Sustainable Water Resources Roundtable

Meeting at Metropolitan Washington Council of Governments
777 North Capitol Street, NE, Washington, DC 20002
Summary of Proceedings January 25/26 2007

Day 1: David Berry, SWRR Manager, called the meeting to order and gave a summary of the meeting agenda and goals. The participants were welcomed by: **David Robertson, Executive Director of Metropolitan Washington Council of Governments** and **Bob Goldstein, Electric Power Research Institute, SWRR Co-chair**.

9:20 **Context of SWRR in national efforts**: **Ted Heintz, White House Council on Environmental Quality**

Ted gave the participants and overview of some other indicator initiatives to put the work of SWRR within a larger context. The Key National Indicator Initiative (KNII) is being moved out of the National Academy of Science to a non profit organization. After a scientific review, the indicators identified by the KNII will be made available to the public. Even though the indicators cover economic, social and environmental topics, the term "sustainability" is not used in the KNII work.

The Collaboration on Indicators of the Environment (CINE) organized by the White House Council on Environmental Quality CEQ) does specify the notion of sustainability with respect to natural resources. The participants of that effort acknowledge that while there may be considerable data on trends in the quality of the environment and the state of natural resources, good indicators analogous to national economic indicators, have not been developed. Rather than working on sets of indicators, the focus of the CINE has been on the institutional aspects of

building the capacity in the US to regularly report on environmental indicators. The National Academy of Public Administration has called together a "panel of fellows' to consider where development of environmental and social indicators could best be based.

Ted concluded with a comment that people in the current Administration particularly leaders in the Council on Environmental Quality and the Department of the Interior are quite supportive of the effort. They apparently consider progress on the capacity for the United States to regularly report environmental indicators as part of their environmental legacy.

9:45 **SWRR efforts on research: Paul Freedman Limno-Tech; Bob Goldstein, EPRI**

Bob presented the work that he and Paul had collaborated on. He said our water and energy infrastructures were designed with a future in mind that no longer exists. The target future for which they were designed is now past. Environmental, economic and social conditions have changed. These new conditions create new scientific and technical challenges. The Sustainable Water Resources Roundtable can provide a valuable forum to discuss research needs, programs and plans to meet these challenges. Water is a shared resource. Its sustainability depends on collaboration among stakeholders representing a broad and diverse spectrum of economic and societal sectors.

The sectors covered at the SWRR research meeting:

- Power generation
- Agriculture and forestry
- Urban issues
- Manufacturing/industry
- Ecological protection
- Ethics, law and policy

The meeting arrived at a consensus on the following needs:

- Improved understanding of critical water resource process and their impact on sustainability
- Decision support models/tools
- Better inventory of critical data
- New monitoring technologies
- Quantify "value" of water
- New policy and law to manage water on regional basis
- Conserve relevant specialists
- Collaboration

Bob announced the First Western Forum on Water and Energy Sustainability, Bren School of Environmental Science & Management, University of California, Santa Barbara. March 22-23, 2007 http://www2.bren.ucsb.edu/~keller/energy-water/first_forum.htm

10:25 **Panel: Connection between Fossil Fuel Energy and Sustainable Water Resources Bob Goldstein, EPRI** moderator

Tom Feeley, National Energy Technology Lab, DOE

Tom presented alternate Water Use Projection Cases

- Case 1 (Status Quo) – Additions and retirements are proportional to current water source and type of cooling system

- Case 2 (Regulatory Driven) – All additions use freshwater and wet recirculating cooling (WRC), while retirements are proportional to current water source and cooling system
- Case 3 (Regulatory Light) – 90% of additions use freshwater and WRC, and 10% of additions use saline water and once-through cooling, while retirements are proportional to current water source and cooling system
- Case 4 (Dry Cooling) – 25% of additions use dry recirculating cooling and 75% of additions use freshwater and WRC, while retirements are proportional to current water source and cooling system
- Case 5 (Conversion) – Additions use freshwater and WRC, while retirements are proportional to current water source and cooling system. 5% of existing freshwater once-through cooling capacity is retrofitted with WRC every five years starting in 2010 Projected Changes in U.S. Thermoelectric Sector Freshwater Withdrawal and Consumption

Tom then presented the FE/NETL Technical and Cost Goals:

- Short Term – Have technologies ready for commercial demonstration by 2015 that, when used alone or in combination, can reduce freshwater withdrawal and consumption by 50% or greater for thermoelectric power plants equipped with wet recirculating cooling technology at levelized cost of less than $2.40 per 1000 gallons freshwater conserved.
- Long Term – Have technologies ready for commercial demonstration by 2020 that when used in combination can reduce freshwater withdrawal and consumption by 70% or greater at levelized cost of less than $1.60 per 1000 gallons freshwater conserved.

John Gasper, Argonne National Laboratory

John made clear that energy and water are inextricably linked.

Energy and power production requires water:

- Thermoelectric: cooling
- Hydropower
- Energy minerals: extraction / mining Fuel Production; (fossil fuels, H2, biofuels/ethanol);
- Emission controls

Water production, processing, distribution, and end-use require energy:

- Pumping
- Conveyance and Transport
- Treatment
- Use conditioning
- Surface and Ground water

Freshwater withdrawals in the US:
Thermoelectric 39% Primarily Nonconsumptive
Irrigation 39% Primarily Consumptive
Public Supply 14%
Industrial 6%
Livestock 2%

Future energy development will put new demands on water:

- Many newer technologies will be more water intensive
- Biofuels and hydrogen economy would require significantly more water than fossil transportation fuels
- Constraints will grow for power plant siting because of water for cooling needs, advanced scrubbing, and CO2 removal
- Readily accessible fresh water supplies are limited and are fully allocated in some areas
- Pumping at deeper depths and longer conveyance distance require more energy
- New technologies to access and/or treat non-traditional water resources will require more energy per gallon of water
- Impaired water, produced water, brackish water, and sea water
- Energy Policy Act of 2005 gives DOE new Authorization for EWN-related R&D

Growing Congressional awareness and action at the Energy Water Nexus

- Sect. 979: Energy-Water Supply Technologies Program
- Water and Energy Sustainability Program
- Assessments
- Tools development for long-term planning
- Report to Congress
- $30M authorization starting in FY07
- Proposed Energy-Water Technology bills
- 2004 introductions in Senate (S. 2658) and House (H.R. 4835)
- National Lab/University-led, technology-focused program to increase water supply
- 2005 introductions in House (H.R. 3182) and Senate (S. 1860)
- Re-scaled proposals ($6M for first year, out year funding "as appropriate")

Examples of national needs, science-technology responses identified by the roadmap process:

- Improved data on regional water availability and sustainability
  - Statistical determination of monitoring needed, improved water data collection and frequency
  - Improved sensors and data management systems
- Coordinated regional natural resources planning
  - Modeling and decision support tools for improved resource management and utilization
  - Climate, hydrology, meteorology variability and uncertainty modeling
  - Assessment of ecological water needs and demands
- Improved materials, processes, and technologies to enhance water use efficiency and energy use efficiency
  - Basic research in chemical and biological processes to improve energy and water use efficiency
  - Applied research and more joint industry-government field demonstrations of emerging technologies
  - Implementation of energy technologies with high water use efficiency
- System-level consideration of energy-water solutions
  - Energy and water transmission infrastructure improvements to enhance efficiency
  - Co-location of energy and water production facilities to improve overall efficiency

Richard Bozek, Edison Electric Institute

Energy use is projected to increase dramatically by 2030. The industry is facing more than a $275 billion investment in new capacity with more than 292 GW of new capacity needed by 2030. At the same time, environmental compliance costs are skyrocketing. The electric utility industry spent more than $24 billion in compliance with federal environmental laws between 2002 and 2005. It is projected, that between 2007 and 2025 the industry will have spent $47 billion for NO_x, SO_2 and mercury controls alone.

Electricity generation, transmission and distribution all require water. Water infrastructure and many industrial, commercial and residential water uses are energy intensive and power generation competes with these uses of water. The industry is responding to this growing pressure by encouraging efficient energy use and addressing the energy-water linkage.

Despite these expenditures electricity remains a great consumer value. Maintaining this value is paramount in the years ahead. Therefore, the challenge is to find a way to create business opportunities and appropriate public policy that encourage and reward electric utility and customer collaboration on innovative and improved water resources management. We must achieve a balance between the cost of industry water-related investments and their benefit. Market-based approaches can provide long-term encouragement to drive action and results to address water management challenges.

Responder: Bob Wilkinson, Bren School Center, UC Santa Barbara

Bob reinforced the importance and magnitude of the energy water nexus partly by giving illustrative examples of water systems and water supply options in California. One graphic showed total water withdrawals and energy inputs to water systems.

1:10 **Current SWRR Framework and Indicators with suggestions for improvements**
John Wells, MN Water Quality Board; Rhonda Kranz, Kranz Consulting;
Doug Wade, Metro Washington COG

The SWRR Vision: A future in which our nation's water resources support the integrity of economic, social, and ecological systems and enhance the capacity of these systems to benefit people and nature

Principles of Water Sustainability

1. *The value of limits of water:* People need to understand the value and appreciate the limits of water resources and the risks to people and ecosystems of unbounded water and land use
2. *Shared responsibility:* Because water does not respect political boundaries, its management requires shared consideration of the needs of people and ecosystems up- and downstream and throughout the hydrologic cycle
3. *Equitable access:* Sustainability suggests fair and equitable access to water, water dependent resources and related infrastructure

4. *Stewardship:* Managing water to achieve sustainability challenges us while meeting today's needs to address the implications of our decisions on future generations and the ecosystems upon which they will rely

Framework and Examples of indicators

System capacities and their allocation

1. Gross water availability
2. Total withdrawals for human uses
3. Water remaining in the environment after withdrawals and consumption
4. Water quality in the environment
5. Total capacity to deliver water supply (i.e., infrastructure capacity)
6. Social and organizational capacity to manage water sustainably

Consequences of the way we allocate water capacity

7. Environmental conditions
8. Resource conditions
9. The quality and quantity of water for human uses
10. Resources withdrawals and use
11. Effects on people of the conditions and uses of water resources

Underlying processes and driving forces

12. Land use
13. Residual flows – the flow of water and wastes back into the water system
14. Social and economic processes – the systems people and organizations develop to influence water resources and sustainability
15. Ecosystem processes

Composite sustainability assessment

16. Water use sustainability – in each watershed, the ratio of water withdrawn to renewable supply
17. Water quality sustainability – in each watershed, indicators of the suitability of water quality for the uses desired, including ecosystem uses

1:50 **Breakouts on current state of SWRR indicators** Participants had advance copies of 17 main indicators and "candidate indicators" from the Appendix of the SWRR report these are available at www.acwi.gov/swrr

Breakout Group #1 Summary (facilitated by Rhonda Kranz, Kranz consulting)
Comments on the SWRR framework and indicators:

- The order of the three systems in the SWRR vision should be switched to parallel that of the egg diagram, i.e. "the integrity of ecological, social, and economic systems".

- SWRR needs a "one-page" overview document of the indicator project with a short description of the goals, process, and simple explanation of the indicators.

- A fairly short but more complete document is needed that includes the following information:
  1. Purpose: Intent and Audience of the Indicators. It should provide a general framework (a universe of tools) that individuals can pull from as relates to their situation (not sector specific)
  2. History of Development Process: How did SWRR get down to 17 indicators? How SWRR's indicators relate to other indicators (e.g., EPA's)?
  3. Table of indicators, definitions, and examples

- It is not clear how the current 5 categories link to the broader, general ideas/principles of sustainability? How are the indicators synthesized to determine sustainability?

- Brand Niemann suggests defining the 3 key terms (water sustainability, water resources, and indicators) and then plugging in each of the 5 categories and 17 indicators under the term(s) that they fit. He proposes that this would help conceptualize the framework and identify redundancies and gaps.

- Specific suggestions on the indicators framework and 17 indicators:
  - Indicator #5 – can remove "over time
  - Indicator #11 – the term "conditions" is ambiguous, need to clarify (contaminants are an issue).

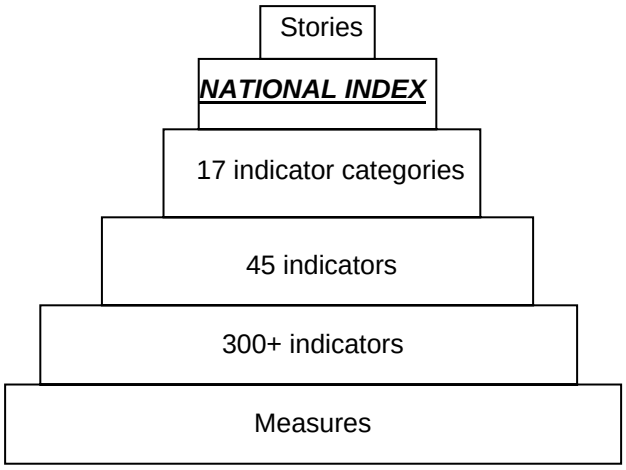
- Suggested SWRR activities:
  - It would be useful for SWRR to identify available datasets related to the indicators
  - The 17 indicators could be prioritized based on amount of data and metadata available

Breakout Group #2 Summary (facilitated by Doug Wade, Metro Washington COG)
John Wells, Doug Wade, Paul Freedman, Aaron Fischbach, Devon Rothschild

- Discussed the history of the indicators and the indicators framework.

Conclusions: too many indicators; framework is too complex for the average user; Indicators Framework Report does not make clear the use of the 300+ indicators at the back of the report.
Suggestions: need to "dumb down" the Indicators Framework so people outside of SWRR can understand how to use the indicators; need to determine who the audience is and what the indicators package is supposed to be used for.

- We think that there should be a National Index (or indices using <10 indicators) established that can be used to inform policy and public opinion.



- Possible National Indices include water quality, water supply, human impact, environmental impact, and infrastructure.
- These National Indices should be scalable to local, regional, and national levels.
- Indicators should be "ranked" in a way that the general public can see improvements (so rank from 1-10, 1-100, or some other method).
- SWRR needs to be able to tell people using the National Indices how to scale them.
- Some tweaking might need to occur on the 17 indicator categories. We did not discuss this in great depth, but there was talk of moving the allocations indicators to a different category, and moving indicator #4 (water quality) to indicator #7 (environmental conditions) or #9 (the quality and quantity of water for human uses).

Breakout Group #3 Summary (facilitated by Bob Goldstein, EPRI)

The breakout group formed an Energy-Water Work Group to include Bob Wilkinson, Tom Feeley, John Dawes, Pieri Noceti, Bob Goldstein, Rees Madsen, and Tim Smith

Discussion included a number of points:

- Could a fact sheet be done in the format of the indicator report?
- Water intensity indicators like gal/MW-hr could be useful.
- Amount of water to produce a unit of energy.
- Water intensity of electricity could be an indicator.
- Water intensity of liquid fuels could be an indicator, gal/BTU.
- Energy intensity of water is another possibility.

4:15 Reports back from breakout groups and discussion on indicators and where the SWRR indicators go from here

- Indicators need to be simplified and made more user-friendly to be useful
- An indicator retreat meeting will be held in the next couple of months to create a revised indicator list and presentation

5:00 Adjourn Several out-of-towners and others continued the discussions at dinner.

Day 2 Opening Panel, EPA and Water Sustainability
Stephen Heare, Director, Drinking Water Protection Division, Office of Groundwater and Drinking Water. EPA
Sheila Frace, Director, Municipal Support Division, Office of Wastewater Management, EPA
Moderator: Devon Rothschild, Ecological Society of America

Sustainable Water Infrastructure
Background

- Our wastewater and drinking water systems are aging
- U.S. population is increasing and shifting
- Current treatment and management may not be sufficient to address emerging issues and potentially stronger requirements
- Investment in R&D has declined
- Funding gap: $270 billion for wastewater and $263 billion for drinking water

Vision:

- Seek innovative approaches and new technologies to help ensure that the Nation's water infrastructure is sustainable
- Accomplish this through collaboration with external stakeholders and conducting research, in the following 4 "pillar" areas:
  - Better Management
  - Water Efficiency
  - Full Cost Pricing
  - Watershed-Based Approaches

EPA's Role

- Advocating Sustainable Water Infrastructure in Our Day-To-Day Programs and Activities
- Partnership with Industry, States, Program Offices and Regions to Engage External Stakeholders
- Supporting the Agency's Strategic Plan
- Cross-cutting themes: innovation, partnerships, new technology, and research

Four Pillars of Water Sustainability

- Better Management:
  - Statement of Intent for Effective Water Sector Utility Management, signed May 2006

- Full-Cost Pricing:
  - Expert Workshop in November 2006 at Michigan State University

- Water Efficiency:
  - Watersense--specification for High Efficiency toilets

- Watershed-based Approaches:
  - EPA Forum on "A Watershed Approach to Utility Management" held on December 4 and 5, 2006, in Alexandria, VA

10:25 **Water Sustainability in the Washington Region: Tracy Bowen, Alice Fergusson Foundation, and Dan Jackson, LMI Associates, Indicators for Trash in the Potomac**

- LMI Overview, Business Areas, and Clients
- Partnership with AFF – Trash Free Potomac Watershed Initiative
- E&E Overview - Sustainability and Watershed Management
- Trash data provides valuable information on:
  - Demographics/population
  - Environment
  - Economic condition
- AFF is gathering data to determine the state of the Potomac watershed:
  - Amount of trash
  - Type of trash
  - Most likely sources of trash
- AFF developing survey to improve knowledge of status of trash in watershed.
- Survey is in pilot stage now – we are planning to expand and improve and conduct pilot March 07

Overall Goals of Trash Survey

- To contribute to success of Trash Free Potomac Initiative
- To increase the analytic rigor of theAlice Ferguson Foundation's trash data
- To provide defensible information about the state of the Potomac
- To develop indicators for sustainable watersheds

11:40 **Summary discussion: where do we go from here on Research, Indicators and Education? How can SWRR best contribute to Water Sustainability in the US? Moderated By David Berry, SWRR Manager**

Matt Ries and Paul Freedman described the interest of the Water Environment Federation Trustees in water sustainability. They will continue to work on this.

John Wells noted that SWRR's strength is its holistic approach. He stated that the SWRR indicators form a package to show the big picture, within which details might be worked out.

Brand Niemann suggested that SWRR should focus more on getting its message out. He urged the use of newer technological tools of the World Wide Web. For example, he asked if SWRR should write paragraphs for Wikipedia, the online encyclopedia and Community 2.0, and We Smarter than Me. Brand also mentioned that an example of a framework for data contribution is the mid-Atlantic activity headed by Tom Cristobal looking at two water problems in the Shenandoah Valley: water table reduction and fish kills.

Tracy Bowen asked how AFF and SWRR could work together. Tim Smith said AFF should submit a talk proposal to WEFTEC '08 for the sustainable water resources session. John Wells suggested that SWRR should commit to work with Tracy.

Tracy called for SWRR to form a subgroup on local and regional issues, which was approved by SWRR. A sign-up sheet passed around. Dan Jackson of LMI will chair this work group. Dan said he would like to make the AFF/LMI project a model for other organizations. Members of

the group include Rick Swanson, Brand Niemann, John Wells, Tracy Bowen, Lisa Watts, and Jackie Cornet. A link to the Alice Ferguson Foundation can be put on the Related Links page of the SWRR web site. Also, Tim Smith suggested the group might consider submitting an abstract for a future WEFTEC'08 track on Sustainable Water Resources Management (meeting to be held by WEF in Chicago in 2008). As it progresses, the work group would focus on the national picture of local and regional water issues, with the Metro Washington areas used as one example.

A next step may be a retreat (perhaps at the FWS facility in Shepardstown) to work on where to go next. For example, the suggestion that a small group of about 10 indicators is a needed level in the hierarchy. A number of attendees seem interested in such a retreat, including the SWRR members active at the last indicator retreat. Rick Swanson, Rhonda Kranz, John Wells, Tim Smith, plus Doug Wade, Matt Ries, Michael Eberle, Bob Wilkinson, and Brand Niemann.

Lisa Watts mentioned that the AFF/LMI project involves volunteers collecting data, and that this is something SWRR should consider.

David would like to see collaboration on research funding. Tim Smith feels that the SWRR members that have thought about research activities could develop a grant. Tim also mentioned that SWRR members could sign on to a "treaty" in support of research (not SWRR as a group, but each member).

Brand Niemann mentioned the usefulness of a public-private partnership.

12:15 Adjourn