

Observations on the Potential Development of Tidal Energy in the Bay of Fundy

By Jacob Chard

Tidal energy in the Bay of Fundy has great potential and its development could bring many benefits to New Brunswick and Nova Scotia. Potentially inexpensive electricity would provide industries with a competitive advantage and reduce expenses for municipalities, institutions, and residential customers of electrical utilities. Investment opportunities and job creation would benefit many citizens. Furthermore, exploitation of renewable energy sources would allow a corresponding reduction of fossil fuel consumption and thus decrease the region's emissions of greenhouse gases and other pollutants. However, given the lack of knowledge concerning potential environmental effects of the developments involved, it would be premature to endorse such projects outright. So-called "data gaps" must be filled in before any commercial projects are approved. Small pilot and demonstration projects could help us to ascertain the economic and environmental viability of large-scale projects; however, even these must only be implemented once it is reasonably certain that they will not have significant adverse environmental effects.

Some may question the necessity of developing tidal power; Nova Scotia has barely begun to exploit its wind resources, despite the proven viability of wind power and universal recognition that the province has world-class winds. Wind power has the capacity to provide a significant portion of the Maritime Provinces' electricity before tidal power is even proven viable. However, given Nova Scotia's current dependence on coal for electricity generation, and the possibility of selling excess electricity to lucrative markets in the north-east United States, it is sensible to examine the potential of tidal power as well. New Brunswick and Nova Scotia may have an opportunity to position themselves as major exporters of electricity. Additionally, tidal power has some advantages over wind power. One of these is predictability; winds are intermittent, and make wind power unsuitable for a primary source of electricity, while tides are cyclical. Moreover, the Bay of Fundy's tides constitute a massive amount of energy; potentially, much more electricity could be generated from these tides than from wind.

It is unknown how much of the tidal energy in the Bay of Fundy can be harnessed and converted to electricity without serious harm being done to the environment. However, it should be acknowledged that no form of electricity generation is entirely benign. Nuclear power plants, while "clean", have the potential to cause destruction on a massive scale. Hydroelectric dams create huge reservoirs that destroy ecosystems and animal habitat, and often devastate ecosystems downstream as they impede the flow of rivers on which they are constructed. Wind turbines are noisy and often considered unsightly. Although their effect on birds is often exaggerated, they do have some adverse impact on local wildlife. Solar power is the least harmful, although a large concentration of panels could potentially cause adverse environmental effects via large changes in local temperature; even when this is mitigated, solar power is relatively inefficient in regions with chronic cloud cover, such as the Maritimes. Tidal power will have its own undesirable effects on the environment; it will be necessary to predict and mitigate these effects to ensure that they do not outweigh the benefits.

While the protection of marine ecosystems is a worthwhile exercise in itself, it is also important because the health of the fishing industry is directly linked to the health of the environment in which it takes place. Consequences of tidal power development such as changes in sediment distribution and oil contamination could alter fish habitat, and

might diminish or displace fish populations. The exact nature and magnitude of such effects must be determined at each proposed site, as they would vary along with local conditions. Similarly, the importance of minimizing these effects would vary by site – for example a certain reduction of current velocity in the wake of the turbines might be acceptable at one site but not at another.

Aside from affecting fisheries by altering marine ecosystems outside their boundaries, Tidal In-Stream Energy Conversion (TISEC) developments might have a more direct impact if constructed in locations that are popular with fishers. It is unknown at this point whether the ideal sites for TISEC developments will coincide with popular fishing grounds; given the large area of the Bay of Fundy, one would think that it will be possible to avoid this. However, if and when a development in a fishing area is justified, fishers should receive compensation for potential losses. With co-operation, the two industries should be able to co-exist.

Tidal power holds many potential economic benefits for communities and the region as a whole. The construction, operation, and maintenance of tidal energy developments will create jobs, benefiting communities near their installation and manufacturers of tidal energy equipment. It remains to be determined if electricity can be generated more cheaply from tidal energy than from competing energy sources. If it can, this will be advantageous to the region for several reasons. Residential, institutional, and municipal customers will have lower electricity bills. So will industrial customers, giving them an advantage over competitors in regions with more expensive electricity. This would result in yet more job creation as industries grow and expand their operations. Finally, if significant amounts of electricity can be generated, the excess can be sold to markets in the north-east United States, in which electricity already costs significantly more than in the Maritimes. Investment in tidal energy developments by Community Economic Development Investment Funds (CEDIFs) will result in profits from such operations being re-invested locally, or ending up in local hands if paid out as dividends. As a side note, the involvement of CEDIFs will improve public acceptance of development, particularly in fishing communities concerned about the potential impact on the profitability of their fisheries. Residents will be more receptive to development if they are able to share in the profits than if they do not stand to gain anything directly.

Developing tidal power in the Bay of Fundy could result in innumerable economic and environmental benefits for Nova Scotia and New Brunswick. However, it would be folly to think that tidal energy projects will have no negative impact; there is a danger of adverse environmental effects resulting from projects that are approved without adequate knowledge of the potential consequences. The two provinces must ensure that development proceeds at a cautious rate, and that adequate studies are conducted to identify potential environmental effects and techniques for their mitigation. As long as it can be demonstrated that the benefits outweigh the drawbacks, such projects should be allowed to proceed.