The Utility of the Future

What it Means and Why it’s Important

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Agenda

• The Utility of the Past
• A Framework to Understand the Utility of the Future
• Why it’s Important
• What’s Next?
The “utility of the past” added value by assuring its customers that it would collect wastewater, move it quickly downstream, treat it to acceptable standards, and dispose of effluent and biosolids without harming the environment.

Then, something happened...
Things Got Complicated

- Demographics took over
- Regulations escalated
- Assets aged
- Finances stretched
- Private interests got aggressive

*We realized that markets once thought of as monopolies were indeed, contestable...*
Public Utilities Increased Operating Efficiency

In the 1990s, NACWA utilities increased efficiency of operations by about 45 percent, but rising costs of increasing requirements have eroded about half of those gains this decade.

Operating Cost Per Capita By Decade

Average Operating Cost/Capita (2009 Dollars)

1989 1999 2009

Operating Cost/Capita

Population Served (1000s)

Source: NACWA Financial Surveys
But Revenue Efficiency Is Slipping

Operating deficits have been eliminated for all intents and purposes, but the major internal revenue efficiency gains seemed to have peaked.

Note: Revenue is total revenue from own sources (excludes intergovernmental loans and grants)
Source: NACWA Financial Surveys
As Utilities Confront Capital Replacement

Wastewater utilities devote an increasing proportion of expenditures to capital plant, a result of increasing environmental and service level requirements and an aging infrastructure, in turn, creating new demands for capital efficiencies.

Capital Expenditures as Percent of Total

Source: NACWA Financial Surveys
So, Utilities Respond on the Capital Side

Percent of NACWA members that have implemented an “asset management system,” defined as an integrative process that enables a utility to determine how to minimize life cycle costs of owning and operating infrastructure assets while meeting customer service demands

Source: NACWA 2009 Financial Survey
Response Begins on O&M As Well

**Electricity as Percent of Total O&M Cost**

- 1999: 7.5% - 10.5%
- 2009: 8.0% - 10.0%

**Range in kWh/gal treated/day (2009)**

- Mean = 0.66

Source: NACWA Financial Surveys
Reuse Kicks in: Revenue Generator?

About 6% of total municipal wastewater effluent in the US is reclaimed for landscape irrigation and recharge. Four states -- CA, AZ, TX, and FL -- account for 90% of reclaimed wastewaters.

Source: USGS and other sources
And Water Use Trends Reverse

Total and Per Capita US Public Water Supply

Public Water Supply (BGPD)


1,000 Gal Per Capita Per Day

Source: US Geological Survey
Welcome to the “Utility of the Future”

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- Energy Efficient Equipment & Networks
- PV, Wind Turbines, Methane & Hydrogen Recovery, Heat Recovery
- Cooling, Recharge, Landscape, Golf Course Irrigation
- NH₄, P Compounds, N Compounds, Metals (Li, Mn, Zn, Au, Ag)
- Bioplastics, Pyrolysis Fuel Oil, Algal Biomass, Solid Fuels, Fertilizers
- Liquid Fertilizer
- Sectoral Expansion, Targeted Upgrades, Managed Package Plants
- NPS Controls, Biowaste Conversion To Methane
**Triple Bottom Line Results**

### Example Processes

- Energy Efficiency
  - Energy efficient equipment & networks
  - Photovoltaic installations
  - Wind turbine installations

- Energy Recovery
  - Methane production from biosolids
  - Hydrogen production from biosolids
  - Recovery of heat
  - Hydrokinetic energy recovery

- Water Reuse
  - Supply of treated effluent for cooling
  - Recharge of effluent to groundwater
  - Effluent for landscape, golf course irrigation

- Materials Recovery
  - Ammonia recovery
  - Phosphorus compounds recovery
  - Nitrogen compounds recovery
  - Metals recovery (Li, Mn, Zn, Au, AG)

- Materials Conversion
  - Bioplastics production from biosolids
  - Pyrolysis of biosolids to fuel oil
  - Algal biomass fuel production
  - Biosolids solid fuel to replace coal
  - Biosolids fertilizer pellets & soil conditioner

- Biosolids Reuse
  - Use of biosolids slurries as liquid fertilizer

### Environmental Effects

- Reduced consumption of fossil fuels
- Reduced greenhouse gas emissions
- Reduced air pollution

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- More fresh water for higher valued uses
- Less salt water intrusion
- Reduced discharges to cleaner waterways

- Reduced loadings to cleaner waterways
- Healthier ecosystems

- Less landfilling
- Less mining and burning of fossil fuels
- Reduced net carbon emissions

- Less landfilling
- Better absorption of nutrients, less runoff

- Less groundwater contamination
- Less septage overflow to waterways
- Reduced nutrient loads to waterways

- Reduced landfill demand
- Reduced methane emissions

### Utility Effects

- Reduced energy demand
- Reduced operating costs

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### Community Effects

- Reduced imports/better trade balance
- Enhanced investment in R&D
- Creation of technology jobs
- Increased household incomes
- Increased local GDP
- Increased local tax receipts

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- • Stronger community partnerships
  • Reduced electric bills
  • Increased tipping fee revenue
  • Reduced grease sewer blockages

- • Creation of manufacturing jobs
  • Increased household incomes
  • Increased local GDP
  • Increased local tax receipts

### Support Community & Economy

- Upgrades & expansions to handle new flows
- Sewer extensions for industrial expansion
- Managed package plants to replace septic systems
- Implement NPS Controls
- Convert community Bio-waste to electricity
FOG Methane at East Bay MUD

- Accepts sewage, food scraps and grease from local restaurants, and waste streams from wineries and poultry farms
- Reduces volume of food waste by 90%
- Saves $3 million a year in electricity costs
- Plant is energy independent and sells electricity back to the grid – first of its kind
- Prevents significant methane releases to the environment
- Qualifies for carbon reduction credits
Phosphorus Recovery at Hampton Roads

- Ostara Nutrient Recovery Technologies’ Pearl process
- Recovers 85% N and 40% P
- Converts to Crystal Green slow release fertilizer
- No additional costs to HRSD
- Significant savings to ratepayers
- Increases plant efficiency
- Replaces mined P fertilizer at fraction of its cost
- Significant reduction in carbon footprint
- Also at Portland OR, York PA, Saskatoon BC, London UK
Solar PV in Lots of Plants

- Boulder, CO
- Pueblo, CO
- Telluride, CO
- Corvallis, OR
- Raleigh, NC
- Phoenix, AZ
- Pima County AZ
- San Diego County, CA
- Tulare, CA
- Charlotte, NC
- Hackettstown, NJ
- Philadelphia, PA
- Oroville, CA
- Nantucket, MA
Wind Turbines in Lots of Places

- Atlantic County, NJ
- Bayshore, NJ
- Browning, MT
- Guthrie, OK
- Narragansett Bay, RI
- Muskegon County, MI
- Fall River, MA
- Falmouth, MA
- Cascade, WI
- Evansville, WI
- El Dorado, KS
- Perry, IA
- MWRA, MA
- Ashtabula, OH
Wastewater Reuse

Reported Water Reuse in 2006 (BGY)

Total = 374 BGY

Source: Water Reuse Foundation
Why is UOTF Important?

• Improves contribution of wastewater utilities to their own bottom line, the environment broadly, and the community they serve
• Brand value on a win-win solution
• Insight on best practices to benefit everyone
• Leadership and partnerships with other water and wastewater organizations

Platform of reform initiatives: policy, legislation, partnerships, finance.
In Case We Think We Know All the Answers....

Video: Taking the Waste Out of Wastewater
http://tinyurl.com/dxuouar