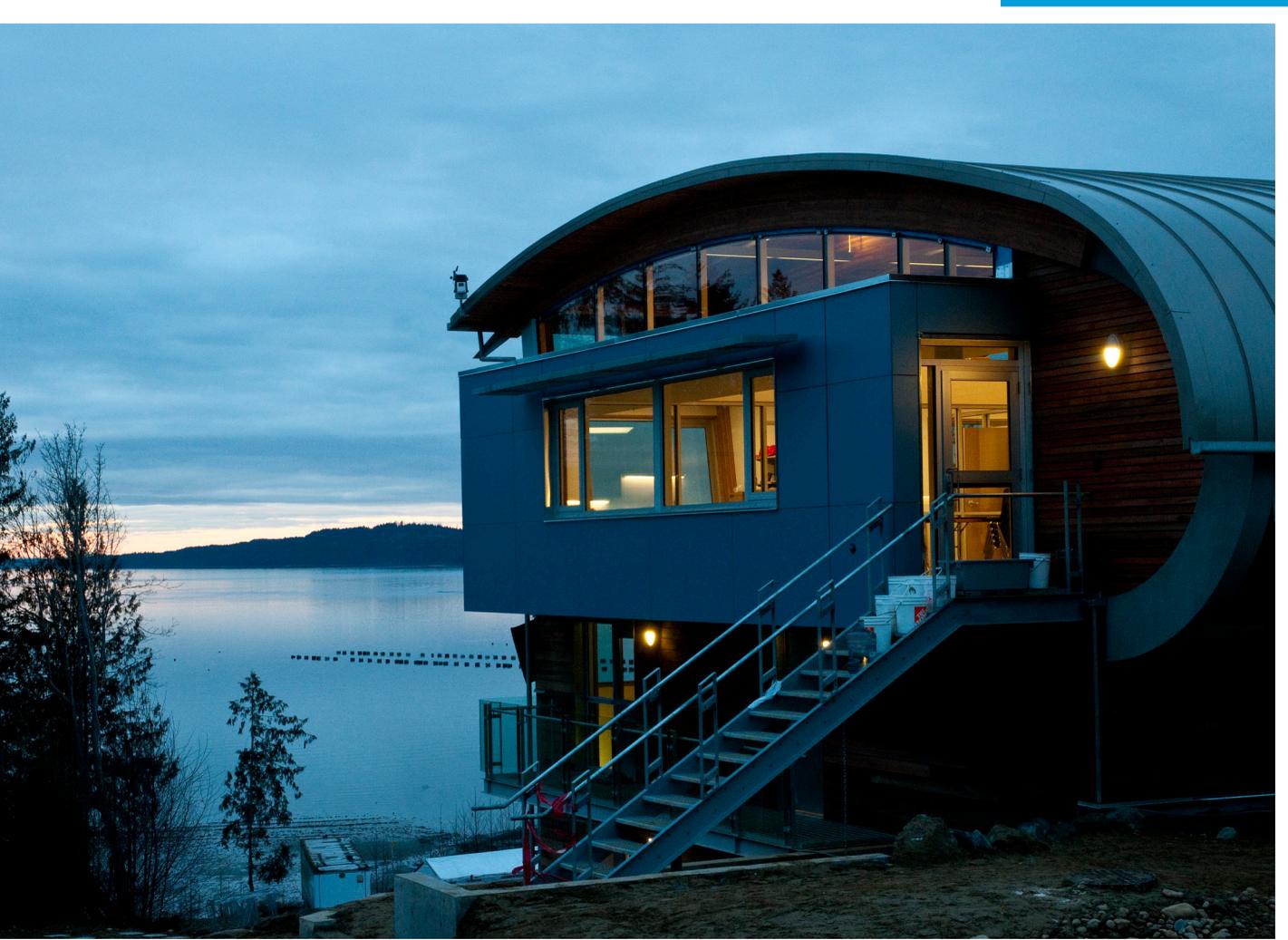
Nanaimo is home to Canada's Department of Fisheries & Oceans Pacific Biological Station (PBS), one of the region's largest employers with approximately 250 workers, and the oldest fisheries research center on the Pacific coast.

The Station performs research on stock assessment, aquaculture, marine environment, habitat, ocean science and fish productivity.

Deep Bay Marine Field Station

The Deep Bay Marine Field Station clusters scientific, environmental, economic and public engagement programming into one facility thereby creating a centre of excellence and innovation to support sustainable shellfish aquaculture development and preservation of coastal ecosystems. The field station plays a critical role in the development and advancement of agricultural industries, including the 100+ year old shellfish farming industry in BC.





Deep Bay Marine Field Station Photo Courtesy of Vancouver Island University

Deep Bay Marine Field Station

The Deep Bay Marine Field Station helps the shellfish industry become more environmentally, economically and socially sustainable through research activities that are part of the Centre for Shellfish Research at Vancouver Island University. The station supports businesses through:

- Commercialization and adoption of innovative technologies,
- Supporting joint ventures and increased business capacity through shared space,
- Providing client services, such as consultancy, monitoring, or diagnostic services, that serve to enhance the capacity of businesses for research and development,
- Developing and promoting new products that enhance the competitive ability of business or result in new start-ups, and
- Collaborating amongst industry, academic and education research institutions and community groups to form innovation systems.



Centre for Shellfish Research

The Centre for Shellfish Research supports the development of technology that serves the aquaculture sector, and in particular the BC shellfish industry. The BC shellfish industry employs between 600 and 1,000 workers annually at over 460 licensed shellfish tentures located near Nanaimo and across the region.

Kintama Research Services

By recruiting talent from the Pacific Biological Station's experienced labour force, Nanaimo-based Kintama Research Services grew to become the world's leader in the design, deployment and operation of large-scale underwater acoustic telemetry arrays. These arrays bring vast new opportunities for precise scientific study of the survival and movements of marine animals, particularly for populations migrating between marine, estuarine and freshwater environments.

Photo Courtesy of
Kintama Research
Services



Nanaimo's Clean Tech Growth Opportunities

Clean Tech Manufacturing

Nanaimo is an ideal location for green manufacturing businesses to expand and benefit from the region's resources, low costs of doing business, and location advantages. There are approximately 135 manufacturing companies in Nanaimo including manufacturers of metal products, value-added forestry products, building materials, food and beverage producers, and high-tech manufacturers in transportation equipment and electronics. Nanaimo has long been a hub for manufacturing, benefiting from:

- Close proximity to Vancouver, but with lower costs of doing business
- An available and highly skilled labour force,
- Highly-developed and expanding transportation infrastructure by road, deep sea port, rail, and air,
- A central location for serving markets across Vancouver Island, British Columbia, Western Canada and Asia.

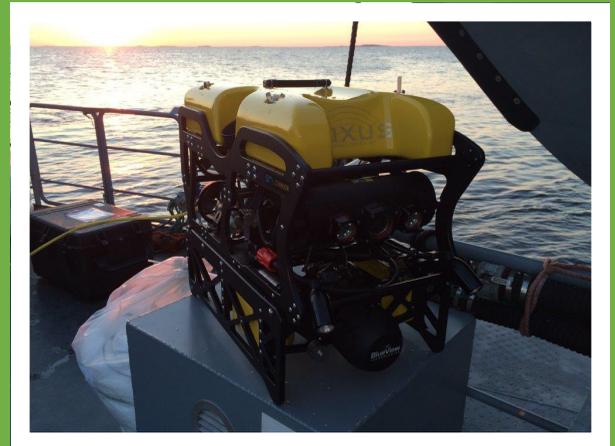
These advantages are driving growth in Nanaimo's manufacturing sector, which has seen employment growth of 33% between 2009 and 2014. Nanaimo is responding to this growth with investments in infrastructure, an expanding base of service businesses targeting manufacturers, and a supportive local government.

The Port of Nanaimo's deep sea Duke Point Terminal built its reputation on exports of the island's forestry sector – with 2.0 million tonnes of logs and 1.3 million tonnes of forest products shipped annually – but the Port has recently invested in creating container shipment capacity. The new capacity allows businesses to ship containers directly to/from Asia through deep water vessels or move them by barge to the Port of Vancouver. Container shipments in the Port of Nanaimo have expanded from zero container shipments in 2011 to 420,000 tonnes of containers in 2015. Ongoing investment in the port continues to offer manufacturers more options to get products to market.

Nanaimo's high-tech sector is oriented to serve manufacturers. According to a recent business survey, high-tech companies in Nanaimo derive 45% of their collective revenues from manufacturing customers and 36% of their collective revenues from resource industry customers in forestry, mining, aquaculture, and other resource sectors with linkages to the manufacturing sector. Conversely, many of the region's manufacturers serve environmental and resource industries. For example, Nanaimo-based Inuktun is a designer and manufacturer of terrestrial and aquatic robotic crawler vehicles that can operate in the toughest of environments. The submersible devices are used for inspecting nuclear reactors, dams, and miles of water line pipe. Also based in Nanaimo, SEAMOR Marine is a manufacturer of subsea observation and inspection-class remotely operated vehicles (ROVs) and a range of modular accessories and related devices.

Nanaimo-based manufacturers SEAMOR Marine and Inuktun both manufacture submersible device vehicles designed to serve resource industries.

Top: Inuktun Versatax 450;
Bottom: SEAMOR Marine ROV





Green Energy for First Nations

Investment in renewable energy resources is expected to continue, with significant opportunities for partnership with First Nations communities.

Development of run-of-river hydro energy has been growing over the past decade among First Nations. Nanaimo-based businesses like SRM Projects and Barkley Project Group design hydro systems suited to the needs of these communities. Renewable energy resource development opportunities are expanding as First Nations look to other technologies as well.

Based on Vancouver Island, the T'Sou-ke First Nation was Canada's first Aboriginal community to implement a major solar project. The system is a net-zero program in which excess power produced by the project generates profits by selling power to B.C. Hydro, offsetting power costs during the darker months of the year. The T'Sou-ke First Nation also entered a partnership with TimberWest Forest Corp. and EDP Renewables Canada to develop large-scale wind projects. A proposed \$750-million project will generate power for up to 30,000 homes.

Other renewable energy projects on the island include:

- Kokish River Hydro Project (15 km east of Port McNeill): 45 megawatt capacity
- Cypress Creek Hydro Project (in Gold River, B.C.): 2.8 megawatt capacity
- Jimmie Creek Hydro Project (90 km north-northeast of Powell River, BC): 55 megawatt capacity run-of-river hydro

The First Nations Clean Energy Business Fund provides money to build capacity in First Nations communities and invest in clean-energy infrastructure. The BC Clean Energy Act enabled the creation of the First Nation Clean Energy Business Fund. The fund provides two kinds of funding:

Capacity Funds (Max \$50,000): These funds assist with clean energy project feasibility studies, community energy planning or engaging with project proponents. Funding is provided to enable an applicant to engage with project proponents, including undertaking financial analysis of potential projects prior to taking equity positions in a project and reviewing development potential within their territories.

Equity Funds (Max \$500,000): These funds support financially viable and resourced clean energy projects with an Energy Purchase Agreement.



Spider Lake, Arrowsmith Aerial Photography

Tidal Energy

Nanaimo is located in the heart of the best sites for future tidal energy development. Canada is rated third in the world for the number of in-stream tidal and wave energy conversion device developers and is well along the path to the demonstration of grid-connected marine energy converters. BC Hydro estimates the realistic energy potential for tidal energy in British Columbia at 20,000 GWh per year, at an estimated 11 cents/kwh for a large (800 MW) site, and 25 cents/kwh for a small (43 MW) site. The best sites are in close proximity to Nanaimo in the Strait of Georgia between Nanaimo and Vancouver, as well as the Johnstone Strait and Campbell River, located north of Nanaimo.

Environmental Sustainability Research and Development

Nanaimo's track record of sustainable development practices supports harmony with the region's pristine environment. UNESCO designates regions around the globe that serve as excellent examples of places where people are living and working well together and in harmony with nature. These model regions were given the designation "biosphere reserve."

The Mount Arrowsmith Bioserve Region is a UNESCO Bioserve and its first roundtable in 2015 gathered representatives from Shaw-Naw-As (Nanoose) First Nation, Qualicum First Nation, the City of Parksville, the Town of Qualicum Beach, the Regional District of Nanaimo, the BC Ministry of Environment, the Vancouver Island Conservation Land Management Program, Island Timberlands, TimberWest, and Vancouver Island University to explore the future of the Biosphere's research and education mandate.

In 2014, Vancouver Island University established MABRRI, the Mount Arrowsmith Biosphere Region Research Institute that connects the expertise and experience of university researchers and concerns of the community to develop a collaborative research agenda for the MABR. There are opportunities for researchers, environmentalists, and other organizations to use the biosphere region as a base for study of sustainable development.

High-Tech Innovation for Agriculture, Aquaculture, Forestry, and Other Resource Industries

Resource industries, including aquaculture, forestry, agriculture, and mining have long been a core component of the regional economy. Businesses in these sectors invest in cutting-edge technologies that bring about better resource conservation, waste reduction, and improved returns, giving rise to a local high-tech sector focused on resource industries. Local resources like the Centre for Shellfish Research, the Deep Bay Marine Research Station, MakerSpace Nanaimo, Innovation Island (a technology incubator), University of Victoria Centre for Aerospace Research, and other organizations help high-tech developers to commercialize new technologies and successfully bring them to market.

Nanaimo GIS developer Integrated Information Services (I2S) uses unmanned aerial vehicles (UAVs), designed to fly at low altitude, to obtain high-resolution aerial imagery. I2S's UAVs use either a stabilized high definition digital camera or a dual camera/infrared sensor that allows for the capture of high quality images, video, and thermal images. Aerial data is processed using high precision photogrammetry software to generate engineering grade topographical site survey data, point clouds and high quality mapping imagery. I2S can gather aerial imagery faster, more accurately and more cost effectively than satellites, manned aircraft, or ground-based measurements. The technology is being applied in mining, forestry, archaeology, and wildlife / ecosystem monitoring.

Produced in Nanaimo, SEAMOR Marine's remote operated vehicles (ROVs) are a popular choice for the aquaculture industry. SEAMOR ROVs perform routine activities such as net inspections, mort recovery, surveying and sampling seabeds, recovery of lost underwater equipment, and inspection of cages, docks, pipes, cables, and moorings. SEAMOR ROVs perform all this without the need for a commercial dive team, thereby significantly lowering costs.

Nanaimo-based iDUS Controls is addressing agriculture needs in the growing field of precision agriculture – an emerging field of technologies that help operators make better decisions, conserve resources, and optimize returns. iDUS Controls is the developer of the SensMit/IRROmesh mesh radio technology and enhanced SensMitWeb cloud service. This user-installable platform is being used for soil and environmental sensing in vineyards, farms, ranches, and large seed operations by a rapidly growing pool of farmers, crop consultants, and enterprise corporations in seven different countries on four continents.

Nanaimo provides a highly supportive and low cost environment that helps high-tech developers and innovators in resource sectors to succeed.

Pacific Coast Wasabi

Based in Nanaimo, Pacific Coast Wasabi Ltd. is part of a "wasabi empire" that is growing as a result of 20 years of Canadian-led research and a network of high-tech, computer-controlled greenhouses that churn out industrial quantities of one of the world's most finicky crop





Photo Courtesy of Vancouver Island University

Nanaimo's Key Resources for Clean Tech Businesses

Nanaimo offers a host of resources that support clean tech businesses throughout their lifecycle. This includes resources for start-ups, research and development capacity, skills training and education capacity, transportation infrastructure and a highly skilled and growing labour force.

Vancouver Island University

Vancouver Island University (VIU) is a dynamic, internationally recognized university supporting a student population of over 17,000 full-time and part-time learners, including over 2,100 international students and 1,500 aboriginal students, and employing over 3,000 faculty and staff. VIU is a significant driver of the regional economy, generating over \$410 million in economic impact annually. VIU is a centre of excellence for teaching, producing quality graduates that are in demand by employers across the country and around the world. The university is also a leader in applied research, supporting many of the region's environmental and high tech businesses.

Science, technology, and environment programs at VIU include:

Bachelors and Higher Degrees

- Computer Science (Bachelors)
- Earth Science (Bachelors)
- Geoscience (Bachelors)
- Mathematics (Bachelors)
- Natural Resource Protection (Bachelors)
- Fisheries and Aquaculture (Bachelors, Post-Degree Diploma)
- Biology (Bachelors)
- Chemistry (Bachelors)

Diploma & Certificate Programs

- Fundamentals of Engineering (Certificate)
- Information Technology and Applied Systems (Diploma, Certificate)
- Resource Management Officer (Diploma)
- Forest Resources Technology (Diploma)
- Fisheries and Aquaculture Technology (Diploma)
- Physics (Transfer Program)

Bachelor of Natural Resource Protection

VIU is the only academic institution in BC to offer a specialized degree in Bachelor of Natural Resource Protection, and only one of two to offer a comparable degree in Western Canada. Graduates of the program progress into careers as environmental consultants, fish and wildlife technicians, biologists, and careers in fisheries, forestry, fish and wildlife, and conservation management. VIU has an international reputation in fisheries and aquaculture applied research, technology transfer, training, and education. The proximity of VIU to fresh-water lakes and streams, as well as to the ocean and estuaries allows fieldwork in these habitats to be a central part of the students' education. The program emphasizes the recognition and appreciation of all the major values of the forest including timber, recreation, wildlife, range, fish, water, and visual landscapes. Graduates of the forest resources technology program have gained employment as timber cruisers, engineers, silviculture contract administrators and planners, G.I.S., aerial photography, and computer applications.

Applied Environmental Research Laboratory (AERL)

The AERL is an internationally recognized research facility that conducts pure and applied research in analytical mass spectrometry and environmental chemistry. The group develops new and improved strategies for the measurement of chemical determinants of environmental and human health. The AERL team carries out in-situ chemical analysis in complex environmental samples, including air, surface and underwater applications.

Centre for Shellfish Research (CSR)

Based in Nanaimo, the CSR serves the entire B.C. coast to support and respond to the research needs of a growing and diversifying shellfish aquaculture industry. The Centre undertakes technical and scientific research on topics including: enhancing industry competitiveness by contributing to improved production, new species and technologies, new products and realization of new opportunities; investigating environmental interactions, oceanography and knowledge necessary for environmental stewardship and

sustainability; multidisciplinary studies needed to solve other problems faced by the industry and by coastal communities such as governance, economic benefit, political structures, social values and others; and contributes to the economic diversification of B.C.'s (coastal) communities by supporting the transfer of knowledge and development of the skilled workforce required.



Institute for Coastal Research

The Institute for Coastal Research at Vancouver Island University works to further understanding of the cultural, economic, environmental and social dynamics of the B.C. coast through collaborative research, creative exploration, dialogue, engagement and education.

International Centre for Sturgeon Studies (ICSS)

ICSS conducts research in four main areas; wild populations, conservation hatcheries, commercial culture, and socioeconomics issues. The Centre facilitates cooperation between conservation and aquaculture activities at regional, national and international levels, led by scientists from across Canada, the United States and Europe. The ICSS will provide the link necessary to form a cluster of industry, university, government and non-government organizations involved in sturgeon research.

UNESCO Mount Arrowsmith Biosphere Region Research Institute (MABRRI)

Nanaimo is located in close proximity to the a UNESCO designated biosphere, the Mount Arrowsmith Biosphere Region. Biosphere reserves

are considered model regions for sustainable development and they work to promote the conservation of biological and cultural diversity in addition to economic and social development. Established in 2014 at Vancouver Island University, the Mount Arrowsmith Biosphere Region Research Institute (MABRRI) is the engine behind the MABR's research and educational programs. MABRRI envisions, funds and coordinates research projects and educational programs or initiatives that advance environmental, economic and social (including cultural and spiritual) sustainability.

The Deep Bay Marine Field Station

The Deep Bay Marine Field Station clusters scientific, environmental, economic and public engagement programming into one facility thereby creating a centre of excellence and innovation to support sustainable shellfish aquaculture development and preservation of coastal ecosystems.



Arrowsmith Aerial Photography

Technology Development Support Organizations



Vancouver Island Sustainable Technology Association (VISTA) represents Vancouver Island based technology students, academic leaders, investors, researchers, innovators and economic development teams. VISTA works with Vancouver Island's vibrant technology businesses as well as the island's three universities and two multi-campus community colleges, which together comprise more than 50,000 students. The VISTA Expo, rotating each year between Nanaimo, Greater Victoria and/or Campbell River, aims to present some of the best sustainable technology talent, through panel discussions, poster-boards, booth exhibitors and stakeholders with both island and regional experts in attendance.



Innovation Island is a regional business incubator that helps technology-based start-ups to accelerate business success through scientific innovation. In 2014 and 2015, Innovation Island advised over 100 companies and hosted 70 events that trained 2,350 entrepreneurs across Vancouver Island. The organization's Venture Acceleration Program has supported 23 companies to secure \$2.4M of private investment capital, over \$1.4M in government grants and other investment, and \$1.4M in new revenue. This activity has added 57 tech jobs to the regional economy as at December 31, 2015.

Innovation Island helps clean tech companies to succeed through several programs. The Venture Acceleration Program is a structured venture development program that helps early-stage entrepreneurs in BC grow their companies.

The BCIC Innovator Skills Initiative provides businesses with up to \$7,500 to hire quality talent and skilled workers to move their startup forward. Complementary business advisory services and other services also help tech companies gain access to capital and grow.



Atrium Ventures \$5 M Seed Fund

High tech entrepreneurs will be getting a jumpstart with the introduction of Atrium Ventures VCC Inc. (Atrium), a \$5,000,000 investment fund dedicated to nurturing early stage companies in BC's technology sector. The fund was launched in August 2016 as a pre-seed/seed stage fund that will target promising technology ventures looking to secure equity-based growth capital. Atrium is anchored by commitments of \$1,000,000 from the Southern Interior Development Initiative Trust (SIDIT), \$750,000 from Interior Savings Credit Union and a group of forward-thinking angel investors. The fund aims to fill a critical gap for early stage tech startups looking to raise equity capital.



Community Futures is rural BC's organization for small business and economic development. Experts offer local assistance from 34 offices throughout rural BC, providing services and tools to help entrepreneurs and small business owners

achieve their goals, including business support services, business planning advice, loans and self-employment assistance.

Community Futures provides financing alternatives to small and medium enterprises when access to credit is a challenge to starting or growing their business. Community Futures uses different lending criteria than a bank, focusing on rural development and providing business financing to small local businesses.



Makerspace Nanaimo is an open community lab: a blend of workshop, studio space, social hub and educational facility where members can share tools, resources and knowledge to build just about anything.. Programmers and hands-on makers

collaborate in the space to develop new products and technologies. Regular meetings address club logistics and make decisions that affect members and the space. All members are encouraged to, participate in this process.

Transportation Infrastructure

Nanaimo Port Authority

Over 4.8 million tonnes of cargo and 4.8 million passengers pass through the Port of Nanaimo each year. The port is a major contributor to the local Nanaimo economy, supporting approximately 6,400 direct, indirect, and induced jobs and generating \$1.2 billion in economic output annually. The Nanaimo Port Authority manages the port's seaplane operations and six deep-sea ship anchorages. The port has seen solid growth in shipping volume over the past decade (See Figure 1) -- growth that is driving expansion of facilities and capabilities at the port.

Figure 1 Nanaimo Cargo Volume 2010-2015

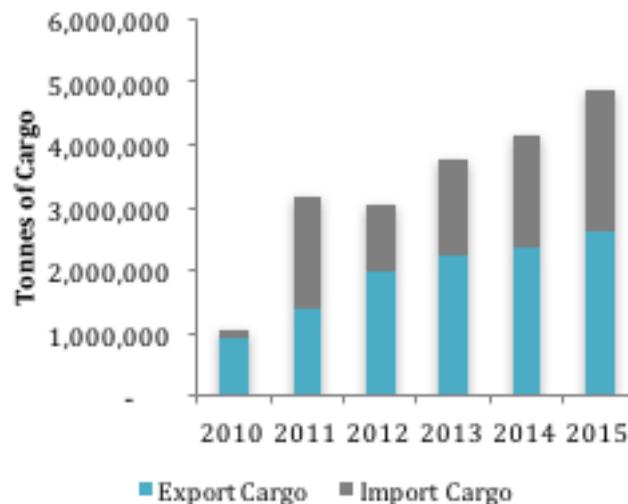


Table 2 Port of Nanaimo Cargo Volume by Product 2010-2015

Volume by Product (Tonnes)	2010	2011	2012	2013	2014	2015
Forest Products	963,616	1,137,204	1,253,573	1,204,955	1,298,382	1,456,101
Logs	890,598	1,481,164	1,153,658	1,708,313	2,015,572	2,368,982
Bulk Cargo	103,631	173,913	187,611	258,132	132,673	141,979
Project Cargo	19,364	1,706	17,051	973	876	33,229
Containers			48,128	245,703	301,801	420,141
Chemicals	27,478	22,082	32,762	24,368	39,038	42,487
Petroleum Products	353,681	355,555	349,233	337,327	356,693	387,408
Total Volume	2,358,368	3,171,624	3,042,016	3,779,771	4,145,035	4,850,327

Duke Point Terminal

The new Duke Point Terminal gives customers direct access between Vancouver Island and major Asian ports, as well as container barge service to the Port of Vancouver, operated by DP World Vancouver. The terminal has a 600-foot long berth and 13 meters of water. The terminal is within the Duke Point Industrial Park, offering easy access to the Island Highway. The 70-acre site is composed of 15 acres of paved area, 55 acres of open leasable storage area has a 40 metric ton container crane and a 100 metric ton barge ramp. The Duke Point Terminal is the Nanaimo Port Authority's prime commercial terminal that is currently handling dimensional lumber, containers and project cargoes.

Nanaimo Assembly Wharf Terminal

The terminal is located very close to the downtown core of Nanaimo near the E&N Railway marshalling yards (Wellcox Yard). The terminal is 37 acres in size and has three deep-sea berths and is also the location of the Port's new Cruise Ship Terminal and Administration office. The property supports 90,000 square feet of covered warehouse space and a barge ramp.

Commercial Inlet Basin and Marina

Located in the heart of downtown Nanaimo, the commercial inlet basin and marina is home to both commercial and recreational vessels marina. The marina and the W.E.Mills visiting pier will hosts over 20,000 boaters during a summer season.

The W.E.Mills visiting Pier is a floating 600-foot long concrete structure that can accommodate larger vessels up to 3,000 displacement tonnes.

Nanaimo Water Aerodrome (Seaplane Terminal)

Nanaimo Water Aerodrome terminal provides airline offices and space for 12 aircraft at one time. Over 150,000 passengers per year fly in and out of this terminal. Current tenants are Harbour Air and Tofino Air.





Transit Connections To Vancouver

BC Ferries

The Vancouver area has two ferry terminals serving Vancouver Island. The Tsawwassen ferry terminal on the south end of the Vancouver (closest to U.S. border crossing and Vancouver International Airport) and the Horseshoe Bay terminal on the north end of the city. The Tsawwassen ferry terminal has service to Victoria (Swartz Bay terminal) and to Nanaimo (Duke Point terminal) on Vancouver Island. The Horseshoe Bay terminal services Nanaimo (Departure Bay terminal). Sailing time from Horseshoe Bay to Nanaimo is one hour, forty-five minutes. Tsawwassen to Nanaimo is a two-hour sailing.

The City of Nanaimo, Nanaimo Port Authority and Snuneymuxw First Nation also have plans to launch a high-speed passenger ferry service between Nanaimo and Vancouver, as a catalyst that will diversify and grow the local economy. Passenger service could begin as early as 2017.

Seaplane

Seair Seaplanes operate up to 12 scheduled flights daily from Downtown Vancouver Harbour to Nanaimo (Departure Bay) and up to 12 scheduled flights daily from Richmond (YVR) to Nanaimo (Departure Bay), as well as up to 8 scheduled flights daily from Richmond (YVR) to 6 of the major Southern Gulf Islands.

Helicopter

In just 18 minutes, Helijet's 12-passenger, twin-engine helicopters whisk passengers on a scenic journey between the two downtown harbours. Helijet operates 14 scheduled flights (seven outgoing and seven return flights) between 7:00 a.m. and 7:00 p.m. weekdays. Flights operate between the downtown Vancouver Harbour Heliport, and the Nanaimo Harbour Heliport at the Cruise Ship Welcome Centre, just minutes from Nanaimo's city centre. Complimentary vehicle parking, downtown shuttle service, taxi and rental car services are available at both terminals.

Nanaimo Airport (YCD)

In 2015, Nanaimo Airport served as the gateway of travel for 312,000 passengers. Between 2006 and 2011, YCD implanted a two-phase expansion that has successfully supported over two million passenger trips. Expansion of the airport has resulted in passenger trips that are 10 years ahead of projections. Air Canada, Island Express and West Jet each operate daily scheduled flights from Nanaimo Airport, with destinations that include Vancouver, Abbotsford, Calgary, Boundary Bay, and Victoria. Together, the three airlines operate 56 regular daily flight schedules.

Light Industrial Property

Greenrock Industrial Business Park

Nanaimo's Greenrock Park sets a new standard for Green Construction. The 28-acre, 24-lot project rethinks how rainwater management effects local ecology and natural habitats. The project uses swaled drainage courses with gently sloped sides filled with vegetation, compost and gravel. The water's flow path, along with the wide and shallow ditch, is designed to maximize the time water spends in the swale, which aids the trapping of pollutants and silt.

The development retains rainwater is on site to irrigate native plants, which protect against drought and mean using less water. Large areas of existing mature forest have been protected, and augmented with newly planted native species, including Garry Oak and Douglas Fir. Weedy plants, including broom and blackberry, have been removed and disturbed areas have been seeded with native grasses.



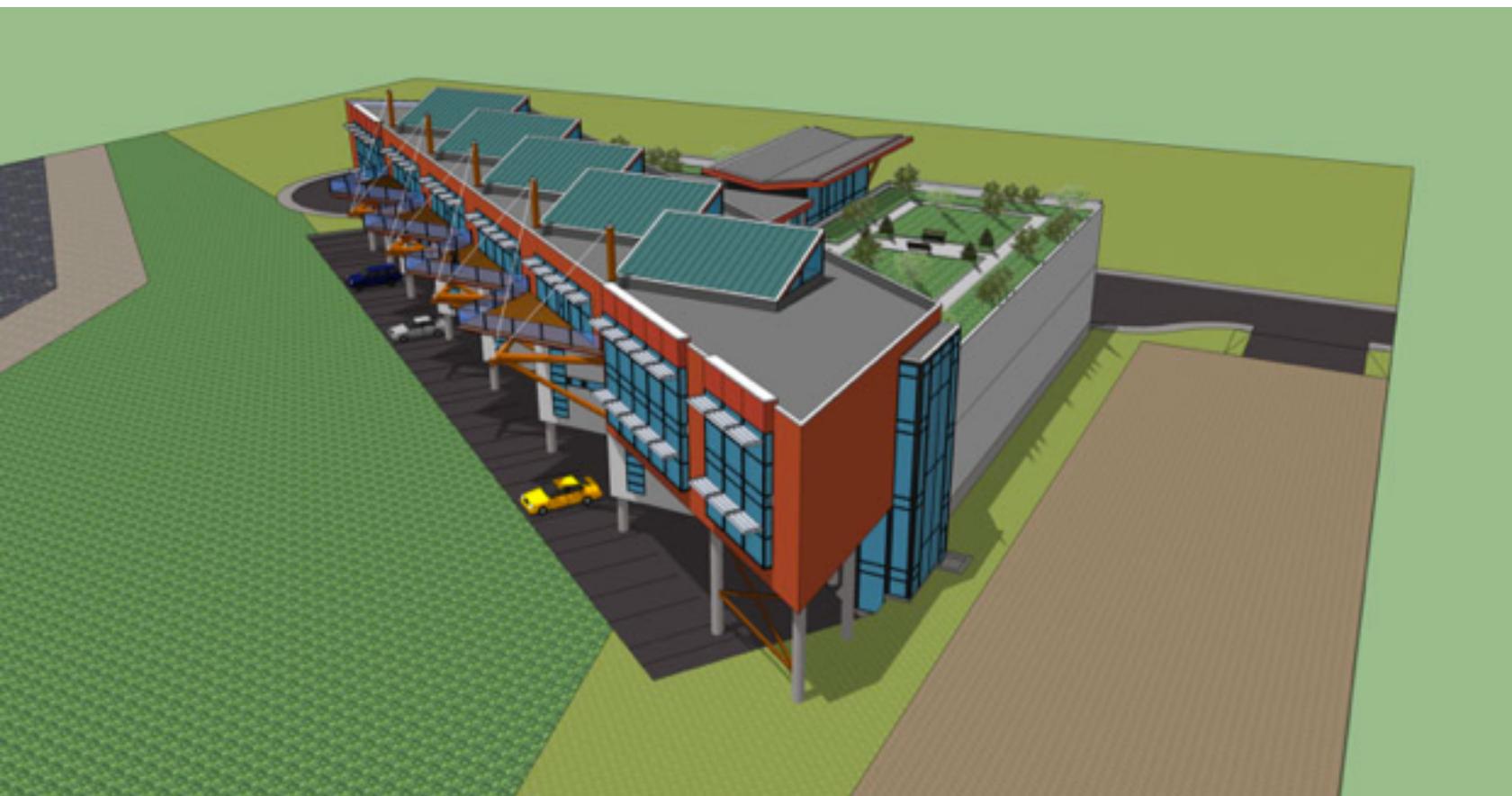
Sandstone Eco Industrial Park

Sandstone is a new mixed use planned development designed to provide new housing choices, a major retail centre, new employment opportunities, and new parks and open spaces for the south of Nanaimo. The project includes 900,000 sq. of industrial property in a business park environment. Sandstone is exploring the opportunity to build a facility that will use waste-to-energy technology, which is unique in North America. This facility will be located next to the Nanaimo Regional District's existing solid waste management facility. At present methane is being recovered from the landfill, and is converted into electricity by running methane powered engines that in turn spin generators. Heat is being lost to the atmosphere in this process. However, a unique collaboration between the Regional District of Nanaimo, the City of Nanaimo and Sandstone is seeking to create a heat recovery system that will supply an "energy loop" to the industrial lands within the Sandstone site.

Divers Lake IT Park

The Divers Lake Innovation and Technology Park is a 70,000 square foot facility that is being developed in the heart of Nanaimo. It is a first of its kind for the Mid-Island region and a home for innovative and high-tech companies in Nanaimo's knowledge economy.

Environmentally progressive solutions such as solar panels and geothermal technology for heating and cooling systems, as well as a truly green roof will be part of the construction parameters for the IT Park.



Financial Resources

WUTIF Capital (VCC) Inc.

WUTIF Capital (VCC) Inc. is a novel angel fund that co-invests with angel investors in promising new technology ventures in British Columbia. In addition to offering above-average investment returns potential, WUTIF offers substantial tax incentives available only to residents of BC. On a \$10,000 investment, investors get back \$7,600 in tax savings (based on tax incentives for top marginal taxpayers in B.C.).

WUTIF invests in promising early-stage technology ventures in British Columbia, such as those being developed at B.C.'s universities and institutions. This includes communications and information technology, health and life sciences technologies, physical sciences, energy and fuel cells. The Fund strives towards a broad portfolio, such that no more than 25% of its investments are in any one particular technology sector.

The Fund is managed by WUTIF Management Corp (WMC). WMC partners with existing technology organizations in the Province to identify companies, perform due diligence on them, and monitor their progress.

British Columbia Renaissance Capital Fund

The BC Renaissance Capital Fund (BCRCF) invests in Venture Capital (VC) funds as a Limited Partner. BCRCF fund managers provide a diversity of investment options to BC high technology companies and access to a variety of investor networks including those in the markets where BC Technology companies seek to sell their goods and services.

BCRCF targets investments in a range of technology sectors with a particular focus on Internet Technologies, Digital Media, Life Sciences and Clean Technologies.

Their funds provide investment at various stages, from seed funding to expansion financing. Fund manager activities include reviewing BC technology companies that are seeking investment, providing mentoring to BC technology companies, speaking at BC conferences, and participating in education seminars and events at BC accelerators, universities and research organizations.

First Nation Clean Energy Business Fund

The First Nations Clean Energy Business Fund (FNCEBF) promotes increased Aboriginal community participation in the clean energy sector within their asserted traditional territories and treaty areas. The fund provides agreements between the B.C. Government and successful applicants for capacity funding and equity funding. It also provides revenue sharing agreements between the B.C. Government and eligible First Nations.

The Clean Energy Act enabled the creation of the First Nation Clean Energy Business Fund. FNCEBF works to assist with clean energy project feasibility studies, community energy planning or engaging with project proponents; including undertaking financial analysis of potential projects prior to taking equity positions in a Project and reviewing development potential within their territories.

Viva Fund

Vancouver Island Venture Acceleration Fund ("VIVA") is the first dedicated investment fund targeting early-stage, high-growth technology companies on Vancouver Island. The fund seeks opportunities for co-investment with Angels and other partners, targeting firms seeking \$100,000 - \$500,000.

Networking & Industry Development Resources

GreenTech Exchange

GreenTech Exchange (GTEx) is a pathfinder organization engaging solution providers with industries and investors. Launched in March 2009, it aims to advance knowledge, ideas, people, products, services and solutions for the green economy. GTEx has delivered over seventy educational forums and networking events in Vancouver and on Vancouver Island to several thousands of participants.

The forums and events engage and enable people in the community to discover their passion, cultivate interests, connect with others, exchange ideas, collaborate on projects, and build and grow businesses in the green innovation and clean technology space. GTEx participants span several groups including: businesses, entrepreneurs & SMEs, investors, service providers, government & agencies, as well as academia.

BC BioEnergy Network

BC Bioenergy Network is an industry-led initiative that helps deploy near-term bioenergy technologies and supports research towards building a world-class bioenergy capability in BC.

As steward to one of the largest forested areas on earth, BC is well-positioned to become a major player in developing green energy for the global bioenergy sector. The mandate of BC Bioenergy Network is to:

- Maximize the value of BC's biomass resources,
- Develop mission-driven research, development and demonstration projects,
- Reduce Greenhouse Gas (GHG) emissions,
- Network and partner in BC, Canada, and internationally to advance BC's bioenergy sector, and
- Champion funding initiatives to support BC-focused bioenergy technology and applications.

To achieve this, BC Bioenergy Network invests in capital and technology development and demonstration, targeted capacity building, as well as education and advocacy. These efforts promote the utilization of BC's biomass resources towards alternative energy – specifically using waste streams in the agriculture, forest and municipal sectors to produce value-added products and energy. To date, BC Bioenergy Network has invested \$15 million in 17 capital projects; \$1.4 million into 12 capacity-building projects; and more than \$375,000 into conferences, workshops and other educational initiatives.

PowerHaus Network

PowerHaus is a network that invests time and capital in promising new companies based in British Columbia providing innovative solutions for established industries that have immediate commercial potential. They focus not only on investment, but also helping companies with management and customer development.

PowerHaus seeds, funds and grows B.C. based businesses by:

- Providing better access to management, capital and markets,
- Addressing specific challenges, issues, problem areas and opportunities within the B2B sector,
- Helping clients develop and market products, solutions & services to BC traditional industries, and
- Improving overall efficiency, productivity and sustainability in established industries.

PowerHaus hosts a monthly forum for investors, mentors and companies to meet, exchange ideas and form partnerships. Companies presenting at the forum have the opportunity to be selected by a committee to participate in the PowerHaus program.

Remote Community Implementation Program

The Remote Community Implementation (RCI) Program assists BC's remote communities in reducing their dependence on diesel generation by funding capital costs of implementation or construction of clean energy systems, such as hydro, wind and solar energy. It is designed to complement other funding programs that are available to assist communities in clean energy planning and research.

A "remote community" is defined as either a civic or First Nation government with existing permanent residences that are within a BC Hydro Non-Integrated Area or not connected to the major natural gas or electric grid. Communities served by local generating stations and distribution networks in BC Hydro's Non-Integrated Areas are also included as eligible remote communities under this program.

BC Innovation Council

BC Innovation Council (BCIC) encourages the development and application of advanced or innovative technologies to meet the needs of industry in BC. BCIC works to accelerate technology commercialization by supporting startups and developing entrepreneurs. With their partners, BCIC delivers programs and initiatives that promote company growth, resulting in jobs, increased revenue and economic development in BC.

BCIC collaborates with partners to create programs and provide support for initiatives that develop entrepreneurs and promote the commercialization of technology. BCIC programs provide technology entrepreneurs with the tools, resources and expert guidance they need to build successful companies and grow their businesses beyond Canada's borders.

Sustainable Development Technology Canada

Sustainable Development Technology Canada (SDTC), funds Canadian clean tech projects and coaches the companies that lead them as they move their ground-breaking technologies to market. SDTC's support of clean tech translates into jobs,

growth, and export opportunities for Canadian companies, as well as economic, environmental and health benefits for all Canadians. SDTC operates at arm's length and receives funding from the Government of Canada.

National Research Council-Industrial Research Assistance Program (NRC-IRAP)

NRC-IRAP is Canada's premier innovation assistance program for small and medium-sized enterprises. It is a vital component of the NRC, a cornerstone in Canada's innovation system, regarded worldwide as one of the best programs of its kind. For nearly 70 years, the National Research Council of Canada Industrial Research Assistance Program (NRC-IRAP) has been stimulating wealth creation for Canada through technological innovation. This is largely accomplished by providing technology assistance to small and medium-sized enterprises, at all stages of the innovation process, to build their innovation capacity and successfully take their ideas to market. NRC-IRAP helps small and medium-sized enterprises identify and understand technology issues and opportunities and provides linkages to the best business and R&D expertise in Canada.

NRC-IRAP offers direct technical assistance, access to the latest technological advances, expertise, facilities and resources. NRC-IRAP may also provide cost-shared financing of innovative technical projects to qualified firms. Expertise reflects regional industrial profiles and covers a range of technologies that include the resource-based industries such as forestry, mining, electronics, software and hardware, advanced materials, industrial engineering, food technology, biotechnology, construction, aerospace, fuel cells, electrochemistry, information technologies, engineering and physics.

Marine Renewables Canada

The term "marine renewable energy" is used to describe the harnessing of power found in ocean waves, tidal flows, and salinity and temperature gradients. Marine Renewables Canada aligns industry, academia and government to ensure

that Canada is a leader in providing ocean energy solutions to a world market through supportive policies, shared infrastructure, and strategic research initiatives. Marine Renewables Canada works to provide a solid foundation for making Canada a leader in the global marine renewable energy industry.

NRC Concierge Service

Concierge is a Government of Canada program that provides a single access point where small and medium-sized enterprises (SMEs) can find high-quality, timely advice to help them innovate and accelerate their growth. Developed, implemented and operated by the National Research Council of Canada's Industrial Research Assistance Program (NRC-IRAP) in collaboration with federal and provincial partners, Concierge improves innovation and economic opportunities for SMEs by helping

them navigate the available innovation resources and support programs. By combining online, phone and in-person services, it addresses the individual needs of SME clients.

The key to the service is that it offers customized guidance from a team of expert advisors, located across Canada. Innovation Advisors are industry experts with extensive networks that provide clients with high-quality referrals and searches that yield tailored information and relevant support.

Innovation Advisors provide one-on-one assistance and use their wealth of industry experience and depth of knowledge to help guide clients to the most appropriate innovation programs and services available. Innovation Advisors have extensive networks and expertise, as well as knowledge about a range of industrial

