Engaging Innovative Thinking to Drive Customer Value

Sustainability for the Next 100 Years
Agenda

- Creating an Innovation Program
- Using WRF 4642
- Ongoing Pilot Projects
  - Leak Detection
  - EBPR
  - PAA
  - Other Technologies
- Other Research Partners
Washington Suburban Sanitary Commission (WSSC)

Provides water and wastewater services to Montgomery and Prince Georges Counties in Maryland

- 100 years of service
- 1.8 million residents
- 460K accounts
- 1000 SqMile service area
- 2 Water Filtration Plants
- 6 Water Resource Recovery Facilities
- 5,800 miles of fresh water pipeline
- 5,700 miles of sewer pipeline
Vision

• Create a New Research program in 2015
  • Dedicate a position to research (specialist)
  • Work with Universities on specific projects
  • Leverage relationships with WRF, WEF, consultants, vendors to find new products and ideas

• At first, we looked for innovative technologies
  • Isle Utilities’ TAG meetings
  • LIFT Link
  • WEFTEC
  • ACE

• Then we stumbled onto WRF 4642
  • Now we had a framework to guide us!
WRF 4642 Utility Innovation Framework

**Results-oriented.** Tangible and intangible improvement aligned with leadership and organizational philosophy.

**Ecosystem-oriented.** Environment encouraging growth and maturation of ideas.

**People-oriented.** Ideators, mentors, adopters leading initiation and application of innovation.
Focus of the Innovation Program

- Reduce operating expenses, improve sustainability (i.e., resiliency, efficiency and quality), and generate revenue
- Inspire Employee Engagement! Better leverage the creativity and problem-solving abilities demonstrated by our staff
- Improve Infrastructure! Targets improvements to:
  - Water Networks
  - Sewer Networks
  - Water Plants
  - Resource Recovery Plants
Focus = Create Standard Procedure (SP)

2. Define roles and responsibilities
3. Create Innovation and Research Council
4. Set budget and staffing
5. Layout evaluation process
6. Create awards available to staff
7. Get approval from Commissioners
Develop and Evaluation – Resources

Staffing
- One position filled (Engineering Research Specialist)
- Converted to Principal Scientist to research focus
- Use engineering staff as expert evaluators
- Used existing consulting contracts for support

Budget
- Created budget category for Innovation
- Reallocated existing budget from Infrastructure Support to Innovation
- Started at $200K, now up to $450K

Tools
- Used existing software to create a business process to capture and evaluate ideas
Engagement – Changing the Culture

- Engage Employees – Innovation Hub
- Reach – Hold Workshops
- Communicate – Create Awareness with Internal Marketing
- Evolve – Develop Long Term Strategy
Engage – Innovation Hub

- Online tool developed through e-Builder for employees to submit new and innovative ideas.

- Process provides:
  - Idea Tracking
  - Expert & End-User Evaluation
  - Pilot or Lab Testing
  - Implementation Support

- Selection Basis:
  - Specific Evaluation Criteria
  - Level of Impact
  - Best Chance of Success
Reach – Get Participation

• Held 13 brainstorming workshops at our facilities
• Took ideas from workshops and created staff innovation teams to flush out ideas and do follow on research and testing
• Created the Innovation Insiders focus group!
Reach – Innovation Workshops

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Communicate – Create Awareness

• Developed communication plan for Innovation
• Created internal web page
• Included Innovation on Splash!
• Emails to management
• Attending Division Management staff meetings
• Emails to employees to advertise the program
• Developed and advertised the brainstorming workshops
Evolve – Develop Long Term Strategy

- Lead PI in WRF project 4907 to create tools for developing an Innovation Program
- Completed an engagement survey to employees to benchmark current state of Innovation
- Held workshops with senior management to define long term goals
- Developing a 5 and 10 year plan for Innovation and Research
Ongoing Pilot Projects

- Leak Detection
  - Acoustic
  - Satellite
- Enhanced Biological Phosphorus Removal
  - Seneca Plant
  - Parkway Plant
- Peracetic Acid Disinfection
  - Parkway Plant
Leak Detection Pilots
Minimizing Non Revenue Water Loss
540 POI and Simulated Leaks
Bethesda
FCS Additional Data

Leak Correlation between v45 (4325 Rosedale Ave, Bethesda, MD 20814, USA) and v41 (4518-4598 Maple Ave, Bethesda, MD 20814, USA).

Confidence: 90.7%

Band Pass Filter Low: 0 Hz, High: 500 Hz
Utilis Satellite Leak Detection Pilot in Bethesda

- 100 POIs in ~450 miles of pipe

Hydromax leak detection crew:
- 4 days
- 2-person crew
- Average POIs investigated per day: 5
- Averaged Leaks found per day: 2
- Leaks found ranged from small drip leaks from meters to large flowrates.

Training of WSSC leak crew took place Aug 7th – 9th
- Collecting similar stats as shown above for Hydromax to confirm WSSC can get the same success rate.
Utilis Pilot

- Compare WSSC FY16 stats to those from Hydromax to compare improved efficiency

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<tr>
<td>Individuals</td>
<td>6</td>
<td>2*</td>
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<tr>
<td>Manhours</td>
<td>2037</td>
<td>64</td>
</tr>
<tr>
<td>Leaks Located</td>
<td>32</td>
<td>8**</td>
</tr>
<tr>
<td>Manhours/Leak</td>
<td>64</td>
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* 2 Hydromax leak detection crew– WSSC did assist with locating listening points
** Includes 3 suspected leaks we have not tried to confirm yet.
Leak Detection Pilot – Next Steps

- Finish Utilis, Echologics, Syrinix Pilots

- Scan for other leak detection technology options and preliminary business case.

- Complete final report leak detection by end of calendar year 2018.
Resource Recovery: Enhanced Biological Phosphorus Removal
Enhanced Biological Phosphorus Removal (EBPR) Study Seneca

Benefits:

- Reduce alum chemical cost (<$800K/yr);
- Reduce solids hauling cost;
- Enhanced sustainability; potential for resource recovery (reduce P in biosolids).
- Potentially improve dewaterability/digestibility/biogas production.
EBPR Study Seneca

- Fermentation zone (no mixing) at beginning of the train (yellow box)
- Preliminary Testing
  - ~45% drop in alum use (~$115K/yr for Seneca).
  - More stable alum dosing.
EBPR Study Parkway

- Pilot testing of sidestream EBPR at full-scale for Parkway – Target mid-2019
Resource Recovery

Parkway Peracetic Acid Disinfection
Peracetic Acid Disinfection – Pilot

- MDE meeting 6/4
- Pipe Reactor Pilot test 7/16/2018 thru 8/3/2018
- 0.5–2.5 mg/L PAA dosed
Peracetic Acid (PAA) Disinfection: Benefits

- “Organic” chemical
  - Does not persist in environment. Lower toxicity to aquatic life.
  - Breaks down to acetic acid, CO$_2$, H$_2$O.
- More powerful oxidant than chlorine
- Does not form chlorinated DBPs
- No need for dechlorinating agent
- Much less maintenance
- Longer shelf-life (9–12 months)
- PAA price more stable than hypochlorite+bisulfite; PAA price continues to drop (new production facilities)
Other Technology Challenges

- Pressure Transient Monitoring
- Primus Line
- Mueller HydroGuard
- Abyss
- Drones
Problem: High Pressure Trenchless Pipe Rehab
Impact: Water or Sewer pipe replacement where location makes work difficult
Status: Preliminary discussions with vendor
Technology Highlight: HydroGuard

- Problem: – Low Chlorine Residual
- Automated flushing systems improve water turnover and ensure quality of water delivery
- Automate sample collection and analysis
- Status: Two units installed
Technology Highlight: ABYSS SOLUTIONS

Problem: Pipe Condition Assessment
Impact: Can use AI to evaluate CCTV video and track changes over time
Status: Preliminary discussions with vendor
Technology Highlight: Drones

Problem: Assessing Remote Areas Quickly
Impact: Drones have the potential to help with activities like trunk walks, emergency leak investigations, routine monitoring, and water quality sampling
Status: Preliminary discussions with vendor
Other Research Partners

- Mid-Atlantic Innovation and Research Forum
  - Collaborate and pool resources
  - Partnership w/Water Research Foundation & area utilities
  - Last meeting at HRSD on December 14th

- VT Center for Applied Water Research and Innovation (CAWRI) – anaerobic digestion

- Rutgers University – Biofiltration with PhD student

- Penn State – Capstone Project
Questions and Answers