# Barriers to Using Decentralized Wastewater For Community Solutions: 2007 to 2020

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# Why Should We Consider Decentralized Wastewater Systems?

- Uses soils to treat and disperse water back into environment;
- Can provide similar or better treatment as direct discharge systems;
- Can be cost effective by saving piping wastewater distances;
- Scalable/phasing flexibility;
- Frees up land uses and facilitates economic growth.



20,000 GPD Community System in Recreational Field, Warren, Vermont

#### Path to Wastewater Solutions for Villages

TYPICAL ENGINEERING STUDIES

· Discuss with community and

#### **Pre-Engineering Feasibility Study Preliminary Engineering** Other Tasks -GOAL Tasks Report (PER) **Depending on Proposal** Help for a local wastewater Hire an engineering firm Engineer completes a PER Additional work may be steering committee **Determine existing** if project will involve public necessary before proceeding Wastewater What do you want? conditions: funds for construction to final design · Identify community vision for Review work to date project Report on work so far: Secure land future of village Conduct soil tests and other Existing conditions · Legal agreements with ready for Survey businesses & residents site investigations (obtain Need for project landowners, land trusts and on plans for future archeological review) Alternatives considered other entities bond vote What do you need? Conduct environmental **Recommend a wastewater** Preliminary purchase and sale Survey locations and status of review (or drinking water) · Zoning and other land use **Identify alternative** existing wells and septic permitting issues project: final design systems wastewater solutions Preliminary design Secure funding Identify permitting and Propose 3 or more Coordinate with business and Project schedule enforcement concerns alternatives housing projects that need Permit requirements including archeological **Evaluate alternatives** Sustainability wastewater Test wells to determine if · Identify pros and cons of Financing Income surveys to qualify for . there is contamination each alternative **USDA-RD** funds What solutions are Develop cost estimates Apply for public funds possible? Identify finance strategies Engage public in preparation · GIS analysis of soils and and possible fee structures for bond vote environmental constraints Identify long term Set up a local loan program · Preliminary soil tests management structures **Decide on system** · Investigate available management technologies · Who will be responsible for long How to Proceed? term system management? Define a scope of services

#### How will fees be structured and collected?

construction

U.S. EPA Funded Study Via the Water Research Foundation 2004-2007

- Led by Stone Environmental Inc. <u>http://ndwrcdp.werf.org/research\_project\_04-DEC-2.asp</u>
- Summarizes perceptions of industry representatives to identify
  - Barriers to using decentralized wastewater solutions and
  - Opportunities for overcoming the barriers



#### Major Categories of Barriers

- Consulting engineer's financial reward for using centralized wastewater treatment systems
- Engineer's lack of knowledge of decentralized systems
- An unfavorable regulatory system for decentralized systems
- Lack of systems thinking applied to wastewater issues

### **Barriers: Funding**

- Engineering contracts are higher for larger scaled projects
- Engineers are used to sewer-type projects with increased design and oversight fees vs. smaller scaled specs and limited inspections
- Funding programs like the Clean Water State Revolving Fund (SRF) are designed for large sewer projects
  - Priority point system categories
  - Federal and State limitations for qualified projects
  - Additional Federal paperwork/studies

#### **Recommended Actions for Improving Funding**

SRF - expand eligibilities to allow decentralized solutions

- Federal and state statutes changed to allow use
- Priority point system ranking changes for better competition of funds
- Expand eligibility to include individual upgrades
- USDA Rural Development
  - Better priority ranking system
  - Cost-effectiveness
- Incorporate integrated water resource management, public health and environmental risks to ranking factors

#### Funding: 2020 Snapshot

- CWSRF was expanded in 2008 ARRA infrastructure efforts
- CIDWT/Univ. of TN: Projecting Costs of Decentralized Wastewater Management Options, 2010
- Environmental Financial Advisory Board report titled: "Funding Strategies for Decentralized Wastewater Systems Nov. 2017"

### Funding: 2020 Snapshot

New Water Infrastructure and Resiliency Finance Center

- https://www.epa.gov/waterfinancecenter
- Includes database of local funding contacts
- And a new septic system basics training module for homeowners
- New case studies
- Draft document "Getting to Yes" using CWSRF and other funding sources

The Center's Strategic Goals



### Barriers: Education

- Decentralized designs not a part of engineering course curriculums
- Newer decentralized technologies and techniques may not have a proven track record, limited studies
- Engineer's soil and groundwater training may not be applicable to soil-based wastewater treatment and dispersal systems



### **Recommended Actions for Improving Engineer's Education**

- Increase Curriculum Topics to Include Decentralized System Design
- Increase Funding for University Research of Decentralized Systems
- Increase Data Sharing on Decentralized System Performance
- Apply Reliability and Costing Tools in an Asset Management Framework

### Education: 2020 Snapshot

- University-Sponsored Regional Onsite Wastewater Training Centers
- Universities including decentralized curriculum
- Consortium of Institutes for Decentralized Wastewater Treatment (CIDWT) Installer training modules
- NAWT, NOWRA, NEHA

#### Education: 2020 Snapshot Continued

The Water Research Foundation (waterrf.org)

**Research Projects and Webinars** 

- 2019 Potable Reuse, CECs, PFAs, Phosphorus
- 2018 LIFT Technology Webinar Series
- 2016 Onsite Non-Potable Water Programs
- 2010 When to Consider Distributed Systems in Urban and Suburban Context

THE Water Research FOUNDATION

#### Filter Topics

- + Treatment (60)
- + Reuse (27)
- + Utility Management (22)
- + Resource Recovery (19)
- + Risk Assessment (19)
- + Water Quality (19)
- + Advanced Treatment (17)



#### 1 - 20 of 186 Results

#### Project #4622

#### Understanding the Source an Polymer-Derived Nitrosamin Precursors

#### Education: 2020 Snapshot...continued

- Examples, Text Books And Guides
  - Engineering:
    - Soil-based Wastewater Treatment (Jose A. Amador and George W. Loomis, 2018)
    - Decentralized Water Reclamation Engineering: A Curriculum Workbook (Robert L. Siegrist, 2017)
  - UMN: Small Community Wastewater Solutions, H2O&M, Community Septic System Owner's Guide
- EPA's Efforts: Listening Sessions, developing plan of actions

#### Barriers: Complex Regulatory System

- Regulations may be:
  - Too lax
  - ► Too inflexible
  - ► Too prescriptive
  - Decentralized regulatory jurisdictions at state, county and local boards of health

No centralized approval process for new technologies/techniques that is universally accepted



### **Recommended Actions for Improving The Regulatory Climate**



- Achieve greater uniformity in decentralized technologies
  - Model Regulations
  - Decentralized Wastewater Glossary
- Improve data sharing
  - Regulators have high-quality permit, maintenance and monitoring tools
  - Work on how regulatory framework can facilitate use

### Regulations: 2020 Snapshot

- Decentralized Glossary published
- No major changes to complex regulatory scheme
- SORA listserv important communications bridge amongst regulators
- EPA/Chesapeake Bay watershed nutrient data sharing agreement
  - Use of proprietary and government data management programs

#### Barriers: Systems Engineering

- Consulting engineers are not required to consider decentralized solutions when conducting alternatives analyses
- Unintended consequences of siloed regulatory programs
- Lack of information on assessing needs, life-cycle costing, watershed impacts



### Recommended Actions for Improving Use of Systems Engineering



- Encourage communities and utilities to use integrated water resources approaches
- Train engineers in broad systems thinking

#### Systems Engineering: 2020 Snapshot

- Network Analysis
- Integrated Water
  Resources Project
  (Burlington, Vermont)



#### **Network Analysis**

A tool to identify existing community network connections, key local features, and ways to enhance network functioning



#### **Network Analysis Overview**



- Two main network features:
  - Nodes (Circles)
  - Edges (Links)
- Insights:
  - Spreading (resources, disease, ideas, etc.)
  - Robustness and fragility
  - Optimization

#### **Cultural Resources Network**

Andrea Wright - Project Delivery Bureau-Enviro Eng. Paul Bruhn - PTV Michael Descrochers - DPS-VDFS Luce Hillman - UVM-Facilities Karen Freeman - VT-HCB

Deb Sachs - Netzero VT

John Crock - UVM-Anthropology Kathy B

Kathy Beyer - Housing Vermont

Judith Ehrlich - VTrans-Historic Preservation

Karl Goetze - Efficiency Vermont

#### Bob McCullough - WVM-Historic Preservation

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Donna Rizzo UVM-CEE

**Bob Neeld - Engineering Ventures** 

Asim Zia - UVM-CDAD

Doug Porter -UVM-CEE

Carolyn Carlson VTrans-Bridges

Mandar Dewoolkar - UVM-CEE

#### Integrated Water Quality Planning: Municipal Wastewater and Stormwater



- Examine all of these obligations as a whole
- Identify the community's relative priorities for addressing human health and water quality improvements (and what tools will used preferentially, such as green infrastructure), and then
- Address these priorities through appropriate sequencing and scheduling of work based on implementing the projects with the highest cost benefit (including non-water quality related benefits) first.



#### Systems Engineering: 2020 Snapshot Continued

- Interdisciplinary Engineering
- Sustainable Community Development
- Ecological Design
- WRF & WEF LIFT Intelligent Water Systems Challenge



#### Conclusions: More Work to Do!

- Professional Organization Support/Training Opportunities
- Expanded financing opportunities for onsite and offsite community solutions
- EPA MOU Partner Work
- EPA Decentralized Team Wants to Hear from YOU!

## Questions?

