Introduction and Welcome:
*Forecasting the Future (Project #4232)*
Linda Reekie – WaterRF Project Manager

**What Do The Next 10-20 Years Have in Store for Us?**

- Changes in world complexity, the water sector, and your utility make this information needed and valuable.
- The results from this project will help you and your utility prepare for the future.
Presentation Outline
1. Research Approach
2. Key Trends to Watch
3. Water Sector Blueprint
4. Utility-Specific Strategy Development
5. Q&A

Part 1
Research Approach
**Defining the Water Sector Blueprint**
*(Excerpts from Water RF RFP 4232)*

- **Identify Trends, Impacts, Strategies**
  “The identification of new and changing trends, and the identification of potential impacts and planning level strategies.”

- **Identify Conceptual Blueprint**
  “The identification of a conceptual blueprint of what the water sector may look like in 10 to 20 years and to project a vision of the desired future and potential strategies for achieving this vision.”

- **Develop Utility-Specific Strategies (Tools)**
  “Help water utilities to position themselves to manage outcomes of impacts and shape their own successful futures.”

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**Utility Participation Has Been Extensive**

**North American Utilities:**
- Akron Public Utilities Bureau, OH
- Anchorage Water and Wastewater Utility, AK
- Anne Arundel Department of Public Works, MD
- Arlington Water Utilities, TX
- Atlanta Department of Watershed Management, GA
- Beaufort-Jasper Water and Sewer Authority, SC
- Columbus Public Utilities, OH
- Columbus Water Works, GA
- El Paso Water Utilities, TX
- EPCOR, Edmonton, Canada
- Greater Cincinnati Water Works, OH
- JEA, FL
- Las Vegas Valley Water District, NV
- Louisville Water Company, KY
- Massachusetts Water Resources Authority, MA
- Metropolitan Water District Southern California, CA
- Salt Lake City Public Utilities, UT
- San Diego Water, CA
- Toho Water Authority, FL
- Tualatin Valley Water District, OR

**International Utilities**
- (Coordinated by IWA)
- Agbar Water, Spain
- Anglian Water, United Kingdom
- Ruhrverband, Germany
- Tekniska Verken, Sweden
- Water Corporation, Western Australia
- Waternet, The Netherlands
- PUB Singapore
Project Approach Included Multiple Tracks

- Survey Previous Studies Use
- Develop Trend Summaries by Category
- Develop Water Sector Strategy
- Survey of Utilities and Water Conferences - Top Trends - (August)
- Workshop Summary (October-November)
- Web Conferences:
  - Utility Participants (December 2010)
  - WaterRF Subscribers (March 2011)

Project Approach Included Significant Utility Participation Over The Past Year

- Literature Review
- Web Conferences (Focus Groups)
- White Papers
- Remote Use
- Technical Workshops
- Case Studies Option
“Futures” Workshop Participants Validated Trends and Expanded Strategies

11/10/2011

“White Papers” Identified New and Changing Trends in Four Categories

- Environmental
  - Energy Demand
  - Climate Change
  - Natural Disasters
  - Total Water Management

- Technological
  - Rate of Technological Changes
  - Information Technology
  - Water System Technology
  - Water Treatment Technology

- Economic/Business
  - Economic
  - Financial
  - Organizational
  - Managerial

- Societal/Political
  - Governance
  - Water-Related Regulation
  - Water-Related Legislation
  - Organizational Sustainability
  - Customer/Constituent and Community Relationships
  - Mass Media Management

White Papers are available on WaterRF website (search for project number 4232): http://www.waterrf.org/Research/ SpecialReports/Lists/SpecialReports/
“Forecasting The Future” – Using The Results

Water Sector Call-To-Action
- Vision of Desired Future
- Strategic Imperatives

What Are Your Future Challenges?

What trends or uncertainties could have the largest impact on your utility in the next 10-20 years?

(Why do you think so?)
Part 2

Key Trends to Watch

Trends Can Be Viewed in Terms of Certainty About Their Impact
Trends Can Be Prioritized by Certainty and Impact

Utility Participants Rated Trends to Prepare for Interaction at the “Futures” Workshop
Trend - Strategy Cycle Shows Relationships Over Time

Key Trends to Watch - Consolidated
1. Uncertain Economy, Financial Instability
2. Decreased Availability/Adequacy of Water Resources
3. Aging Water Infrastructure/Capital Needs
4. Shifting Water Demands
5. Changing Workforce, Dynamic Talent Life-Cycle
6. Expanding Application of Technology
7. Customer/Stakeholder Engagement, Media Influence
8. Increasing/Expanding Regulations
9. Efficiency Drivers, Resource Optimization
10. Climate Uncertainty
1. Uncertain Economy, Financial Instability

- World-wide recession causes slow economic growth and lengthy employment recovery
- Customer financial pressures limit or reduce water rate increases
- Utilities face public and political pressures to improve efficiency and cut costs
- Historical underfunding of retiree pension and health benefits and investment market uncertainty strain public utility finances
- Full cost pricing for water services and infrastructure remains challenging to justify and implement
- Debt financing increases use of tax free revenue bonds

2. Decreased Availability/Adequacy of Water Resources

- High quality potable water supplies are less available due to uncertain adequacy of freshwater sources and growing concerns about water quality (emerging contaminants, invasive species, non-point runoff, etc.)
- Increasing demand for water supplies from competing interests (agriculture, thermoelectric power, “fracking”) reduce availability and quality of water sources
- Quantity of water supply is uncertain with weather extremes affected by climate change
- Total water management efforts (for water, recycled wastewater, stormwater, groundwater recharge, etc.) increase water availability in constrained supply areas
3. Aging Water Infrastructure/Capital Needs

- Substantial capital is required to replace and upgrade aging water and wastewater infrastructure.
- Investments in water infrastructure continue to fall short of replacement and renewal requirements.
- Revenues based on water rates are insufficient to meet growing capital needs.
- Consent decrees mandated by EPA for controlling sewer overflows may consume customer and community financial capacity.
- Progressive utilities manage for sustainability (asset management/renewal, risk management, “triple bottom line”) of water infrastructure.

4. Shifting Water Demands

- Increasing water conservation attitudes/habits and water efficient appurtenances/appliances reduce per capita consumption. Use–based (quantity) rate models result in decreased revenues.
- Improved efficiency of industrial water use and offshore movement of manufacturing reduce water demand.
- Growing segment of older customers alters water demand/consumption profiles and increases quality concerns (especially health-compromised consumers).
- Continuing U.S. population movement toward the South and West (away from the Northeast and Midwest) creates excess capacity problems for older utilities and expansion problems for younger utilities.
5. Changing Workforce, Dynamic Talent Life-Cycle

- Organizations attract employees with flexible work schedules, the ability to learn new skills, and access to technology and social networks
- Aging workforce and world-wide competition increases demand for skilled technical resources
- Reduced compensation packages (benefits, pensions) challenge water utilities to attract new workers
- Social networks provide opportunities to tap into a broader workforce pool
- Extended career workforce eases knowledge gap of new workers

6. Expanding Application of Technology

- Wireless and mobile technology provide continuous connectivity to web-based applications
- “Smart” components and systems monitor and control water supply and demand infrastructure
- Water treatment technology advances provide options for potable and non-potable water needs
- Information technology infrastructure and applications are “virtual” with many options for software/service provision
- “Data deluge” challenges utilities to create useful information for decision making
- Integration and convergence of technology increases
7. Customer/Stakeholder Engagement, Media Influence

- Direct customer/stakeholder engagement increases with “blended media” interactions
- Public perceptions are formed by mass/social media outside of utility influence or control
- Water utilities reach out to citizens, community groups and other stakeholders to understand perceptions and build credibility
- Public organizations use social media to disseminate emergency notifications and response information
- Water issues are viewed as vital to public health, environmental preservation, social welfare, and community development

8. Increasing/Expanding Regulations

- Holistic approaches in regulation shift from “end-of-pipe” rules to policies that provide protection of watersheds
- Regulation of contaminants as a group (rather than one at a time) allows more cost-effective approaches to drinking water protection and/or treatment
- “Water smart” programs and policies address water shortages as well as protecting and preserving water quality
- Broader detection of emerging contaminants drives investigation of human health impacts and potential regulation
9. Efficiency Drivers, Resource Optimization

- Productivity improvements are driven by economic conditions, downward pressures on water rates, and public perception of government inefficiencies
- Increased global demand for resources leads to constrained or unreliable supplies
- Energy reductions are driven by cost management and greenhouse gas reduction goals
- Resources and energy (use, recovery, generation) are optimized throughout the water/wastewater cycle
- Collaboration, consolidation, and rationalization of small systems with adjacent larger systems provides efficiencies, economies of scale, and improved services

10. Climate Uncertainty

- Increased concentrations of atmospheric greenhouse gases continue to raise average global temperatures
- Increased intensity, frequency and duration of extreme weather events negatively impact water resources and related infrastructure
- Frequency of occurrence and severity of natural disasters increase with associated environmental, economic, and social impacts and recovery costs
- Rising mean sea levels impact reliability and performance of coastal area water infrastructure
- Water-related ecosystem services (food supply, nutrient cycling, erosion effects, etc.) are stressed by climate change and human impacts
Poll #1

Thinking about the next 10-20 years, which of these trends are most likely to significantly impact your utility? (pick your top 3)

- Climate Uncertainty
- Efficiency Drivers, Resource Optimization
- Increasing/Expanding Regulations
- Customer/Stakeholder Engagement, Media Influence
- Expanding Application of Technology
- Changing Workforce, Dynamic Talent Life Cycle
- Shifting Water Demands
- Aging Water Infrastructure/Capital Needs
- Decreased Availability/Adequacy of Water Resources
- Uncertain Economy, Financial Instability

Part 3

Water Sector Blueprint

- Vision of Desired Future
- Strategic Imperatives
“The Future Ain’t What It Used To Be”

- Yogi Berra

Vision of Desired Future

- A Vision for the Water Sector to Achieve in the Next 10-20 Years
- Twelve Statements that Support a Desired Future for Water Utilities as “Essential Service Providers”
Vision Of Desired Future: Water Utilities Are Essential Service Providers

1. Trusted guardians of public health
   Consumers believe that drinking water at the tap is safe and high quality.

2. Collaborative partners in total water management
   Utilities effectively manage water resources to produce the best outcomes for communities and the environment.

3. Efficient providers of high-quality, reliable, affordable water service
   Utilities provide services that meet or surpass customers’ expectations.

4. Effective promoters of sustainable resources for water and energy
   Utilities ensure optimal use of water and energy resources.

Vision Of Desired Future: Water Utilities Are Essential Service Providers

5. Financially viable organizations
   Utilities demonstrate financial prudence by applying sound fiscal policy for business/capital investments in sustainable resources.

6. Employers of choice for serving the public good
   Water sector organizations offer socially and environmentally responsible career opportunities.

7. Good stewards in preserving the natural and built water infrastructure
   Utilities protect and restore the natural and built water infrastructure.

8. Successful users of state-of-the-art technology and information
   Utilities use cost-effective advanced technological solutions to provide customers with the best service possible.
Vision Of Desired Future: Water Utilities Are Essential Service Providers

9. Proactive open communicators with all Stakeholders
   Utilities promote understanding and public awareness.

10. Respected organizations with transparent performance information
   Utilities demonstrate accountability to build stakeholder trust.

11. Advocates for community quality of life; enablers of economic development
   Utilities, in partnerships with business, special interest groups and other stakeholders, make decisions that positively contribute to the social, environmental and economic well-being of the community.

12. Effective emergency responders
   Utilities respond quickly, safely and effectively to emergency situations.

Reflect on Your Utility’s Vision and Mission: What Are Your Future Challenges?

1. Trusted guardians of public health
2. Collaborative partners in total water management
3. Efficient providers of high-quality, reliable, affordable water service
4. Effective promoters of sustainable resources for water and energy
5. Financially viable organizations
6. Employers of choice for serving the public good
7. Good stewards in preserving the natural and built water infrastructure
8. Successful users of state-of-the-art technology and information
9. Proactive open communicators with all Stakeholders
10. Respected organizations with transparent performance information
11. Advocates for community quality; enablers of economic development
12. Effective emergency responders
Strategic Imperatives

• Strategic Imperatives Are Based on Strategies That Apply to Many Trends

• Utilities Can Use Example Strategies for Your Own Strategy Development

• Strategic Imperatives Are the Water Sector “Call to Action” (Seven Broad Imperatives)

Example Strategies Are Provided For Utilities To Use In Your Own Strategy Development

• Example strategies provide “food for thought” to review existing utility strategies or create new/updated strategies

• Example strategies are linked to specific trends and impacts (may be unique to each utility situation) – an example follows …
Example Strategy for Use by Utilities
(included in Final Report)

Environmental Trend 1:

Increased global demand for resources (energy and other growth-related commodities) lead to constrained and/or unreliable supplies.

**RANGE OF MAJOR IMPACTS**

Low Impact: Minor variations with little fluctuation in supply.

High Impact: Volumes dramatically with substantial savings and uncertainty in supply.

**POSSIBLE STRATEGIES**

A. Diversify energy sources to include renewable/alternative energy sources (contract suppliers/buy alternative sources, recover process energy, generate renewable, etc.).

B. Implement energy efficiencies (change processes/equipment, optimize operations’ processes, improving equipment efficiency, etc.).

C. Reduce water demand (conservation pricing, public awareness outreach, change appearance/process uses, alternative quality source delivery, etc.).

D. Manage total resource demands to meet defined goals/constraints for long-term economic, social and environmental benefits (e.g., triple bottom line).

E. For treatment chemicals with constrained or unreliable supplies, evaluate and implement alternative chemical applications, with consideration of chemical efficiencies and treatment effectiveness.

Strategies That Apply Across Many Trends and Impacts Are “Strategic Imperatives”
**Strategic Imperatives: What Utilities Must Do**

1. **Communication: Multi-Faceted Engagement**
   Utilities build trust in environmental, social, corporate, and regulatory areas by engagement with diverse key stakeholders.

2. **Collaboration/Partnerships**
   Utilities consider alternative models in the provision of various water services such as private-sector participation, public organization partnerships, and regional collaborations.

3. **Total Systems View**
   Utilities consider all of the technological, financial, physical, and regulatory practices that affect sustainable water resources and infrastructure for optimal delivery.

4. **Rate Making/Financing**
   Utilities use rate structures that contribute to the long term financial viability and sustainability of the utility.

5. **Applied Information and Control Technology**
   Utilities use technology to effectively meet challenges of efficient operation, exceptional service, and meaningful public engagement.

6. **21st Century Leadership Skills**
   Utility leaders possess (or acquire) three clusters of leadership knowledge and skills to respond to:
   a) Context - business risk and opportunities
   b) Complexity - lack of certainty, lack of agreement
   c) Connectedness – build effective relationships with new kinds of partners

7. **Adaptive Planning and Implementation**
   Utilities have a strategic planning process that facilitates the development and implementation of robust strategies under various levels of uncertainty in environmental and economic climates.
Poll #2

Which strategic imperative is most important for your utility to address going forward? (pick one)

1. Communication: Multi-Faceted Engagement
2. Collaboration/Partnerships
3. Total Systems View
4. Rate Making/Financing
5. Applied Information and Control Technology
6. 21st Century Leadership Skills
7. Adaptive Planning and Implementation

Part 4

Utility-Specific Strategy Development
"It is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change"

- Charles Darwin

Strategy Is About Making Choices

- Strategy is about making choices – because time and resources are limited
- What must be different from today to go forward successfully?
- The best strategies (most robust) will work for a range of drivers/trends/impacts (i.e., test them in different scenarios)
- The best strategies also work even if impacts are less than predicted (i.e., “no regrets” – because it’s the right thing to do)
Strategies Are Developed and Implemented Based on Range of Control

Adaptive Strategies
- Routinely assessing and adjusting

Mitigating Strategies
- Constantly monitoring and responding

Water Sector Blueprint and Other Information Can Drive Development of Utility-Specific Strategies

- White Papers
  - Trends
  - Impacts

- Water Sector Blueprint
  - Vision of Desired Future
  - Strategic Imperatives

Utility-Specific SCAN

Utility-Specific Strategies
Utility-Specific Strategy Development Can Use a Proven Methodology

- Trends
- Impacts
- Potential Strategies
- Scenario-Based Analysis
- Implement
- Track/Adjust

Refer to WaterRF Project 2849 – “Strategic Planning and Organizational Development for Water Utilities”

Utilities Can Use Scenario-Based Analysis To Develop Your Own Strategies

- Define most significant trends and plausible impacts from Scan process
- Select most challenging scenarios based on the combination of two trends
- Analyze using matrix to look at “best case” to “worst case” scenarios
- Brainstorm potential strategies using strategy examples from this project
- Develop strategies from above analysis for all relevant combinations of trends
Example Scenario-Based Analysis Leads To Most Robust Utility-Specific Strategies

TREND: Increasing Energy Use/Cost

IMPACT RANGE

Slow Rise

Erratic Swings and Dramatic Increase

TREND: Decreasing Water Resources

“BEST CASE” SCENARIO

 Demand Met with Existing Supplies

Strategies

“WORST CASE” SCENARIO

 Demand Not Met Even with Alternative Supplies

Strategies

How to Use the “Futures” Research for Your Own Utility

1. Review White Papers
2. Use Trends and Impacts to Identify Those Most Significant for Your Utility
3. Review Key Trends to Watch
4. Develop Your Own Vision of Desired Future
5. Use Scenario-Based Analysis to Develop Most Robust Strategies for Your Utility
6. Review Strategic Imperatives to Adjust Your Utility-Specific Strategies
Part 5

Question and Answer Session

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Thank You!