

# Hydrokinetic Power Development from Hydro Green Energy



Mark R. Stover  
Vice President  
Governmental & External Affairs  
Holyoke, MA  
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# About Hydro Green Energy, LLC

- Houston, TX based technology integrator and renewable energy project developer.
- Hydro Green's systems operate in rivers, tidal areas and oceans.
- HGE can also deploy at existing hydropower projects (Hydro+™) for increase in overall output (incremental hydro).
- HGE owns U.S. Patent # 6,955,049.
- 87 U.S. and international hydrokinetic energy patents are pending.
- First project is expected to begin operations in Oct. '08 on the Mississippi River in Minnesota.
- 16 Preliminary Permits Issued, one voluntarily surrendered (AK). Pursuing river, tidal and ocean projects.
- Secured Series-A in 4/08; Series-B negotiations almost complete.



# Partners of Hydro Green Energy

- ***Balch & Bingham*** – legal (energy)
- **Bond & Smyser, LLP** – legal (corporate)
- ***Concepts NREC*** – turbine design, engineering, R&D, equip. fab
- ***Hatch Energy*** – engineering, licensing
- ***Knight Piesold*** – project development, engineering
- ***Kleinschmidt Associates*** – PADs, reg. assistance
- **Mason & Petruzzi** – legal (intellectual property)
- ***Normandeau Associates*** – environmental, regulatory
- ***National Hydropower Association*** (serve as vice chair of New Technologies Council)
- **TerraSond** – river mapping and profiling, relationships (AK)
- **Texas Renewable Energy Industries Association (TREIA)**
- **The Renewable Energy Alaska Project (REAP)**
- **Wind Energy System Technology Group (WEST)**



# About Our Patented Turbine

Generic Device Specifications	
Power Conversion	Mechanical - Patented Shroud Chain Drive
Electrical Output	Synchronized with Grid
Foundation	Surface Suspension
Generator	Above Water on Platform
Dimensions	
Rotor Diameter	12 feet
Exit Duct Length	8 feet
Exit Duct Area	200 feet <sup>2</sup>
Runner depth below surface	3 feet
Weight Breakdown	
Structural Steel	15,000 Pounds
Rotor	12,000 Pounds
Exit Duct	17,000 Pounds
Power	
Rotor Rotational Speed	21 revolutions per minute (rpm)
Rotor Tip Speed at 21 rpm	3.67 meters per second
Cut-in Speed	1.0 meter per second
Maximum Rated Speed	3.5 meters per second
Rated Electric Power	98 kW @ 3.5 m/s
Capacity Factor	Up to 100% - site specific
Availability Factor	>99.0 %
Turbine Coefficient of Performance [Cp]	0.62 at design flow



# Our Patented Turbine

(Model of Units Being Built for MN Project)



# Hastings Project Barge Progress

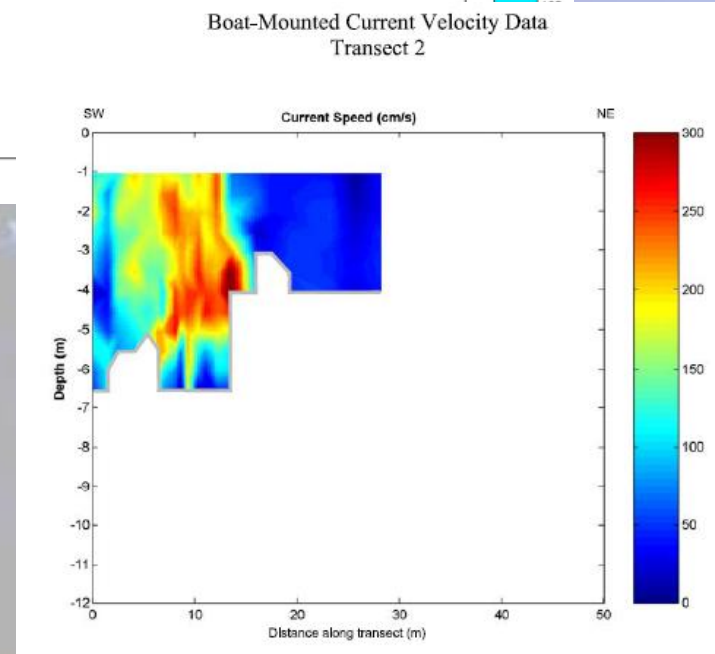
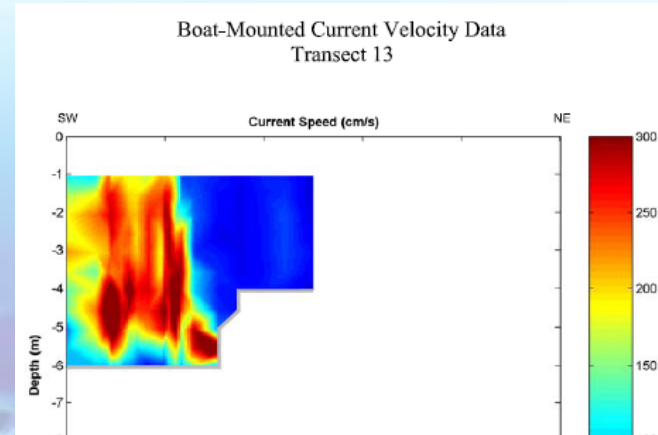
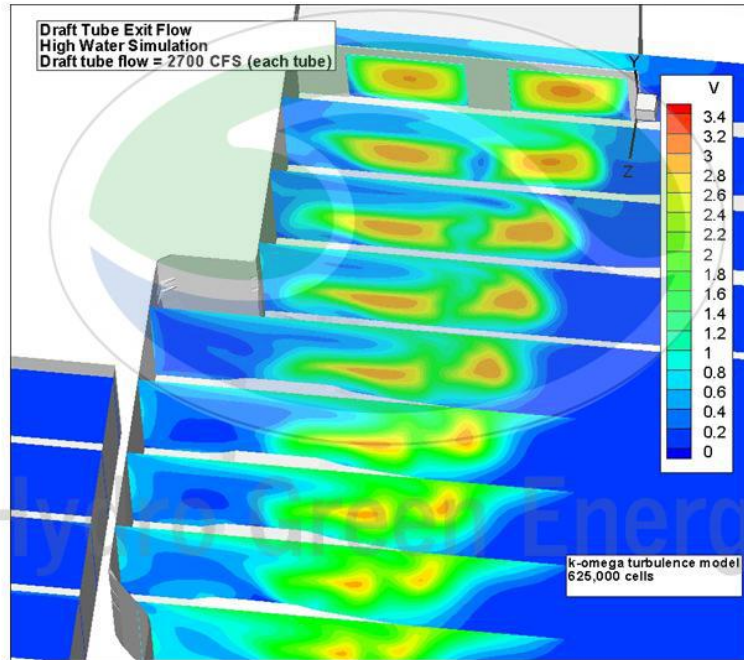


# Hastings Project Early Blade Design



# Hastings Project CFD vs. Actual Data

## Velocity Contour Details



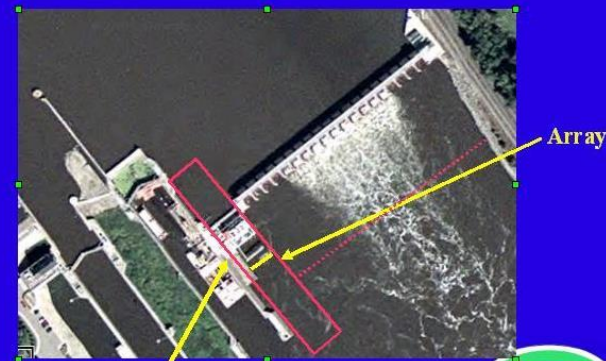


# The First Project

- City of Hastings, MN 4.4MW Hydroelectric facility.
- A surface mounted array of hydrokinetic turbines.
- 70-200 kW installed.
- Up to a 5.7% increase in existing plant capacity.
- First commercially-operational, FERC-licensed HK plant in U.S. (invaluable real world experience, first mover status, leader in HK industry)
- Environmental tests and monitoring.
- Can be duplicated at hydro sites worldwide.



City of Hastings Hydro Project - 4.4 MW  
Mississippi Lock and Dam #2



Substation, grid connection, metering facility all less than 250 feet from array = LOWER PROJECT COSTS

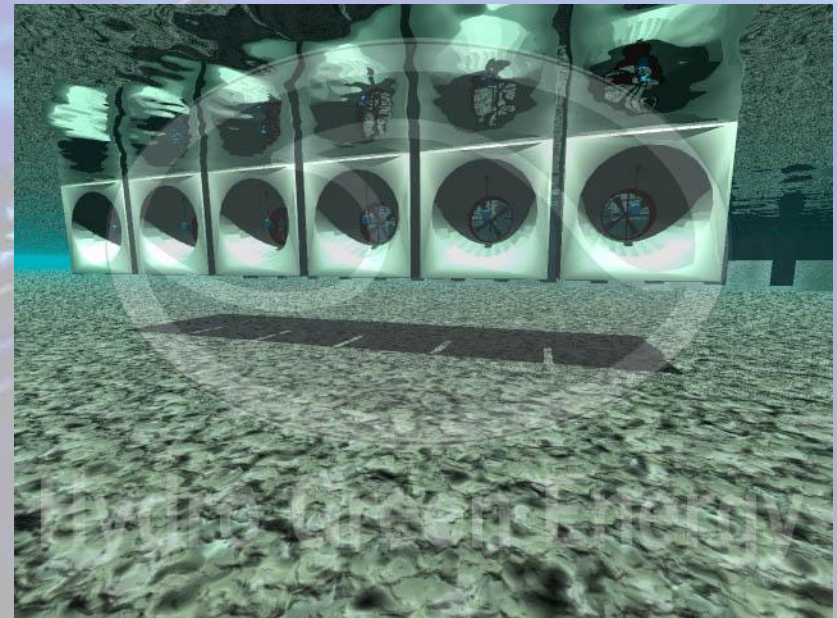


Hydro Green Energy



# Utility-Scale River/Ocean Concept

- Install multi-unit HGE hydrokinetic turbine arrays in river or ocean.
- Surface suspended system: easily visible for river traffic; no drilling into river bed; easily removable; easy to service, environmental studies easy to perform.
- Preliminary permits for sites in Alaska, Mississippi, New York.
- Potential to scale up after pilot license.
- Intend to file for pilot licenses in spring of 2009.
- Conducting R&D on unit to operate in tidal setting (rotating unit), as well as R&D on ocean technology (floor mounted?). Permits in AK, ME and TX.



# Contact Information

**Mark R. Stover**  
**Vice President**  
**Governmental & External Affairs**  
**mark@hgenergy.com**  
**877-556-6566 x711**  
**www.hgenergy.com**

