

## Nenana Hydrokinetic

<b>Grantees</b>	Golden Valley Electric Association (Utility-Cooperative), University of Alaska Fairbanks (Non Profit Entity)
<b>Technology Type</b>	OCEAN/RIVER
<b>Region</b>	Railbelt
<b>AEDG Project Code</b>	10096

### REF Grants Received

Round	App	Grant Title	Grant #	AEA Project #	Phase	Start Date	End Date	Status
1	97	Nenana Hydrokinetic Construction	2195437	407053	Feasibility	8/20/08	12/31/12	Closed
0	-6	Nenana River ROR Hydro Reconnaissance Study	7	407021	Reconnaissance	1/28/09	2/16/10	Closed

### Grant 2195437: Nenana Hydrokinetic Construction

**Project Scope:** The University of Alaska - Fairbanks, Institute of Northern Engineering will conduct a detailed characterization of the hydrokinetic energy potential of the Tanana River adjacent to the community of Nenana over a 15-month period to include a summer-winter-summer cycle. While the year-round flow is the most important factor that determines the hydrokinetic energy potential of a river, the feasibility of deploying a hydrokinetic turbine system and its efficiency are also affected by the interaction of the hydrokinetic turbine and the river environment. These can involve interactions between turbines, and the anchors and cables holding the turbine in place, with fish populations, floating or submerged debris, ice, and sediment. The river characterization to be undertaken in this project is designed to investigate the interactions between the river environment and hydrokinetic power systems. This process will require the following studies.

Mapping the river flow throughout the summer and winter months to determine the seasonal impact of ice. Existing data from a local US Geological Survey gauging station will be used to estimate the historical river flows and its variation. Measurements of flow velocities just prior to river freeze-up (October) and river break-up (April) were completed in 2008 and 2009.

Monitoring the sediment carried in the river's main flow and along the bed to determine the baseline conditions and the variability of sediment accumulation and erosion that can affect turbine operations. This includes the influence of anchors and bed-mounted turbines. If a functioning turbine is available to the project, this monitoring will be extended to examine the effect of turbine operations on sediment deposition / erosion and sediment effects on turbine operation. The deployed anchoring system will be monitored to determine changes in sediment deposition and/or erosion that may occur as a result of flow disturbance by anchors.

Monitoring fish populations in summer and winter to determine their number, river usage patterns, and species and age composition. Fish populations, and their behavior, differ from summer to winter and understanding those differences may be important to bed-mounted turbines that plan to operate year-round under an ice cover. A study of fish interaction with turbines requires high-resolution sonar equipment that is beyond the budget of this project, but is intended to be incorporated into future studies. Determining fish behavior around turbines will be addressed by these studies. In addition, the impact on larval and juvenile fish drifting downstream will be studied.

Monitoring summer debris flow and possible mitigation strategies will also be completed. This will include the design and testing of an instrumented variable angle trash rack that can measure accumulated trash load. River flow measurements above and below the trash rack will be used to determine the influence of debris on the local flow that can affect turbine efficiency.

The results of this project will provide critical information to utilities, villages, and commercial hydrokinetic manufacturers who are considering using or commercializing hydrokinetic turbines. Information about what permits are needed and who are critical stakeholders, what are the challenges of deploying and operating hydrokinetic turbines in the river environment and how fish, sediment, ice, and river debris, and their mitigation may affect turbine operations and efficiency.

**Project Status:** The final report has been published and the grant closed out.

<b>As of Nov. 30, 2013</b>	<b>Budget</b>	<b>Expenditures</b>
Renewable Energy Funding	\$450,000.00	\$450,000.00
Other State Funding	\$0.00	\$0.00
<b>Total State</b>	<b>\$450,000.00</b>	<b>\$450,000.00</b>
Required Local Match	\$0.00	\$0.00
Federal Grant Funding	\$0.00	\$0.00
<b>Total Project Costs</b>	<b>\$450,000.00</b>	<b>\$450,000.00</b>

**Grant 7: Nenana River ROR Hydro Reconnaissance Study**

**Project Scope:** The project is to prepare a reconnaissance study of the Nenana River for a run-of-river hydroelectric project. A report will be prepared to document findings of the study and shall address: power generation and capacity factor, narrative to describe plant, site services, access, transmission infrastructure, costs, critical issues, and conclusions as to the technical and economic feasibility of the project and recommendations for further study.

**Project Status:** The project is complete. The project completed the study titled "Nenana River Hydropower Scheme Healy, Alaska Reconnaissance Study", by Knight Piesold and Co., and dated January 2009.