Solid Waste Update

Kristy Smith, Bioreactor Manager
Landfill Overview

- Opened in 1997
- 31 acres filled
- 23 acres actively filling
- 54 acres
  (Approximately 11 football fields)
Landfill Overview

- Open 6 days/week and most holidays
- 1,000,000 pounds of waste goes into the landfill each day
- 92,000 pounds of recycling processed everyday
- 1.4 MegaWatts of Renewable Electricity generated everyday, powering 1100 homes
- So how does that relate to emissions?
Methane gas is produced as garbage decomposes
How does methane gas produce electricity?
Emissions Offset by Generator

Total CO2e (MT) Offset by Generator

- 2014: 3,607 MT
- 2015: 4,126 MT
- 2016: 3,334 MT
Generator Output

- During 2014 – 2016, the generator offset **11,067 metric tons (MT) of CO2 emissions.**

Carbon Equivalencies

- **2,338** passenger vehicles taken off road for one year
- OR
- Carbon absorbed by **10,475 acres** of U.S. forests in one year

* www.epa.gov/energy/greenhouse-gas-equivalencies-calculator
Total Carbon Equivalencies

11,067 (Generator Offsets) + 67,000 (Cumulative Carbon Credits) = 78,067 Metric Tons (CO2e)

That's like:

- 16,490 passenger vehicles taken off road for one year
- 8.8 million gallons of gasoline not consumed
- 8,244 homes’ energy use for one year
Terminology – what do you mean?

CO2e: Carbon dioxide equivalent, a standard unit for measuring carbon footprints. Expressed in metric tons (MT).

kilowatt-hour (KWh): A unit of measure for electricity

kBTU: one thousand British Thermal Units (BTU), a common unit of measuring thermal energy
Facilities Portfolio Overview

- **84** facilities controlled by Buncombe County

- Total Area – 1.71 million SF  
  (About 30 football fields!)

- 2016 Utility Cost - $1.87 million

- Average Utility Cost per SF - $1.10
2014 Energy Audit – Resolution #13-12-06

- Shaw Environmental and Infrastructure
  - Professional Engineering Team
    - 5 member team
    - 20+ years of experience
  - Strong Duke Energy relationship
    - Utility Incentive Total - $45,000

- ASHRAE level 3 Assessment – 10 Largest Buildings
  - (American Society of Heating Refrigeration and Air-Conditioning Engineers)
  - Energy Use Analysis
  - Walk-through Survey
  - Capital Measure Recommendations
CS1  Courthouse, Detention Center A, Detention Center B, 35 Woodfin, 40 Coxe, 200 College, 202 Haywood, Animal Shelter, 164 Erwin Hills Rd, 59 Woodfin Pl
Clint Shepherd, 1/4/2017

CS2  American Society of Heating, Refrigeration, and Air Conditioning Engineers
Clint Shepherd, 1/4/2017

CS3  Net Audit Cost - $66,000
Clint Shepherd, 1/4/2017

CS4  Resolution #13-12-06 - establishes a goal of 2% reduction annually until a final goal of 80% is achieved
Clint Shepherd, 1/5/2017
10 Largest Buildings

- Courthouse
- Detention Center
- Detention Addition
- Family Justice Center
- County Administration
- Sheriff Department
- Animal Shelter
- 911 Center
- Interchange Building
- Health & Human Services
Audit Results – What did they find?

Identified 26 Energy Cost Reduction Measures (ECRMs)

- Total Annual Energy Savings - $250,000 per year
- Total Implementation Cost - $2.9 Million
- Return on Investment (ROI) – 12 year (average)
Execution – What was the first step?

9 Measures

• Less than a 5 yr ROI
• 4% Carbon Emissions Reduction Projected (over 2 Yrs)
• Total Implementation Cost - $250,000
• Total Potential Energy Savings - $100,000 per year
## 9 Measures – at a glance

<table>
<thead>
<tr>
<th>ECRM</th>
<th>ECRM Name</th>
<th>% CO2e Reduction</th>
<th>Payback Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>De-lamp Fixtures</td>
<td>.13</td>
<td>2.5</td>
</tr>
<tr>
<td>5</td>
<td>Thermostat Programming</td>
<td>.77</td>
<td>1.5</td>
</tr>
<tr>
<td>6</td>
<td>Thermostat Additions</td>
<td>.81</td>
<td>3.8</td>
</tr>
<tr>
<td>8</td>
<td>Utilize outside air</td>
<td>.42</td>
<td>3.3</td>
</tr>
<tr>
<td>9</td>
<td>HVAC adjustments</td>
<td>1.06</td>
<td>1.0</td>
</tr>
<tr>
<td>12</td>
<td>Vending Machine Controls</td>
<td>.04</td>
<td>1.7</td>
</tr>
<tr>
<td>13</td>
<td>Computer Controls</td>
<td>.68</td>
<td>2.7</td>
</tr>
<tr>
<td>22</td>
<td>Efficient Clothes Washers</td>
<td>.03</td>
<td>3.0</td>
</tr>
<tr>
<td>26</td>
<td>Solar heating system tune-up</td>
<td>.02</td>
<td>2.0</td>
</tr>
</tbody>
</table>

**Total** 4% 2.5 Years
Challenges & Considerations— To Name a Few

• Standard maintenance practices
• Changing facility portfolio
• Efficient practices in new construction design
• Seasonal Fluctuations
• Maintaining the existing workplace environment
Energy Intensity – kBTU/sq. ft.

For Reference

**Energy Intensity**: measure of energy used for an area

**kBtu**: a standard unit used to measure energy

<table>
<thead>
<tr>
<th>Year</th>
<th>Energy Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>66.10</td>
</tr>
<tr>
<td>2013</td>
<td>65.86</td>
</tr>
<tr>
<td>2014</td>
<td>65.66</td>
</tr>
<tr>
<td>2015</td>
<td>65.03</td>
</tr>
<tr>
<td>2016</td>
<td>59.48</td>
</tr>
</tbody>
</table>
Utilities – Average Cost/SF

(Includes Electricity, Water, and Natural Gas)

<table>
<thead>
<tr>
<th>Year</th>
<th>Cost/SF</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>$1.21</td>
</tr>
<tr>
<td>2013</td>
<td>$1.22</td>
</tr>
<tr>
<td>2014</td>
<td>$1.21</td>
</tr>
<tr>
<td>2015</td>
<td>$1.20</td>
</tr>
<tr>
<td>2016</td>
<td>$1.10</td>
</tr>
</tbody>
</table>
Fleet Overview
Fleet Portfolio Overview
(FY 2017 Year-to-Date)

- Fleet Size – just over 450 vehicles
- Fuel Cost – about $550,000 this year
- Average Cost/Mile - $0.22
Fleet – Fuel Mileage

Average Miles per Gallon (MPG)

Medium Duty: 3.89, 3.77, 3.79, 3.73, 3.75
Heavy Duty: 76% Light Duty, 20% Medium Duty, 4% Heavy Duty

Total Active Fleet (by vehicle category)

Total fleet size: 459 units
Carbon Emissions Reduction

Tracking our reduction goal
Resolution & Baseline Approach

- **Resolution adopted** December, 2013 (Fiscal Year 2014)
- Resolution established goal of **2% annual reduction** in emissions
- To measure goal, emissions for Fiscal Year 2014 were set as the **baseline**.
- Reduction is for **combined** fleet and facility carbon emissions.
Facility & Fleet Carbon Emissions

Determining the Baseline
Facility & Fleet Carbon Emissions

Setting the Goal (2% Annual Reduction)

Future Emissions to be Below Line!

<table>
<thead>
<tr>
<th>Year</th>
<th>Facility Emissions</th>
<th>Fleet Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>16,000</td>
<td>2,000</td>
</tr>
<tr>
<td>2015</td>
<td>14,400</td>
<td>2,000</td>
</tr>
<tr>
<td>2016</td>
<td>12,960</td>
<td>2,000</td>
</tr>
<tr>
<td>2017</td>
<td>11,520</td>
<td>2,000</td>
</tr>
<tr>
<td>2018</td>
<td>10,080</td>
<td>2,000</td>
</tr>
</tbody>
</table>

Metric Tons CO2e
Facility & Fleet Carbon Emissions
FY 2015 vs. Goal

Reduction Goal

Fleet Emissions
Facility Emissions
Facility & Fleet Carbon Emissions
FY 2016 vs. Goal

Reduction Goal

<table>
<thead>
<tr>
<th>Year</th>
<th>Fleet Emissions</th>
<th>Facility Emissions</th>
<th>Metric Tons CO2e</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>5,000</td>
<td>11,000</td>
<td>16,000</td>
</tr>
<tr>
<td>2015</td>
<td>4,500</td>
<td>10,500</td>
<td>15,000</td>
</tr>
<tr>
<td>2016</td>
<td>4,000</td>
<td>10,000</td>
<td>14,000</td>
</tr>
<tr>
<td>2017</td>
<td>3,500</td>
<td>9,500</td>
<td>13,000</td>
</tr>
<tr>
<td>2018</td>
<td>3,000</td>
<td>9,000</td>
<td>12,000</td>
</tr>
</tbody>
</table>
Facility & Fleet Carbon Emissions
FY 2017 Trend vs. Goal

- No Reduction
- Carbon Reduction
- Reduction Goal

Metric Tons CO2e

- Fleet Emissions
- Facility Emissions

Year: 2014, 2015, 2016, 2017, 2018
Emissions Reduction Through Strategic Maintenance

Example Projects
Judicial Center LED’s – a maintenance project

**Project Details**
- Ongoing
- 120 kits installed to-date
- 90w replaced w/ 30w
- 15,000 KWh saved / yr
- $1,200 annual savings, 3 year payback

**Carbon Equivalencies**
- 10 metric tons reduced
- 2 vehicles avoided
- 270 tree seedlings planted (and grown for 10 years)
Roofing Projects – more maintenance completed

- Over **30,000 SF** replaced since FY15
- A cool roof is very light in color and provides a high level of reflection
- Can reduce roof temperature by 50 degrees*
- Can reduce electricity **10-15%***

* www.energystar.gov
Emissions Reduction to Date

- 2014: 2.8% Reduction
- 2015: 7.5% Reduction
- 2016: 10.3% Reduction From baseline

Carbon Reduction of 1,625 Metric Tons

Fleet Emissions

Facility Emissions

Metric Tons CO2e
Carbon Footprint Reduced!
Savings during 2014-2016:

<table>
<thead>
<tr>
<th>Fleet &amp; Facilities</th>
<th>Generator Offsets</th>
<th>Carbon Credits</th>
<th>Total Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,625</td>
<td>11,067</td>
<td>67,000</td>
<td>79,692 Metric Tons (CO2e)</td>
</tr>
</tbody>
</table>

Equivalent to:
- 16,883 passenger vehicles taken off road for one year
- OR 9.0 million gallons of gasoline not consumed
- OR 8,400 homes’ energy use for one year