Abstract Submitted
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Resource Evaluation and Energy Production Estimate for a Tidal Energy Conversion Installation using Acoustic Flow Measurements[1] IAN GAGNON, KEN BALDWIN, MARTIN WOSNIK, University of New Hampshire — The Living Bridge project plans to install a tidal turbine at Memorial Bridge in the Piscataqua River at Portsmouth, NH. A spatio-temporal tidal energy resource assessment was performed using long term bottom-deployed Acoustic Doppler Current Profilers ADCP. Two locations were evaluated: at the planned deployment location and mid-channel. The goal was to determine the amount of available kinetic energy that can be converted into usable electrical energy on the bridge. Changes in available kinetic energy with ebb/flood and spring/neap tidal cycles and electrical energy demand were analyzed. A system model is used to calculate the net energy savings using various tidal generator and battery bank configurations. Differences in the tidal characteristics between the two measurement locations are highlighted. Different resource evaluation methodologies were also analyzed, e.g., using a representative ADCP bin vs. a more refined, turbine-geometry-specific methodology, and using static bin height vs. bin height that move w.r.t. the free surface throughout a tidal cycle (representative of a bottom-fixed or floating turbine deployment, respectively). ADCP operating frequencies and bin sizes affect the standard deviation of measurements, and measurement uncertainties are evaluated.

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