Why Not WRFF?

Drivers | Challenges | Path Forward

Murali Erat, P.E.

TACWA Meeting
July 27, 2018 | Houston, TX
Water Resource Recovery
WRRFs of the Future

- Wastewater is a re-NEW-able resource
  - Nutrients
  - Energy
  - Water
- Protection of human health/Environment + Recovery of valuable resources
Why Not WRRF?

Drivers

Challenges

Path Forward
Water Scarcity

Increasing Water Demand | Decreasing Water Supply | Reclaimed Water Viable Option
Direct Potable Reuse (DPR)

Colorado River Municipal Water District (CRMWD) | City of Wichita Falls
• Biosolids Rich in Nutrients
  • Nitrogen
  • Phosphorus

• Extracting Phosphorus from wastewater is more efficient than mining from reserves

• Phosphorus is a non-renewable resource

Growing Nutrient Demand for Agriculture

US Phosphate Rock Reserves = 40 yrs
(USGS, 2016)

15% of annually mined P ends up in human excreta
(Cordell et al., 2009)
• N production from non-bioavailable sources (Haber Bosch Process) is energy intensive and non-sustainable

• Greenhouse gases (GHG) emission from Nitrogen Production

Growing Nutrient Demand for Agriculture
Biosolids as Commercial Fertilizers

“Hou-Actinite”
City of Houston

“Bloom”
DC Water

“Milorganite”
Milwaukee Metropolitan Sewerage District
• Energy use accounts for one-third of total operating cost

• Increasing cost of energy

• Energy from fossil fuels contributes carbon footprint and greenhouse gases (GHG)

• Focus on energy neutrality through energy reduction and recovery
• Potential nutrient limits in the future

• Biological Nutrient Removal (BNR) processes and Sidestream treatment for enhanced removal of Nutrients

• Biosolids from BNR processes rich in Phosphorus

Stricter Environmental Regulations
• Sludge hauling/disposal cost can be significant

• Reduced landfill capacity

• Landfills produce greenhouse gases

• Stricter landfill regulations

Decreasing Landfill Capacity
• Enables WRFFs to operate independently during power outages due to natural disasters

• Not relying on landfill capacity for sludge disposal

• Resilient to variability of waste streams
The world is running out of phosphorus, which threatens global food supply

By ASRASR (Own work) [CC BY-SA 4.0], via Wikimedia Commons

Resiliency
• Key challenge for WRRFs of the Future

• Capital cost investment for resource recovery implementation can be high

• Tight capital improvements budget
• Complexity of operation of resource recovery techniques

• Need for skilled labor to operate WRRFs of the Future

• Investment for training and development for next generation workforce
• Capital expenditure focus on replacement of aging critical infrastructure

• With aging infrastructure maintaining service and compliance is a key challenge
- Lack of public awareness and understanding of WRRF goals
- Difficult and costly to educate public on benefits of water reuse and biosolids
Call me WWTP

WRRF – Path Forward
• **Develop Resource Recovery Plan**

• **Replace aging infrastructure with resource recovery in mind**
• Educate ratepayers understand the goals of WRFFs
• Raise awareness of water demand and supply
• Outreach to educators to develop lesson plans to engage young minds
• Find creative ways to engage public
- Look at lifecycle cost for broader view
- Revenue streams from resources: water, nutrients and energy
- Consider non-monetary factors:
  - Resilience
  - Environmental stewardship
  - Local economic activity

Rethink Affordability of Resource Recovery
• Wastewater is a re-N-E-W-able resource
• Resource Recovery can be the norm in the future
• Plan Now for Resource Recovery
• Public Awareness and Education is Key

Call me WWTP WRNF

Murali.Erat@freese.com | (832) 456-4709
WRRF of the Future
• Reduce net energy consumed per unit of water treated

• Use of energy efficient technologies/processes: fine bubble diffuser, high efficiency blowers etc.

• Energy auditing of facility

• Energy reduction goals

Energy Breakdown at WRRFs


Reduce Energy Consumption