

# Hydropower Energy Viable Alternative for Louisiana?



# Overview of US Hydropower

US Net Energy Generation (% 2006)



## Hydro = 7% US Generation

- 40% 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

# 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

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“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.”

# Increasing Awareness

On March 24, Secretaries of the US DoI, DoE, and DoA signed an MoU to increase hydropower generation at Federal facilities and facilitate the regulatory process for hydropower. Specific action items for the Agencies include:

- Assess the potential for incremental hydropower generation at Federal facilities
- Increase coordination between agencies to reduce delays in development process
- Identify types of hydropower projects that could be identified as environmentally friendly
- Identify opportunities to integrate hydropower and other renewables into the electric grid

# **2010 Louisiana Legislature**

## **Act No. 930**

**Arnold (HB 841) Act No. 930**

- **Existing law authorizes the State Mineral and Energy Board ("board") to lease for the development and production of minerals, oil, and gas, any lands belonging to the state, or the title to which is in the public, including road beds, water bottoms, vacant state lands, and lands adjudicated to the state at tax sale.**
- **New law adds the authority to lease for the development and production of "alternative energy sources". New law authorizes the board, in consultation with the Dept. of Transportation and Development, to adopt rules and regulations in accordance with the APA. New law defines "alternative energy sources" as energy sources other than oil, gas, and other liquid, solid or gaseous minerals. It will include, but not limited to, wind energy, geothermal energy, solar energy and hydrokinetic energy.**
- **It does not include the cultivation or harvesting of biomass fuels or the use of state land or water bottoms for facilities which utilize biomass fuel to produce energy.**
- **New law further provides that no lease shall be granted for hydrokinetic energy development that is inconsistent with the terms of a permit, license, exemption, or other authorization issued by the Federal Energy Regulatory Commission. Effective August 15, 2010. (Amends R.S. 30:124)**



Center for  
Bioenvironmental  
Research



# RIVER SPHERE

What is RiverSphere?

RiverSphere is a place for real work, research, public exhibition, and economic development.

Who is behind RiverSphere:

RiverSphere is a project of Tulane University, led by the Tulane/Xavier Center for Bioenvironmental Research in partnership with numerous other organizations.

Since its inception in 1988, RiverSphere's partners have grown to include federal, state, and local agencies; business and public officials; corporations and foundations; and volunteers. Initial support began with a generous land donation from River Park Partnership.

The partnership has just won a \$3 million grant from the U.S. Economic Development Administration to build RiverSphere, a renewable energy center that will focus on developing new hydrokinetic turbines. The project includes floating barge facilities that will be available to private technology companies for testing prototype hydrokinetic turbines in the slow moving currents of the Mississippi river



# RIVER SPHERE



Test barges will serve as the first “vendor-neutral” hydrokinetic test site in the U.S., which should offer a big boost in terms of cutting research and development costs, as well as helping companies to collect data that will support eventual commercialization. In addition to serving as a port for test barges, RiverSphere will include sustainability labs devoted to the hydrology and ecology of the Lower Mississippi River Deltaic Plain and exhibition space focusing on the revitalization of the new Orleans riverfront.

The \$3 million grant comes from disaster appropriations related to hurricanes Katrina and Rita, and it’s an excellent example of combining sustainability technology, academic excellence and private enterprise to revitalize a community by creating and exporting new green jobs. It’s a sharp contrast to the impact of fossil fuels (namely coal) on their host communities. RiverSphere’s focus on sustainability extends to the center’s construction, which instead of relying on new building will primarily consist in repurposing an existing 22,000 foot warehouse.

# RIVER SPHERE



Where is RiverSphere?

RiverSphere is slated for an 80,000 square foot site on the banks of the Mississippi River in downtown New Orleans, Louisiana, USA. (90° West, 30° North). The site is located about one mile upriver from the French Quarter and 1-2 miles from Tulane University's downtown and uptown campuses, respectively. RiverSphere co-occupies a wharf and is proud to partner with Mardi Gras World.

RiverSphere, a place to study rivers, is optimally suited for this site because the Mississippi is North America's greatest river, and because New Orleans was established to take advantage of the strategic artery as it approaches the Gulf of Mexico, 95 miles downriver.



# Federal City ~ New Orleans

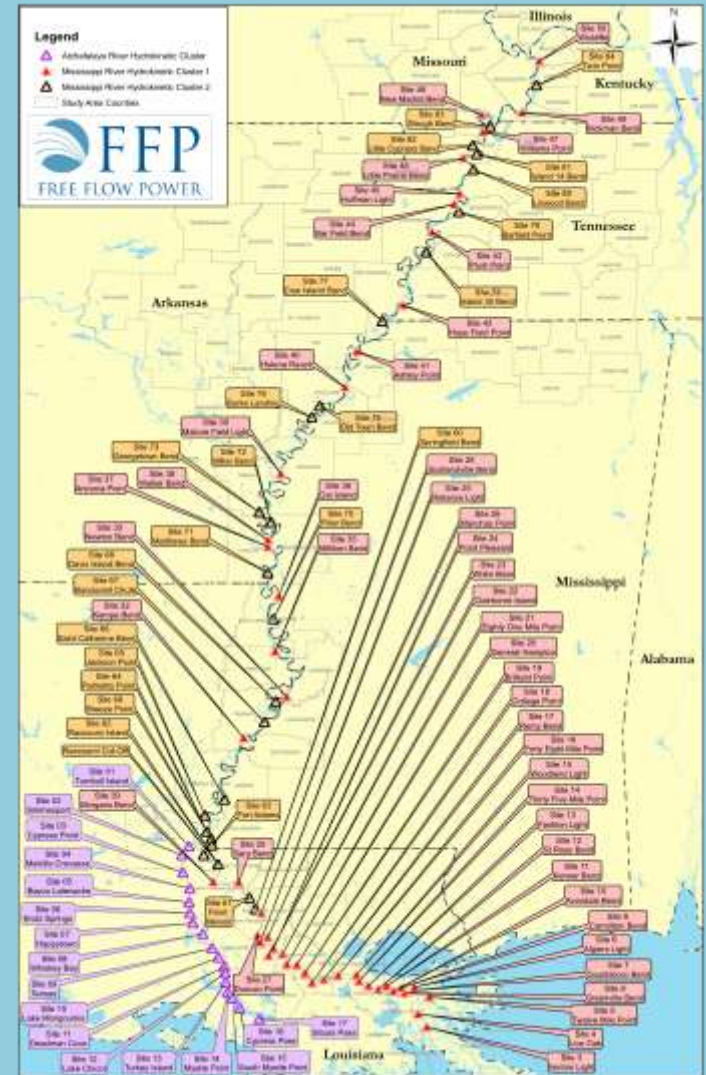




# Marine Forces Reserve National Headquarters

# Developing Hydrokinetics in Rivers

- Free Flow Power (FFP) is working to deploy hydrokinetic generators in Mississippi River Basin with FERC, USACE, and other approvals
  - 81 Total Projects:
    - 71 sites on Mississippi River
    - 17 sites on Atchafalaya River
  - Each Site = 2 -16 Miles of River
    - ~ 550 Miles of River
- FFP is still investigating potential turbine concentrations but preliminary studies show 150 – 500 turbines per mile might be feasible
  - = 3.3 GW to 11 GW installed capacity
  - Or (825 MW to 2,750 MW of generation)



# 46 Initial Projects on Mississippi River



2008

- 57 Preliminary Permits Granted in January
- Outreach in prep of Pre-Application Documents (PAD)

2009

- Filed PAD on 55 Sites (7 ILP = “Lead Sites”) in January
- Public Scoping & Study Negotiation Process throughout 2009

2010

- FERC Study Determination (Jan, 2010) = 11 Studies (below)
- FFP Surrendered 9 Sites on Upper Mississippi River
- Filed 1<sup>st</sup> Quarterly Study Report with FERC on April 30, 2010
- Fish Entrainment Technical Conference on July 14, 2010

11 Studies

In-Situ Deploy 4 Units

Ongoing Consult

FERC License App

1. Infrastructure Siting Study
2. Hydraulic Study
3. Navigation Study
4. Damaged Turbine Recovery Study
5. Fish Entrainment, Population Sampling, Habitat Use, & Movement (*\*technical conf to be held on July 14*)
6. Acoustic Energy Study
7. Electromagnetic Field Study
8. Vegetation, Wildlife Habitat, & Noxious Weeds Inventory
9. Rare, Threatened, and Endangered Species Study
10. Commercial Fishing and Recreation Study
11. Archaeological and Historical Resource Investigation

# Timeline and Milestones for Initial 46

## Initial Deployment

- 2010
- Advanced Site Study, Flow Analysis, Civil Engineering
- Install SmarTurbine™ on Pylon or Floating Mount; Conduct Studies

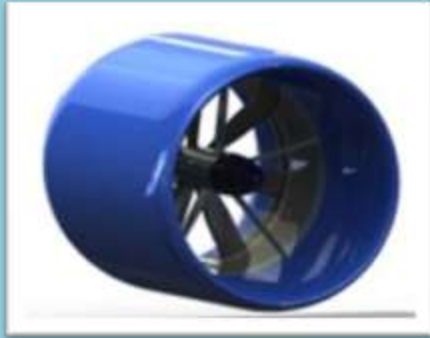
## Licensing & Financing

- 2007 – 2013
- Obtain FERC Hydropower Licenses and USACE permits
- Secure Financing for Utility-Scale Project from Private Sector
- Must complete FERC study plan mandate

## Full-Scale Installation

- 2014
- Install Full Arrays, Begin Generating on Commercial Scale
- Up to 1,000 Jobs in Manufacturing Turbine Systems
- Up to 3,200 Jobs in Construction, Operations & Maintenance

# SmarTurbine™ Generator



Cost-effective design with  
single moving part



Three-meter SmarTurbine™

- 10 kW in 2.25 m/s flow
- 40 kW in 3.8 m/s flow



One-meter SmarTurbine™

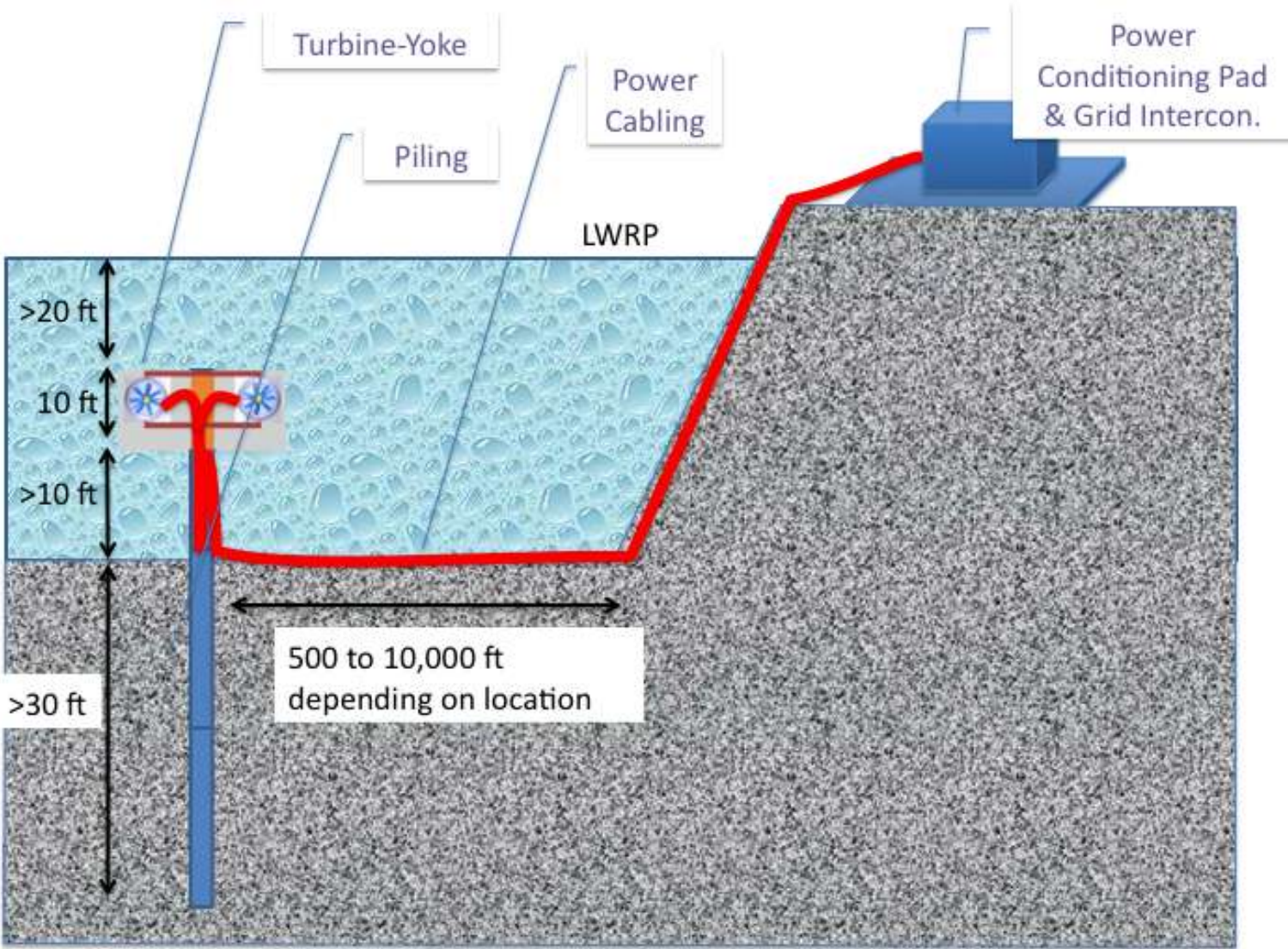
- 10 kW in 3 m/s flow



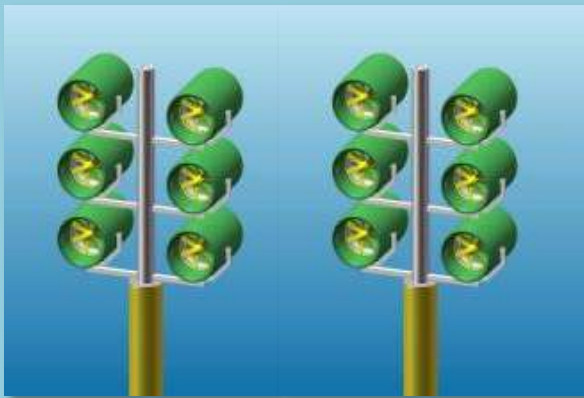
“Smart” computer  
electronics for efficiency  
and maintenance



# Flexible Deployment Options



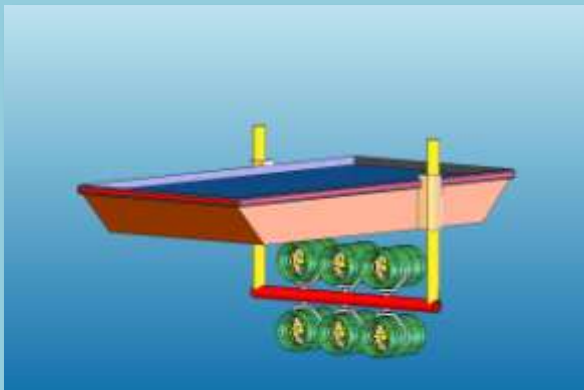
# Flexible Deployment Options



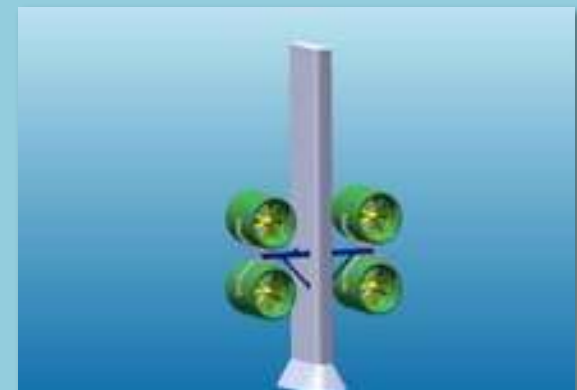
Attached to Pylons



Suspended Between Pylons



Suspended from the Surface



Attached to Existing Structures

# Hydrokinetics = Triple Win?



## #1 Manufacturing

- New industry serving global demand for SmarTurbines™, distributed through ports

## #2 Job Creation - Servicing the Turbines

- Regional operation and maintenance builds on preexisting talent in maritime service industry



## #3 Build Domestic Energy Economy

- Increase energy independence while controlling cost of electricity

# Why Industry Says we need more Hydro Power.

- **Reliable:** Hydropower is highly predictable.
- **Renewable:** Water resources are not depleted during the production of electricity.
- **Domestic and Secure:** Hydropower is not subject to disruptions from foreign suppliers or cost fluctuations.
- **Clean:** Hydropower does not produce toxic or greenhouse gases.
- **Efficient:** Hydropower turbines can convert over 90% of available energy into electricity.

# Rep. Jeffery J. Arnold

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**LOUISIANA**

*House of Representatives*