

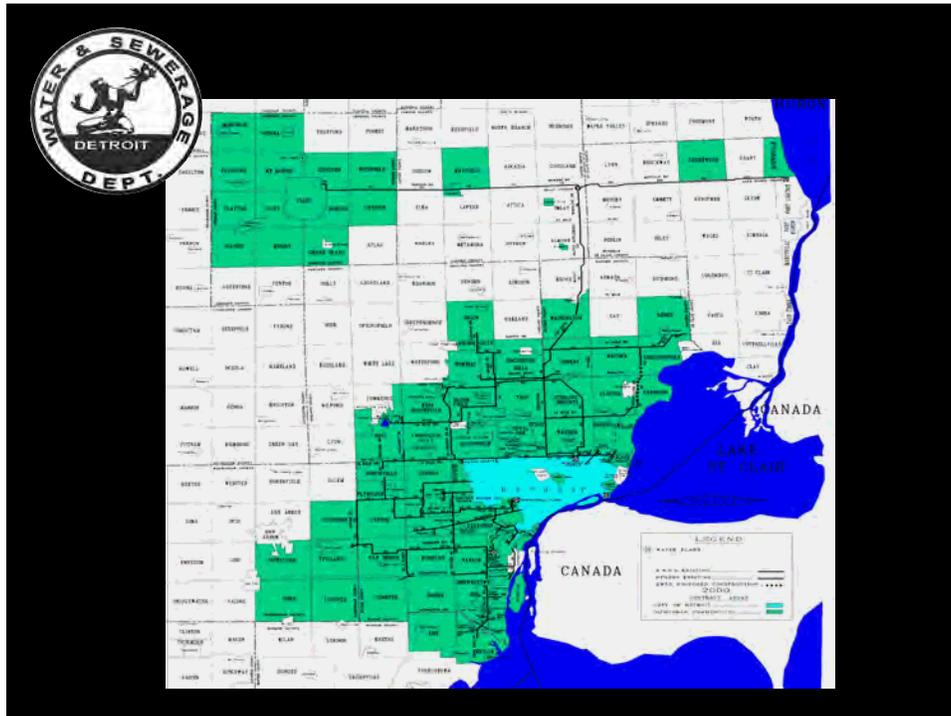
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# Real-Time System Optimization for Sustainable Water Transmission and Distribution

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## Energy Management AWWARF, 2005

*Energy use at drinking water utilities represents one of the utilities' largest operating costs, consuming as much as 35 percent of annual operating budgets....energy use is expected to increase...with implementation of new treatment processes....*



## DWSD

- **Third largest** energy customer of DTE
- Annual water withdrawal from Lake Huron and Detroit River of **220 billion gallons**
- **300 Million KW-Hours** of electricity annually by high- and low-lift pumps



## Contaminant loading to Great Lakes basin

### DWSD energy (US DOE, 2002)

- 475 M lbs. carbon dioxide
- 4,400 lbs. methane
- 7,500 lbs. nitrous oxide
- 2 M lbs. sulfur dioxide

Coal-fired electrical plants account for **16 of the top 25** sources of Lake Michigan mercury pollution (Johnson, 2005)

90% of toxic loadings to Great Lakes (GLIN, 2008)



**Tucker, Young, Jackson, Tull, Inc.**  
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The goal of the project is **reduction in energy consumption** through the optimization of pump operation at water utilities.

## Advisory Board

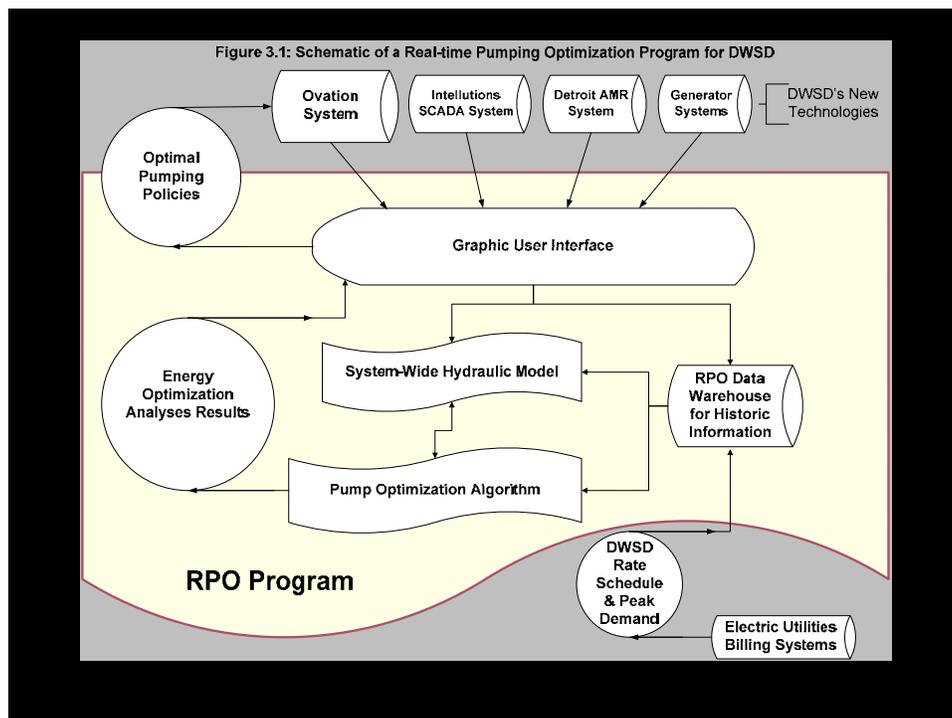
- City of Cleveland
- IBM
- Next Energy
- DTE
- City of Monroe
- DWSD
- MDEQ Air Quality Division
- Shepherd Advisors

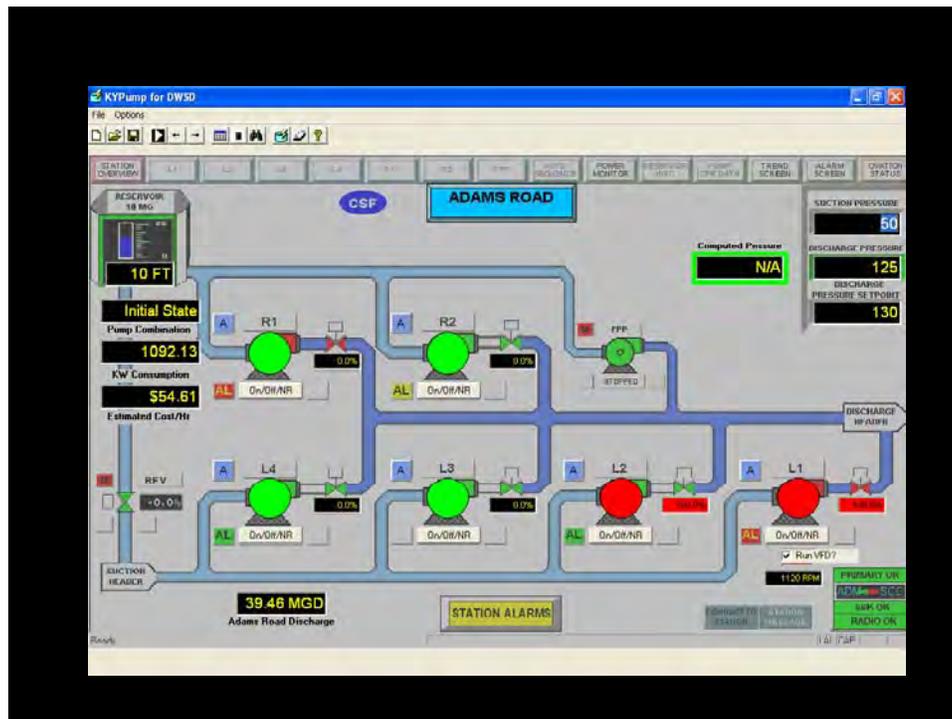
### Real-Time System Optimization for Sustainable Water Transmission and Distribution

- Market Analysis
  - Literature Review
  - Industry Survey
- **Optimization Software**
- Pilot Test Results - Quantification
- Training Modules
- Evaluation Report

## Previous Optimization

- Developed a computer program and guidelines for operators to optimize pump operations
- Provided SCC operators with the ability to minimize energy use by selecting energy efficient pump operations to reliably meet system demands





## Beyond the Obvious

- H<sub>2</sub>O Pricing Strategies
- The **New** Economy
  - Taking Advantage of Existing Infrastructure
- Control Theory
  - Operator Control?

## The New York Times

### Web-Enabled Smart Grids

Clay Risen

December 12, 2008

Xcel Energy of "plans to build the country's first city-scale 'smart grid' is "a response to what economists would call a tragedy of the commons: people use as much energy as they are willing to pay for, without giving any thought to how their use affects the overall amount of energy available."

Because "there's no way to monitor power use once it leaves the station -- utilities error on the side of oversupply, which wastes energy and harms the environment."

But, "Xcel's \$100 million initiative, called *Smart Grid City*," is "a set of technologies that give both energy providers and their customers more control over power consumption. It relies on a network of fiber-optic cables, high-tech meters, and sensor-laden transformers to provide power stations with **real-time data on demand all along the grid**, allowing them to fine-tune the electrical supply, detect failing equipment, and predict overloads." A "Web-enabled control panel in their homes" allows consumers "to regulate their energy consumption more closely -- for example, setting their AC system to automatically reduce power use during peak hours."

## Tuscola County WJRT-TV

### Wind Towers Installed in Tuscola County

Terry Camp

December 12, 2008

"Two wind farms have been built in the Thumb area, both built by private companies. Now the groundwork has been laid for the first public utility wind farm. **Consumers Energy plans on building a wind farm to produce electricity**, as long as there is enough wind. They began measuring the wind Friday. This is believed to be the farthest a Michigan public utility has ventured into the world of wind energy. **DTE Energy has plans to build wind farms**, but Consumers says it's the first to construct meteorological towers. Two more weather towers should be up in Tuscola County by the beginning of next week, weather permitting."



**Great Lakes  
Protection Fund**

Ideas in Action



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