

# **NutrientSmart**

A proposed voluntary program to recognize nutrient reductions

April 10<sup>th</sup> & 11<sup>th</sup> 2019





### **Today's Goal**

# The goal of this webinar is to describe, gauge interest, and get feedback on the proposed NutrientSmart (NSmart) program





# NSmart Steering Committee Members

• Association of Clean Water Administrators (ACWA)

- Environmental Council of the States (ECOS)
- O Environmental Protection Agency (EPA)
- O Individual Utilities
- National Association of Clean Water Agencies (NACWA)

O States

- Water Environment Federation (WEF)
- The Water Research Foundation (WRF)



### **Steering Committee Comments**

"ACWA supports NSmart, an exciting new program for regulated utilities to receive recognition for innovative efforts in reducing nutrient loads. We are excited to be a part of this project because the NSmart recognition program will compliment many of the state nutrient reduction strategies being implemented across the nation."

Julia Anastasio, Esq. ACWA

"The Water Research Foundation (formerly the Water Environment & Reuse Foundation) is pleased to have been part of this voluntary program from its inception as it provides a good platform to recognize and showcase the exemplary leadership by water utilities in North America who proactively manage nutrient pollution and protect our watersheds, the public we serve, and the environment we cherish. Water utilities have helped fund various research and demonstration programs and implemented innovative practices for healthy and livable communities and they deserved to be recognized. The NSmart recognition program can also help inspire other communities."

Amit Pramanik, Ph.D. WRF



### **NSmart Objective**

NSmart is a proposed voluntary program recognizing nutrient reductions by water resource recovery facilities (WRRFs), and potentially industries and other entities in partnership with them, through educational outreach, technology, and innovative methods





# Why Reduce Nutrients?

• When in excess, nitrogen and phosphorus in aquatic environments may lead to harmful algal blooms (HABs), low dissolved oxygen, fish die-offs, etc.

• HABs and excess nutrients can have a negative impact on the:

Ecosystem

Economy

Human and animal health





### Who Can Participate?

NSmart will be initiated with water resource recovery facilities (WRRFs) seeking recognition for their efforts to reduce nutrient discharge. We would also like to make it available to other watershed entities and industries that partner with them but we need your input to do so.





### **NSmart Overview**

#### O Advocate

Participants working to establish outreach programs <u>AND/OR</u> reduce nutrients 30-70%

#### O Partner

> Participants have an outreach program in place <u>AND</u> are actively reducing nutrients (TN,TP or both)

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- Silver: 70-85% nutrient reduction
- Gold: 85-90% nutrient reduction
- Platinum: 90%+ nutrient reduction

#### O Innovator

> Participants have achieved Partner and have successfully implemented an innovation that reduced nutrient levels. Innovation falls into 2 categories:

- Treatment Technology
- Leadership in Nutrient Management





# Case Study – Silver Tier

#### O Manhattan, Kansas

- > 11 MGD Johannesburg BNR process installed 2012
- Average TN reduction 2015 to 2018 84%
  - Based on DMR data reported to the Kansas Department of Health and Environment
- Outreach
  - 2017 Annual Utilities Report

#### Excerpt from Manhattan, KS 2017 Utilities Report

#### Biological Nutrient Removal Process Keeps Waterways Healthy



The latest improvement to the Wastewater Treatment Plant provided the City with a highly effective and efficient system known as Biological Nutrient Removal (BNR). This process is used for the removal of harmful nutrient compounds found in Wastewater Treatment Plants, specifically nitrogen and phosphorus that come from human waste.

#### BNR effectively removes harmful compounds before they are discharged into surface or ground water.

It is especially important to the City of Manhattan to preserve and protect the environment. Consequences of not having a system like BNR can be seen in summer algae blooms found in some surface waters. These blooms can put our ecosystem in danger by killing fish, killing necessary flora and fauna, producing lower oxygen levels, and creating murky water that aquatic animals cannot survive in. Because conventional biological processes designed to meet secondary treatment effluent standards typically do not remove the total amount of nitrogen and phosphorus to the extent needed to protect receiving waters, wastewater treatment facilities are increasingly being required to implement processes that reduce effluent nutrient concentrations to safe levels.

This can be a challenge for wastewater treatment plants because it usually involves major process modifications to a plant, such as making a portion of the Aeration Basin anaerobic and/or anoxic, which reduces the aerobic volume and limits nitrification capacity.

The unfortunate impacts of this beneficial process include an increased mass of biosolids produced, which will require additional land application acreage. Accounting for increased acreage need is part of our ongoing Water and Wastewater plans project to prepare the City of Manhattan for the future.



## Case Study – Gold Tier

#### • Fairfield Co-Tussing Road WRF, Ohio

- 3.0 MGD Vertical Loop Reactor installed 2004
- Average TP reduction 89%
  - Based on DMR data reported to the Ohio EPA

#### Outreach

- Hosted various operator education meetings and tours
- Handout flyer for quick facts on WRF



Tussing Road Water Reclamation Facility Fairfield County, Ohio

A Wastewater Master Plan was completed in 2000 for

the Fairfield County's Tussing Road Water Reclama-

tion Facility (WRF) service area. This rapidly develop-

ing service area includes approximately 6,490 acres in

field County. As a result of this Plan, the Tussing Road

WRF underwent a major expansion and upgrade com-

The Vertical Loop Reactor (VLR) facility is designed to

hourly flow of 9.0 MGD. The WRF consists of an influ-

ent pumping station, mechanical influent screen, three

(3) VLR aeration basins, two (2) final settling tanks, a

waste sludge storage tank, thickened sludge storage

tank, sludge belt filter press facility, lime stabilization

facility, post aeration/UV disinfection, two blower

operators laboratory and control center,

and workshop area, and a utility room.

buildings, electrical building, and a 3300 square foot

control building. The control building contains offices,

lunch/conference room, maintenance vehicle garages

treat 3.0 million gallons per day (MGD) with a peak

Violet Township, which is located in northwest Fair-

pleted in 2004 at a cost of \$5.76 million.

**Project Description:** 

11050 Tussing Rd. Pickerington, Oh 43147

#### Process Description:

Raw wastewater enters the headworks via one onsite and three regional pumping stations. A hyrdodyne rotating channel screen removes rags, floatable solids, and other debris. The removed debris is compacted and dried by a shaftless screw conveyor with progressively spaced flights.

Screened wastewater is sent to three VLR aeration basins. Coarse bubble diffusers, in conjunction with rotating disk aerators, provide oxygen to remove organic pollutants and ammonia from the wastewater. Wastewater then flows to the final settling tanks where biological solids are settled out of the water. The solids are recycled to the VLR basins while the clarified water passes through the post aeration and UV disinfection channels. Excess waste solids are wasted to a sludge holding tank and decanted to reduce volume. The thickened waste sludge is pumped into a second storage tank prior to dewatering on a belt filter press. The sludge cake is mixed with lime for biological stabilization before disposal by land application.

The current facility is easily expandable by the addition of one (1) VLR basin, one (1) settling tank, and one (1) aerobic digester. The facility is expandable to an ultimate peak hour capacity of 12.0 MGD.

#### Fairfield County, Ohio Board of Commissioners

Mike Kiger Steve Davis David Levacy

Fairfield County Utilities Department Tony Vogel, PE, Director Donald S. Rector, PE, Deputy Director

Wastewater Division Representatives

Jason Conrad, Chief Wastewater Operator Steve Russell, Class I Operator Ross Davis, Class I Operator Kyle O'Hare, Class I Operator Mike Burnworth, OIT

Laboratory Director

Diana Liston

Design and Construction Engineer ARCADIS FPS, Inc. Akron, Ohio

Contractor

Shook, Inc. Dayton, Ohio

Any major wastewater facility improvements project requires hard work and commitment from all levels of local and state governments. Great appreciation is noted to those who those who contributed to the upgrade and to those who cantinue to make it a success.



# Case Study – Platinum Tier

#### O Manhattan, Kansas

- > 11 MGD Johannesburg BNR process installed 2012
- Average TP reduction 2015 to 2018 95%
  - Based on DMR data reported to the Kansas Department of Health and Environment

### Outreach

2017 Annual Utilities Report

#### Excerpt from Manhattan, KS 2017 Utilities Report

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# Advocate/Partner Qualifying Requirements



#### 1. Outreach

- List what your facility has done in the past 3 years or plans to do, as a whole for nutrient reductions
- Partner level needs to have one completed item
- > Possible outreach examples:
  - > Website, flyers, community events, bill stuffs, social media, TV commercial, radio ad, etc.

#### 2. Nutrient Data

- Participants must include 12 consecutive months of influent and effluent data
  - Influent collection is at the facility's discretion and in accordance with their permit
  - Influent collection and analysis must be via an approved method listed in 40 CFR part 136
  - Effluent data will be monitored through the discharge monitoring report
- > Applications for Nutrient reduction recognition can be TN, TP, or both
- > Data reports will determine which Level and Tier the participant qualifies for





# **Innovator Qualifying Requirements**

O Current Partner status (Silver, Gold, or Platinum)

- Innovation categories:
  - Treatment Technology
  - Leadership in Nutrient Management
- Innovation categories are sub-divided into classes based on average design flow rate of Partner facility
  - > < 1 million gallons per day
  - > 1-10 million gallons per day
  - > > 10 million gallons per day





# **Innovation: Treatment Technology**

 Treatment Technology innovations demonstrate a significant advancement in nutrient removal and/or recovery over existing technologies or processes including nutrient management projects resulting in:

- Reductions in capital costs
- Reductions in operation and maintenance costs
- Reductions in volume/footprint
- > Innovative recovery of water, energy, or nutrients





# **Innovation: Treatment Technology**

#### • Example topic areas:

- Advancement in treatment and recovery:
  - Carbon diversion with nutrient removal, granular sludge nutrient removal applications, nutrient recovery, mainstream deammonification, low dissolved oxygen high performance nutrient treatment
- Significant improvements in performance with existing technologies
  - Example: trickling filter nitrogen removal to significantly lower discharge levels than typical, low level (below 0.5 mg/1 TP) biological phosphorus removal with no chemicals
- Other novel biological treatment and/or recovery processes
- Water resource recovery facility that was the leader in implementing an innovative, emerging technology at full scale that has significantly improved performance
- Innovative projects with multiple benefits
  - Examples: nutrient removal through water reuse/water supply augmentation or other benefits such as reducing salt water intrusion into aquifers; nutrient source separation with or without extractive nutrient recovery, etc.
- Advanced lagoon retrofits for nutrient removal with significant improved performance in warm or 15 cold climates



## **Innovation: Leadership in Nutrient Management**

- Leadership in Nutrient Management innovations are designed to encompass a broad range of topics
- Facility makes case for why their innovation deserves recognition
- Some possible projects that would fall under this catch all category include:
  - >Robust utility research program, mentoring and sharing knowledge with other utilities
  - Community outreach
  - Coupling green infrastructure, watershed activities, and storm water with nutrient reduction
  - Innovative technology testing or demonstration



# Case Study – Innovation: Leadership in Nutrient Management

• Hampton Roads Sanitation District, Virginia

- > A national leader in nutrient reduction research
- Evaluated multiple cutting edge deammonification sidestream treatment processes at their facilities
- Demonstration of leadership in nutrient management
  - Shared operations knowledge with others via publication in WE&T
  - Klaus, S., Edgerton, A., and Bott, C. (2017, May). How to operate an annamox process: Sidestream deammonification: Recommendations and lessons learned. WE&T, 29(5), 28-33.
    Excerpt from WE&T article



# How to operate an anammox process

Sidestream deammonification: Recommendations and lessons learned

ephanie Klaus, Andrea Edgerton, and Charles Bott

Selection dearmonification is an emerging treatment indestruants of wastivative treatment. Dearmonification is attractive bocause of docreased aention energy quinements, no required esteral action, and docreased aolds doctors over traditional initiation of the selection over placetons in the Marpton Roads Sanitation District (MRSD) in grive argenerated the first two in North America. Experiences at these facilities have led to several operational legiths that can be transformed to other tacilities considering namonification. Investigations and operators determined that the oceases could march full capacity 31 of month after seeding. They also found great value in using online sensors (reinforced by grab samples) to help ensure boundary conditions during startup. Robust control systems maintain the conditions during long-term operation with minimal operator input.

#### What is deammonification?

Dearmonification is a two-step process that continues partial nitritation and nancehics ammonia oxidation (nancmov), In the linst step, aerobics ammonia oxidation (nancmov), In the linst step, aerobics ammonia oxidation (nancmov) and tep, nancehics ammonia oxidating bacteria (name) over the remaining ammonia and the nitrite to notrogen gas and a small amount of nitrate under anoics conditions.



### NSmart Advocate/Partner Application

#### General overview:

The application asks for enough information to evaluate the application, but does not create a burden for those applying or reviewing it.

#### • Advocate/Partner Level:

- Complete NSmart application
- Submit supporting documents
  - Proof of communications plan
  - Current permit(s) about nutrients
  - Most recent DMR
  - Influent data (12-24 consecutive months)
  - Trend of reduction levels in last 3-5 years (if available)
  - Raw data (supplemental)
- Due once a year, date TBD
- Partner status is for 3 years
- Must renew Partner recognition the year before expiration to ensure active status in program



# **NSmart Innovator Application**

#### O Innovator Level:

- >Must have an active NSmart Partner application on file
- Complete NSmart Innovator application
- >Submit supporting documents for Innovator category:
  - Treatment Technology
  - Leadership in Nutrient Management

> Applications judged amongst peers based on average design flow rate

(i.e., <1 MGD, 1-10 MGD and >10 MGD)





# **NSmart Innovator Application Requirements**

#### • Supporting document requirements:

- > Data submitted can be in any form (i.e., graphs, tables, charts, etc.)
- > Application materials will be considered public information
- Applications that do not follow the guidelines may not be reviewed
- > Due once per year on the determined date
- > Notified of application status in about 3-4 months after submitting application





### Innovator: Treatment Technology

### • Requirements:

- $\succ$  In 1,500 words or less describe the innovation
- > Demonstrate the facility's percent of nutrient reduction
- > In 1,000 words or less demonstrate the environmental impact
  - Those applications that show demonstrated, measured impacts (e.g., reduced benthic algae, improved aquatic indices, reduced suspended algae, improved instream DO or pH profiles, additional nutrient load reduction achieved, etc.) will receive enhanced consideration.
- Demonstrate the innovation's longevity (additional tabular or graphic data) supporting the innovation may be included up to a maximum of 5 pages (and as part of the Innovator summary discussion application maximum)



# **Innovator: Leadership in Nutrient Management**

### • Requirements:

 $\succ$  In 1,500 words or less describe the innovation

#### Provide visual documentation of nutrient reduction activity

 Possible examples: news report, pictures, screen shot of website hits/likes, etc.





# **Innovator Application Evaluation Process**

Treatment Technology	Leadership in Nutrient Management
50 pts: Describe the innovative technology (give examples – e.g. new technology; energy reduction; energy recovery, nutrient recovery; water reuse; etc.	35 pts: Transferability- how easy would the innovation be to replicate or apply to another water resource recovery facility?
25 pts: Percent of nutrients reduced	30 pts: Percent of nutrients reduced
15 pts: Evaluation of the ancillary environmental impact (could be any or all the following: reduced GHG, reduced footprint, etc.)	30 pts: Scope of impact – what was the innovation?
10 pts: Evaluation of the time, operation, length of innovation longevity, performance and (must include minimum 12 consecutive months of data (can submit up to 3 years) to support case)	5pts: Provide outside documentation of the innovation (possible examples: news report, pictures, website hits/likes, third party independent verification, etc.)
Total Points: 100	Total Points: 100



### **Innovator Selection Process**

- Innovation applications are reviewed by a panel
- Ideally one representative from each of the following sponsoring organizations will serve on the panel (Minimum of 3 panel members, in total):
  - > ACWA
  - EPA HQs and Regional Offices
  - NACWA
  - > WEF
  - > WRF
  - Recognized innovators from the previous year will also be invited to serve on the panel.

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Treatment Technology and Leadership in Nutrient Management innovations will be reviewed by same panel



### **Innovator Selection Process**

- Panel members must include a brief write up of a few sentences explaining why they gave the scores they did for each section in the application.
  - Panel members will identify their top two choices
  - Panel votes will be tallied
- The 2 projects from each category with the most votes will be given to the EPA for consideration of an innovator award
  - Should there be a tie for projects with the most votes all will be sent to next round. No other projects will be considered.
  - Should there be one project with the most votes and a tie for projects with the second most votes all projects, with most and second most votes, will be sent to nextround.
- Office of Enforcement and Compliance Assurance (OECA) will review finalists before the EPA selects an innovator to be recognized
- Up to 1 Innovator award will be given in each category (unless there's a tie)
- Facility can apply the following year if not selected for an Innovation award in current year
- If recognized, facilities will be invited to serve on the Innovation panel. Should they serve, they will not be allowed to submit a new innovation while on the panel



# **NSmart Recognition**

#### O Advocate

- > Letter and certificate
- > Once qualified, participants do not need to renew

#### O Partner

- Letter and tier colored plaque (i.e., silver, gold, or platinum)
- Use of NSmart program identifier
- Recognition lasts for 3 years can renew or apply for another Level/Tier

#### O Innovator

- Award ceremony at peer attended conference
- > One time recognition can apply for multiple awards in both innovation categories





### **Discussion and Feedback**

• Would your entity want to participate in NSmart? Why/Why not?

- O How do we include non-traditional, non-regulatory, and watershed approaches used by WRRFs and their partners in the categories and tiers so that equivalent effort/reductions to the loading reductions of WRRFs on their own are recognized?
  - Have two Partner Categories?
    - "WRRF-Technology Partner" using the existing proposed %reduction requirements and
    - O"WRRF-Watershed Partner" with different but equivalent requirements

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- What would "different but equivalent" be? How would it be measured?
- What would you change about the proposed program?

• Comments and questions



### THANK YOU FOR ATTENDING!

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