

# The Water Resources Utility of the Future: A Blueprint for Action

NACWA

**WERF**

**Water Environment  
Federation**  
the water quality people®

Kenneth Rubin, PhD



# A Word About Process

---

- Collaborative effort of NACWA, WEF, WERF
- Pretty quick turnaround – started in Sept. finished late Dec.
- Steering Committee and Task Force to provide structure and industry input, respectively
- Steering Committee – 9 members, 3 from each sponsoring organization
- Task Force – 48 members from across the industry: 31 utilities (mostly public, but couple of IOUs), 9 consultants, 4 academics, 4 technology firms
- An initial characterization -- each sponsoring organization will take it further

## **Bottom Line: Major Paradigm Shift**

PAST: collect wastewater, move it quickly downstream, treat it to acceptable standards, and dispose of waste without harming the environment.

FUTURE: manage resources to generate value for the utility and its customers, improve environmental quality at least cost to the community, and contribute to the local economy

## Utilities Today: World Class Sophistication

- Deliver services to 90+ percent of the US population
- Manage more than \$500 billion in net assets
- Finance some \$25 billion a year capital investments
- Manage combined budget of more than \$55 billion/yr
- 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.

*But...its not all good*

# 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- The CWA regulatory regime was built for an economy and an ecology that's now 40 years old and out of date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

# Welcome to the “Utility of the Future”

PAST

**Motivation** Collect, Remove, Treat, **Activity** Dispose Safely

**Innovation**

Increase  
Revenue

Water Reuse

Materials Recovery

Materials Conversion

Biosolids Reuse

Energy Generation

- Industrial Cooling, Recharge, Landscape, Golf Course Irrigation
- NH<sub>4</sub>, P Compounds, N Compounds, Metals
- Bioplastics, Pyrolysis Fuel Oil, Algal Biomass, Solid Fuels, Fertilizers
- Liquid Fertilizer
- Photovoltaics, Wind Turbines

FUTURE

Reduce Cost

Energy Efficiency

Energy Recovery

Operating Efficiency

- Energy Efficient Equipment & Networks
- Methane & Hydrogen Recovery, Heat Recovery
- Automation and Smart Operations, Asset Management, Sourcing

Support  
Community  
& Economy

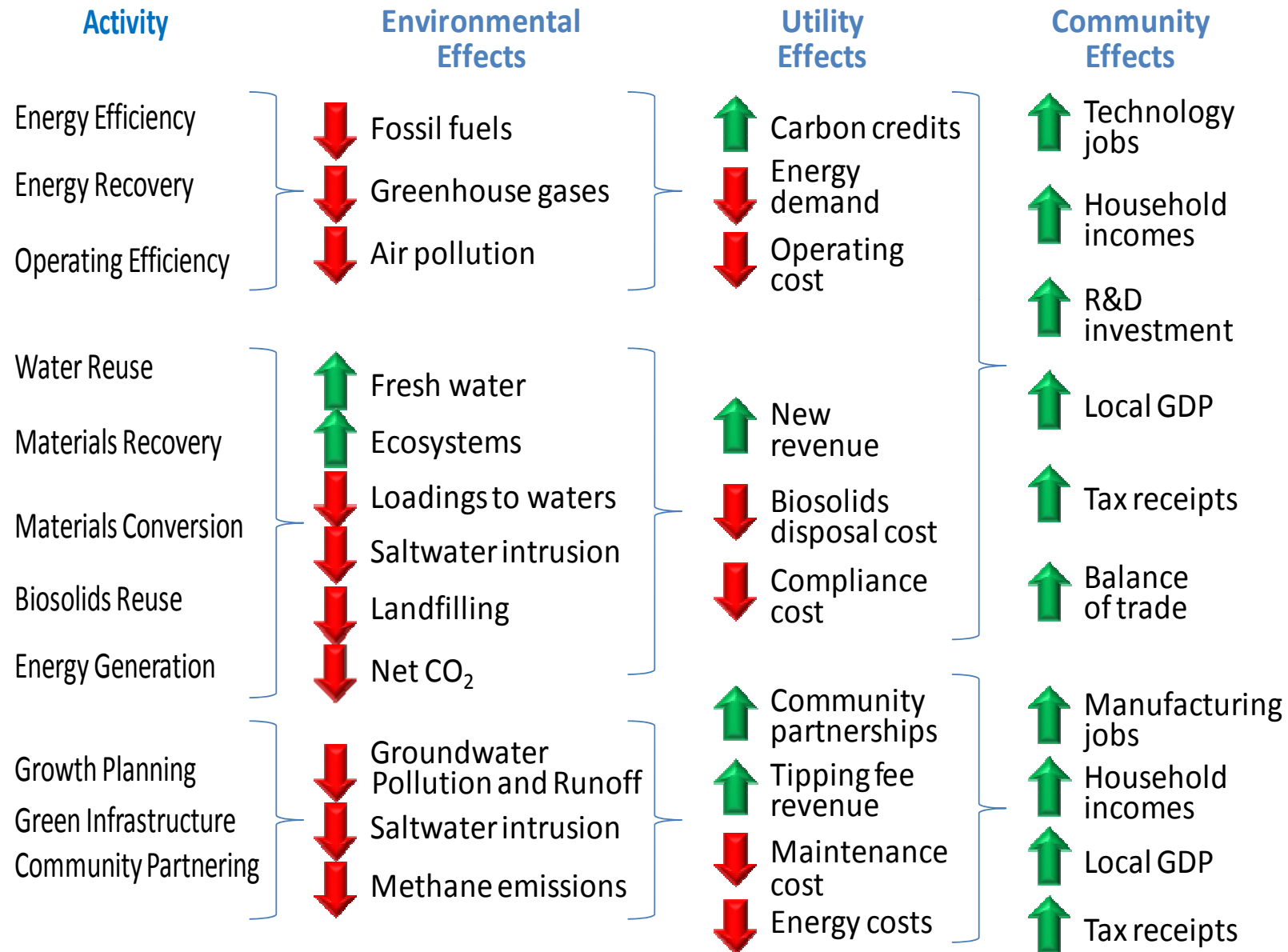
Growth Planning

Green Infrastructure

Community Partnering

- Sectoral Expansion, Targeted Upgrades, Managed Package Plants
- NPS Controls, Biowaste Conversion To Methane, Green Infrastructure

# Delivering Triple Bottom Line Results



# Case: 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





# Case: 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 Clean Water Services, OR, York PA, Saskatoon BC, London UK



# Case: Solar PV – Its Everywhere

---

- 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



## Case: Wind Turbines – They're Everywhere

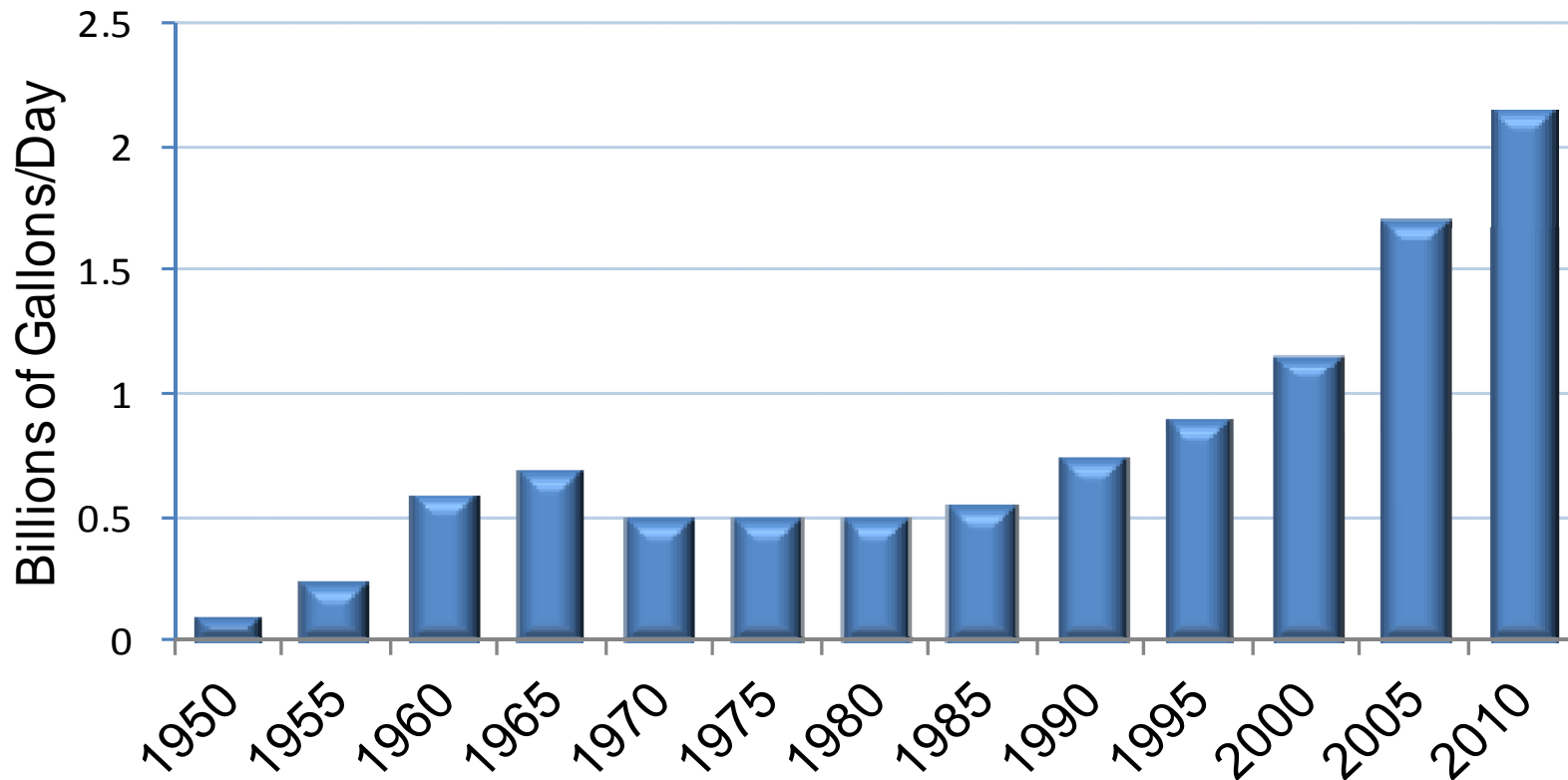
---

- 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



# Case: Wastewater Reuse Growing Fast

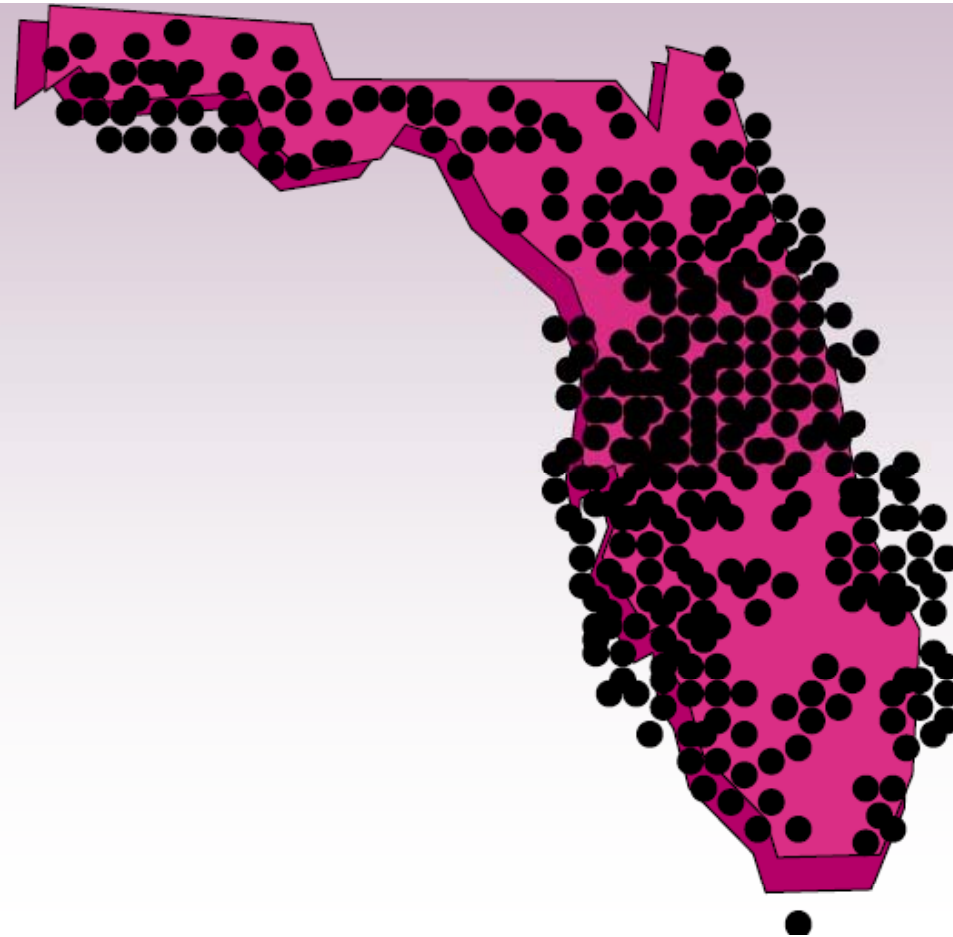
## Wastewater Reuse (BGD)



Source: USGS and other sources

# A Look at Florida's Reuse Program

---



- 420 wastewater reuse systems
- 465 BGY capacity, 263 BGY reused (2011)
- 40% landscape, 25% aquifer recharge, 15% agricultural, 15% industrial cooling, 5% fire protection, toilet flushing, car washes

# Emerging Technologies

---

- CNG from biogas for vehicles and CHP
- Solar algae harvesting to recover nutrients and generate biogas
- Microbial fuel cells using algae to generate electricity from wastewater
- Constituent-specific storm water filtration and local reuse
- Various forms of solid fuel from biolids as coal substitutes

## 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.

# **Blueprint: Create Environment of Innovation**

*Creating a vision for the future of our industry*

- Identifies a range of changes to legislation, administrative practices, and programmatic structures.
- Identifies things clean water agencies are already doing and suggest more of it as well as more widespread adoption, and
- Calls for some bold, transformative thinking around new ways of doing business.



# #1: Encourage Clean Water Agencies to Lead Innovation at the Watershed Scale

---

*Regulatory flexibility on discharge limits linked to environmental results using modified TMDL or alternative watershed-based solutions.*

- Trading (good models in Ohio River Valley, LI Sound, and maybe emerging in Chesapeake watershed)
- Adaptive management (good model in Wisconsin)
- Alternative approaches to ecosystem and habitat restoration (good model trying to emerge in Narragansett Bay)
- Use USDA and state resources for conservation programs to help bring other sources, mainly Ag to the table.

## **#2: Remove Barriers and Provide Incentives for Technology Developers to Partner with Utilities**

*A few logical, enabling initiatives we can take today to push the UOTF agenda and capture triple bottom line results*

- Reform federal/state renewable energy credit and similar programs
- Amend the SSI rule (March 2011): use multi-media risk assessment instead.
- Relax the private-use test for tax-exempt bonds that finance public energy recovery/production projects.
- Amend state RPS eligibilities to include energy recovery projects from biosolids.
- Clarify state water use rights for reclaimed wastewater
- Amend SRF eligibilities to include wastewater reuse.

## #3: Speed Up the Pace of Innovation and Rate of Technology Adoption.

---

*Help push us over the edge of innovation by de-risking a conservative industry*

- ARPA-W: high-risk, high-reward R&D
- An ARPA-W risk offset facility
- 50-state program of reciprocal technology certification
- Wastewater reuse investment tax credits for private firms that invest in rural or low income communities
- Water markets to define rights for recycled water

## **#4: Organizing and Managing Our Own Future**

*Since we don't have all the answers, prepare for change*

- Congressional Caucus
- Continued advocacy from Task Force
- Knowledge management: create the “Industry of the Future”
- New intergovernmental partnership on Resilience of Clean Water Infrastructure
- 21<sup>st</sup> Century Watershed Act