Welcome

Conservation Applied Research & Development (CARD) Webinar

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A Cohort Approach to Wastewater Treatment Energy Efficiency
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- Attendees in listen-only mode
- Type questions into Q&A box
- Send to “All Panelists”
- Questions addressed at end
- Webinar recorded & archived
- Slide set will also be available

Additional WebEx Controls at Bottom of Your Screen

Q&A on right side of WebEx panel

Send Questions to All Panelists

Type Questions in Q&A box
• Purpose to help Minnesota utilities achieve 1.5% energy savings goal by:
  • *Identifying new technologies or strategies to maximize energy savings;*
  • *Improving effectiveness of energy conservation programs;*
  • *Documenting CO₂ reductions from energy conservation programs.*

  *Minnesota Statutes §216B.241, Subd. 1e*

• Utility may reach its energy savings goal
  • Directly through its Conservation Improvement Program (CIP)
  • Indirectly through energy codes, appliance standards, behavior, and other market transformation programs
CARD RFP Spending by Sector thru June 2018 (FY2018)

- 9 Funding Cycles
- Over 420 proposals
- 107 projects funded
- Almost $24.5 million in research
Minnesota Technical Assistance Program (MnTAP)

- Work with industrial businesses on process efficiency projects.
- Technical Assistance, Intern Program, Special Projects
Center for Energy and Environment (CEE)

- Promote energy efficiency to strengthen the economy while improving the environment
- Provide practical energy solutions for homes, businesses, and communities
- Data-driven and community-engaged
Efficient MN Wastewater Plants are Critical

Critical Infrastructure
• Public health
• Economic development

600 MN communities with wastewater treatment

200 MN communities with mechanical facilities
WWTPs are Complex Systems to Clean Water
Why focus on WWTP Energy Efficiency?

According to the U.S. EPA, WWTPs account for:

- **2%** of ALL electric energy use in U.S.
- **25-40%** of WWTP operating budget

**Investment in energy efficiency in WWTPs**

- Extends useful life of vital infrastructure
- Reduces cost burden for communities
- Contributes to state and local economies
Energy Opportunities in Small + Mid-sized WWTPs

Project Results (kWh)

- Implemented
- Planned
- Recommended

kWh

0 1,000,000 2,000,000 3,000,000 4,000,000 5,000,000 6,000,000
Barriers for Small & Mid-sized WWTPs Energy Efficiency

- **Barriers**
  - Limited knowledge on energy use
  - Perception efficiency requires capital
  - Tailored solutions for customized plants
  - Risk of not meeting permit requirements

- **Technical assistance overcame barriers**

- **Project to explore CIP options**
Solution: Cohort Training Program

Share best practices between facilities

• Savings with many plants at once
• Empower operators
• Network to share ideas and discuss optimization
Assessing the Target Market

Plant Counts and Energy Use by Size

107 facilities
127 million kWh electricity

Mechanical Plant Flow Range

Series1
Series4

Annual Energy (kWh)
Count (#)
Cohort Training Delivery and Logistics

- Four hour sessions
- Eight weeks between core modules
- Rotate training location
- Pre-work required
Module 1: Benchmarking, Footprinting, Energy

Foundation for energy efficiency

Electric Costs and ENERGY STAR (ESPM) Scores
MN Wastewater Treatment Plants with Similar Hydraulic/BOD Loads

<table>
<thead>
<tr>
<th>Hydraulic Flow Range for Plant Comparison</th>
<th>Annual Electric Cost at $0.10/kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.37-0.41 MGD</td>
<td>94</td>
</tr>
<tr>
<td>1.2-1.6 MGD</td>
<td>79</td>
</tr>
<tr>
<td>3.8-5 MGD</td>
<td>63</td>
</tr>
</tbody>
</table>

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Module 2: Secondary Aeration Efficiency

Identifying and implementing aeration blower savings

Aeration Energy Costs at DO Levels

Electrical cost ($/yr)

$0 $2,000 $4,000 $6,000 $8,000 $10,000 $12,000 $14,000 $16,000 $18,000

DO concentration

$12,000

1 2 3 4 5 6 7
Module 3: Aerobic Digester Efficiency

Identifying and implementing digester blower savings

• Current airflow
• Airflow needs
• Savings potential
• How to reduce airflow
Conference Calls

Project update call

• Project status

• Barriers

• Cohort will break barriers

Breaking barriers!
Module 4: Results and Continuous Improvement

• Share and celebrate results
  Implemented/Planned
  Savings/Impact
  Develop utility report

• Next steps

• Additional actions
  Pump systems
  UV disinfection
  Lighting and buildings

• Continuous improvement
Cohort Training Builds on Sector Culture

Support from MN Wastewater Groups

• Minnesota Rural Water Association (MRWA)

• Minnesota Wastewater Operators Association (MWOA)

• Minnesota Pollution Control Agency (MPCA)

*Training can count toward continuing education credits*
Cost Effectiveness

Assumptions
• Max Training Cost per Plant ($6,000)
• Cost Effective Program Rate ($0.02/kWh lifetime)
• Operational Lifetime (4 years)
• Target savings rate based on prior assessments (25%)

Cost Effective Facilities
• Minimum plant energy use (300,000 kWh/yr)
• Minimum cost effective plant size (0.3 MGD)
Literature review

- **Existing cohort WWTP efficiency programs**

- **Takeaways**
  WWTP cohort programs are relatively new
  No examples in the Midwest
  No examples across multiple utility territories
  NEEP best practices may be informative
Stakeholder interviews

- **Interviewees**
  Utilities, aggregators, WWTP operators, WWTP associations

- **Takeaways**
  Utilities want: opportunity for involvement; certainty on energy savings

  WWTP professionals noted: desire to leverage education requirements
Program Administration *within CIP framework*

Single-utility *or* aggregator CIP filing

Implementation by third-party organization

Coordination with utility CIP staff or account reps
Wide geographic spread
Rainbow of dots, with few clusters

Xcel Energy – 28 WWTPs
GRE – 25 WWTPs
MRES – 13 WWTPs
SMMPA – 13 WWTPs
Other w/ <10 – 29 WWTPs
Program Administration Considerations (pt. 2)
Statewide approach makes sense

*There is currently no statewide CIP program structure*

What’s to be gained?

• Energy use total for target-size WWTPs: 127,000,000 kWh
• 25% saving assumption = 31,750,000 kWh/yr to be gained

Ideally: utilities claim their part of those savings
Program Funding Options

• **Registration fee for WWTP operators**
  - Operators pay training provider/implementer
  - Rebated by utilities
  - Can be an accreditation fee

• **Paid upfront**
  - Entire or partial payment based on cost/savings estimates
  - To claim savings under CIP: utilities pay
  - Potential U.S. DOE or other funding coverage
Summary
• Target market for energy efficiency in MN WWTPs
  • 107 facilities
  • 32 million kWh opportunity

• Cohort based training program to capture opportunity
  • Active learning based
  • Efficiency options from site data
  • Cohort support drives implementation

Next Steps
• Traditional training options
  • Association continuing education
  • Education component for new operators

• Options for utility participation
  • Traditional utility based CIP
  • Consideration of state-wide program development
  • Support studies for select facilities
Questions?

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Send us your questions using WebEx Q&A box
CARD Project Resources

For Reports use CARD Search Quick Link

For Webinars use CARD Webinars & Videos Quick Link

For Other research documents use CARD Fact Sheets, Guidelines & Tools Quick Link

Webinar Recording & Final Report available in few weeks

R&D Web Page (https://mn.gov/commerce/industries/energy/utilities/cip/applied-research-development/)
Thanks for Participating!

Upcoming CARD Webinar:
- No CARD webinars currently scheduled

Commerce Division of Energy Resources e-mail list sign-up

If you have questions or feedback on the CARD program contact:
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