Water Resources Utility of the Future (UOTF)

Tom Sigmund, NEW Water
Wisconsin Government Affairs Seminar
February 28, 2013
Utilities Today: World Class Sophistication

- Deliver services to 90+ % of the US population
- Manage more than $500 billion in net assets
- Finance some $25 billion a year capital investments
- Responsible for a workforce of about 50,000
- Remove more than 90% of organic inputs, estimated 55% of nutrients, and nearly all harmful bacteria
- Account for less than 10% of remaining water quality impairment of the nation’s rivers, streams, lakes, reservoirs, and coastal shoreline and only about 30% of impaired estuaries
UOTF…What Does it Look Like?

Treatment plants become energy self-sufficient or a net energy producer…
UOTF...What Does it Look Like?

Cities are redesigned...from below ground up...to become extensions of the treatment and supply system...
UOTF…What Does it Look Like?

Watershed management is as important as the formal treatment system.
## UOTF a New Paradigm

<table>
<thead>
<tr>
<th>Past</th>
<th>Future</th>
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<tbody>
<tr>
<td>Handlers of wastewater</td>
<td>Managers of sustainable resources</td>
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<tr>
<td>Seeking permit compliance</td>
<td>Watershed-scale environmental leaders seeking least-cost, highest return solutions</td>
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<td>Engineers designing treatment plants</td>
<td>Regional planners of weather-resilient, green communities</td>
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<td>Isolated public service units</td>
<td>Integrated members of economically thriving local communities</td>
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# Welcome to the Water Resources Utility of the Future

## Motivation

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Activity</th>
<th>Innovation</th>
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<tbody>
<tr>
<td>Reduce Cost</td>
<td>Energy Efficiency</td>
<td>• Energy Efficient Equipment &amp; Networks</td>
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<td>Energy Recovery</td>
<td>• Methane &amp; Hydrogen Recovery, Heat Recovery</td>
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<td>Operating Efficiency</td>
<td>• Automation and Smart Operations, Asset Management, Sourcing</td>
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<td>Increase Revenue</td>
<td>Water Reuse</td>
<td>• Industrial Cooling, Recharge, Landscape, Golf Course Irrigation</td>
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<td></td>
<td>Materials Recovery</td>
<td>• NH$_4$, P Compounds, N Compounds, Metals</td>
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<td>Materials Conversion</td>
<td>• Bioplastics, Pyrolysis Fuel Oil, Algal Biomass, Solid Fuels, Fertilizers</td>
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<td>Biosolids Reuse</td>
<td>• Liquid Fertilizer</td>
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<td>Energy Generation</td>
<td>• Photovoltaics, Wind Turbines</td>
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<tr>
<td>Support Community &amp; Economy</td>
<td>Growth Planning</td>
<td>• Sectoral Expansion, Targeted Upgrades, Managed Package Plants</td>
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<td>Community Partnering</td>
<td>• NPS Controls, Biowaste Conversion To Methane, Green Infrastructure</td>
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What’s Behind the Paradigm Shift?

• We’re way out on the unit removal curve
• Traditional inter-governmental partnership that recognized public goods nature of clean water has nearly disappeared
• The CWA regulatory regime was built for an economy and an ecology that’s now 40 years old and out of date
• With deleveraging balance sheets and an environment of “no new taxes” clean water agencies struggling to make ends meet
A Word About Process

- Collaborative effort of NACWA, WEF, and WERF
- Pretty quick turnaround – started in September finished late December
- Steering Committee – Nine members, three from each sponsoring organization
- Task Force – 48 members from across the industry: 31 utilities (mostly public, but couple of IOUs), 9 consultants, 4 academics, and 4 technology firms
Blueprint: Create a Vision for an Environment of Innovation

- Identify a range of changes to legislation, administrative practices, and programmatic structures
- Identify things clean water agencies are already doing and suggest more of it as well as more widespread adoption
- Call for some bold, transformative thinking around new ways of doing business
Great Story, So Why Do We Need Help?

- Fundamentally the market is working and will likely continue to work, but in a slow, clunky, and geographically uneven way.

- Without help, transaction costs will be needlessly high, technology adoption rates will be needlessly slow, communities and politicians will be under-informed, and the benefits shown here won’t be captured.

- The UOTF is being held back by certain structural barriers and resistance to change: regulatory pressure, fiscal pressure, political pressure, and risk of technology failure.
UOTF Legislative Actions

- Fully support public and private enterprises as they make the transition to the UOTF
- Sanction watershed-based solutions to water quality challenges
- Encourage water reuse and conservation where feasible
- Enable full recovery of waste heat and energy
UOTF Legislative Actions

- Create a Congressional UOTF caucus to collaborate with industry and other subject experts
- Create a new national infrastructure resiliency funding program in response to extreme weather events
UOTF Legislative Actions

• Craft a 21\textsuperscript{st} Century Watershed Act that builds on 40 years of Clean Water Act achievements, but embraces UOTF initiatives more fully:

  – Redefine Publicly Owned Treatment Works in a manner that recognizes it as a resource provider

  – Extend permit terms or offer more flexibility for projects that employ resource recovery activities like water recycling

  – Make water reuse an eligible activity to receive federal financial aid
UOTF Financial and Risk Allocation Actions

• Focus disparate federal programs on UOTF objectives
• Maximize efficient water use and reuse for new government buildings
• Stimulate the pace of technology innovation with a new advanced R&D program for clean water
• Implement pooled risk-sharing strategies and reciprocity for technology approval across all states
UOTF Institutional or Programmatic Changes

• Stronger support for green infrastructure to frame a broader conversation about fundamental urban design

• Integrated watershed planning that engages the public, civic leadership, potable water utilities, and infrastructure professionals to make better decisions
How Bad It Can Get
Plowing Through Waterways Allows Sediment and Nutrients to Leave Fields
Desired Conditions
UOTF Productivity Improvement

- Use process/decision support tools such as Lean, Six Sigma, and sustainability-driven environmental management systems
- Use social media and smart technology to interact with stakeholders and better deliver services
- Standardize operator certification to create a better trained and more mobile workforce
UOTF Advocacy, R&D, Education, and Outreach

- Key roles for NACWA, WEF, WERF, and EPA
- Support focused, collaborative research
- Advocacy for legislative change
- Advisory services to regulators
- Enhance public information and participation
- Knowledge base platform to detail and update the latest UOTF technologies and practices
The Industry of the Future

- Managers of valuable resources
- Maximize net benefits (environmental and community) in the form of reduced cost and increased revenue
- Driven by triple bottom line business case analysis
- Develop strong partnerships with external stakeholders and use those partnerships to achieve goals
New Brand, New Attitude

- Reframe the conversation through branding
UOTF as a Force for Change

- National in scope
- Subsidiaries everywhere
- Employ millions
- Assets in the trillions
- Invest $100 billion annually
- Collaborative effort with NACWA, WEF, and WERF
Bold, Transformative Thinking Required

- Realize most effective solutions often involve others outside the utility's direct control
- A 21st Century Watershed Act must be enacted to support these initiatives
- Clean Water Utilities become leaders in the watershed community seeking to deliver maximum environmental benefits at the least cost to society
Water Resources Utility of the Future (UOTF)

Tom Sigmund, NEW Water
Tsiggmund@newwater.us
(920) 438-1095

www.newwater.us