



Northwest PowerPipe

WATER PIPE • WATER POWER

February 2010

Water Pipe



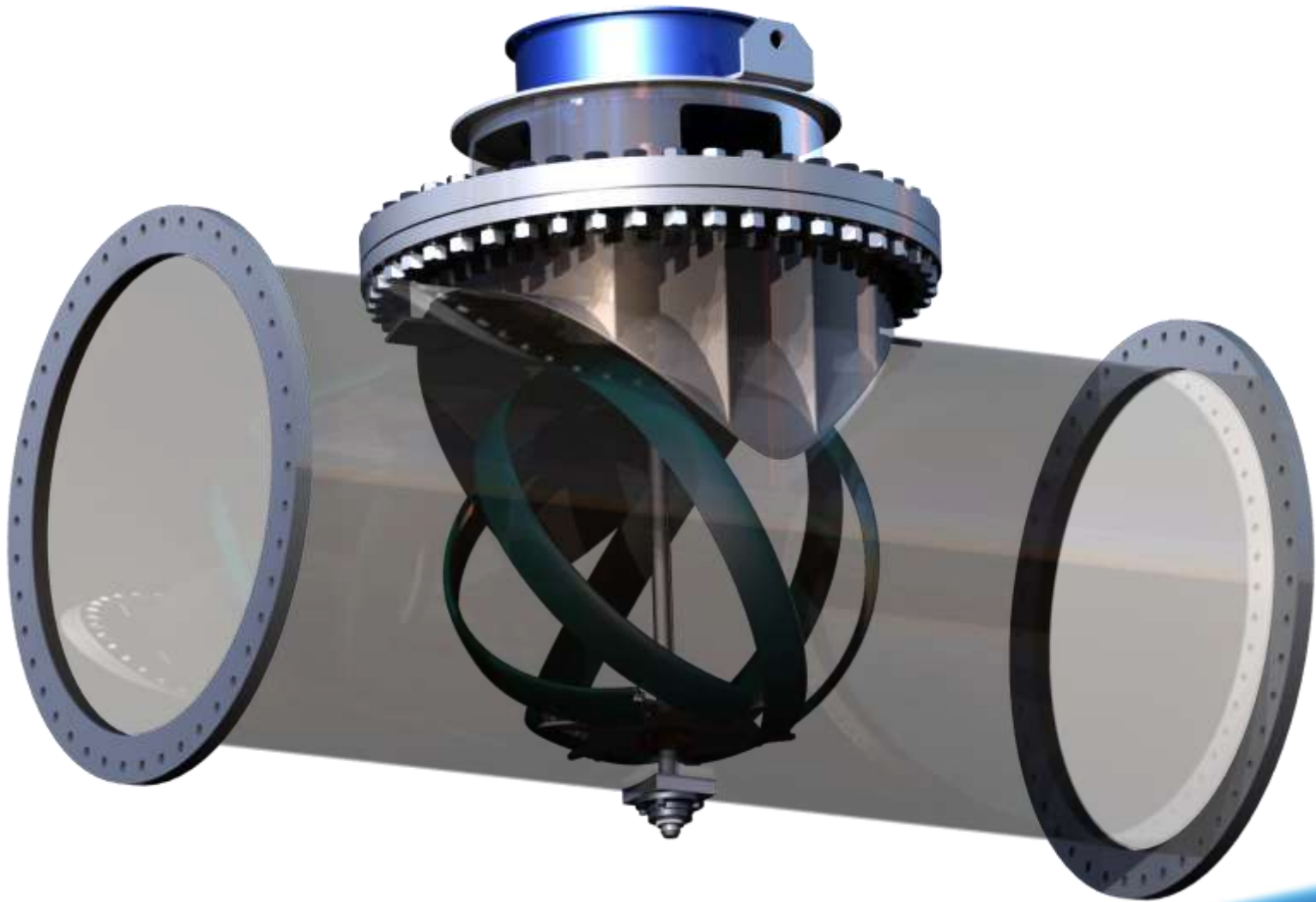
Water Power



A leading manufacturer of large diameter, high-pressure steel pipe



An innovator in low-solidity hydrokinetic turbine design



The Concept

- 🌱 Install a hydrokinetic turbine in a pipeline
- 🌱 Generate clean energy
- 🌱 Allow for modular system integration
- 🌱 Mitigate political and environmental challenges

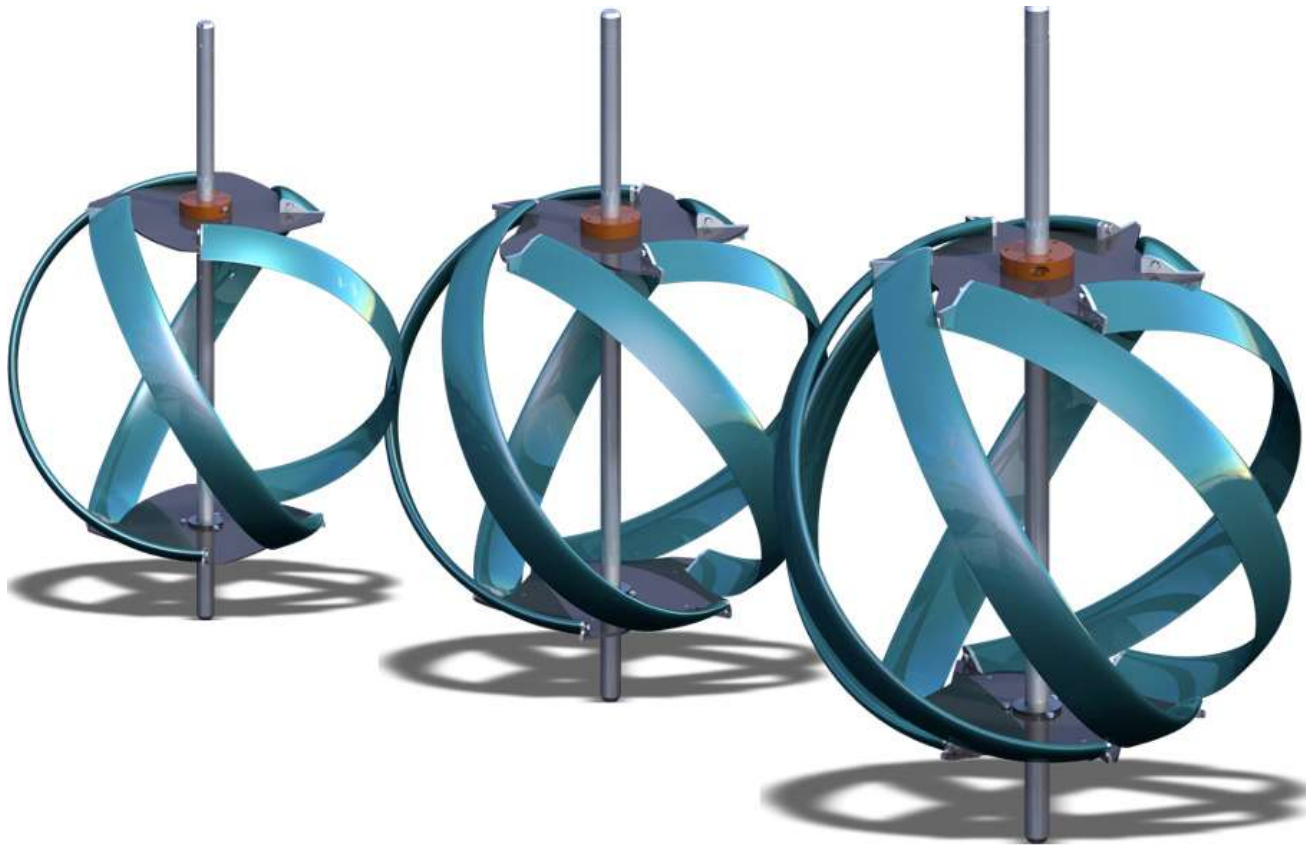


The Challenge[s]

- 🔄 Extreme conditions
- 🔄 Wide range of flow conditions
- 🔄 Pressure extraction
- 🔄 Water transmission efficiency versus hydroelectric efficiency



The Solution



The “Spherical” Turbine

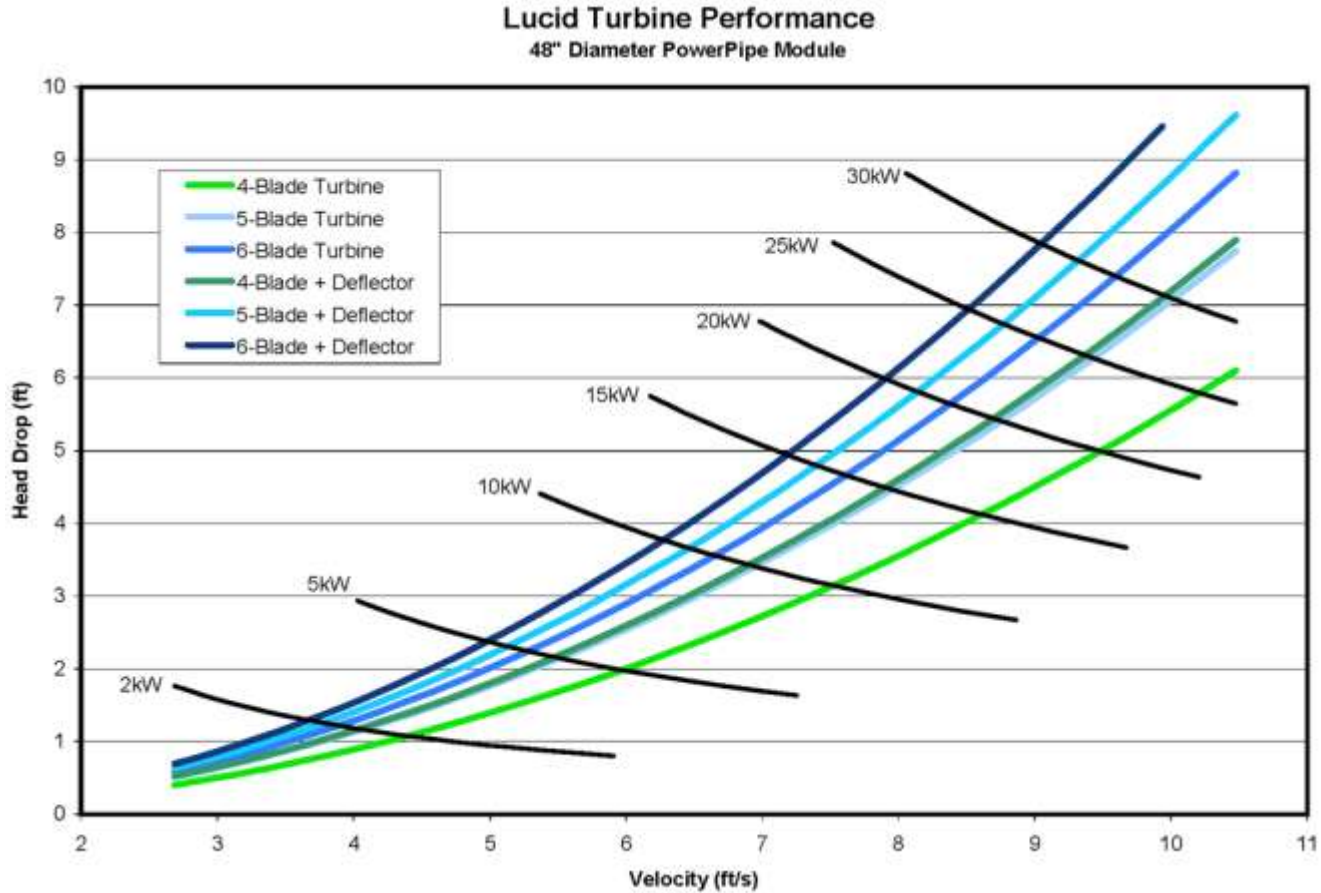
Prototype Testing



- 2 Pipe sections
- 5 Turbines
- 10 Configurations
- 158 Test cycles



Power Curves from Testing



Entering the Water Utility Industry

- 🔄 Speak water, not watts
- 🔄 Proof of concept
- 🔄 Multi-track design criteria
- 🔄 New R&D for turbine design



Demonstration Projects

- High-pressure seals
- New turbine configurations
- Custom generators
- Characterize power output relative to flow requirements



Research Projects

- 🔄 Advance turbine technology
- 🔄 Fine tune operating ranges
- 🔄 Evaluate system components
- 🔄 Work through licensing process



Thank You!