



## “Knowing your Site and Sticking To It”

**Abstract:** Dr. Alex Hay, Dalhousie University

---

### ***Toward Turbulence Measurements at Turbine “Hub-Height”: The Vectron Project***

*(Alex Hay, Len Zedel, Robert Craig, Sven Nylund, Joel Culina)*

The prospect offered by the high-speed flow in rivers and tidal channels as a source of hydroelectric power is attracting increasing interest worldwide. However, an area of significant uncertainty among turbine design engineers is the expected range of turbulence intensities and stresses in the oncoming stream. Obtaining the necessary measurements – i.e. continuous time series of turbulent velocity at the heights above bottom spanned by the turbine -- is a significant challenge. Remote acoustic Doppler profiling techniques represent a promising approach, but for many reasons commercially-available Doppler systems are not able to meet the measurement need: hence the Vectron Project.

The goal of the Vectron Project is the development of an experimental Doppler system specifically designed for turbulence measurements at hub height in high speed flows. The project is a private-sector/university collaboration among Nortek Scientific (Canada), Nortek AS (Norway), the Fundy Ocean Research Centre for Energy (FORCE), turbine manufacturers partnered with FORCE, Memorial University of Newfoundland, and Dalhousie University. The project was initiated in late 2013, with a one-year planned development timeline, and the first field deployment planned for late 2014.

In addition to outlining the Vectron Project, the presentation will include a brief summary of recent turbulence measurements in one of Nova Scotia tidal passages. These results are used: (a) to illustrate both the potential of acoustic Doppler remote sensing for turbulence measurement, and the limitations of standard acoustic Doppler profiler systems; and (b) to provide thereby the rationale behind the Vectron design. If time permits, preliminary results based on modelling studies of the expected performance of the new system will also be presented.