

ASME

Water Management Technology Vision and Roadmap Workshop Results & Next Steps

**Michael Tinkleman and John Lyon
September, 2008**

UIC Water Community of Practice (water and energy)





ASME

- Promotes the art, science and practice of **mechanical and multidisciplinary** engineering and allied sciences
- Develops **codes and standards** that enhance public safety
- Provides **lifelong learning** and technical exchange opportunities
- Benefits the engineering and technology **community**



ASME Strengths

- Depth and breadth of members' knowledge
- Neutral unbiased convener
- Identifying new water solutions
- Developing new standards and training
- Collaborative assistance in moving water initiatives forward

ASME's technology focus in ...



standards
collaborative R&D
conferences
courses / training
competitions
publications

- Water and waste water treatment
- Energy/Power
- Bioprocessing
- Pharmaceuticals
- Nanotechnology
- Advanced materials
- MEMs
- Fuel cells
- Pressure technology



Water Management Technology

- \$1.9 trillion global industry with 11% growth over last five years
- 7% of ASME members and their companies have a direct involvement in water industries
- 25% of ASME members are dependent on water availability, quantity, quality, cost and processing to deliver their primary products and services



Current ASME Water Activities

- ASME Water Management Symposium, May 2005, House Science & Technology Hearing Room
- 1st ASME Water Quality, Drought, Human Health & Engineering Conference, October 2006
- ASME Solutions Water Management cluster activities
- Water Vision-Roadmap Workshop, National Academy of Sciences, May 9 - 10, 2007



Current ASME Water Activities

- Process Industries Technical Division – Water Technical Committee
- Performance Test Code (PTC) 19.11 – Steam & Water Conditioning & Analysis in the Power Cycle
- Research & Technology Committee on Water & Steam in Thermal Processes
 - Steam Subcommittee – Publishes U.S. Industrial Steam Tables
 - Water Subcommittee – Consensus Documents – Lay-up of Boilers, Turbines & Auxiliary Equipment
- Ad-Hoc Research Committee on Water Management Technology – Darrell Pepper, UNLV & John Lyon, EPA – Co-chairs
- Power Plant Environmental Chemistry (PPEC) Research Committee

ASME Vision & Roadmap Workshop



AGENDA

- Trends and Drivers
- Vision for Water Management
- Potential Roles
- Key Challenges
- Priority Activities
- Action Plans

Purpose:

- Serve as a starting point for dialogue among ASME, industry, government, and academia
- Define ASME Role in Water Management Technology
- Guide future ASME efforts to develop value-added products and services in the water management area that benefit both ASME members and the nation at large
- Washington, D.C. National Academy of Sciences
- May 9-10, 2007

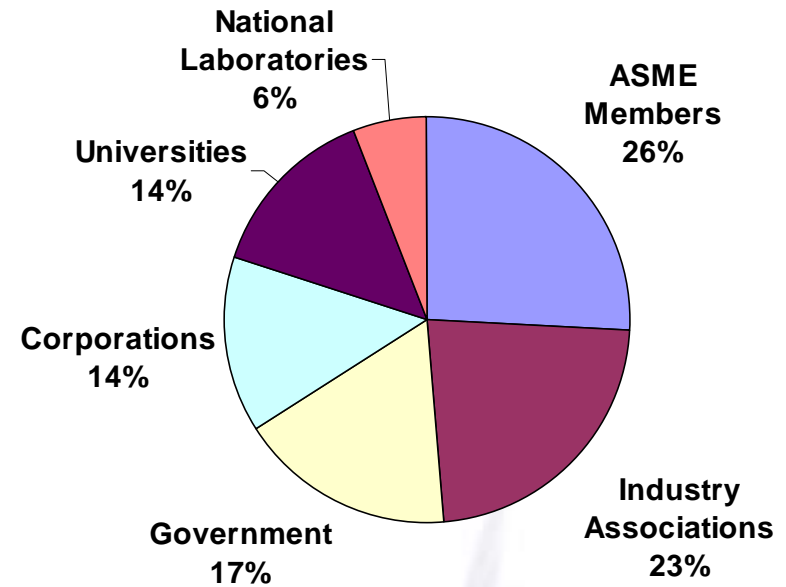


Senator Domenici Welcoming Letter

- **“Water resources management is critical for our nation.**
- **We cannot maintain our current standard of living, become energy independent nor improve the living condition for the rest of the world without critically evaluating how we will meet our water needs.**
- **... I commend the leadership of your organization for having the foresight to address the role that ASME might play in solving our national and international water needs.**
- **Let me extend my welcome to the participants in the Water Management Technology Vision and Roadmap Workshop sponsored by ASME.”**

Pete V. Domenici, United States Senate

Profile of Roadmap Participants



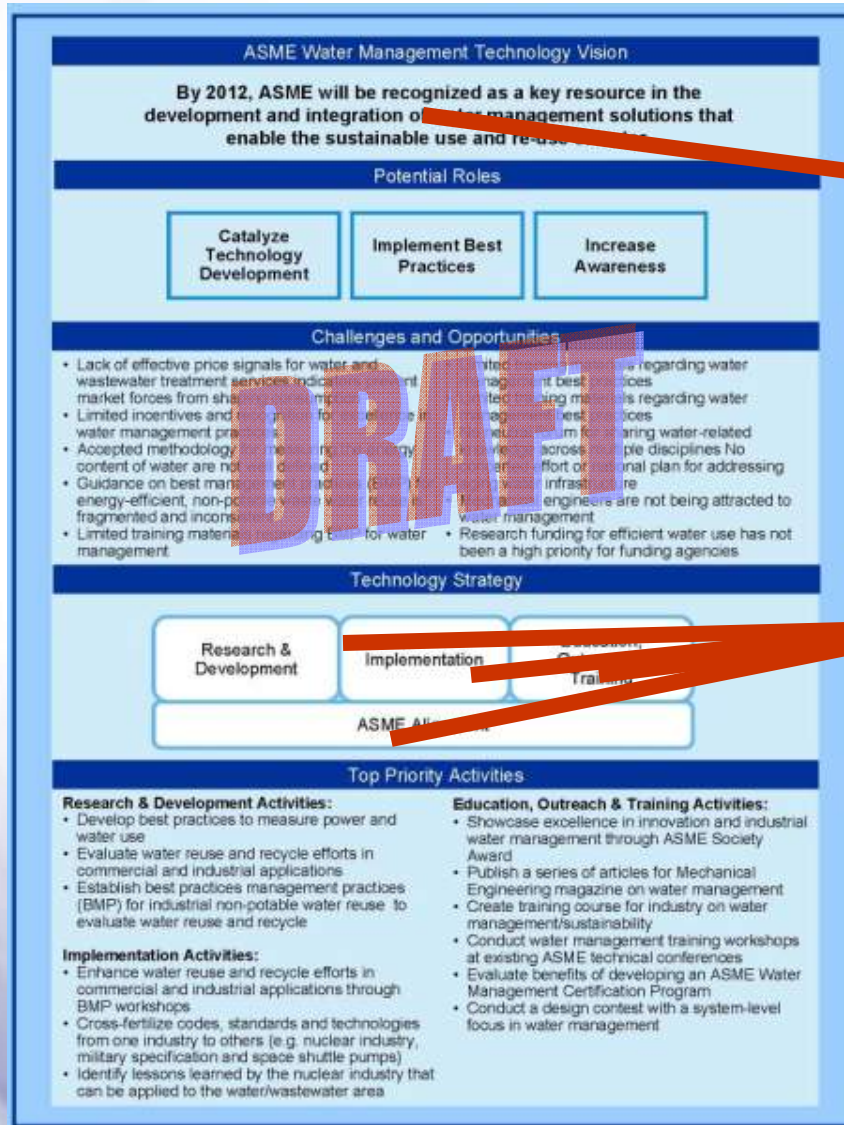
35 participants from ASME and 24 organizations across the U.S.



Roadmap Participants

- Martin Allen, AwwaRF, Director Research
- Ahmad Fakheri, Bradley University
- Robert Goldstein, EPRI
- Richard Jacobsen, Idaho State University, Chair BRTD
- I. S. Jawahir, University of Kentucky
- Pramod Kulkarni, California Energy Commission
- Russell LeFevre, IEEE, President Elect
- John Merson, Sandia National Laboratories
- Nag B. Patibandla, Rensselaer Polytechnic Institute
- Darrell Pepper, University of Nevada Las Vegas, CRTD Ad-Hoc Water Management Research Committee
- Stephen Shulder, Constellation Energy
- Michael Tinkleman, ASME
- Philip Beauchamp, GE-Global Research
- Joshua Dickinson, Water Reuse Foundation
- Michael Dimitriou, Water & Wastewater Equip Mfg. Assoc.
- Noha El-Ghobashy, ASME
- John Lyon, EPA
- Caterina Hatcher, EPA Energy Star
- Jane Kucera, Nalco Global Equipment Solutions
- Cindy Lee, National Science Foundation
- Audrey Levine, EPA
- Edward Osann, Potomac Resources, Inc.
- Gerald Sehlke, Idaho National Laboratory
- Terry Shoup, ASME President
- David Weiman, Agricultural Resources
- Justin Young, ASME
- Keith Carns, Global Energy Partners, LLC
- Burton Dicht, ASME
- Katherine Hollinger, FDA
- Raj Manchanda, ASME
- Stephanie Meadows, API
- Charles Noss, EPA
- Kyle Schilling, ASCE-EWRI President
- Brandes Smith, ASME

ASME Water Management Vision and Strategies



Vision

By 2012, ASME will be recognized as a key resource in the development and integration of water management solutions that enable sustainable use and re-use of water.

Technology Strategy

- Research & Development
- Implementation
- Education, Outreach & Training
- ASME Alignment



Top Water Management Issues

- **Technology**
 - Slow adoption of new technologies
 - Inadequacy of current technologies
- **Economics**
 - Add the value of water to everything
 - Relationship of water availability and economic development
- **Water Supply**
 - Sustainability and water re-use
 - Water footprint of goods and services
- **Policy** — Energy Water Nexus DOE Study
 - Energy for water vs. water for energy
- **Leadership**
 - Lack of standards
 - No Department of Water

ASME Water Steering Committee Workshop – 10/2006



Challenges and Opportunities

Economics

- Lack of effective price signals for water and wastewater treatment services indicators prevent market forces from shaping consumption
- Limited incentives and recognition for excellence in water management practices

Tools and Standards

- Accepted methodology for measuring the energy content of water are not well defined
- Guidance on BMP'S for energy-efficient, non-potable waste water reuse is fragmented and inconsistent
- Limited training materials regarding best management practices (BMP) for water management

Collaboration

- No neutral forum for sharing water-related knowledge across multiple disciplines
- No concerted effort or national plan for addressing aging water infrastructure

Awareness

- Mechanical Engineers are not being attracted to water management

Government

- Research funding for efficient water use has not been a high priority for funding agencies



Top Priority Activities

Research and Development

- **Develop best practices to measure power and water use**
- **Evaluate water reuse and recycle efforts in commercial and industrial applications**
- **Establish best management practices (BMP) for industrial non-potable water to evaluate water reuse and recycle**

Implementation

- **Enhance water reuse and recycle efforts in commercial and industrial applications through BMP workshops**
- **Cross-fertilize codes, standards and technologies from one industry to others (e.g. nuclear industry, military specification and space shuttle pumps)**
- **Identify lessons learned by the nuclear industry that can be applied to the water / wastewater area**



Top Priority Activities (Continued)

Education, Outreach and Training

- Showcase excellence in innovation and industrial water management through **ASME Society Award**
- Publish a series of articles for Mechanical Engineering magazine on water management
- Create training course for industry on water management / sustainability
- Conduct water management training workshops at existing ASME technical conferences
- Evaluate benefits of developing an ASME Water Management Certification Program
- Conduct a design contest with a system-level focus in water management

Next Steps

- ASME Water-Vision-Roadmap Finalized & Printed – 2nd Qt 2008
- Follow-Up with Workshop Participants
- ASME Best Practices Process Industries Workshop – Fall 2008 (ASME internal funding)
- Subcommittee on Water Availability & Quality (SWAQ) – ASME Roadmap Briefing – March 20, 2008



ASME Best Practices Process Industries Workshop

- Develop a series of Water Management Technology Best Practices and Innovations Workshops for specific industrial sectors
- First workshop in series -- Water Management Technology Best Practices and Innovations Workshop for the Process Industries (Fall 2008)
- Workshop will include 25 – 35 representatives of the processing industry sector including ASME members.



ASME Best Practices Process Industries Workshop

- Focus Areas of the Workshop will include:
 - Involving processing industries that use large amounts of water (Chemical, Beverages, Pulp and Paper, Semiconductor (e.g. Dow, DuPont, Coca Cola, Georgia Pacific, MEMC Silicon Wafer, NALCO, etc.))
 - Identifying best practices currently used for water reduction and water reuse
 - Evaluating innovative technologies and tools that can be used to minimize water consumption within the production process



ASME Best Practices Process Industries Workshop

- Will provide real world case studies from industrial operations presenting the most innovative approaches being taken to minimize water use.
- Will evaluate BMPs looking at overall water reduction, technologies used, plant modifications needed, life-cycle cost strategies, potential for technology innovation, secondary benefits, and market transformation needs.



Other Water Priorities ...

Source: DOE Energy-Water Nexus Project

- Treating and reusing non-potable process (“gray”) water in power production
- Accessing currently unused water sources, such as saline aquifers
- Reducing or eliminating water use altogether in generating power
- Delivering water and energy more efficiently to prevent losses
- Minimizing water-related impacts from mining, energy production and use, and disposal of solid byproducts

Energy and Water are ... Inextricably linked



Water for Energy

and

Energy for Water

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 requires energy:

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

ENERGY and WATER
ENERGY and WATER

ASME
SETTING THE STANDARD



Water Quotes

EPRI Water Efficiency Workshop – 11/2007

- “Water is a critical resource. All regions of the US are vulnerable to water shortages and now more than ever there is a need for industry specific technologies and practices to be developed and implemented to increase water and energy efficiency.”
 - Dr. Robert Goldstein, Senior Technical Executive, EPRI
- “The US will need 50% more water by the year 2035 for energy, industrial and domestic use. Since water availability over the same period will remain the same, we must close the gap by providing water efficient technologies and reuse practices and by developing technologies to reclaim water.”
 - Michael Hightower, Sandia National Laboratories
- “One of EPA’s Long-term Research Themes is to mitigate source water impairment by optimizing interventions including Best Management Practices (BMP) performance.”
 - Dr. Charles Noss, National Program Director for Water Quality, USEPA