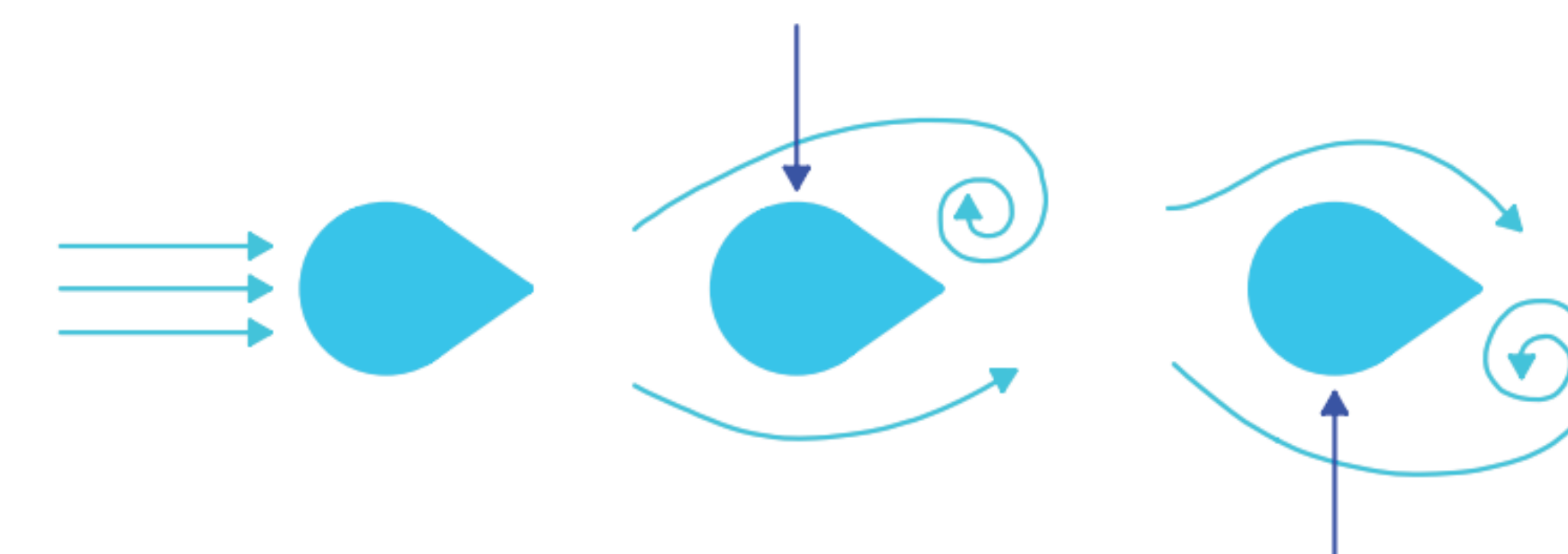


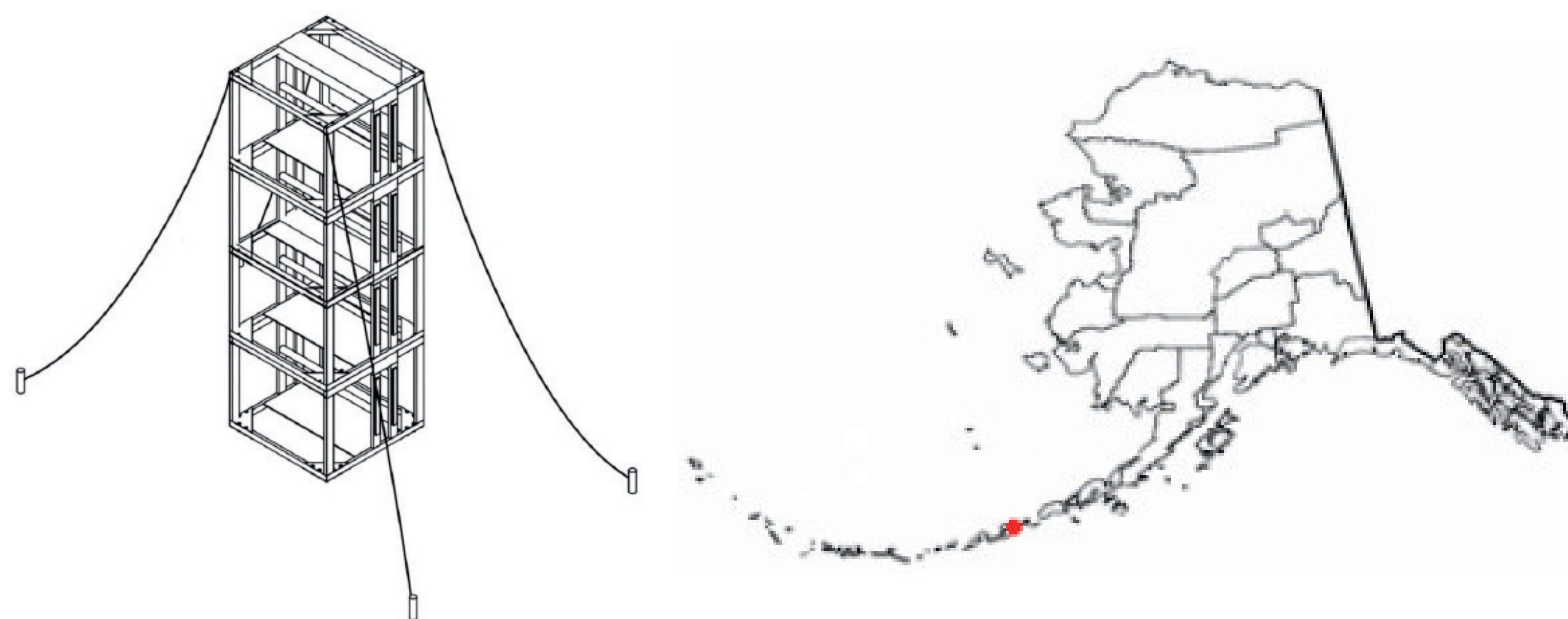
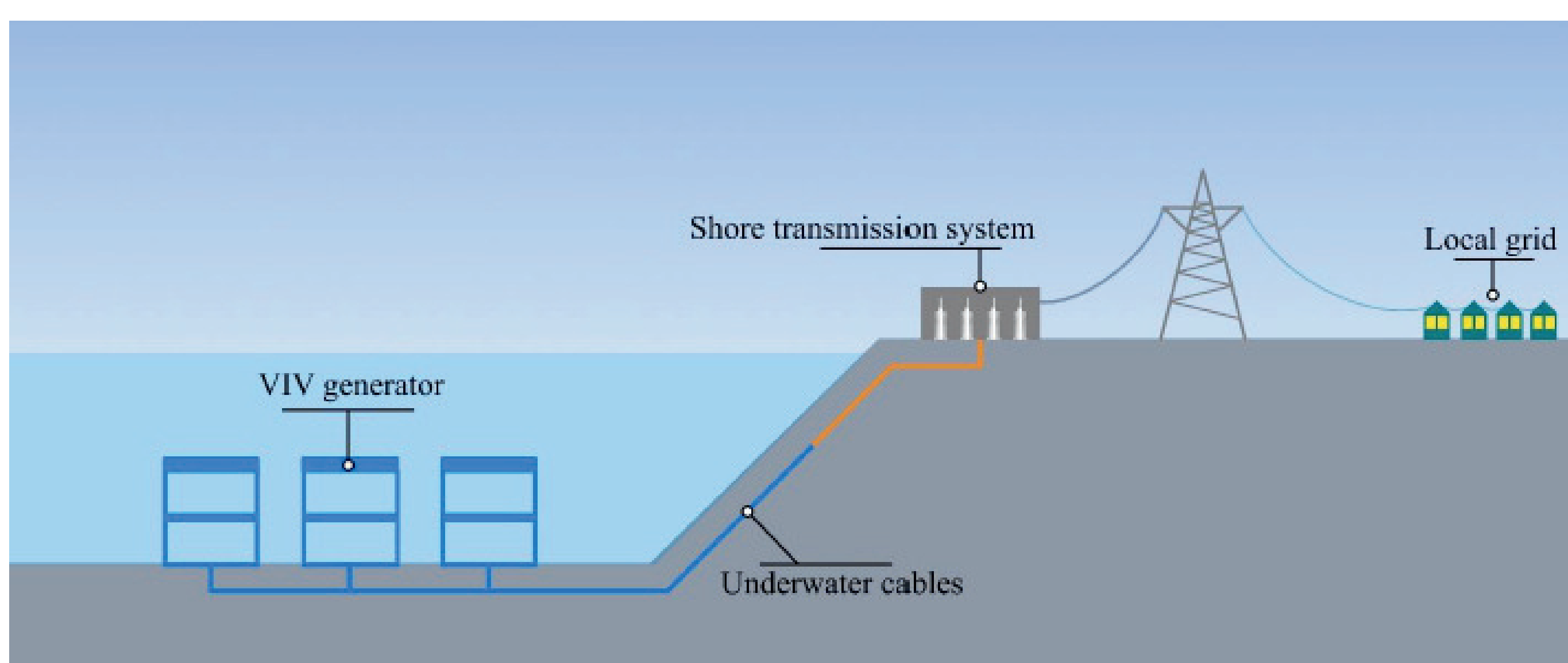
# VORTEX INDUCED VIBRATION TIDAL CONVERTER

By Webb Institute



## INTRODUCTION

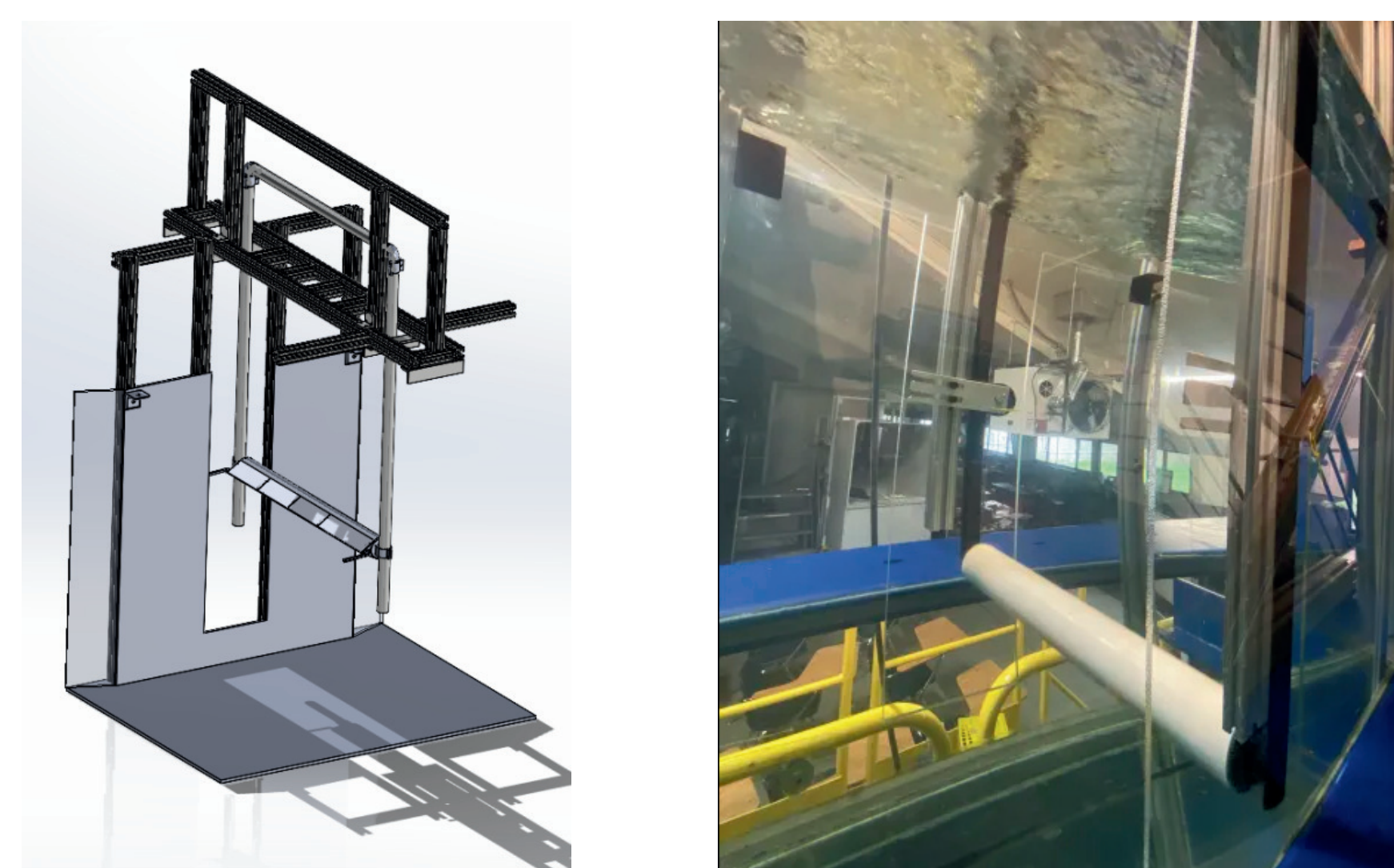
The proposed Vortex Induced Vibration Energy Generator (VIV) design is simple to build, scalable, and cost effective. In response to the urgent need for reliable, accessible, and renewable energy generating sources, the VIV generator is a promising alternative that can power remote communities as they transition away from fossil fuels. The current model is to be installed offshore to provide power to remote-Alaskan island communities by utilizing a stacked mount of multiple foils. This location will allow the device to adequately convert the tidal energy.



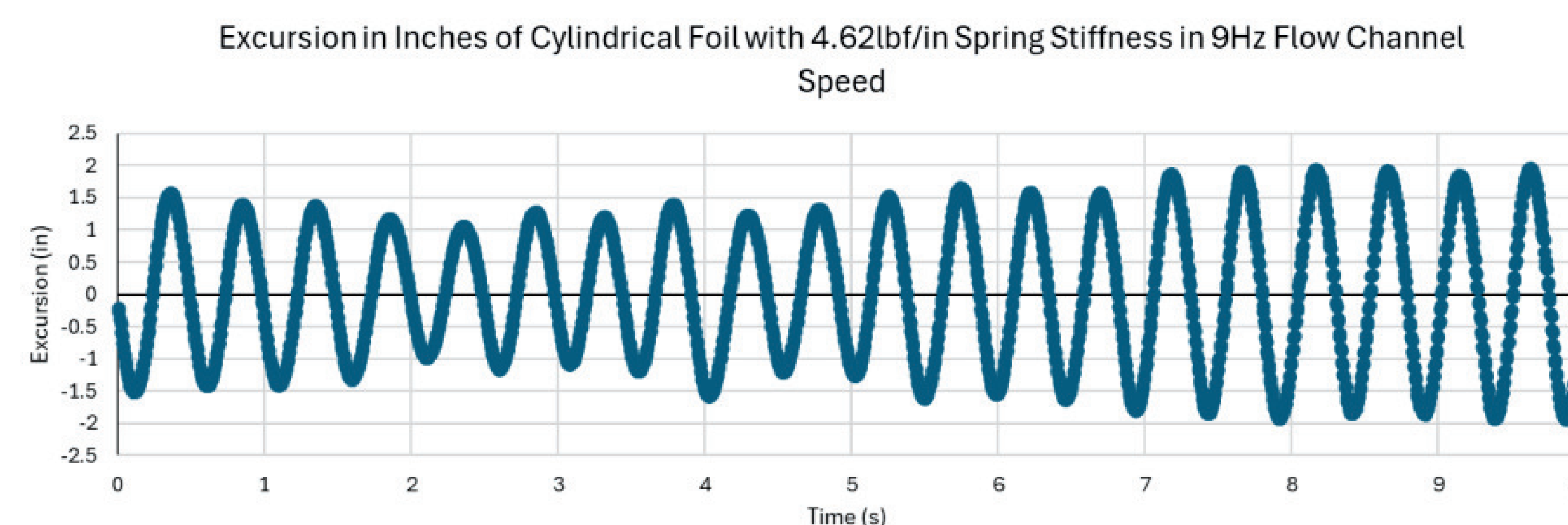
## RESULTS

VIVs occur due to vortex shedding, driven by flow over an immersed body. Vortices are created by flow separation over the body. This phenomena occurs at low flow speeds, making it ideal for small currents. Using our circulating-flow channel, an immersed foil's vibrations can be harnessed to generate electricity. The results of these tests are below.

### MODEL TESTING



The designed foil's vibrations were compared to a bluff cylinder in the circulating-flow channel.



### TEAM MEMBERS

#### Students

Ashmore, B., Calli, W., Coppi, M., Erdos, K., Freischlag, K., Heidenreich, D., Kanemasu, B., Kawabata, E., Kealey, B., Mullan, A., Ng, A., Nicoletti, L., Sanchez, M., Sir, D., Wolfe, W.

#### Advisors

Professor Richard Royce  
Professor Michael Martin



## BUSINESS PLAN

### Areas Impacted:

Remote-Alaskan Island communities rely on micro-grids, driven by small, inefficient fossil-fuel powered generators.

### Where we plan to implement:

Umnak, Dutch Harbor, King Cove, Akutan, False Pass

### What we will implement:

A scaled VIV tidal energy converter system that can provide reliable, renewable energy. These foils will be scaled up to stacked sets of 20-m long units.

## FINANCIAL ANALYSIS

The energy output from the technical section can be used to scale the VIV generator to be large enough to support Aleutian Island communities.

- Scaled unit power output: **15.2 kW**
- Scaled system power output: **212.8 kW**
- Umnak community power needs: **196 kW**
- Estimated lifespan: **30 years**
- Total cost estimation: **\$19.5MM**
- Power generation cost: **\$0.35/kWh**

### Overall Cost Breakdown

