

Alaska Hydrokinetic Energy Research Center Phase 2 Strategic Plan (6/16/2015)

Mission Statement

It is the Alaska Hydrokinetic Energy Research Center's (AHERC) mission to determine whether hydrokinetic energy technologies are a viable source of sustainable, renewable energy for small, remote communities in Alaska as well as outside.

To succeed in its mission will require AHERC and its public and private sector partners to accomplish the following goals 1) deployment of at least one microgrid integrated wave, tidal or in-river grid hydrokinetic energy project in Alaska within the next 5 years 2) demonstration of the viability of hydrokinetic energy for powering small (e.g. autonomous environmental monitoring or lodges) and large (e.g. mining) electrical loads in remote areas. To accomplish these goals, AHERC will need to maintain and strengthen existing partnerships (e.g. with the Power Systems Integration Laboratory, the UAF School of Fisheries and Ocean Sciences and the Northwest National Marine Renewable Energy Center) and expand its partner network as well.

To succeed AHERC must build on leadership established during its phase 1 (2010-2014) strategic plan. Specifically, AHERC will expand its 1) project implementation capabilities 2) ability to deploy monitoring and measurement assets to remote locations 3) ability to analyze data collected in support of detailed site characterizations and 4) ability to provide site specific solutions for moorings and infrastructure necessary to successful hydrokinetic power installations in Alaska and other environmentally and logistically challenging locales. AHERC will also need to engage and educate students at multiple levels (from high school through professional level engineers).

Path Forward

This strategic plan outlines the reasons for- and route-to continued expansion of AHERC's capabilities and impact. The phase 2 strategic plan is necessitated because the prior objectives to establish a sustainable AHERC and a viable test site for in-river hydrokinetic energy projects were met. In addition, the political, financial, and industrial maturity of the hydrokinetic energy industry have changed since the original strategic plan was created.

Hydrokinetic power generation technology is an emerging technology subject to the same development cycle other emerging technologies are, known as the "Gartner emerging technology hype cycle" (Figure 1). Emerging technologies typically negotiate the following five stages before achieving success (1) initial enthusiasm with the promise of the technology; (2) Inflated expectations from publicity and some initial limited successes; (3) disillusionment as technology failures and problems arise; (4) second and third generation products show benefit of technology and become economically viable for first adopters; (5) general adoption of technology occurs.

Gartner Emerging Technology Hype cycle

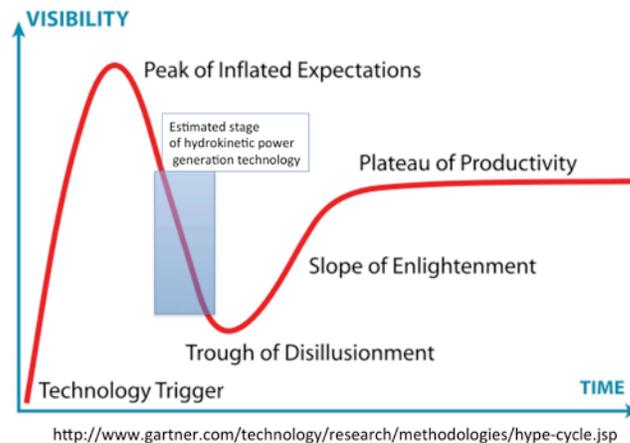


Figure 1. Gartner emerging technology hype cycle.

Hydrokinetic energy technologies are nearing stage (3), the trough of disillusionment. Typically, technologies negotiate this low point by exploiting niche markets. Alaska, where energy costs are extremely high, is one niche market that hydrokinetic energy developers are examining closely. However, because of logistics and climate, working in Alaska is challenging. As a research center within the UAF Institute of Northern Engineering, AHERC is well-positioned to identify the relevant challenges and develop solutions to challenges before failures lead to further disillusionment with this promising technology. Supplying power to remote lodges or to autonomous scientific instrumentation are two such niche applications where hydrokinetic energy could be applied.

Because AHERC and the hydrokinetic energy industry were both comparatively new when the phase 1 strategic plan was formulated, the initial strategic plan encompassed a broad array of topics. In the phase 2 plan, we will build on the successful development of AHERC and focus on its capabilities for resource and fisheries assessments, debris characterization and mitigation, and project deployments in logistically and environmentally difficult locations.

Outcomes from AHERC's continued success will include (1) information necessary for regulatory agencies to evaluate the impacts of hydrokinetic turbines on fisheries or other biological resources (2) determination of hydrokinetic generation operating costs and benefits. Operational costs may include fisheries or other environmental impacts, operation and maintenance costs. Benefits will likely include reduced fuel usage that leads to increased savings as well as improved energy security. Our agenda will require developing new methods for observing fisheries interactions and habitat changes associated with hydrokinetic energy converters, new resource assessment techniques as well as the development of a workforce skilled in making such specialized measurements and able to safely and successfully deploy hydrokinetic infrastructure. In the process of achieving our mission, AHERC will foster the ability of its numerous small Alaska-based partner

businesses to export their knowledge of all phases of hydrokinetic energy project planning and implementation to other developing economies around the world.

In Phase 2, AHERC will (1) further build out its Tanana River Test Site to include a grid connection and expand the test site's cliental and (2) strengthen existing collaborations with its peer research initiatives within ACEP and UAF and with its national partners (e.g. NNMREC). A robust test site will ensure Alaska remains a site of continuing activity and innovation for the hydrokinetic energy industry and serve as gateway for companies to explore the Alaskan market. It will also allow AHERC to refine operating procedures for supporting installations and to achieve the goals outlined above. Since AHERC is a small organization, partnerships are key to AHERC's ability to succeed. AHERC will increase its international partnerships as well especially in markets where Alaskan expertise is relevant.