



Nova Scotia

Tidal Energy

BOSTON

NEW YORK

The power of the highest tides in the world.
The plan to harness it.

Fundy Power

Nova Scotia is home to the Bay of Fundy, where more than 160 billion tonnes of water flow twice a day. That's more than four times the combined flow of every freshwater river in the world.

Tides moving from the outer Bay into the smaller Minas Basin can reach speeds up to 5 meters per second, and rise up to 16 meters vertically – the height of a five-storey building. Acadia University researcher Dr. Richard Karsten estimates 2500 megawatts of extractable energy from the Minas Basin and surrounding area.

Nova Scotians have long been aware of the power of the Bay of Fundy, building tidal mills as early as 1607, and constructing a tidal power plant in 1984 – one of only three in the world. New technology suggests Fundy tides have the potential to play a much larger role in Nova Scotia's energy future.

A Plan to Harness It

To help realize the Bay of Fundy's potential, the Province of Nova Scotia has taken a number of strategic actions to move ahead, helping to create:

- A Test Centre
- Green Rules + Incentives
- Research + Monitoring
- Legislation

Annapolis tidal plant generates up to 20 megawatts, enough power for up to 6,000 homes.

Bay of Fundy

“One of the best places for tidal power in the world.”

James Ives, CEO, OpenHydro



Test Centre

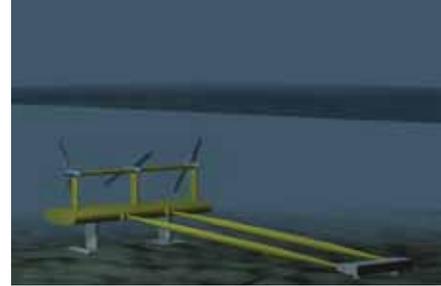
Nova Scotia established FORCE – the Fundy Ocean Research Centre for Energy – as Canada’s leading test centre for tidal energy technology. FORCE works with developers, regulators, and researchers to study the potential for tidal turbines to operate within the Bay of Fundy environment.

FORCE provides a shared observation facility, submarine cables, grid connection, and environmental monitoring at its pre-approved test site. The site is ideal for testing, with water depths up to 45 meters at low tide, a sediment-free bedrock sea floor, straight flowing currents, and water speeds up to 5 meters per second.

Nova Scotia has selected four participants (see images at right); in 2009, NS Power deployed the first commercial-scale device in North America at the FORCE test site.

FORCE receives funding support from the Government of Canada, the Province of Nova Scotia, Encana Corporation, and participating developers. More information is available at fundyforce.ca.

Developers + Technologies;
Nova Scotia Power (with OpenHydro),
Atlantis Resources Corporation (with
Irving Shipbuilding and Lockheed
Martin), ALSTOM (with Clean Current),
and Minas Basin Pulp and Power
(with Marine Current Turbines).



Other Activity

Nova Scotia is also encouraging small-scale technology (up to 0.5 megawatts) as a community-based energy solution. These devices connect at the distribution level, and enjoy a fixed price for their output (see Incentives, next page). Fundy Tidal Inc., a company based on Brier Island in the Bay of Fundy, is moving forward with plans to develop small arrays. Provincial regulation also allows other developers (both local and international) to pursue similar projects along Nova Scotia’s coastlines and rivers.

Other companies have expressed interest in developing lagoon or barrage projects in the Bay of Fundy, using technology similar to that used in conventional dams. The potential scale of these projects is large and would require an extensive environmental assessment.

New Energy micro-tidal
device being tested in
Brier Island, Nova Scotia.



Green Rules + Incentives

The Province has created a number of policies to ensure the electric utility uses more renewable content – critically important while fossil fuels remain lower priced on the world market.

The motivation is simple: until recently, nearly 90 per cent of Nova Scotia's electricity supply came from imported fossil fuels, most of it coal. This meant spending electricity dollars outside the region, and exposing customers to both volatile market prices and harmful emissions.

In response, the province created:

GHG (Greenhouse Gas) Caps

North America's first and only hard caps on greenhouse gas emissions from electricity, which increase in intensity from 2010 through to 2020.

Targets

A law requiring 25 per cent renewable electricity supply by 2015, and 40 per cent by 2020. The utility faces penalties for not meeting the deadlines.

Incentives

Fixed prices, or feed-in tariffs (FITs), for both small and large tidal projects (distribution and transmission scale). This gives developers certainty about the price they will receive for their energy output, making it easier to secure financing.

Working together, these three policy tools spur the potential of tidal technology to play an increasing role in Nova Scotia's future energy mix.

Research + Monitoring

In-stream tidal is a new technology, and the Bay of Fundy is an important environmental, biological, and socio-economic resource to Nova Scotia. Research and monitoring plays a critical role in determining public understanding and acceptance of this new industry and its possible impacts on the environment.

In 2007, with provincial funding, Nova Scotia's OEER Association (OEER) carried out a Strategic Environmental Assessment (SEA) focused on tidal energy in the Bay of Fundy. OEER consulted with communities, the fishing industry, and others with activities or interest in the Bay of Fundy to provide input on whether, and how, to proceed with potential development. Planning is underway to apply the existing SEA framework to a SEA Phase II, for development of marine renewable energy off the Atlantic Coast of Nova Scotia, including the Cape Breton area.

In 2009, with provincial funding, the OEER and its sister association, OETR, approved eight projects ranging in duration from two to three years. Combined, these projects create the most comprehensive research program ever undertaken on hydrodynamic modeling in the Bay of Fundy region. Areas of research include:

tidal resource assessment, sediment dynamics, animal behaviour, near and far field effects, potential effects of ice and debris, and potential effects of tidal lagoons.

Also in 2009, FORCE began an environmental effects monitoring program for the test site, with a particular emphasis on fish and mammals. This ranges from fish tagging and acoustic monitoring for mammals to marine bird and mammal surveys to fish migration echo sounder and netting trials.

All of this information will be vital to Nova Scotia's acceptance of possible future development.

Scientific research is a key part of developing tidal energy technology that is compatible with the Bay of Fundy.



Legislation

Nova Scotia is also putting new legislation in place – for tidal and other marine renewables – that will outline a clear path to move from demonstration to larger projects. This will give developers and the public more certainty around what is required to ensure any development is safe, viable and acceptable.

The legislation will look at the design of the licensing system, how to award development rights, and how to coordinate various government entities to ensure the process is clear and efficient. These issues will affect developers' business models and the public interest, while good legislation will attend to both.

www.gov.ns.ca/energy/public-consultation/marine-renewable-energy.asp

- Planning
- Economic Opportunities
- Environment
- Occupational Health and Safety
- Rights Allocation
- Regulatory Model

Contact

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Timeline

1984

- Annapolis tidal barrage installed

2008

- Province selects three developers, commits to support tidal centre, research, legislation
- Major vessel survey identifies ideal site

2009

- Environmental Assessment approved
- NS Power deploys OpenHydro (first large-scale device in North America)
- Environmental monitoring begins

2010

- Province announces renewable electricity goal of 40% by 2020
- RFP for 4th berth released
- Province announces tidal FIT
- FORCE research facility completed
- OpenHydro retrieval (redeployment scheduled for 2011)

2011

- Atlantis wins 4th berth at FORCE

Upcoming

2011

- subsea cable
- transmission line
- substation
- FIT price
- new legislation to clarify commercial path and public interests
- new research and info sharing

2012

- ALSTOM, Atlantis, Minas Basin Pulp and Power device installation