Energy Sustainability

Experience at the Downers Grove Sanitary District

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Agenda

- Background

- Improved Efficiency / Energy Reduction

- Energy Production / Use Of Resources
Downers Grove Sanitary District

- 11/22 MGD average/peak full treatment capacity
- Primary clarification
- Single-stage nitrification
- Tertiary sand filtration
- *Oversized* anaerobic digestion
- Sludge dewatering and aging
- Excess flow primary and disinfection to 110 MGD total
The Management Challenge

- Energy: 15% of operating budget
- Cost-effective reductions: good business practice / expected by rate payers
- Synergies
  - Staff skills
  - Automation/controls
  - Existing energy infrastructure
  - Available technologies
  - External funding
Energy Types and Needs

- Electricity
  - Pumping
  - Aeration
  - Other process

- Natural Gas
  - Heating - Building

- Digester Gas
  - Heating - Process
Historic Energy Use

Abandon Old CHP

Kwh / year

- bio-gas flared
- bio-gas used
- natural gas
- electricity
Model Program - Strass, Austria

TOTAL ENERGY USE

NET ZERO

TOTAL ENERGY PRODUCTION
Initial Focus: Energy Reduction/Efficiency

- Aeration System Improvements - 7 year payback on $1 million (after $250,000 grant)
- Pumping Station VFDs - 3 year payback on $50,000 (after $20,000 grant)
- Lighting Upgrades - 3 year payback on $25,000 (grant funding varies)
- HVAC
  - Desiccant Dehumidifier - 8 year payback on $100,000
  - Geothermal/Effluent Water Heat Pumps - 0 year payback (replacement program as old units fail - $5,000 per year)
  - Absorption Chiller - 7 year payback on $10,000

MORE TO COME
Energy Reduction Trend

Kwh / year

Aeration Improvements

- bio-gas flared
- bio-gas used
- natural gas
- electricity

Dehumidifier
Current Focus: Energy Production
Available Resource: Sludge

- Incineration - need to dewater first - net energy concerns
- Bio-fuel cell - very early stages of development
- Improved Gas Production
  - More feed stock (grease, food, etc)
  - Improved feed stock (WAS lysis)
  - Better digester mixing
Energy Generation Projects

- Goal: Produce sufficient energy to meet reduced energy demand
- FOG/Food Waste Receiving Station = Increased Biogas Production - ARRA funding
- Combined Heat and Power - $496,000 grant funding so far
  - Electricity Generation
  - Digester Heating
Energy Production and Use

Kwh / year

Grease Receiving

CHP #1

CHP #2

- bio-gas flared
- bio-gas used
- natural gas
- electricity
Matching the Model

- Efficiency Improvements
- CHP Projects
- Gas Production

Bar chart showing energy, dig gas used, and dig gas available over years from 2002 to 2019. The chart includes the following data points:

- Energy (kWh/year) for each year.
- Dig gas used.
- Dig gas available.
Conclusions

- Energy is a controllable expense
- Energy reduction technologies are compatible with wastewater O&M skill-sets
- Energy reduction is cost-effective
- Opportunities of all sizes are available
- Grant / other funding opportunities continue
Questions

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