Resource Recovery

A wealth awaits in our WRRFS

February 20, 2020
NYC Wastewater Resource Recovery

- 14 Wastewater Treatment Plants ranging in capacity from 39.9 MGD to 310 MGD dry weather capacity
- 6 Dewatering Facilities at our Treatment Plants
- 4 CSO Facilities
- 96 Pump Stations - Combined, Sanitary and Stormwater
- 497 Regulators; 152 Miles of Intercepting Sewers
- 14 Inner Harbor Vessels – 5 Sludge Vessels – and 1 Bio-solids Barge

<table>
<thead>
<tr>
<th>Area No.</th>
<th>Borough</th>
<th>Rated_cap MGD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manhattan</td>
<td>Wards Island 275</td>
</tr>
<tr>
<td></td>
<td></td>
<td>North River 170</td>
</tr>
<tr>
<td>2</td>
<td>Bronx</td>
<td>Hunts Point 200</td>
</tr>
<tr>
<td>3</td>
<td>Brooklyn</td>
<td>Newtown Creek 310</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>39th Ward 110</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Coney Island 60</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Red Hook 120</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Owls Head 80</td>
</tr>
<tr>
<td>8</td>
<td>Queens</td>
<td>Jamaica 100</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Bowery Bay 150</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Rockaway 45</td>
</tr>
<tr>
<td>11</td>
<td>Staten Island</td>
<td>Port Richmond 60</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>Oakwood Beach 40</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>Total 1805</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>Total 1805</td>
</tr>
</tbody>
</table>

LEGEND

1. WWTP
2. Service Area Boundary
Resource Extraction Points

1. Wastewater Influent
2. Primary Screening
3. Main Sewage Pump
4. Primary Settling
5. Aeration Tank
6. Final Settling
7. Secondary Sludge
8. Primary Sludge
9. Thickener
10. Anaerobic Digester
11. Biogas (CH4)
12. Sludge Storage and Dewatering
13. Clean Water
14. To Landfill
## What’s in biosolids??

<table>
<thead>
<tr>
<th>Heat Dried</th>
<th>Compost</th>
<th>Class A</th>
<th>Class B</th>
<th>Liquid</th>
</tr>
</thead>
<tbody>
<tr>
<td>WATER</td>
<td>5%</td>
<td>50%</td>
<td>75%</td>
<td>75%</td>
</tr>
</tbody>
</table>

### Also

<table>
<thead>
<tr>
<th>Also</th>
<th>about this much</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>5,000-10,000 Btu/d lb.</td>
</tr>
<tr>
<td>Organic matter</td>
<td>20-70% (dry)</td>
</tr>
<tr>
<td>N-P-K</td>
<td>4-3-0</td>
</tr>
<tr>
<td>Micronutrients</td>
<td>Ca, Fe, Cu, Zn</td>
</tr>
</tbody>
</table>

### Bio/Chem Characteristics

- **Binding Sites** - reducing bioavailability of Pb, As, etc.
- Inert sand, silt, grit, and synthetic particles
- Trace elements (mostly in compounds)
- Pathogenic micro-organisms
- Synthetic and natural organic chemical compounds (e.g. including polymers)

Data Courtesy NEBRA
Where do biosolids go?

Biosolids in the Field
Adding biosolids to soil offsets greenhouse gas emissions in 3 major ways:

1. some of the carbon added to soil stays there for a long time
2. Biosolids make plants grow bigger faster which means more plants can take more carbon out of the atmosphere via photosynthesis.
3. Using biosolids instead of synthetic fertilizer. Synthetic fertilizer takes a tremendous amount of fossil fuel to manufacture.
Highly Regulated Material

- Biosolids beneficial use is regulated by the Federal Government through the “503s” (40 CFR 503); and disposal through 40 CFR 258
- States have the authority to further regulate biosolids use and disposal
  - Regulations are often more restrictive than federal
  - Regulations are not harmonized geographically
  - Some states are biosolids friendly {PA} others are not as {NJ}
- The 503s set a baseline for treatment and classification
  - Class A (aka EQ) – highest level of treatment, least restricted use
  - Class B – some treatment, some restrictions on use
  - Unstabilized (unclassified) – "incomplete" processing at the WRRF (only capture and dewatering*) and cannot be directly reused. AKA "sludge"

* Some Plants manage sludge as a liquid
What is regulated by the 503 Rule

![Diagram showing regulated aspects of the 503 Rule]

Figure 1-1. What a Part 503 standard includes.
Land Application is great, but
Evolution of Solids Recovery

Sludge Disposal

Biosolids Beneficial Use

Bioenergy

Resource Recovery

1970

1993

2000

2005

2010

Figure ES-1: Our changing view of solids management
Resource Management and Recovery

Inputs
- Residential & Commercial Wastewater
- Industrial Wastewater
- Stormwater
- Food Waste

Processing Manufacturing
- Process Water Reuse
- ELECTRICITY CoGen & Di-Gas Reuse

Outputs Products
- CLEAN Water
- Fit-for-Purpose Water
- Biosolids Products
- Renewable Energy
- Next Generation Products
Food Waste Co-Digestion

- Newtown Creek Pilot Project 2016 – 2019
- Potential for synergy in the solids + energy nexus
Resources and References

- [www.nebiosolids.org](http://www.nebiosolids.org)
- [https://www.epa.gov/ghgemissions](https://www.epa.gov/ghgemissions)
- [https://www.epa.gov/lmop](https://www.epa.gov/lmop)
Jennifer McDonnell
Resource Recovery Program Manager
DEP Energy Office
jmcdonnell@dep.nyc.gov

www.nyc.gov/dep          facebook.com/nycwater   twitter.com/nycwater