Great Lakes Water and Energy Initiatives

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Great Lakes Commission
Associate Commissioners
Ontario and Quebec

Commissioners
3-5 delegates from each state

Observers
Federal, regional, tribal, NGO

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Presentation Overview

• The Great Lakes-St. Lawrence River Basin Compact and Agreement

• Three Relevant GLC Initiatives
  1. Great Lakes Energy-Water (GLEW) Initiative
  2. Value of Great Lakes Water Initiative
  3. Great Lakes Rivermouth Collaboratory
“When it comes to water, the past is no longer a reliable guide to the future”

-From “Water: Adapting to the New Normal” by Sandral Postal
Great Lakes-St. Lawrence River Basin Water Resources Compact (and Agreement)

- Ban on new diversions
  - Limited exceptions could be allowed, such as for public water supply purposes in communities near the Basin
- Consistent standard to review proposed uses of Great Lakes water
- Strengthened technical data collection
- States and Provinces must develop and implement a water conservation and efficiency program
- States and Provinces must also report on cumulative impacts
Great Lakes-St. Lawrence River Basin Water Resources Compact (and Agreement) Requirements

By Dec. 8, 2008, states must:
- Be ready to review proposed exceptions for diversions
- Create Compact Council and begin organization

Within one year, states must:
- Submit progress report on programs and list of baseline volumes

Within two years, states must:
- Develop conservation and efficiency goals, implement a program, and promote conservation measures
Great Lakes-St. Lawrence River Basin Water Resources Compact (and Agreement) Requirements

Within five years, states must:

- Develop a water management program for new or increased in-basin withdrawals and consumptive uses
- Give states and provinces notice of consumptive use proposals of 5 mgd or greater
- Maintain a water resources inventory
- Create a registration program for persons who withdraw 100,000 gpd or more, or divert water of any amount
- Collectively conduct an assessment of cumulative impacts of water uses
Resource Standard

- Return of water to source watershed less consumptive use
- No significant individual or cumulative adverse resource impacts
- Incorporation of environmentally sound & economically feasible water conservation measures
- Compliance with all applicable laws
- Reasonable use
  - Balances efficiency; economic, social, and environmental effects; supply potential of source; avoidance/mitigation of impacts; restoration plan if any
Water Management Challenges and Opportunities

- New Mandates/No staff
- New Tools (ex: Michigan Water Assessment screening tool)
- New Policies (ex: Minn. Conservation Pricing Law)
- Leveraging water conservation in sensitive watersheds.
- Measuring Cumulative Impacts
  - What metrics do you use?
  - Consistent, comparable data needed!
- Key sectors, drivers: Energy & Public Supply
Great Lakes Energy Water (GLEW) Nexus Initiative

http://wiki.glin.net/display/GLEW
GLEW Focus:  Water Use Impacts from the Electric Power Sector

Water Use in the Great Lakes Basin (Excluding Hydropower)

- **37.5%** (15.52 bgd) Thermoelectric Power
- **25.6%** (10.59 bgd) Fossil Fuel-Sourced Thermoelectric Power Generation
- **36.9%** (15.25 bgd) Nuclear-Sourced Power Generation
- **0.44%** (0.18 bgd) Consumptive Use
- **0.56%** (0.23 bgd) All Other Uses

TOTAL = 41.36 bgd

Source: Great Lakes Regional Water Use Database Repository 2006 report using 2004 data. Graphic is not to scale.
GLEW Goals

• Arm regulators and the energy industry with new information to improve their ability to assess and measure current and potential future impacts from different energy mixes.

• Enable regulators to target specific decision points, either in the planning or operations phases, that achieve specific public policy goals.
Objectives

- Aim to better integrate water resource impacts into energy planning
- Look at “What If” future electric power scenarios
- Look at ways to improve policy drivers
Why?

• Smarter energy planning
  - Identify new conservation opportunities for the power sector

• Better Protection of Great Lakes water resources
  - Energy mixes that minimize aquatic resource impairments to the Great Lakes basin from the power sector

• Comply with the Great Lakes-St. Lawrence River Basin Water Resources Compact and Agreement
  - water conservation
  - assess cumulative impacts of water withdrawals
Where? The Watershed

The Great Lakes Basin
Where? The Energy Shed
Electricity Market Module Regions

- 1. East Central Area Reliability Coordination Agreement (ECAR)
- 2. Electric Reliability Council of Texas (ERCOT)
- 3. Mid-Atlantic Area Council (MAAC)
- 4. Mid-America Interconnected Network (MAIN)
- 5. Mid-Central Area Power Pool (MAPP)
- 6. New York (NY)
- 7. New England (NE)
- 8. Florida Reliability Coordinating Council (FL)
- 9. Southeastern Electric Reliability Council (SERC)
- 10. Southwest Power Pool (SPP)
- 11. Northwest Power Pool (NPP)
- 12. Rocky Mountain Power Pool, Arizona, New Mexico, and Southern Nevada (RA)
- 13. California (CA)
Who will use the information/products we develop?

1. Regulators
   - state energy and environmental managers and regulators
   - relevant federal agencies
     (e.g., Federal Energy Regulatory Commission)

2. Industry
   1. energy utilities
   2. system operators
   3. independent power producers
Who is Developing the Products?

**Advisors**
- Alliance for Water Efficiency
- Argonne National Laboratories
- DTE Energy Company
- Edison Electric Institute
- Electric Power Research Institute
- Illinois Dept. of Natural Resources
- Michigan Public Services Commission
- New York Power Authority
- Ontario Power Generation
- Ontario Ministry of Energy and Infrastructure
- Pennsylvania Dept. of Environmental Protection
- Recycled Energy Development
- U.S. Dept. of Energy, National Energy Technology Laboratory
- University of Texas, Austin
- We Energies
- Wisconsin Dept. of Natural Resources
- Wisconsin Public Service Commission

**Core Team**
- Great Lakes Commission
- Cornell University
- Sandia National Laboratories
- Great Lakes Environmental Law Center
- Environmental Law and Policy Center
What are we going to do? (Deliverables)

1. Great Lakes Energy and Aquatic Resources Nexus Maps
2. Great Lakes Energy and Aquatic Resources Nexus Model
4. Policy analysis document
5. Plan for a follow-on pilot project
1. Great Lakes Energy and Aquatic Resources Nexus Maps
2. Great Lakes Energy and Aquatic Resources Nexus Model

- Energy and Water Power Simulation Model *(Sandia National Lab)*
- Enhance model with new environmental rules
- Develop "What If" Scenarios for future electric power generation
- Show ecological tradeoffs associated with power generation scenarios
Great Lakes Future Power Generation Scenarios

- Baseline—business as usual
- High electricity demand
- Low electricity Demand
- New fuel and cooling technology mix
  - Increased renewables
  - Increased natural gas
  - No new once through cooling; retrofit portion of existing plants to closed loop or dry cooling
- Climate Impacts
  - Carbon capture
Model Structure and Supporting Data

- Electrical Power Production
  - EIA and eGRID

- Thermoelectric Water Use

- Energy Use for Water

- Water Use/Consumption
  - Great Lakes Commission; U.S. Geological Survey

- Demography
  - Census Bur. BEA

- Water Supply
  - U.S. Water Assessment

- Water Stress
  - Sandia; Cornell University

- Water Stress

- Green House Gas Production

- Great Lakes
- BEA
- EIA and eGRID
New Environmental Rules for Model (new metrics)

- Water Quantity
- Low Flow Vulnerability
- Water Quality Sensitivity
  - Impaired waters
- Thermal Vulnerability

Integrated Environmental Sensitivity Index
Sample Model Output

Ratio of 5th Percentile Stream Flow to Surface Water Demand

Supply/Demand

- <1
- 1-3
- 3-10
- >10

- Modeling outputs/results
- Factors not considered by the model
- Ways to minimize environmental losses under various power mix scenarios
- New framework for analyzing power generation impacts on Great Lakes aquatic resources
  - Ways to integrate environmental considerations into existing energy planning and regulatory decision-making
4. Policy analysis

- Examine policies related to:
  - Power markets and energy planning
  - System operating practices (e.g., dispatch)
  - Energy facility siting

- Recommendations to promote environmentally-preferable electric energy planning
5. Design Follow-on Project

- Develop a plan for phase II
  - Readily modifiable into a funding proposal

- Options:
  - Subregional Application of Model
  - Further Exploration of Outliers
Value of Great Lakes Water Initiative
Value of Great Lakes Water Initiative

- How is public water priced in the basin now?
- What are the socio-economic, political and Institution barriers to water pricing?
- What are the sensitive watersheds in basin that would most benefit?
Project Tasks and Deliverables

1. Identify sub-watersheds in the GL basin that reflect a spectrum of hydrologic conditions and are under land development pressures.

2. Survey & analyze financial drivers for rate setting

3. Conduct 2-3 workshops for local officials across the basin

Deliverable: a list of candidate sub-watershed areas for future pilot demonstration
Task 4: Survey and Analysis of Financial Driver for Water Rate Setting
Preliminary Survey Findings

• 75% rates were readily available on the utility website.
• The highest quality reporting is from Wisconsin
• Majority follow a uniform or decreasing block.
• Minnesota has more increasing block rates
• 6 are seasonal rates.
Perspectives on Water Conservation:
The Great Lakes Experience

Locations & Dates
- Ann Arbor, MI
  - October 12
- Racine, WI
  - November 8
- Buffalo, NY
  - November 10

Map of the Great Lakes region with cities marked:
- Ann Arbor, MI
- Racine, WI
- Buffalo, NY
Project Outcomes

• Feasibility Report with recommendations to the states/provinces

• Proposal for future pilot study(ies)
Great Lakes Rivermouth Collaboratory

*bring together regional experts to develop an integrated, multi-agency approach for research, monitoring, restoration, and protection of rivermouth ecosystems*

A Rivermouth Science Agenda and Implementation Framework
Great Lakes Rivermouth Collaboratory

- USGS partnering with GLC
- Provide a critical missing linkage among the science disciplines historically focused on distinct ecosystem components (watershed, coastal, nearshore or deepwater ecologies)
- Institutionalize collaboration among science and management communities
- Strengthen the foundation for future research
- Ensure that restoration goals are met for heavily used and impacted ecosystems.
Tasks and Objectives

1. Conduct a series of workshops and webinars that will improve scientific knowledge and understanding of rivermouth ecosystems and their restoration and sustainability needs

1. Apply that knowledge in the development of a common rivermouth science agenda and an institutional framework to guide and support restoration and management of these vital ecosystems

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ECCENTRICITY: AMERICA'S VAST UNTAPPED ENERGY RESOURCE

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