



Presentation to: Red River Valley Association

CLEAN, DOMESTIC, SCALABLE,
CONTINUOUS, COMPETITIVE
POWER

March, 2010



A new generation of energy

Hydropower
Development

Hydropower
Technology

Overview of Free Flow Power

- Founded in 2007
- One of most active developers of new hydropower projects in the US
- 25 professionals, many with 15-30 years experience
- Value proposition:
 - **For Investors:** a pure play in hydropower, a valuable yet overlooked renewable energy sector with growth opportunity.
 - **For Electricity Consumers:** carbon-free electricity with greater reliability and a lower cost of power than other renewables.
 - **For Project Owners:** an integrated approach to licensing, engineering, and finance to capture value and address challenges quickly and cost-effectively.

FFP's Business Segments



Acquire,
improve, manage
hydropower
assets

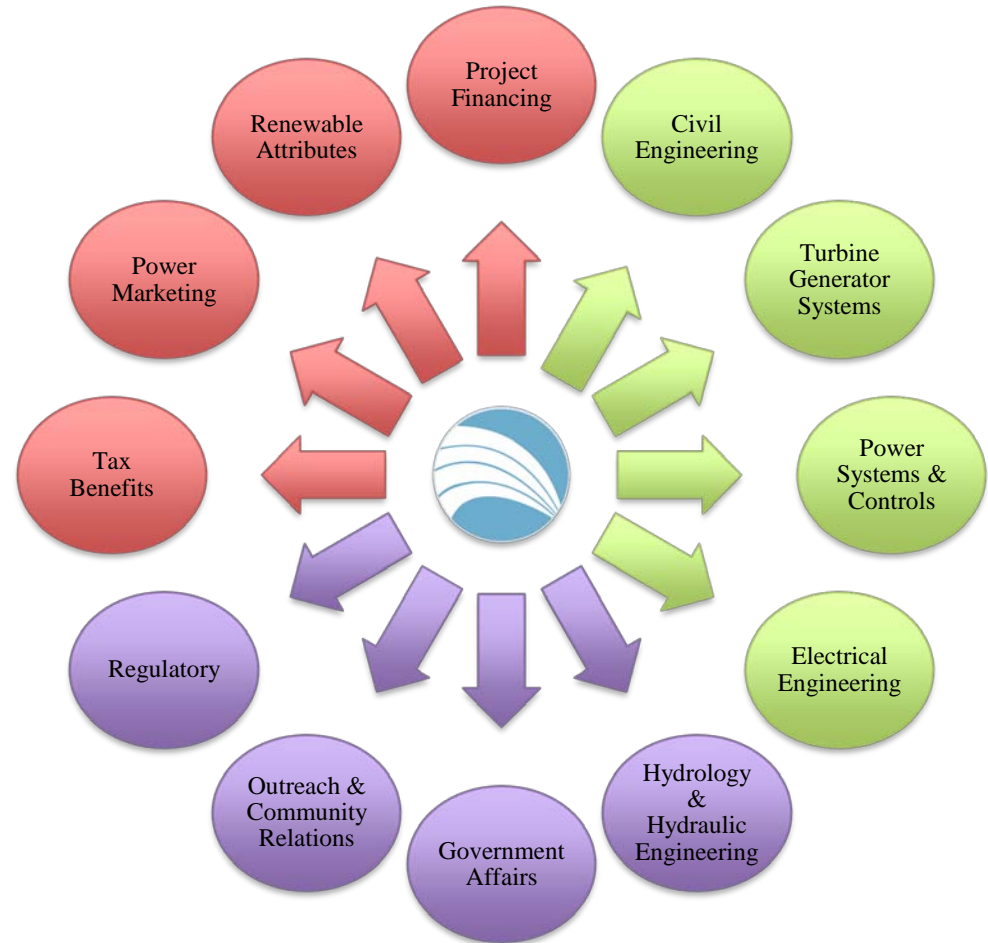
Develop new
conventional
hydropower

Develop
hydrokinetic
generation

Services businesses that complement other segments

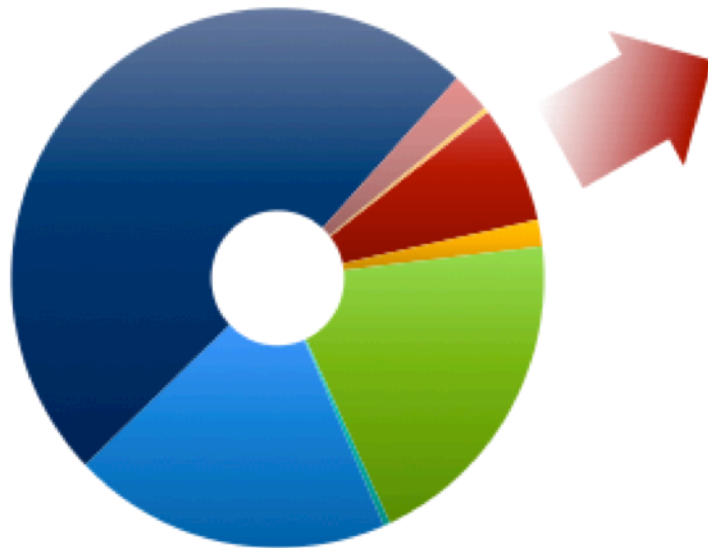
Free Flow Power's Expertise

- Professionals with 35+ years experience developing and managing hydro projects
- Offices in
 - South (New Orleans, LA)
 - Northeast (Boston, MA)
 - Northwest (Bellingham, WA)
- Expertise in
 - Financing
 - Engineering
 - Regulatory Affairs



Overview of U.S. Hydropower

US Net Energy Generation (% 2006)



■ Hydro
■ Natural Gas
■ Nuclear
■ Other Renewables
■ Petroleum
■ Other Gases
■ Coal
■ Other

Hydro is 7% of US Generation

- 40% of US generation in 1940s
- Still 75% US renewable energy generation

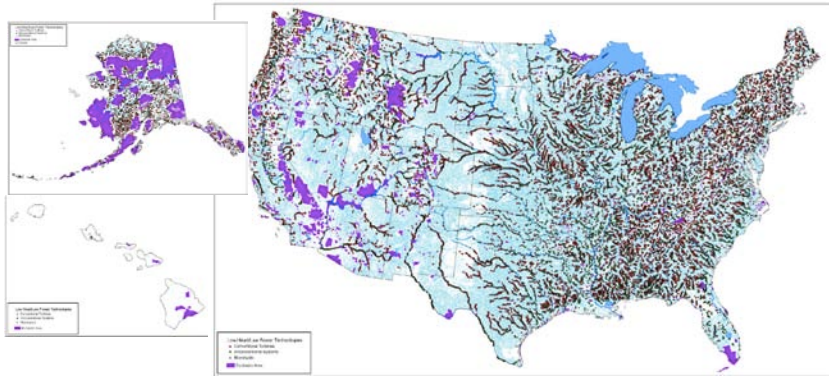
Estimated potential for hydro to grow to 20% US generation

- 10,000 MW new conventional hydro
- Marine and hydrokinetic renewable energy

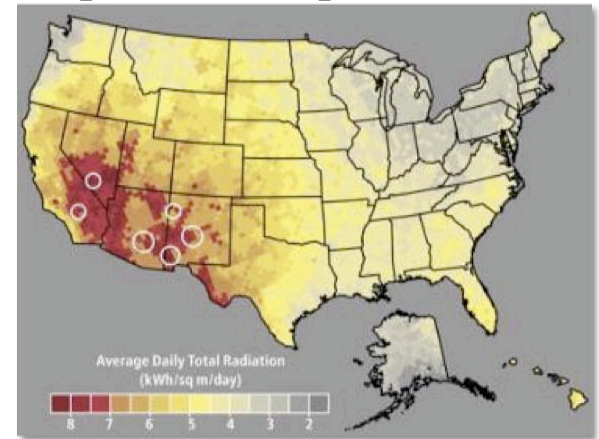
Hydro is A Domestic, Low Impact, Dispatchable, Renewable Source

People & power needs are near water; not deserts, plains, and mountains

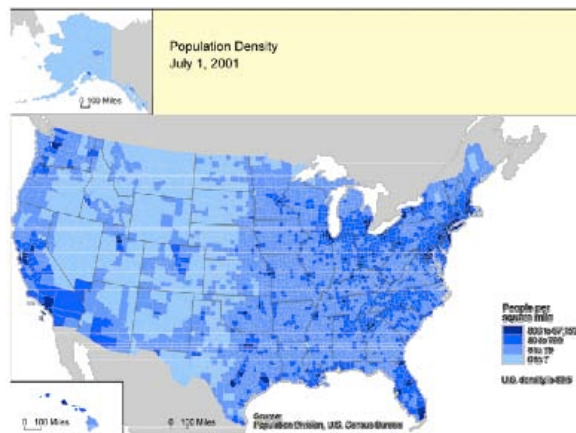
Low head hydro potential map



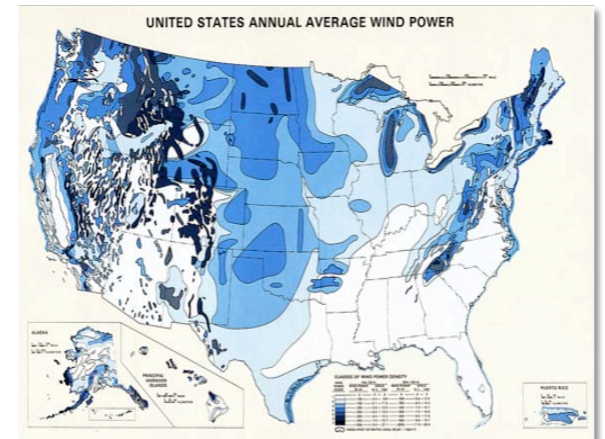
Solar potential map



Population density map



Wind potential map



DoE Secretary Chu on Hydropower

“It’s actually the lowest cost clean energy option”

– remarks at the Clean Energy Economy Forum, Philadelphia, PA, September 17, 2009

“Several years ago, I've heard repeatedly that hydro power in the United States is maxed out; it's not going to expand anymore. And for a while I just listened and said, 'this must be true,' but then we began to look into it and since I've become secretary I've really looked into it. The exact numbers, we may differ, but in our estimates **we have about 70 GW of additional hydro which would have minimal impact**; and so where does this come from? It comes from putting in better turbines in existing dams, it comes from run-of-the-river turbines that don't create the minimal environmental impact and it comes from using water storage that was made for flood control and then as you let that water out, it generates small electricity with it. The fact is, its 70 GW and 96 GW today of hydro, so it's nearly double. **Seventy GW is 70 nuclear power plants, maybe 100 new coal plants. If you look at the economics of hydro, it's far less than any of those.** So it's one of the best kept secrets.

* * *

“**It's an incredible opportunity and it's actually the lowest cost clean energy option. So I will do my best to make that known to the United States; and directly under our control in the DOE, we will be pushing this.** And people say, 'new dam, big lake, kill the fish,' and all this other stuff; we're not talking about that anymore. We're not talking about a lot of large, new reservoirs. Just work with what we have and it's a massive amount of power.”

2 Conventional Hydro Business Units

- Acquire, Improve & Manage (AIM)
 - Identify assets with significant upgrade potential and execute AIM strategy on behalf of institutions
- New Hydro on Existing Dams (NHED)
 - Of the 79,000 dams in the US, only 2,000 generate electricity



Benefits of Hydrokinetic Energy

Low Visual/Landuse Impact

Reduce GHG Emissions

Before:

After:



FFP Project 42, Memphis, TN



Wind Farm, Palm Springs, CA



Solar Farm, Las Vegas, NV

Avoided Hydrocarbon	Annually, Per SmarTurbine™
CO2 (Tons)	60
Coal (Tons)	36
Oil (Barrels)	130
Natural Gas (Cu. Ft.)	745,540



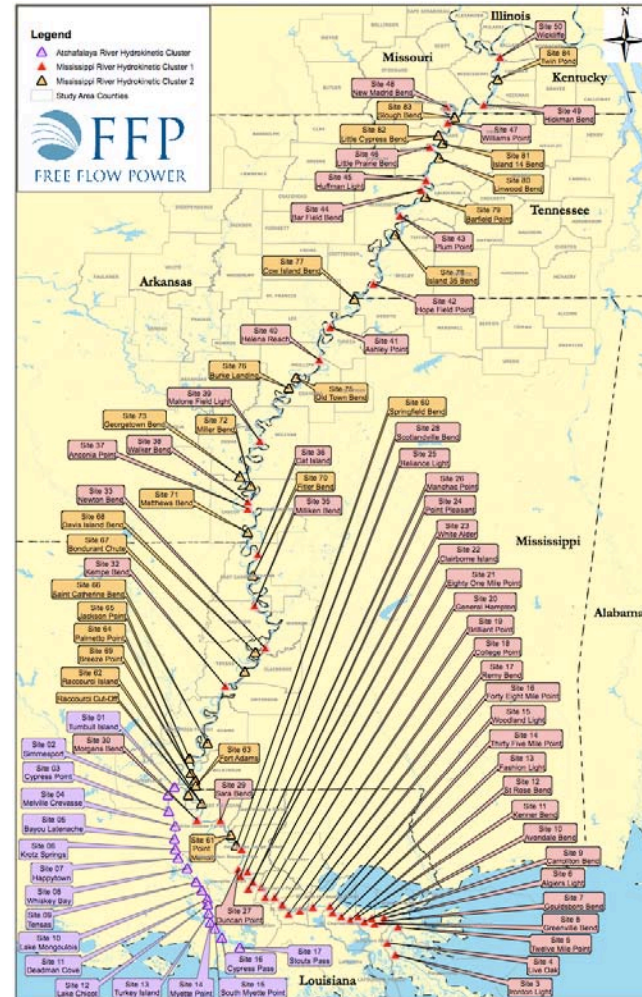
3 Meter SmarTurbine™

- Overall dimensions
 - 3 meter diameter
 - 4.5 meter length
- Rotor
 - 7 blades (2:1 TSR)
 - 2.25 meter diameter
- Performance Goals
 - 30 to 40% turbine efficiency
 - 90 to 95% generator efficiency



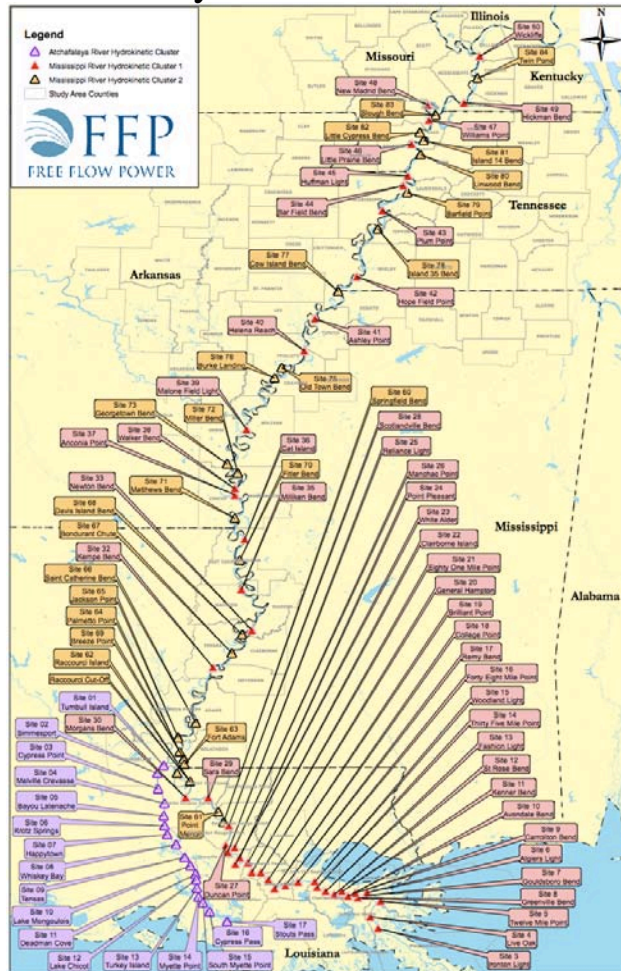
Mississippi River Basin is FFP's Initial Commercial Hydrokinetic Market

- Deploy hydrokinetic generators in Mississippi River Basin with FERC and Army Corps licenses
 - 71 sites on Mississippi River
 - 17 sites on Atchafalaya River
- Capacity up to 1,600 MW
- Attractive for scale, proximity to customers, batch licensing process, & single environmental assessment

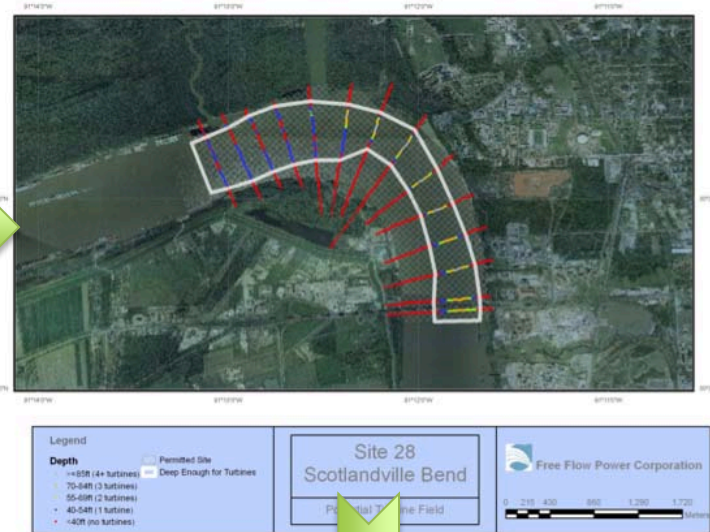


Underwater Array Commercial Deployment (Good sites at >5MW/mile)

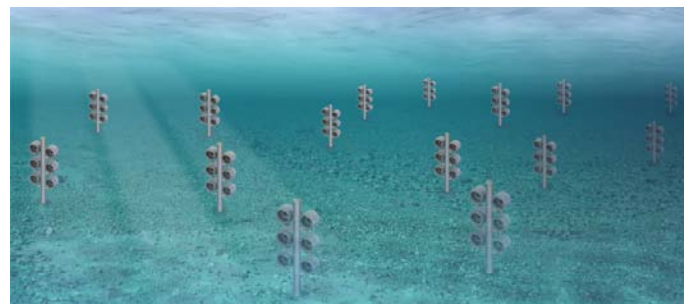
88 Hydrokinetic Sites



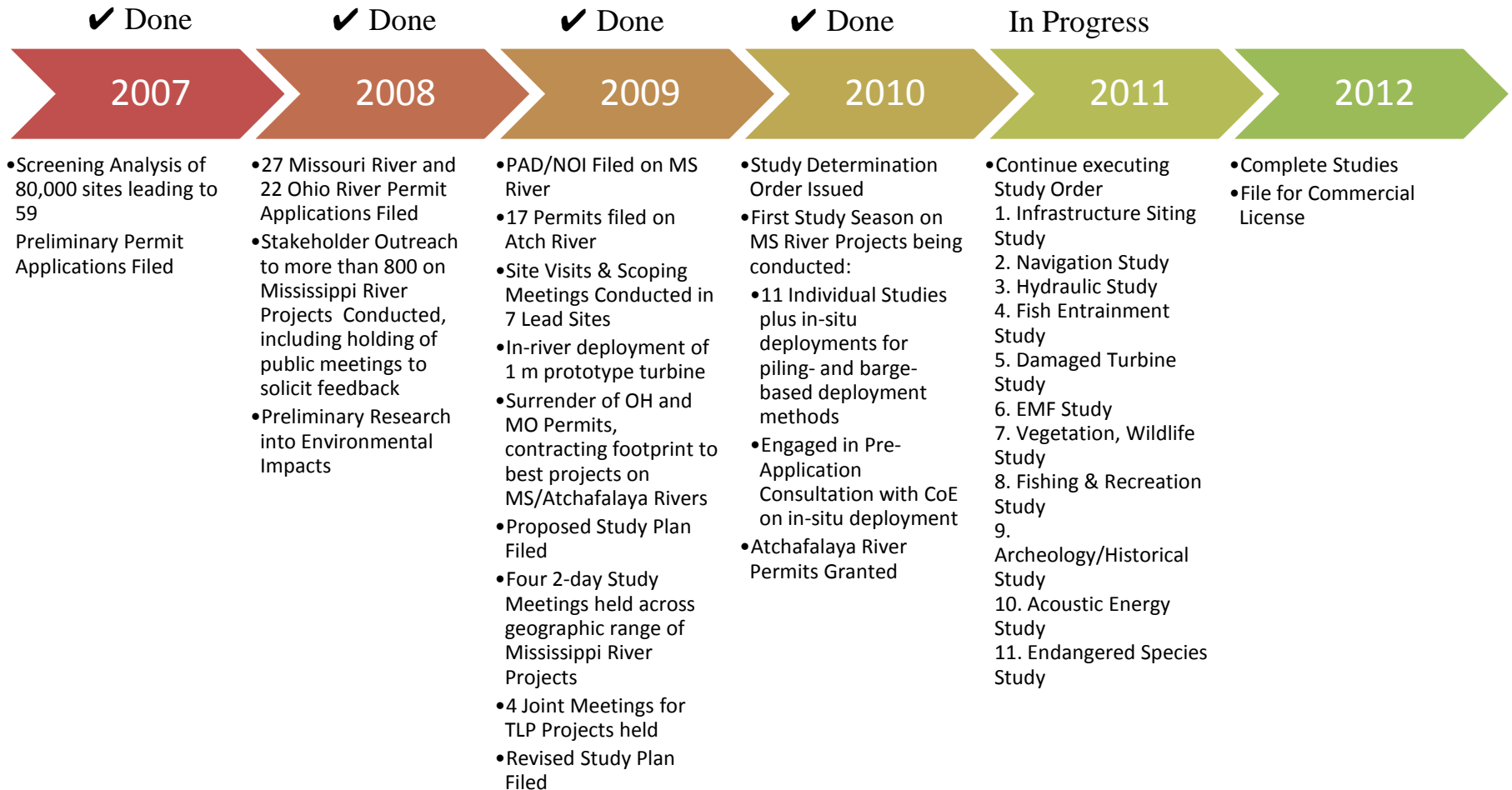
Each Site from 2 to 16 Miles



Piling-Mounted Turbines Every ~150 ft



FFP FERC Site Licensing Milestones



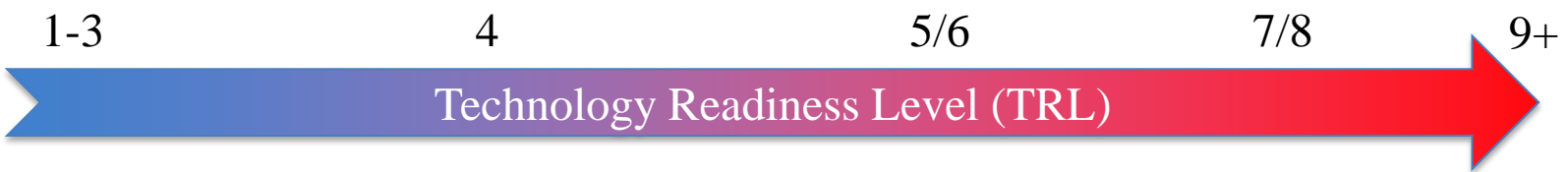
FFP Technology Advancement

2007 2008 2009 2010 2011 2012 2013



- Basic Research**
 - Assessment of alternatives
 - Performance analysis
 - Baseline selection
- Applied Research**
 - Proof of Concept: Subscale 1.4-Meter SmarTurbine
 - Flume tests (10kW in 3 m/s flow)
- Early Demonstration**
 - In-river floating deployment
 - Monitoring and analysis of operation and debris effects
- Full-scale Demonstration**
 - \$1.4M DOE AWP grant
 - Full-scale Prototype: 3-Meter SmarTurbine (40kW in 3 m/s flow)
 - Flume testing
 - In-river testing
- Pre-commercial Deployment**
 - In-river piling-based turbine array demonstration
 - Environmental studies
 - Fish entrainment testing
- Commercial Deployment**
 - Grid-connected array deployment
 - Commercial scale power and production

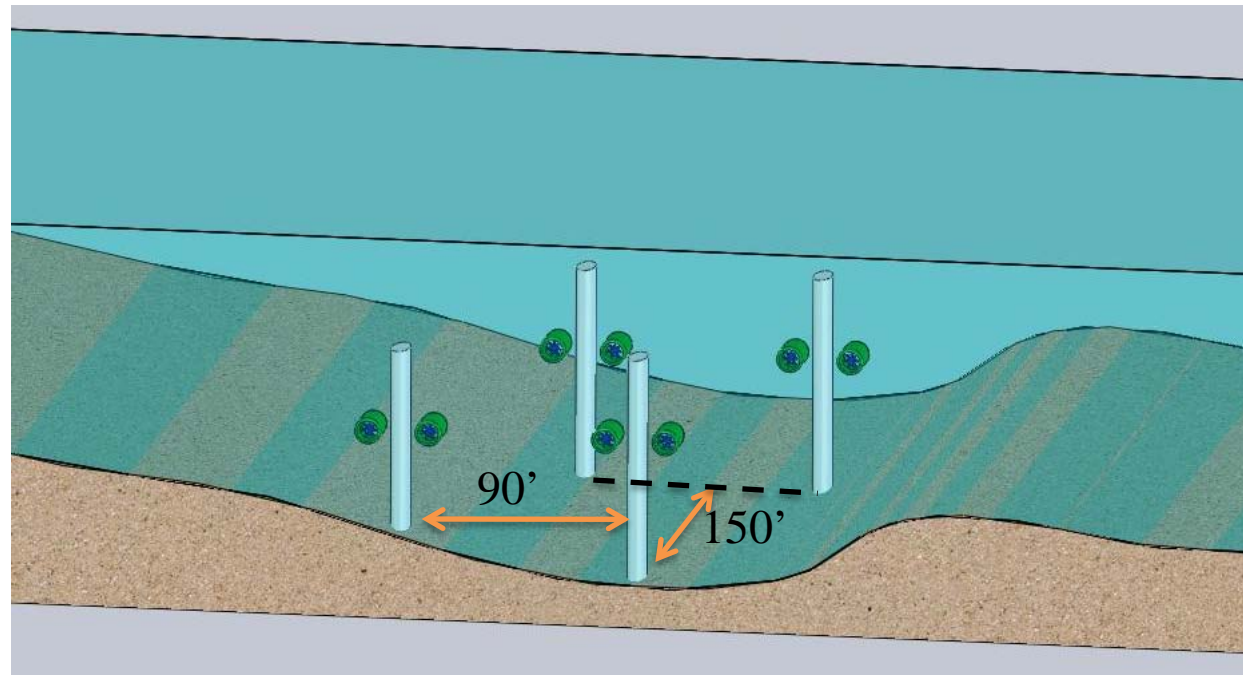
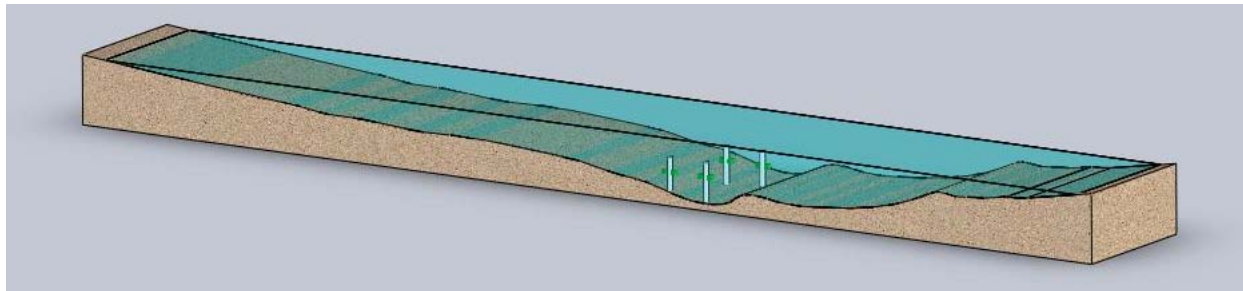
Current status →



FERC Study Plan Determination

Study Title	Site Independent or Specific
Turbine Siting Study	Both
Navigation Study	Both
Hydraulic Study	Both
Fish Entrainment Study	Independent primarily
Damage Turbine Recovery Methods	Independent
Electromagnetic Field (EMF) Study	Independent primarily
Vegetation, Wildlife Habitat & Noxious Weeds Inventory	Both
Commercial Fishing & Recreation Study Plan	Both
Archeological & Historical Resource Investigation	Both
Acoustic Energy Study Plan	Independent primarily
Rare, Threatened & Endangered Species Study	Both

Site 28 In-Situ Turbine Layout



- 1 turbine/piling plan (graphic shows 2)
- 90 feet transverse spacing
- 150 feet downstream spacing
- 45 feet longitudinal offset from upstream piles
- Install gill net & stationary monitoring on at least 1 turbine for fish entrainment validation testing

Hydrokinetic Siting Process

- Define boundaries of project site
- Assess bathymetry
 - Sufficient depth
 - Accounting for navigation & structures
- Assess velocity profile
 - ADCP transect scans
 - Annual flow range
- Lay out turbine array



Proposed Installation at FFP Project 42, Hope Field Bend, Memphis, TN

SmarTurbine™ Designed for Environment

Environment's impact on SmarTurbine™

- Polyethylene forward shroud absorbs impact from large debris.
- Solid epoxy glass blades with strength to withstand medium debris.
- One moving part with rim generator to avoid fouling from small debris.
- Bearing system designed for wear from silt and sand.
- Surfaces treated for bio-fouling.

SmarTurbine's™ impact on environment

- Low tip speed ratio (2:1, compared to 5:1 for wind turbines) to eliminate fish injury from blade strike.
- No high velocity regions to cause turbulent shear stress.
- No small gaps to cause grinding injury.
- Low pressure gradient.
- Deployed below navigation channel, off the riverbed.
- Minimal onshore equipment.
- No chemical lubricants.



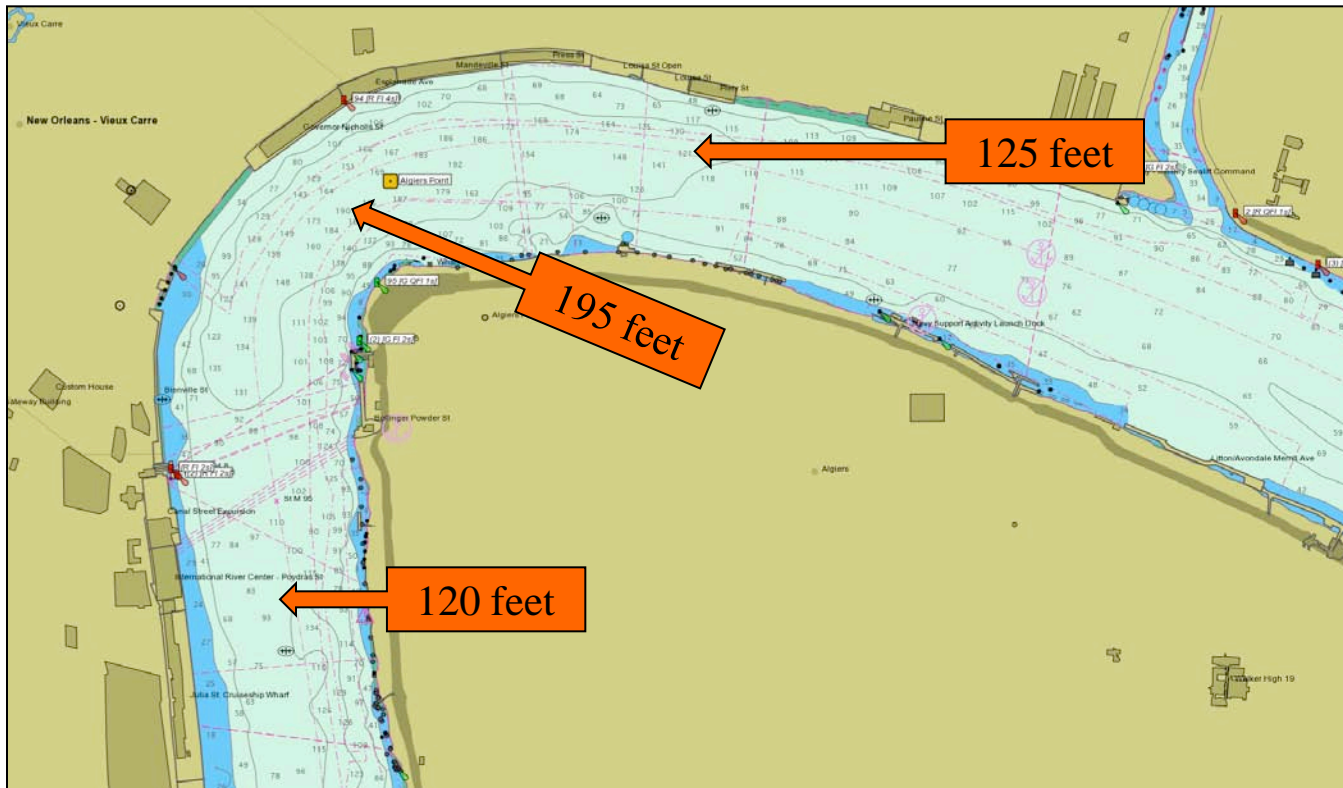
Site Detail – Depth Profile

South of Baton Rouge

- Navigation channel authorized to 55' for shipping traffic
- River depths up to 100'-250'

North of Baton Rouge

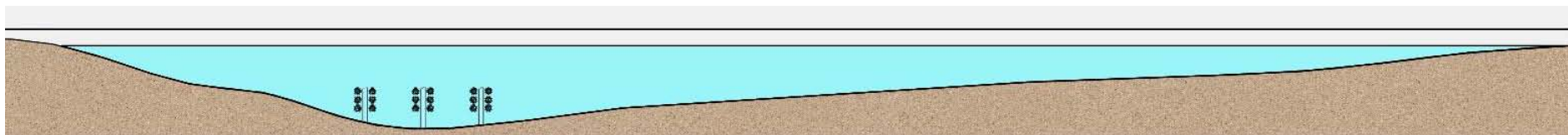
- Navigation channel authorized to 9' for barge traffic
- River depths up to 30'-50'



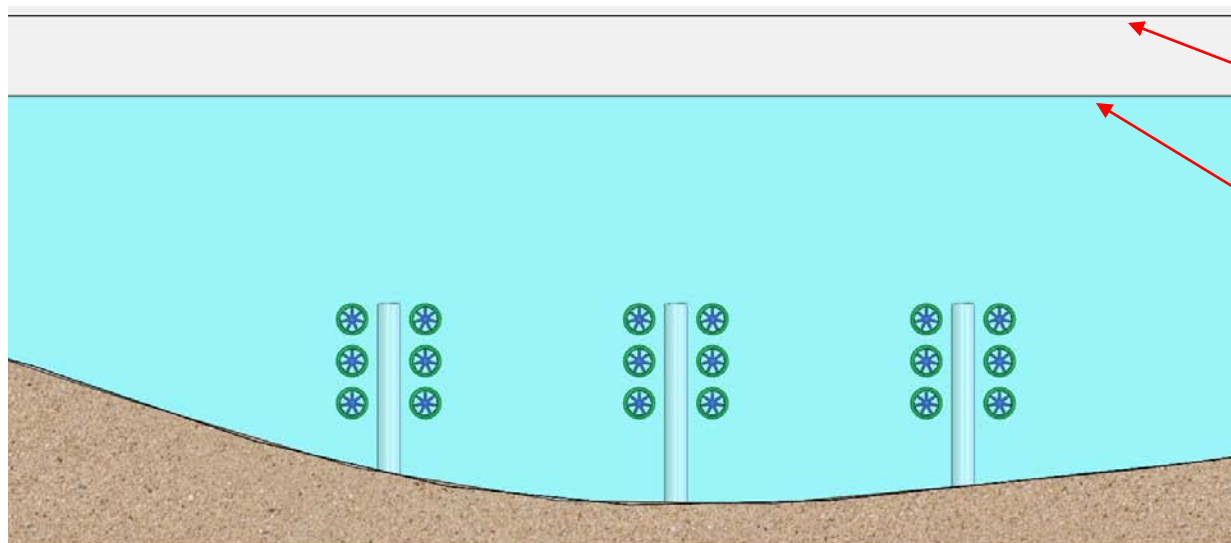
FFP Project 6, Algiers Point, New Orleans, LA

Scale of Turbine Deployment @ Algiers Point

- Cross Section, Site 8
 - 2485' Wide at LWRP



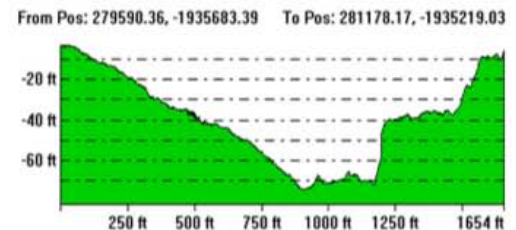
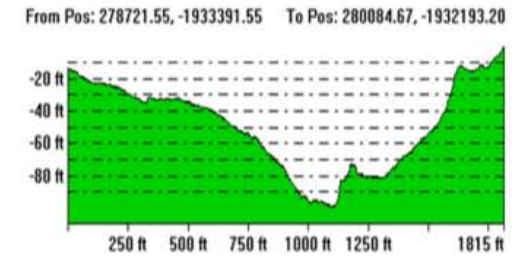
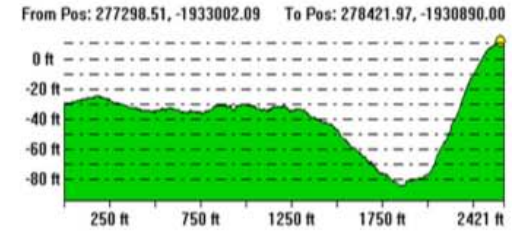
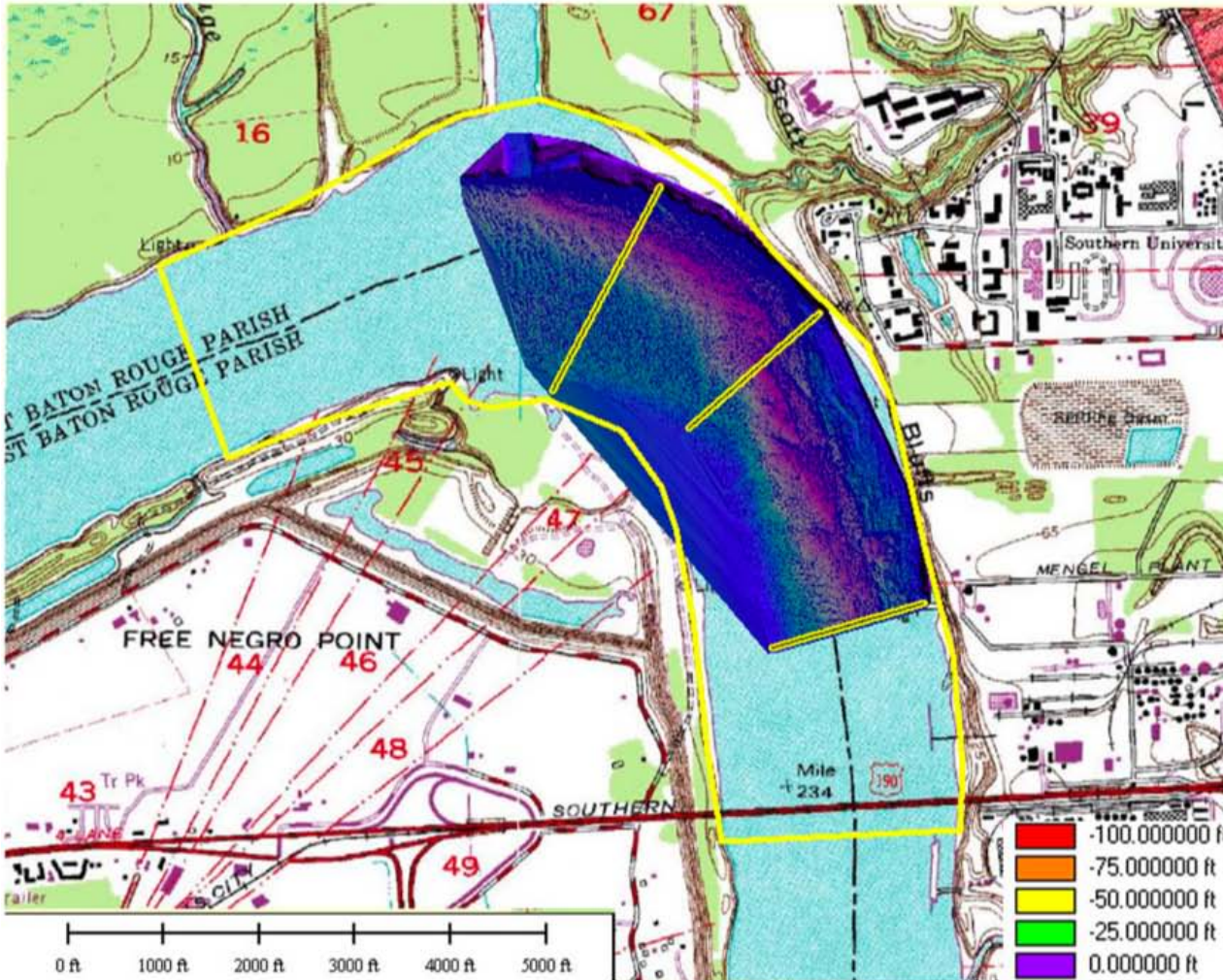
- Zoom of turbines
 - 65' below LWRP



25' above LWRP

LWRP

Site Detail – Bathymetry



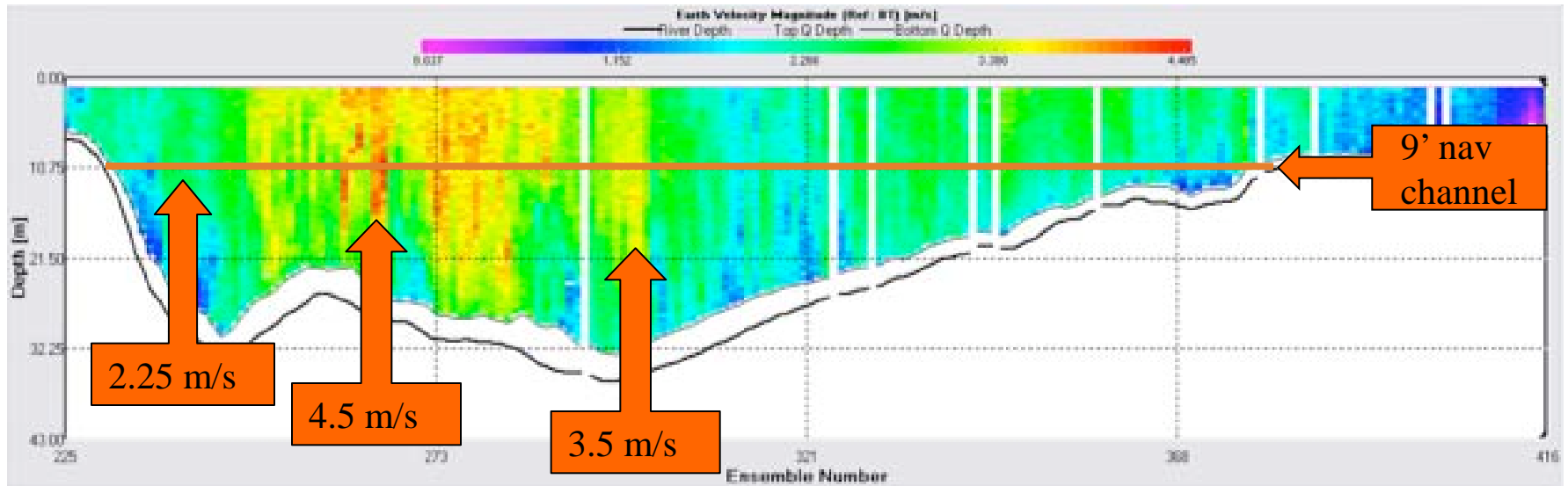
FFP Project 28, Scotlandville Bend, Baton Rouge, LA

Site Detail – Velocity Profile

Target flow = 2.25 m/s, 75% of time

Flows accelerate around outside of bends

Deeper, no dredging in areas of fast flow

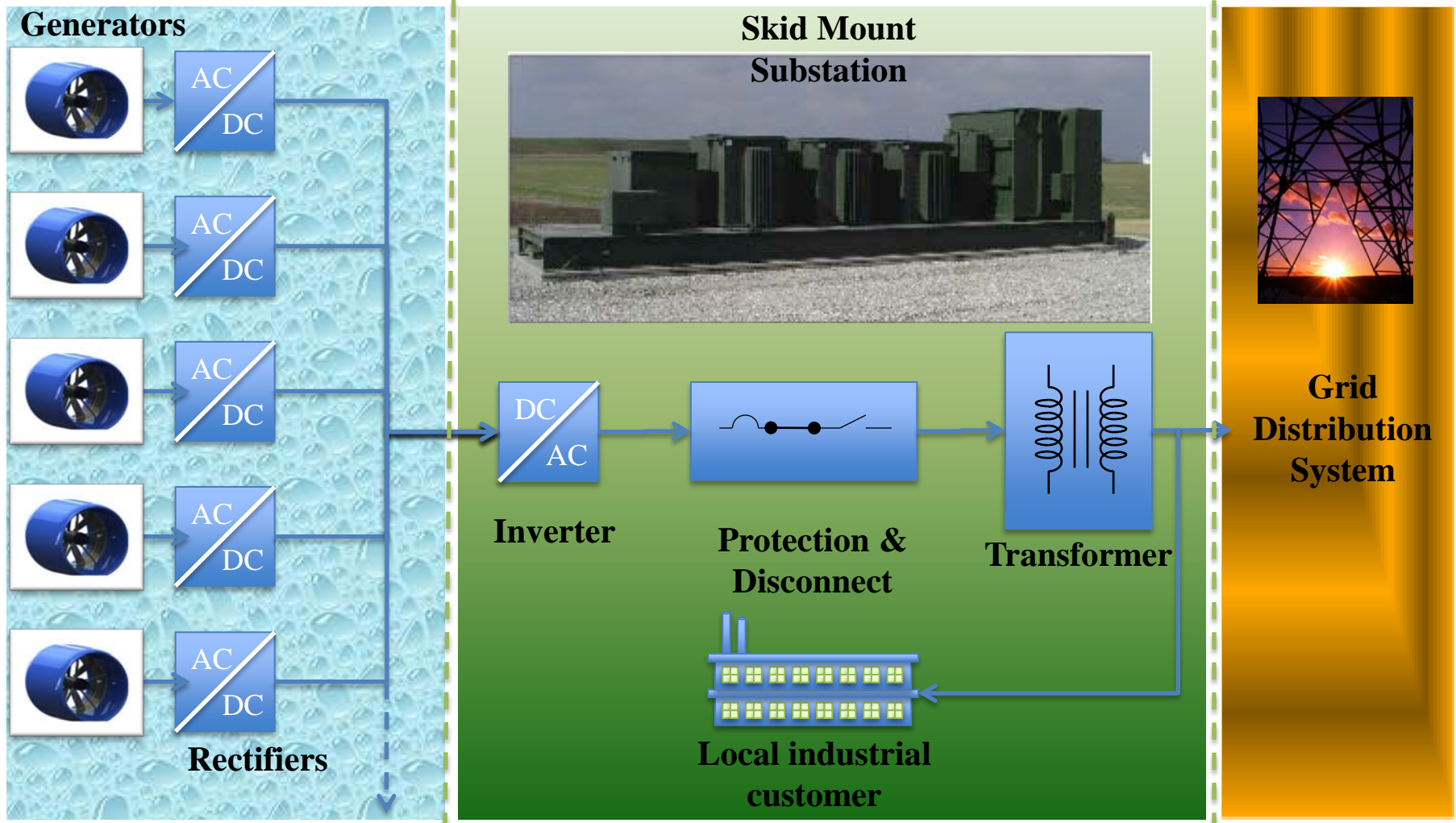


Site near Vicksburg, MS

Hydrokinetic Farm Power Distribution System

In The River:

On The Shoreline:



Contact Us

BG (Ret) Robert Crear – 601 631 4177
rcrear@free-flow-power.com

Free Flow Power Corporation Headquarters

239 Causeway Street, suite 300
Boston, MA 02114

Tel: (978) 283-2822

Fax: (978) 283-2808

www.free-flow-power.com

Free Flow Power Corporation - New Orleans

220 Camp Street
New Orleans, LA 70130

Tel: (978) 283-2822

Fax: (978) 283-2808

www.free-flow-power.com