Wastewater Treatment Impacts from AB 32 and Climate Change

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Orange County Sanitation District
5th Largest WWTP in USA

Reclamation Plant No. 1
Fountain Valley

Treatment Plant No. 2
Huntington Beach
Overview

Climate Change Regulations and Implementation

Wastewater Treatment and Greenhouse Gas Emissions

Practical Steps Forward
Climate Change Regulations and Implementation
Why is air first?
Greenhouse Gases can make the other climate change symptoms worse.
California Regulations

- 2006 California Global Warming Solutions Act (AB 32)
  - 1990 Greenhouse Gas (GHG) levels by 2020
  - 80% GHG levels by 2050

- California Environmental Quality Act (CEQA)
  - 10+ options to disclose GHG for construction projects

- Local Air Board
  - Several rules for CH4, CO, NOX, SOX, CO2
Early Action Items

- Large facility mandatory emissions reporting
- Low carbon fuel standard
- More restrictions on refrigerants
- Landfill methane capture
- Sulfur hexafluoride (SF6) reductions in non-electric sector
Early Action Items (continued)

- Reduce GHGs in consumer products
- Reduction of PFCs from semiconductor industry
- Other items aimed at energy efficiency and fuels
Wastewater Treatment and Greenhouse Gas Emissions
## Expected Direct GHG Emissions for WWTP Processes

<table>
<thead>
<tr>
<th>Category</th>
<th>Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong>Secondary</strong></td>
<td>CH4, from anaerobic treatment processes (i.e., lagoons)</td>
</tr>
<tr>
<td><strong>Advanced</strong></td>
<td>N2O, from NDN process</td>
</tr>
<tr>
<td><strong>Solids Handling</strong></td>
<td>CH4, from sludge handling such as digestion (may be considered <em>de minimus</em>) or from incomplete combustion of digester gas and emissions from offsite operations</td>
</tr>
<tr>
<td><strong>Effluent Discharge</strong></td>
<td>N2O, from denitrification of nitrogen species originating from wastewater effluent in receiving water</td>
</tr>
<tr>
<td>Category</td>
<td>Emissions (in MM tons of CO2 eq.)</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Domestic Wastewater Treatment Baseline</td>
<td>2.83</td>
</tr>
<tr>
<td>California State Total for 1990</td>
<td>427</td>
</tr>
<tr>
<td>2020 “Business as Usual”</td>
<td>600</td>
</tr>
</tbody>
</table>

**Source:** US EPA and Intergovernmental Panel on Climate Change (IPCC)
Potential GHG Emission Sources

Collections
- Pumping Station
  - Manhole
  - Headworks
    - Air Scrubber
    - Chemicals
  - Primary Treatment
  - Secondary Treatment
    - Solids Digestors
    - Air Scrubber
    - Engine Generators
    - Dewatering
    - Effluent

Treatment Plant
- Solids Reuse
- Solids Dewatering
- Digestors
Impact of AB 32 on Wastewater Agencies
Changes in Air and Water Temperature

- Impact air quality / odors
- Increase in sea water level and relocation of facilities
- Impact of wastewater quality
- Need to accommodate existing and new industry
- Need to adjust discharge permit and pollution control program
- Need to review effluent guidelines
- Need to adapt NPDES permit
Changes In Weather

- Impact of increase rainfalls
- Impact on wastewater operations
- Challenges in accommodating high flows and low flows
Engineering Challenges

- AB 32 require facility to be more energy efficient
- Need emission and reporting protocol for wastewater industry
- Must increase energy production
- Need funds to adapt to climate research
- Need funds to conduct research related to climate change
- Need better estimate of regional impacts
Practical Steps Forward
California Wastewater Climate Change Group (CWCCCG)

- over 40 POTWS
- Industries
- State Agencies
- National Agencies

Develop acceptable GHG emission protocols for POTWs
Develop Strategies for Future

- Work together to present a consistent message based on good science
- Identify agency approach for climate change
- Discuss other issues besides emissions
  - Reliability, protecting public health
  - Long-term sustainable operations
  - Mitigating risks to facilities / agencies
Immediate Climate Change Steps for POTWs

- Volatile rain period impacts (peak and dry periods)
- Increased power cost as power industry is regulated
- Expansion needs for septic systems (GHG and volatile rain failures)
- Emergency preparedness
- Design parameters sensitivities
Immediate Climate Change Steps for POTWs (continued)

- Equipment ranges (dry, peak)
- Process design parameters (higher BOD, NH4, TSS)
- Flood protection (rising seas)
- Future air quality regulations
- Future space considerations
- Lifecycle costs (land, power)
- Discuss with Stakeholders (elected & customers)
Other Issues for POTWs

- Limited control of sewers
- Public wants existing taxes to solve new problems
- POTWs could be considered a natural anthropogenic process
- We don’t have the option to go “out-of-business”
OCSD’s Research Efforts

- Emission controls technologies
- Deep well injection of biosolids (sludge)
- Characterizing influents (e.g., NH4 increases)
- Alternative treatment technologies with lower energy use or increased power production potential
- Add calculation of carbon footprint
Conclusions

- Climate change issues will effect the design and operation of POTWs
- Need to look at other risks outside normal risks
- Need to do sensitivities on life cycle costs that climate change could impact
- Need to calculate ecological footprint
Acknowledgements